उत्तराखण्ड शासन

URBAN MUNICIPAL SOLID WASTE MANAGEMENT ACTION PLAN FOR STATE OF UTTARAKHAND

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Urban Development Directorate
Dehradun

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Draft Final Revised Report

FOREWORD

ACKNOWLEDGEMENT

Vision Statement

The vision for Swachh Uttarakhand in line with the Swachh Bharat Mission is to ensure hygienic, clean and litter free environment across the state, where waste is treated as a resource, managed scientifically in an environmentally sustainable manner and zero Waste reaches landfills by 2040.

This vision can be accomplished by guiding all ULBs towards Sustainable Solid Waste Management as per SWM Rules 2016 by adopting suitable measures for waste minimisation at source with an emphasis on the principles of 5Rs, comprising Reduce, Reuse, Recycle, Recover and Rethink; with proper systems of segregation, collection, transportation, processing, treatment and disposal in complete harmony with the environment and in line with prevalent regulations.

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सचिव,
शहरी विकास विभाग,
उत्तराखण्ड शासन।

आपके पत्र संख्या–UUSDIP/SWM-14/1501, दिनांक 18 मार्च, 2015 के साथ उपलब्ध कराये गये राज्य नगरीय ठोस अपशिष्ट प्रबन्धन कार्ययोजना के प्रारूप पर इस विभाग की सहमति प्रदान की जाती है। कृपया तद्नुसार प्रकरण पर अग्रेत्तर कार्यवाही करने का कष्ट करें।

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(डॉ0 रणबीर सिंह)
प्रमुख सचिव

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Abbreviations

ADB	Asian Development Bank
BOT	Build Operate Transfer
BOOT	Build Own Operate Transfer
CPF	Community Participation Fund
CPHEEO	Central Public Health and Environmental Engineering Organization
CnT/ C&T	Collection and Transportation
CPCB	Central Pollution Control Board
CDM	Clean Development Mechanism
DEA	Department of Economic Affairs (India)
D-2-D	Door to Door Collection of Waste
DPR	Detailed Project Report
DSCR	Debt Service Coverage Ration
EOI	Expression of Interest
FIRR	Financial Internal Rate of Return
GoI	Government of India
GHS	Green House Gases
IEC	Information, Education Communication
IMTF	Inter Ministerial Task Force
JnNURM	Jawaharlal Nehru Urban Renewal Mission
LoI	Letter of Intent
MOF	Ministry of Finance
MOUD	Ministry of Urban Development (India)
MoEF	Ministry of Environment and Forest (India)
MNES	Ministry of Non-conventional Energy Sources (India)
MOA	Ministry of Agriculture (India)
MSWM	Municipal Solid Waste Management
RSLF	Regional Sanitary Landfill
RMCF	Regional Mechanized Composting Facility
SBM	Swachh Bharat Mission
SPCB	State Pollution Control Board
SPV	Special Purpose Vehicle
MTPD	Metric Ton Per Day
NGO	Non-Government Organization
NUSP	National Urban Sanitation Policy
PPP	Public Private Partnership
PnD/ P&D	Processing and Disposal
ULB	Urban Local Bodies
UUSDIP	Uttarakhand Urban Sector Development Investment Program
VGF	Viability Gap Funding

1 Executive Summary:

The State of Uttarakhand, also referred as "Dev Bhumi" was formed on 9th November 2000 as the 27th state of the India. Uttarakhand State has a combined rural and urban population over a crore, of which the urban population is around 30 percent. The state as a whole (urban and rural) is generating approximately 3000 metric tons of solid waste every day of which the waste generated by the urban areas is around 918 MTPD of MSW (Annual report CPCB, 2014-15).The total urban contribution increases two-fold, considering the large floating population that visits the state every year. Of the waste generated only 40-50% is collected and disposed, largely unscientifically.

After the commencement of the JnNURM in year 2005-06, a conscious effort from the State of Uttarakhand was initiated to scientifically manage its municipal solid waste. Dedicated solid waste management (SWM) projects were initiated in four towns of Uttarakhand i.e. Dehradun, Haridwar, Haldwani and Nainital and currently these projects are in various stage of completion.

The needs of integrated SWM plan for the other ULBs have been long felt by the Policy Planners of the State of Uttarakhand. The experience gained in setting up of the above four projects have also forced the Policy Planners to have a relook at the ways MSW is to be managed in the hilly state.

Government of India has launched an ambitious "Swatch Bharat Mission"(SBM) which undertakes to make India a clean country by 02nd October 2019 when the country shall be celebrating the 150th birth anniversary of Father of Nation – Shri. Mahatma Gandhi Ji. The main objective of SBM is to ensure personal and community hygiene focusing on the scientific management and disposal of municipal solid waste.

The National Green Tribunal (NGT), Principal Bench of Hon'ble Supreme Court of India, New Delhi has also been proactive in this regard and has passed direction to the State Government under the Petition No. 199 of 2014 Almitra H. Patel & Anr. Vs. Union of India & Others to come forward with complete time bound action plan.

The Tribunal has also suggested the State Government to study the project which had been upheld by the Tribunal in its judgement of Capt. Mall Singh & Ors. Vs. Punjab PCB & Ors. – Appeal No. 70 of 2012 dated 25/11/2014. Hon'ble NGT in OA No. 199 of 2014 (Almitra H. Patel Vs Union of India) on 5thFebruary, 2015 further directed that "the Central Pollution Control Board shall submit its independent comment in relation to formulation of a national policy with regard to collection and disposal of a municipal solid waste as a National Policy to be adopted. Let the CPCB also submit such proposal within two weeks from today and put it on their websites so that other State Board and State Government shall also have advantage of that report and take the same into consideration while submitting status reports/ suggestion in

accordance with this order."

The CPCB in compliance with the said direction came out with a suggestive/ indicative "Action Plan for Management of Municipal Solid Waste" the suggestions of the Hon'ble Tribunal and CPCB were duly incorporated in the said draft action plan of the State

The Ministry of Environmental and Forest, Government of India vide their Notification dated 8th April 2016 enacted "Solid Waste Management Rules, 2016" stipulating compliance criteria for segregation, collection, storage, transportation, processing and disposal of municipal wastes. In accordance with the SWM Rules, 2016, State Urban Development Department has to prepare a state action plan/strategy on solid waste management within a year of the Rule notification.

In light to above and in compliance with the aforesaid directions, the Urban Development Directorate, Government of Uttarakhand with active consultation with all stake holders i.e. SPCB, ULBs and Department of Environment and Forests had earlier prepared draft State Level Action Plan (2015) for the management, handling and disposal of municipal solid waste. The said draft action plan has been accordingly revised by UDD in accordance with the -Solid Waste Management Rules, 2016 in consultation with GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit).

This revised action plan, in line with the SWM Rules 2016, broadly identifies the gap between the current municipal waste generation and its scientific disposal and the key strategies to fill the existing gap by year 2021. The said draft plan is based on 30 year's projection, designed in phased manner to achieve the set plans in next 4 years i.e. 2017-21. It also focuses on the existing ongoing MSW projects, challenges and constraints before the Urban Local Bodies (ULB), provide solutions that are measurable, reliable, practicable and sustainable based on supportive studies and analysis undertaken by the State. This will help the ULBs to opt for the best suitable and proven technologies for ensuring segregation, collection, storage, transportation, processing and scientific disposal of its municipal wastes in accordance with the laid provisions under the SWM Rules, 2016. The draft action plan also highlights the estimated project cost, which the ULBs will require over the next 10years and suggests the ways and means to make these projects financially self-sustaining based on the principle of "Polluters to Pay".

Last but not least, no efforts to effective SWM Rules compliance can be successful without the active participation of the public themselves. The plan also envisages a component dedicated to the Capacity building of the ULBs and undertaking an extensive IEC campaigns to cultivate among the public a "Civic Sense".

Apart from the MSW there are other wastes like – hazardous, industrial and medical wastes whose scientific management are either inadequate or not as per the prescribed norms. As

Uttarakhand's municipal waste generation is estimated to rise to approximately 7500 metric tons per day by 2041 (both urban and floating population), resulting in an estimated 2.7 million tons of municipal waste being generated every year, solutions are therefore needed urgently.

To design strategy as per the SWM Rules 2016 for proper management of state's current SWM situation, following guiding principles of waste management have been considered:

1) Waste is a resource

2) Individuals must accept responsibility for and cost of their own waste

3) Resource recovery and recycling is a priority and the Integrated Solid Waste Management Hierarchy will be adhered to.

4) Segregation at source must be adopted

5) The informal sector plays a critical role in recycling

6) Public participation is essential

7) Residual waste must be properly handled, treated and disposed to minimize the load on landfill

8) The system must be run on incentivized, performance based principles and

9) All stakeholders have different responsibilities and each should be effectively integrated

10) Land is limited, thus should be utilized as minimum as possible

11) The waste generator has a critical role in the entire system and the ULBs are responsible for the management of waste.

12) The full cost recovery according to the "polluter pays principle" should be implemented with adequate measures for cross subsidising the poorer sections of society.

13) Extended Producers Responsibility used for incentivizing recycling.

The SWM action plan is designed to rapidly transform SWM sector functions, operations and implementing institutions. Under the plan, by 2021 the SWM system will provide a reliable, sustainable house to house municipal waste collection service to every waste generator in the state, achieve a recycling efficiency, ensure that all residual waste is transported and disposed of in an environmentally safe and socially responsible manner and in conjunction with other implementing stakeholders, make progress in initiating and improving the state's waste system.

The plan has been designed to deliver the results in three phases, as under;

Table 1-1Implementation Schedule

Phase	Implementation Time Period	Category	Total Projects	Total No of ULBs.
I	Upto – Dec. 2018	Pre-approved JnNURM and NGRBA funded project	7	21
II	Upto – Dec. 2019	Cluster & Priority ULBs under Integrated Approach	41	61
III	Upto – Dec. 2021	Other ULBs	10	10
	Total		**58**	**92**

As shown in Table 1-1, a total 58 projects have been planned under the three phases, which covers almost every ULBs of the State i.e. 92. The phases were planned according to category of town on priority list. The phase wise details along with its criteria of selection are highlighted in forthcoming chapter. The process approach at the disposal end is planned phased wise as shown in Table 1-2

Table 1-2Project Description

Phase	Approach	No. of	No. of ULBs
I	Integrated MSWM	4	4
	Cluster Based MSWM	3	19
II	Integrated MSWM	31	29
	Cluster Based MSWM	10	30
III	Integrated MSWM	10	10
	Total	**58**	**92**

It is presumed that if phase wise plan is executed in a proper manner, then by end of Phase – III i.e. year 2021 at least 90+ % compliance can be achieved. This will surely enhance the State's aesthetic and healthy surrounding looks.

The outcome of the above phased wise plan implementation would benefit the state in following manner. The waste quantity is subject to the inclusion of the rural or peri-urban areas in case the area of the city is enhanced.

Table 1-3Project Compliance Achievement

Phase	Total ULB's MSW (MTPD)	Total ULB's Population Catered (In Lacs.)	Projected Project Capex Cost (Cr.)	Compliance Achievement (%)	
				MSW Mgmt	Population Catered to
I	718.54	18.17	239.76	72.12%	70.54%
II	255.62	6.97	396.95	25.66%	27.06%
III	22.10	0.62	39.03	2.22%	2.41%
TOTAL	**996.26**	**25.76**	**675.74**	**100.00%**	**100.00%**

The proposed action plan includes the following components;

(1) Prioritizing of ULBs and formation of clusters to economise the project operation

(2) Development and implementation of waste management infrastructure, machineries, handling equipment and tools, extensive IEC programs in order to promote public awareness and support development of the private sector led waste recycling industries in the State.

(3) Installation of a new waste collection and transfer system to provide waste collection for every waste generator in the state and consisting of direct vehicle collection and manual community collection methods.

(4) Selection of suitable land, land transfer, Geo-technical survey, Environmental approvals, design, construction, contract procurement, operation and maintenance for SWM facilities of the state etc.

(5) Funding Plan and Capacity building of ULBs

The total proposed Capex for entire 3-phase is approx. ₹675.74 crores. The funding of O&M initially for a period of 5years is proposed under the NGRBA's (National Ganga River Basin Authority) "Namami Gange" Mission, so to make the whole approach acceptable and financially sustainable. To make the project financially viable, fund inflow too has been planned which does include – recovery of expenses under Polluters to Pay Principle as User fee, resource recovery by maximizing recycling and resale of the processed waste, providing subsidized services and through external funding to meet the gap etc.

Some of the funding are estimated from the Central Government under Swachh Bharat Mission, 13th finance commission and from Asian Development Bank financed projects.

2. Objectives:

(1) To ensure compliance with **Solid Waste Management Rules, 2016** notified in April 8, 2016

(2) To bridge the gap that exists between the current solid waste being generated, segregated, collected, transported, processed and scientifically disposed of by the year 2021

(3) To address the current needs, constraints and capacity limitations so to achieve "**100% scientific disposal of MSW by the year 2025**" goal

(4) To use a holistic integrated and cluster based approach to make the SWM sector self-sustainable and viable based on the **Principles of 5R's** i.e. Reduce, Recycle, Recover, Reuse and Restrict

(5) To promote the principles of **Polluter to Pay** and enhance collection of user fee

(6) To encourage the waste generators to **source segregate** waste, thus fulfilling their role set forth in the SWM Rules 2016.

(7) To **integrate informal sector** in the management of municipal solid waste.

(8) To **promote Extended Producers Responsibility** in promoting recycling .as emphasized in SWM Rules 2016.

(9) To modernize and mechanize the operation and maintenance of Civic and Public Health Facilities in all the ULBs of the State to provide better and healthy living environment for the citizens of the State

(10) To develop the strategy that provides a **'road map'** to completely transform State's SWM sector, transitioning it to an integrated, fully functioning and sustainable system which will serve the ULBs for coming decades

(11) To generate "**civic sense**" amongst the masses to uplift the city's sanitation and personal hygiene conditions and raise the hopes for a sustainable common future through extensive IEC programs

(12) To preserve precious lands by creating regional scientific landfills

(13) To provide extensive jobs and research and development opportunities in the MSWM sector

3 Introduction:

Solid Waste Management is one of the essential obligatory functions of the Urban Local Bodies in India. This service is falling too short of the desired level of efficiency and satisfaction resulting in problems of health, sanitation and environmental degradation. Most urban areas in the country are plagued by acute problems related to solid waste. Due to lack of serious efforts by town / city authorities, garbage and its management has become a tenacious problem and this notwithstanding the fact that the largest part of municipal expenditure is allotted to it.

Barring a few progressive municipal corporations in the country, most local bodies suffer, due to non-availability of adequate expertise and experience, thereby the solid waste is not properly handled resulting into creation of environmental pollution and health hazards. Therefore, a need to handle this problem in a concerted manner and adopt strategies to tackle all aspects of waste management scientifically involving private sector wherever necessary and possible is need of the hour.

In the year 2016, the Government of India enacted “Solid Waste Management Rules, 2016” stipulating compliance criteria for, segregation, collection, storage, transportation, processing and disposal of municipal wastes. The Ministry of Environmental and Forest, Government of India vide their Notification dated 8th April 2016 made it effective from the date of its publication in the Gazette of India. These rules are therefore applicable throughout the country. The Solid Waste Management Rules, 2016, were updated based on the Municipal Solid Wastes (Management and Handling) Rules, 2000.

Uttarakhand, a State located in the Northern part of India, often referred as “Dev Bhumi” was carved out of the Himalayas and adjoining North-Western districts of Uttar Pradesh on November 09, 2000, becoming the 27th State of India. During thesame period, Municipal Solid Waste (Management and Handling) Rules, 2000 was also notified. The State is also the first choice of tourists as perfect nature’s destination apart having religious importance. The floating population of the Stateis almost double the total population of the State in a year. Thus, effective management of waste and maintaining hygienic conditions for every city in the state is a big challenge before the State Government, with limited resources and land availability.

Though the Government of Uttarakhand is committed to improve the health, sanitation and hygiene conditions of the ULBs, certain challenges, especially with respect to land availability put the state in a difficult situation. Now since NGT has been constituted by Hon’ble Supreme Court of India, which is monitoring the progress of every States in India, thus SWM Rules, 2016compliance is on top priority for the State.

4 Current Status of Solid Waste Management:

With the launch of JnNURM project by Government of India, in year 2007, Uttarakhand too initiated its three-ambitious pilot solid waste management projects for city of Dehradun, Haridwar and Nainital under the said scheme. These projects were awarded in year 2008-09, having total projected cost of Rs.50.63 Crore and benefiting approx. 9.00Lac population(Table 4-1).

Table 4-1Approved Projects under JnNURM

ULB	Population	MSW Generation (MTPD)	Project Value (in Cr.)	ISWM Contract Awarded on PPP
Dehradun	583679	291.840	24.60	M/s SPML, New Delhi
Nainital	41377	20.689	09.31	M/s A2Z Group, Gurgaon
Haridwar	231139	218.056	16.72	M/s KRLIPL, Calcutta

However, the first two, PPP partners left the projects in between because of land unavailability and rise in operational expense, after delivering the services of door to door collection and waste transportation to the landfill for over 3 years. Subsequently the launch of the Swachh Bharat Mission (SBM) of the government of India in 2014 provided a thrust to these projects.

The current status of the above 3 project ULBs are as under:

Table 4-2Approved JnNURM Project's Current Status&SBM funding

S.No.	ULB Name and Project Cost	Updated Status as of 2017
1.	**Dehradun** Project initiated JnNURM :2008 Project Cost: Rs.24.60Cr; Released: Rs.16.09Cr; Utilized: Rs.09.66Cr; Available: Rs.6.43Cr; SBM Funding2017: The project has been merged with SBM and Rs.	• As processing facility could not be setup and the waste is simply being dumped at the pervious dump site. • DPR has been submitted to NGRBA for approval. • D2D collection is being done in all 60 wards by Nagar Nigam. • Tender has now been awarded to Ramky Enviro Engineers Ltd. for solid waste processing, composting and scientific landfill disposal system in built, operates and transfer mode. • Land at sheeshambara has been handed over to the PPP operator • Constructions of boundary wall, fencing, buffer zone and office for staff have been completed and project will be

	1.5 Cr. has been released under SBM for solid waste management.	fully functional byOctober 2017. • Project has been delayed to get environmental clearance and single bid came thrice.
2	**Haridwar** Project JnNURM :2009 Project Cost: Rs.16.72Cr; Released: Rs.7.02Cr; Utilized: Rs.06.16Cr; Available: Rs.0.86Cr; Project merged under SBM and Rs. 3 Cr. has been released under SBM for solid waste management	• Vehicles procured– waste compactors, dumper placers, auto tippers, tricycle and bins etc., • D2D collection is being done in all 16 wards by Nagar Nigam. • Boundary wall, Green belt and Staff room have completed. • Compost plant and Scientific land fill is under progress and will be completed till September, 2017. • Project delayed due to getting Environmental clearance from MoEF&CC.
3	**Nainital** JnNURM Project: 2010 Project Cost: Rs.9.31Cr; Released: Rs.2.33Cr; Utilized: Rs. 02.15Cr; Available: Rs.0.18Cr; No funding under SBM currently	• Vehicles procured– waste compactors, dumper placers, auto tippers, tricycle and bins etc., • D-2-D collection in 11wards was started but soon closed by the Private Partner. • Nagar Nigam itself is now managing the entire C&T operation, due to non-sustainability the contractor has served notice of termination. • EIA was issued, but the land dispute remains unresolved with the Forest Dept. • Waste continues to be dumped at old sites. • D2D collection is being carried out in 4 wards by the ULB • The waste will be transferred to Haldwani solid waste processing facility.

For the above three projects, the baseline information on the available assets with each local body shall be prepared for all the ULBs and in particular for the ULBs where new procurement under pre-approved JnNURM and other government schemes were made; appropriate asset inventory shall help to reduce future expenses.

Apart from the above, Government of Uttarakhand identified 47 ULBs in order to restructure its SWM system through SPA (Special Plan Assistance) which have 25ULBs in Hill region and 22ULBs in Plain region, but the project was later sanctioned for 26ULBs for Rs.1609.85Lacs, of which Rs.1000.53Lacs were released and expenditure of Rs.6.61Cr. were incurred by these 26ULBs. These 26 ULBs includes 07 in Kumaon and 19ULBs under Garhwal region. Details of the ULBs are given in the table below. Most of the ULBs have spent entire funds made available to them by procuring the vehicles, equipment and erecting civil infrastructure required in compliance with the SWM Rules, 2016.

Table 4-3Approved SPA Projects

FINANCIAL ASSISTANCE PROVIDED UNDER SPA	
Garhwal Region (19)	**Kumaon Region (7)**
Vikasnagar, Mussoorie, Doiwala,Swargashram, Kotdwara, Srinagar, Muni-Ki-Reti, Chamba, Narendra Nagar,Uttarkashi, Gauchar, Nandprayag, Karanprayag, Chamoli-Gopeshwar, Dwarhat, Didihat, Landhora, Jhabrera, Laksar	Shaktigarh, Mahuakheragang, Mahuadhabra, Kelakhera,Khatima, Ram Nagar, Bhawali

Rest of the ULBs have been managing the municipal waste from the funds available to them under 13th finance commission and ULB's own resources. Many ULBs have created little infrastructure for their MSW management, which are inadequate and also does not comply with the laid provisions under the act.

Thus, a plan was required to implement good practices and create a sustainable model for management of municipal solid waste. To achieve State's Objectives laid for preparation of this Action Plan, essential components based on past, present and future analysis are required as under;

(a) Estimate Future Population and Waste Generation Quantities

(b) Waste assessment and audit

(c) Geographical Conditions, Land Status and Availability

(d) Resource Availability and Limitation with ULBs

(e) Identifying the regulatory entities within the planning area

(f) Waste handling and disposal technologies options, availability and necessity

4.1 Estimate Future Population and Waste Generation Quantities:

The town wise current and projected population and waste generation details areas follows

Table 4-4ULBs Existing and Projected Population/ MSW Status

SR	NAME OF THE ULB	ULB Status	Population		MSW Status (MTPD)	
			2011	2041	2017 (@300gcpd)	2041 (@400gcpd)
1	Gauchar	NP	7955	14631	2.39	5.85
2	Nandprayag	NP	1641	3200	0.49	1.28
3	Karanprayag	NP	8283	14268	2.48	5.71
4	Chamoli-Gopeshwar	NPP	21447	42879	6.43	17.15
5	Joshimath	NPP	16709	29997	5.01	12.00
6	Badrinath	NP	2307	8405	0.87	4.62
7	Pokhari (New)	NP	6119	8854	1.84	3.54
8	Gairsain (New)	NP	8665	11265	2.60	4.51
9	Dehradun	NN	583679	1168101	218.88	642.46
10	Vikasnagar	NPP	13927	20840	4.18	8.34
11	Mussoorie	NPP	28897	38396	10.84	21.12
12	Harbartpur	NP	9771	13966	2.93	5.59
13	Rishikesh	NPP	70499	149542	26.44	82.25
14	Doiwala	NP	8705	11317	2.61	4.53
15	Shivalik Nagar (New)	NPP	17307	22499	5.19	9.00
16	Haridwar	NN	231139	423618	86.68	232.99
17	Roorkee	NN	118188	185676	35.46	74.27

SR	NAME OF THE ULB	ULB Status	Population		MSW Status (MTPD)	
			2011	2041	2017 (@300gcpd)	2041 (@400gcpd)
18	Manglaur	NPP	52994	68892	15.90	27.56
19	Jhabrera	NP	11186	14542	3.36	5.82
20	Laksar	NP	21760	28288	6.53	11.32
21	Landhore	NP	18370	23881	5.51	9.55
22	Bhagwanpur (New)	NP	17304	22495	5.19	9.00
23	Pauri	NPP	25440	40925	7.63	16.37
24	Kotdwara	NPP	33031	45527	9.91	18.21
25	Srinagar	NPP	20091	26118	6.03	10.45
26	Satpulli (New)	NP	4226	5494	1.27	2.20
27	Dogadda	NPP	2423	3150	0.73	1.26
28	Swargasharam Jauk (N)	NP	4669	6070	1.40	2.43
29	Rudraprayag	NPP	9313	15000	2.79	6.00
30	Sri Kedarnath	NP	612	1720	0.23	0.95
31	Ukhimath (New)	NP	2920	3796	0.88	1.52
32	Augustmuni (New)	NP	7367	9577	2.21	3.83
33	Muni-ki-Reti	NPP	28636	43000	8.59	17.20
34	Narendra Nagar	NPP	6034	8608	1.81	3.44
35	Chamba	NP	7771	10102	2.33	4.04
36	New Tehri	NPP	24012	31216	7.20	12.49
37	Ghansali (New)	NP	7775	10108	2.33	4.04
38	Kirti Nagar	NP	1517	1972	0.46	0.79
39	Dev Prayag	NP	2868	3442	0.86	1.38
40	Barkot	NP	6720	8736	2.02	3.49
41	Gangotri	NP	1100	3168	0.33	1.27

SR	NAME OF THE ULB	ULB Status	Population		MSW Status (MTPD)	
			2011	2041	2017 (@300gcpd)	2041 (@400gcpd)
42	Chinyalisaur (New)	NP	8844	11497	2.65	4.60
43	Uttarkashi	NPP	17480	22724	5.24	9.09
44	Nauvgaon (New)	NP	3875	5038	1.16	2.02
45	Purola (New)	NP	5306	6898	1.59	2.76
46	Dwarahat	NP	2749	3574	0.82	1.43
47	Almora	NPP	34125	47178	10.24	18.87
48	Chaukutiya (New)	NP	4796	6235	1.44	2.49
49	Bageshwar	NPP	9079	11803	2.72	4.72
50	Kap Koth (New)	NP	5365	6975	1.61	2.79
51	Champawat	NPP	11029	24878	3.31	9.95
52	Lohaghat	NP	7926	10304	2.38	4.12
53	Tanakpur	NPP	17622	22909	5.29	9.16
54	Banbasa (New)	NP	7990	10387	2.40	4.15
55	Nainital	NPP	41377	45712	15.52	25.14
56	Haldwani	NN	171351	222756	64.26	122.52
57	Lalkuan	NP	7644	9937	2.29	3.97
58	Bhimtal	NP	7722	10039	2.32	4.02
59	Ramnagar	NPP	54787	102615	16.44	41.05
60	Bhowali	NPP	6308	8200	1.89	3.28
61	Kaladhungi	NP	7611	9894	2.28	3.96
62	Didihat	NP	6522	8479	1.96	3.39
63	Pithoragarh	NPP	56044	133036	16.81	53.21
64	Dharuchula	NPP	7039	9151	2.11	3.66
65	Beri Naag (New)	NP	7641	9933	2.29	3.97

SR	NAME OF THE ULB	ULB Status	Population		MSW Status (MTPD)	
			2011	2041	2017 (@300gcpd)	2041 (@400gcpd)
66	Gangolihaat (New)	NP	7112	9246	2.13	3.70
67	Munsiyari (New)	NP	3620	4706	1.09	1.88
68	Kiccha	NPP	41810	108885	12.54	43.55
69	Rudrapur	NN	154514	404705	46.35	161.88
70	Kashipur	NN	121610	233060	36.48	93.22
71	Jaspur	NPP	50520	87820	15.16	35.13
72	Mahuadhabra	NP	7326	9524	2.20	3.81
73	Bazpur	NPP	25513	33167	7.65	13.27
74	Khatima	NPP	15087	25139	4.53	10.06
75	Shaktigarh	NP	6309	7239	1.89	2.90
76	Mahuakheragang	NP	12584	28022	3.78	11.21
77	Kelakhera	NP	10929	13149	3.28	5.26
78	Sitarganj	NPP	19978	28455	5.99	11.38
79	Dineshpur	NP	11342	23663	3.40	9.47
80	Sultanpur Patti	NP	9848	11753	2.95	4.70
81	Gadarpur	NPP	19289	25076	5.79	10.03
82	Pipalkoti*	NP	3521	4577	1.06	1.83
83	Tharali*	NP	4482	5827	1.34	2.33
84	Piran Kaliyar*	NP	19201	22333	5.76	9.98
85	Gaja*	NP	1800	24961	0.54	0.94
86	Lamb Gaon*	NP	2330	2340	0.70	1.21
87	Nanakmatta*	NP	8478	3029	2.54	4.41
88	Gularbhoj*	NP	4829	11021	1.45	2.51
89	Ranikhet Chiniyanoula*	NP	5100	6278	1.53	2.65

SR	NAME OF THE ULB	ULB Status	Population		MSW Status (MTPD)	
			2011	2041	2017 (@300gcpd)	2041 (@400gcpd)
90	Bhikiyasain*	NP	4570	6630	1.37	2.38
91	Selaqui*	NP	16880	5941	5.06	8.78
92	Chamiyala*	NP	5306	6898	1.59	2.76
	Urban Agglomerations (UA) Consolidated minus ULBs		459968	597958	137.99	239.18
	Total		**3049338**	**5107549**	**995.98**	**2354.52**

Note:

1. * New ULBs added in 2017
2. Figures for MSW generation calculated on average of 300gcpd (2011), 400gcpd (2041)
3. Figures for MSW generation for cities of Dehradun, Haridwar, Rishikesh, Haldwani, Mussorie, Nainital, Badrinath and Sri Kedarnath calculated based on 375 gcpd (2011) and 550 gpcd (2041) to include floating population.
4. Floating population for all towns not considered as individual city figures not available.

Table 4-4 includes population and waste generation estimations only for Urban Local Bodies and does not include areas under peri-urban and rural area. The peri urban areas surrounding theULBs clusters as well as the villages en-route to the should be included for estimation of waste generation and during further appraising the efforts to set-up the new infrastructure on the state level.

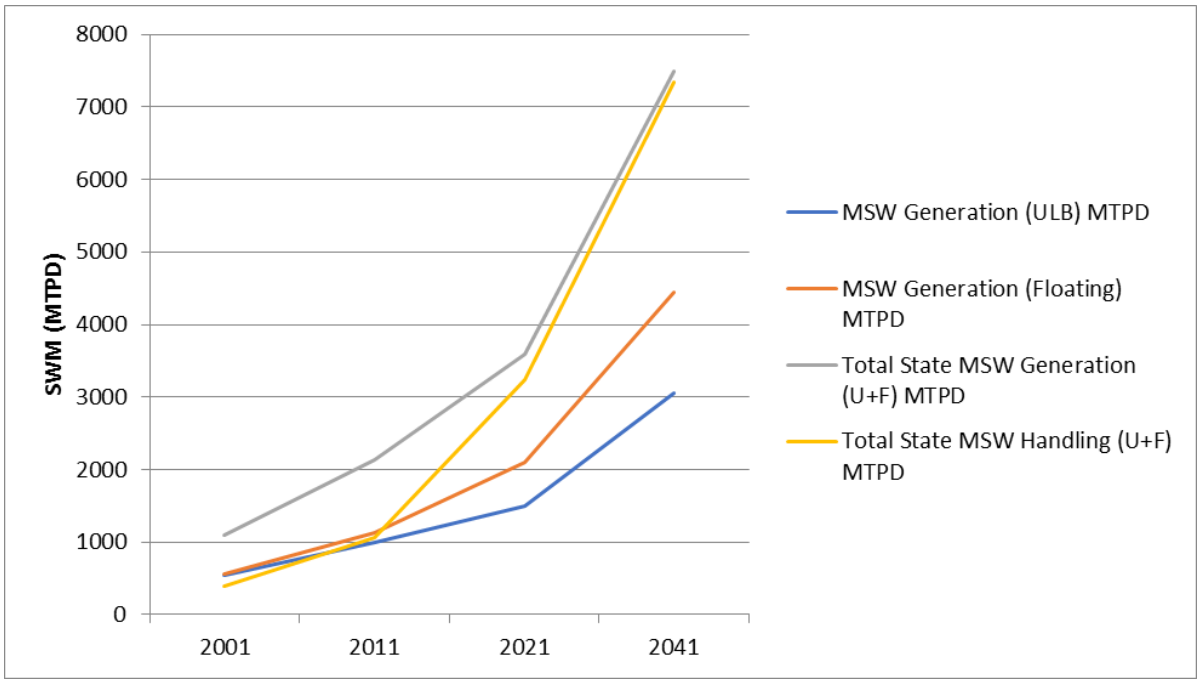
All Urban Local Bodies should undertake proper baseline data collection while planning the projects. A real-time assessment of the quantity of waste generation within the ULBs jurisdiction as well as a characterization of their waste, would enable the ULBs to design a proper waste management system for their city which fulfils each ULBs specific needs. Waste volumes should also consider seasonal variations and should be temporal in nature.
There will also be an increase in the number of ULBs in the state, so the projected urban population for table 4-4 and 4-5 differ, as table 4-5 calculates increase in urban population based on the current growth trend. The total population considering the urban (ULB and urban agglomerations) and rural areas is highlighted in Table 4-5

Table 4-5Gap Analysis (Facts based) Existing and Future

S.N.	Particulars	Year	2001	2011	2021	2041
1	Population (Urban) (ULB+UA)	Nos	2179074	3049338	4900648	7635452
2	Population (Rural)	Nos	6310275	7036954	7740649	9288778
3	Total Population (Urban & Rural) (1+2)	Nos	8489349	10086292	12002687	16924231
4	Population (Floating)	Nos	11135580	15129438	21004703	29617404
5	MSW Generation (Urban)	MTPD	545	996	1492	3054
6	MSW Generation (Floating)	MTPD	557	1135	2100	4443
7	Waste Generation (Rural)	MTPD	631	880	1065	1461
8	Per capita generation rate(U)	Kg/cpd	250	300	350	400
9	Per capita generation rate (F)	Kg/cpd	50	75	100	150
10	Per capita generation rate (R)	Kg/cpd	100	125	150	200
11	Per capita generation rate (U+F+R) (8+9+10)	Kg/cpd	400	500	600	750
12	**Total State MSW Generation (Urban & Floating) (5+6)**	MTPD	1102	2131	3592	7497
13	**Total State Waste Generation (U+R+F) (5+6+7)**	MTPD	1733	3010	4881	9355
14	**Total MSW Handling Gap for (U+F) ((5+6)-16)**	MTPD	716	1065	359	150
15	**Total Waste Handling Gap for state (U+R+F) ((5+6+7)-16)**	MTPD	606	1505	475	187
16	**Handling (Gap)**	%	35%	50%	10%	2%
17	**Available/ Required Land**	Acre	**234.5**		**400**	
18	**Land availability gap**	Acre			**165.5**	

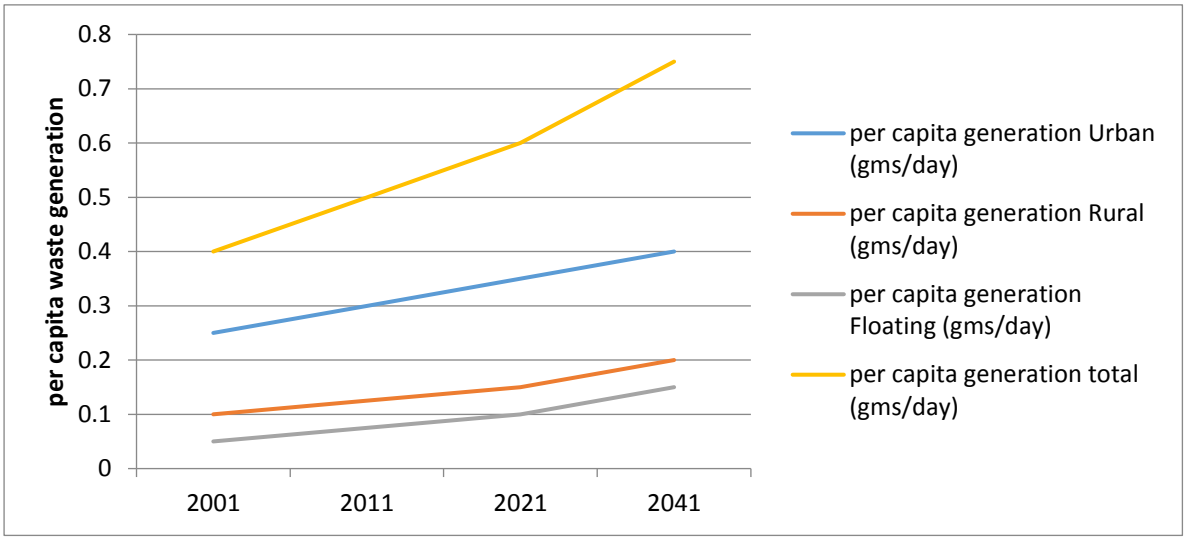
Source: Census 2001, 2011; UDD, 2017; estimations ADB&GIZ

Figure 4-1State Solid Waste Generation Trend



Head	Value	Years			
		2001	2011	2021	2041
MSW Generation (ULB)	MTPD	545	996	1492	3054
MSW Generation (Floating)	MTPD	557	1135	2100	4443
Total State MSW Generation (U+F)	MTPD	1102	2131	3592	7497
Total State Waste Handling (U+F)	MTPD	386	1065	3233	7347
Total MSW Handling Gap for (U+F)	MTPD	716	1065	359	150

Figure 4-2 Per capita waste generation rate



	2001	2011	2021	2041
per capita generation Urban (gms/day)	0.25	0.3	0.35	0.4
per capita generation Rural (gms/day)	0.1	0.125	0.15	0.2
per capita generation Floating (gms/day)	0.05	0.075	0.1	0.15
per capita generation total (U+R+F) (gms/day)	0.4	0.5	0.6	0.75

Based on the above facts and graphical representation, it is well understood that land availability gap is huge and can be filled only with effective planning. After year 2025, due to continuous urbanization, waste generation will increase tremendously owing to increase in ULBs population due to expansion and increase in per capita waste generation.
To keep an accurate estimate on waste generation, each ULB in state should periodically check and measure the waste volume to establish the baseline for waste generation and also include the general and seasonal variations in the planning process.

Uttarakhand has 3 SEZs which may generate commercial and MSW like commercial waste. If the amount of the waste generated within the Special Economic Zones (SEZ) is beyond a certain threshold (e.g. 5 %) that waste volume shall be included in both the current and the future waste volumes to be taken into account for either a ULB or a cluster. Each SEZ shall assign 5 % of its plot areas for waste management handling purposes as per SWM Rules, 2016.

4.2 Waste Assessment and Audit:

Two of the below ADB funded studies were conducted during year 2010-13 by Uttarakhand Urban State Development Investment Program:

1) Quantification and Characterization Study of Municipal Solid Wastes in 28 Program ULBs of UUSDIP

2) Behaviour in Handling and Disposal of Solid Waste Management in 31 ULBs under UUSDIP

For the above program, ULBs identified were 51% from Garhwal and 49% from Kumaon region. The objective was to ascertain the chemical properties, quantification and characterization of the municipal solid waste generated from the State on daily basis and to help in decision making process for the proposed Municipal Solid Waste Management system.
This also brings to focus the necessity of synergy in the design, construction and maintenance of the SWM infrastructure, tools and machineries etc.

4.2.1 Quantification and Chemical Characterization Study of Municipal Solid Wastes in 28 Program ULBs of UUSDIP

The outcome of the study is as follows;

Table 4-6Physical Characterization of the MSW

Physical Characterisation of MSW (%)	
Organic Waste	44.76
Fuel Potential	12.83
Recyclables	24.43
Inert	17.98
Total	100.00

Figure 4-3Physical Characterization of the MSW

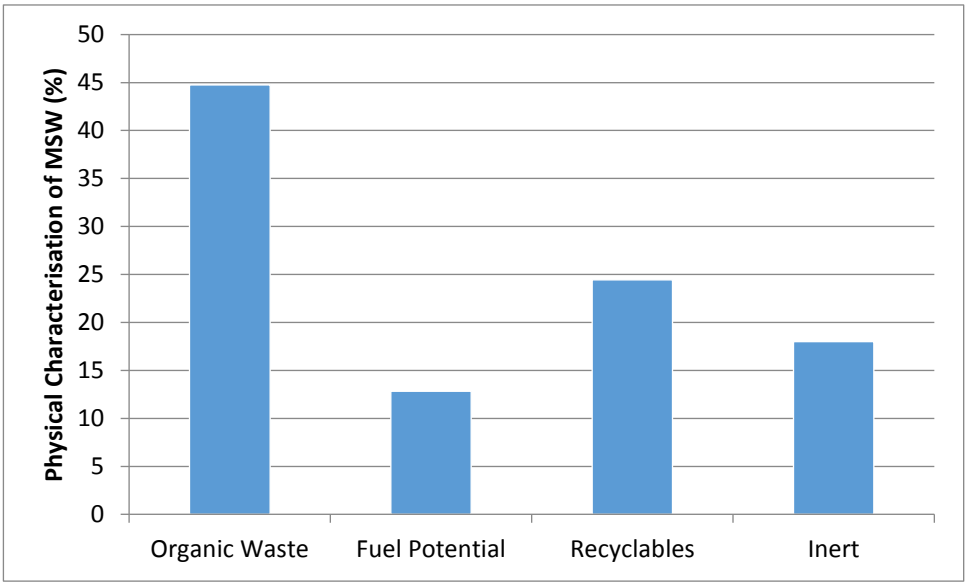
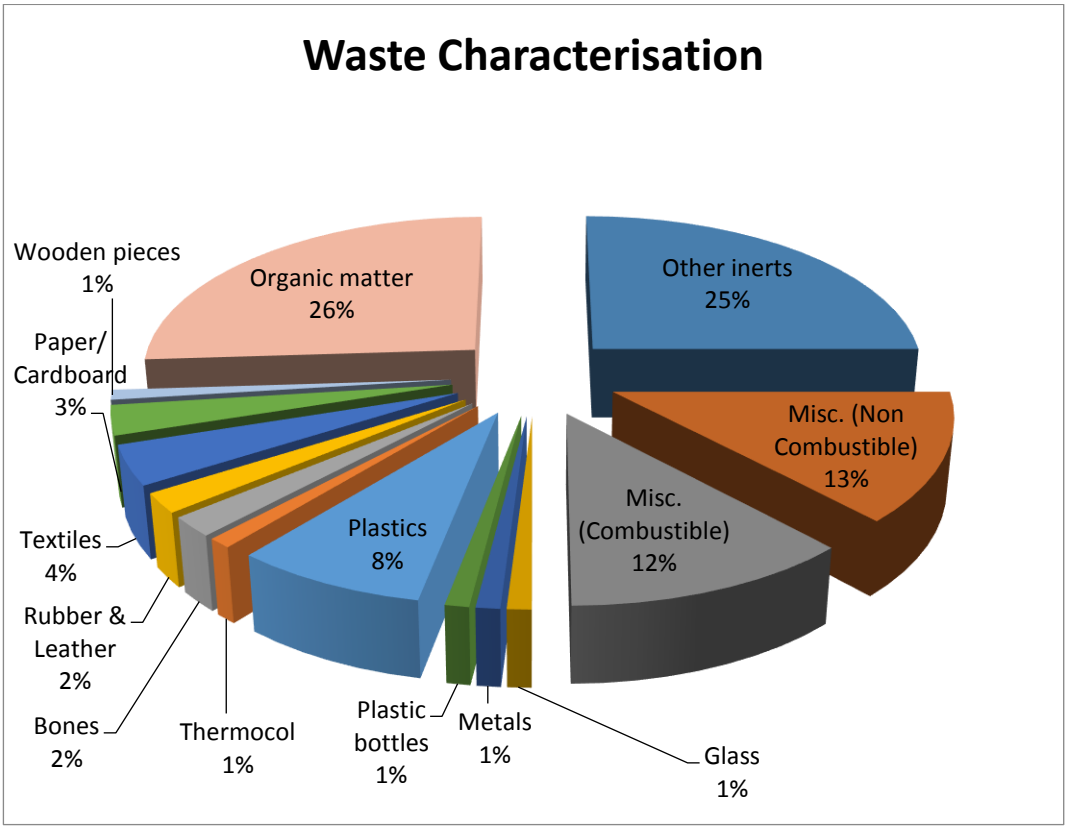


Figure 4-4 Waste Characterisation in percentage



To ascertain the chemical properties of the municipal solid wastes, various chemical tests were performed on following parameters

Table 4-7Chemical Characteristics of MSW

Sl. No.	Chemical Test Parameters	Code/ Guideline Method/ Protocol - Followed
1	pH	IS:3025
2	TVS	IS: 10158-1982/ Gravimetric Method
3	TS	IS: 10158-1982/ Gravimetric Method
4	Moisture Content	IS: 9235-1979
5	Organic Carbon	IS: 228 (Part-1) or using C-H-N-S analyzer
6	Nitrogen	Kjeldhal or using C-H-N-S analyzer
7	Potassium	
8	C/N Ratio	IS: 10158-1982 or using C-H-N-S analyzer
9	Phosphorus	IS: 228 (Part-3)
11	Sulphur	IS: 228 (Part-9)
11	Chloride	Titrimetric/ EPA method 9253
12	Calorific Value (a) Kitchen Waste (b) Mixed Waste (c) Fuel/ Combustible Matter	Bomb Calorimeter (kcal/ Kg)
13	Biochemical Oxygen Demand	IS: 3025 (P-44)- 1993; for 3days at 27Deg. Cel., (mg/ Kg)
14	**Heavy metals** {Arsenic (As), Selenium (Se), Zinc (Zn), Iron (Fe), Magnesium (Mg), Nickel (Ni), Cadmium (Cd), Copper (Cu), Mercury (Hg), Lead (Pb), Chromium (Cr)}	Atomic Absorption Spectrophotometer (mg/kg)

Table 4-8Chemical Properties of MSW

	CHEMICAL PROPERTIES	Results of Different Sample					
Sr.	Chemical Test Parameters	1	2	3	4	5	Average
1	pH	5.9	6.5	7.2	7.1	5.7	6.48
2	TVS	20.20%	17	18.3	15.96	19.5	14.1924
3	TS	79.80%	83	81.7	84.04	80.5	66.0076
4	Moisture Content	28.30%	26.2	25	27.6	30	21.8166
5	Organic Carbon	13.50%	10.6	16.5	14.7	10.3	10.447
6	Organic Matter	67.40%	59.5	61.2	53.2	65.2	47.9548
7	Nitrogen	0.87%	0.65	0.72	0.63	0.54	0.50974
8	Potassium	0.65%	0.71	0.63	0.57	0.7	0.5233
9	C/N Ratio	15.50%	16.82	22.9	23.3	19	16.435
10	Phosphorus	0.48%	0.56	0.4	0.5	0.65	0.42296
11	Sulphur	0.22%	0.32	0.32	0.26	0.24	0.22844
12	Chloride	0.29%	0.27	0.26	0.3	0.28	0.22258
13	Calorific Value						
(a)	Kitchen Waste	2876	2856	3067	2438	2360	2773.4

(b)	Mixed waste	1210	1190	1130	1377	1256	1232.6
(c)	Fuel/ Combustible Matter	3144	3368	3288	3068	3187	3211
14	BOD (mg/kg)	122331	97680	109058	87780	127390	108847.8
15	Heavy Metal (mg/kg)						
	Arsenic (As)	Not detected					
	Selenium (Se)	Not detected					
	Zinc (Zn)	23.6	26.1	26.9	44.8	71.2	38.52
	Iron (Fe)	1967	1828	2557	1870	2530	2150.4
	Magnesium (Mg)	2452	3485	2840	3252	3762	3158.2
	Nickel (Ni)	0.98	1.6	1.7	3.2	4.4	2.376
	Cadmium (Cd)	Not detected					
	Copper (Cu)	2.8	2.1	3.6	1.9	2.9	2.66
	Mercury (Hg)	Not detected					
	Lead (Pb)	1.4	1.1	1	0.71	0.98	1.038
	Chromium (Cr)	Not detected					

Table 4-9 Proximate Analysis of MSW

	PROXIMATE ANALYSIS	Mixed	Organic	Fuel & Recyclable	Average
1	Moisture Content % by mass	30	58.3	22.5	36.93
2	Total Volatile Substance % by mass	17.2	60.2	64.1	47.17
3	Ash Content % by mass	75.7	27.5	20.2	41.13
4	Fixed Carbon % by mass	7.1	12.3	15.7	11.70

4.2.2 Behaviour in Handling and Disposal of Solid Waste Management in 31 ULBs under UUSDIP

The study was done in order to understand the status of disposal of municipal solid waste, segregation of garbage, pattern of waste disposal, special category of waste disposal, status of toilet and other sanitation system, frequency of road and drain cleaning, availability of resources for handling and management of the waste, complaints redressal mechanism, level of satisfaction amongst the stake holders, community view on current practices, need and their willingness to pay the user fee to avail their choice of services and their understanding over the penal clauses against littering and non-cooperation towards effective waste management etc.

The key findings from the project are presented as under;

(1) Waste Segregation: As per the existing practices only dry recyclables like – newspaper, glass bottles, plastic bottles and metal scrap are separated out from the waste stream at generation level; approximately 30-40% of the waste generators segregate high value dry recyclables and sell it to the scrap dealer or Kabariwala for monetary benefits. Other than the separation of high value dry recyclables from generator, segregation at source does not happen. It is also witnessed that the different type of wastes viz. biomedical, hazardous, industrial and e-waste including construction debris are mixed with municipal wastes and dumped at the same site.

(2) Waste as a Resource: Awareness about converting waste to resource is very less amongst the generator, thus efforts to segregate the waste at source is not made. Efforts in this direction if made will yield significant results.

(3) Waste Disposal: No efforts are made to recover the resources from the waste. In 16 ULBs, although compactor system for the recyclable waste is installed, it is hardly utilized. No compost is produced from the organic waste though at many

places NADEP pits are been made. It shows either the ULBs staffs are not properly trained and motivated or there is lack of staff to operate and maintain the system. Rest ULBs are adopting the old practice of waste collection, handling and disposal at unidentified and unscientific dumpsites. Such practices could be termed as illegal waste management practices and need immediate attention, before it becomes hazardous for the surrounding flora and fauna.

(4) Waste Collection: Door to door waste collection service is provided only at a few places, with the help of NGOs. Whereas, in most of the places the waste is routed directly to community bins or dumped in adjoining empty lands or nalas (drains). The collection and storage system within the ULBs are also found inadequate to receive and store the waste in a proper manner. It is witnessed that either the receptacles are very old (discarded one), small sized or placed at very far place, that travelling to that point will be too much time consuming. The dhalos (waste receptacles) for waste collection in most of the cases provide free access to birds, flies and animals, since they are broken or do not have the provision for a gate.

(5) Complaint redressal: ULBs lack proper administrative and infrastructure setup to address the complaints lodged by the public regarding the waste disposal. Because of this no proper records are maintained and followed.

(6) Satisfaction Level: The unhygienic and un-aesthetic surroundings with deteriorating health and environmental conditions have put the public satisfaction level to a minimum. The poor waste management infrastructure and administrative setup of ULBs too has worsened the situation further.

(7) User fee, willingness to pay and make attitudinal change: The good part of the above situations is that people who are looking for a change are willing to provide a monetary contribution to the ULBs in form of user fee, provided the ULB approaches the society/ community and provides them with improved and reliable waste management solutions. As the existing situation not only affects the image and economics of the ULB but also the tourists flooding in from all over the world. The old mindset that waste is only the responsibility of the ULB has also now slowly started to change. But still many people are not accepting it as their own responsibility to safely store and get it disposed through legalized means. The IEC activities will surely help in bringing vast attitudinal change towards waste management.

Some of the ULBs have enacted byelaws for collection of user charges in the state. Following table provides the status of ULBs on Bye laws for user charges.

Table 4-10 Existing Status of ULBs on bye-laws for user charges

Sr. No.	Name of ULB	Status of Bye-laws for User charges		
		Already has bye-laws	In process / Sanctioned by Board	Doesn't have bye-laws
1	Gauchar	Yes		
2	Nandprayag		In Process	
3	Karanprayag	Yes		
4	Chamoli-Gopeshwar		In Process	
5	Joshimath		Sanctioned by Board	
6	Badrinath			No
7	Pokhari (New)	Yes		
8	Gairsain (New)	Yes		
9	Pipalkoti			No
10	Tharali			No
11	Dehradun	Yes		
12	Vikasnagar	Yes		
13	Mussoorie			No
14	Harbartpur	Yes		
15	Rishikesh		In Process	
16	Doiwala			No
17	Shivalik Nagar (New)			No
18	Selakui			No
19	Haridwar	Yes		
20	Roorkee (ADB)			No
21	Manglaur (ADB)			No
22	Jhabrera			No
23	Laksar	Yes		
24	Landhore			No
25	Bhagwanpur (New)		In Process	

Sr. No.	Name of ULB	Status of Bye-laws for User charges		
		Already has bye-laws	In process / Sanctioned by Board	Doesn't have bye-laws
26	Piran Kaliyar (New)		In Process	
27	Pauri		In Process	
28	Kotdwara	Yes		
29	Srinagar	Yes		
30	Satpulli (New)			No
31	Dogadda		In Process	
32	Swargasharam Jauk (New)			No
33	Rudraprayag	Yes		
34	Sri Kedarnath			No
35	Ukhimath (New)			No
36	Augustmuni (New)	Yes		
37	Munni-ki-Reti	Yes		
38	Narendra Nagar	Yes		
39	Chamba	Yes		
40	New Tehri	Yes		
41	Ghansali (New)			No
42	Gaja (New)			No
43	Lamb Gaon			No
44	Kirti Nagar			No
45	Dev Prayag	Yes		
46	Barkot			No
47	Gangotri			No
48	Chinyalisaur (New)			No
49	Uttarkashi			No
50	Nauvgaon (New)			No
51	Purola (New)			No
52	Dwarhat			No
53	Almora		In Process	
54	Chaukutiya (New)			No
55	Bageshwar			No

Sr. No.	Name of ULB	Status of Bye-laws for User charges		
		Already has bye-laws	In process / Sanctioned by Board	Doesn't have bye-laws
56	Kap Koth (New)		In Process	
57	Champawat			No
58	Lohaghat			
59	Tanakpur			No
60	Banbasa (New)			No
61	Nainital	Yes		
62	Haldwani	Yes		
63	Lalkuan	Yes		
64	Bhimtal	Yes		
65	Ramnagar (ADB)	Yes		
66	Bhowali			No
67	Kaladhungi			No
68	Didihat			No
69	Pithoragarh		In Process	
70	Dharuchula	Yes		
71	Beri Naag (New)			No
72	Gangolihaat (New)			No
73	Munsiyari (New)			No
74	Kiccha (ADB)	Yes		
75	Rudrapur	Yes		
76	Kashipur	Yes		
77	Jaspur			No
78	Mahuadhabra			No
79	Bazpur			No
80	Khatima			No
81	Shaktigarh			No
82	Mahuakheragang	Yes		
83	Kelakhera		In Process	
84	Sitarganj			No
85	Dineshpur			No
86	Sultanpur Patti			No

Sr. No.	Name of ULB	Status of Bye-laws for User charges		
		Already has bye-laws	In process / Sanctioned by Board	Doesn't have bye-laws
87	Gadarpur			No
88	Nankamatta			
89	Gularbhoj			
90	Ranikhet Chiniyanoula (New)			No
91	Bhikiyasain (New)			No
92	Bindukhatta			No
Total No. of ULBs		27	8	57

Source: UDD, 2017 the above figures has been changed (will provide new list)

4.3 Geographical Conditions, Land Availability Status in ULBs:

A summarized status of State is laid as under;

- **Total area of State**: 53,484 Km^2
- **State's Total Population** as per census (2011) – Approx. 1.086Cr.
- **Total 92 ULBs Population**, as per 2011 census - 30.49Lacs
- **Total Population**- Urban =30.3% ; Rural = 69.7%
- **Total forest area** – Approx. 34,651 Km2 (64%)
- **Total Revenue Land** – Approx. 6.33Lac Hec. (11.1%)
- **Total Agricultural Land** – Approx. 13.37Lac Hec. (23.6%)
- **Urban Development & Infrastructure** – Approx. 2.17Lac Hec. (3.8%)
- **Floating Population** – 200 to 300Lac / Year (As per MoT, 2010)
- **Total No. of ULBs** (including 11 newly formed): 92

  Breakup: Nagar Nigams: 6

  Nagar Palika Parishad: 43Nagar Panchayat:43
- Total No. of ULBs in hilly region: 50(54%)
- Total floating population (2001): 11 million
- Population Density: 189 persons/ km^2

The State has approximately 93% area with hilly terrain and approximately 65% area under forest; only 35% of the state area is urban land for planning and development of infrastructure and industries.Thus, to identify a suitable land for MSW management in compliance with the said rules becomes the toughest task for the Urban Local Bodies. Also the land, if any identified, are either inadequate or not complying with the norms, since most of the lands are situated at the bank of a stream, river or its tributaries.
The 13 District Magistrate have been informed about the requirement of the land in their concerned ULBs and have thus been directed to identify and help the ULB to get one suitable land either of forest or revenue, if not available with the concerned local body. Till date two D.O. Letters from Principal Secretary, Urban have been issued to all the District Magistrate and many of them have even complied with the directions.

Though many of the ULBs have complied with the directions of DO Letters, but the land identified by them, is either Forest or Revenue, thus is pending to get transferred on their name.

A meeting chaired by Principal Secretary, Forest and Environment, Government of Uttarakhand on dated 05/11/2014 and second on 11/01/2015 had directed ULBs to coordinate with Forest Department and SPCB authorities to expedite the process of site identification and allocation. In another meeting chaired by Secretary, Urban Development, GoU with various ULBs on dated 17/01/2015, strict instructions were passed to identify the suitable sites at the earliest and report to the Directorate for further needful action. It is believed that in few months' time ULBs may get some lands for undertaking the proposed activities. The required land includes the land required for SLF and setting up Compost facility. However, as of 2017, 32 ULBs are yet to identify suitable site for setting a compliance landfill and processing facility for the MSW. This also includes the newly identified ULBs.

The land status of all the ULBs in compliance to the aforesaid directions is detailed as under in Table 4-11

Table 4-11Status of Land identified for MSW Project Implementation

Sr. No.	Name of ULB	Land Required (In Acre)	Land Status (In Acre)				Remark
			Identified	Location / Ownership	Proposed	Location / Ownership / Proposed to Department	
1	Gauchar	2	0.93	Nagar Palika Parishad	0.00		
2	Nandprayag	2	0.01	Revenue Department	0.00		
3	Karanprayag	2	0.19	Revenue Department	0.00		
4	Chamoli-Gopeshwar	4	0.15	Nagar Palika Parishad	0.94	Revenue Department	
5	Joshimath	4	0.50		0.00		
6	Badrinath	2	0.20	Nagar Panchayat	0.00		
7	Pokhari (New)	2	0.00		0.49	Revenue Department	
8	Gairsain (New)	2	0.07	Van Panchayat	0.00		
9	Pipalkoti	2	0.00		0.00		Yet to Identify
10	Tharali	2	0.00		0.00		Yet to Identify
11	Dehradun	76	19.76	Nagar Nigam	0.00		
12	Vikasnagar	2	2.47	Nagar Palika Parishad	0.00		
13	Mussoorie	4	0.02	Nagar Palika Parishad	0.00		
14	Harbartpur	2	0.00		2.37	Forest Department	
15	Rishikesh	10	10.00	Nagar Palika Parishad	0.00		

Sr. No.	Name of ULB	Land Required (In Acre)	Land Status (In Acre)				Remark
			Identified	Location / Ownership	Proposed	Location / Ownership / Proposed to Department	
16	Doiwala	2	0.95	Nagar Palika	0.00		
17	Shivalik Nagar (New)	2	0.00		3.71	Forest Department	
18	Selakui	2	1.30	Nagar Panchayat			
19	Haridwar	30	49.40	Nagar Nigam	0.00		
20	Roorkee	15	4.64	Nagar Nigam	0.00		
21	Manglaur	6	0.00		0.00		Yet to Identify
22	Jhabrera	2	1.60	Gram Sabha	0.00		
23	Laksar	2	0.02	Nagar Panchayat	0.00		
24	Landhore	2	1.24		0.00		
25	Bhagwanpur (New)	2	0.00		0.00		Yet to Identify
26	Piran Kaliyar (New)	2	0.00		0.00		Yet to Identify
27	Pauri	4	0.00		2.49	Forest Department	
28	Kotdwara	5	0.99	Nagar Palika Parishad	2.47	Forest Department	
29	Srinagar	2	7.41	Nagar Palika Parishad	0.00		
30	Satpulli (New)	2	0.00		0.00		Yet to Identify
31	Dogadda	2	0.00		1.30	Forest Department	

Sr. No.	Name of ULB	Land Required (In Acre)	Land Status (In Acre)				Remark
			Identified	Location / Ownership	Proposed	Location / Ownership / Proposed to Department	
32	Swargasharam Jauk (New)	2	0.00		0.00		Yet to Identify
33	Rudraprayag	3	1.98	Nagar Palika Parishad	0.00		
34	Sri Kedarnath	2	0.00		0.00		Yet to Identify
35	Ukhimath (New)	2	0.05	Revenue Department	0.00		
36	Augustmuni (New)	2	0.35		0.00		
37	Munni-ki-Reti	3	0.00		0.00		Yet to Identify
38	Narendra Nagar	2	0.17	Revenue Department	0.00		
39	Chamba	2	0.05	Nagar Panchayat	0.59	Forest Department	
40	New Tehri	2	0.37	Nagar Palika Parishad	0.00		
41	Ghansali (New)	2	0.00		0.00		Yet to Identify
42	Gaja (New)	1	0.00		0.00		Yet to Identify
43	Lamb Gaon	5	0.00		0.00		Yet to Identify
44	Kirti Nagar	2	0.00		2.02	Government of Uttarakhand	
45	Dev Prayag	2	3.95	Revenue Department	2.62		
46	Barkot	2	0.06		0.06	Government of Uttarakhand	

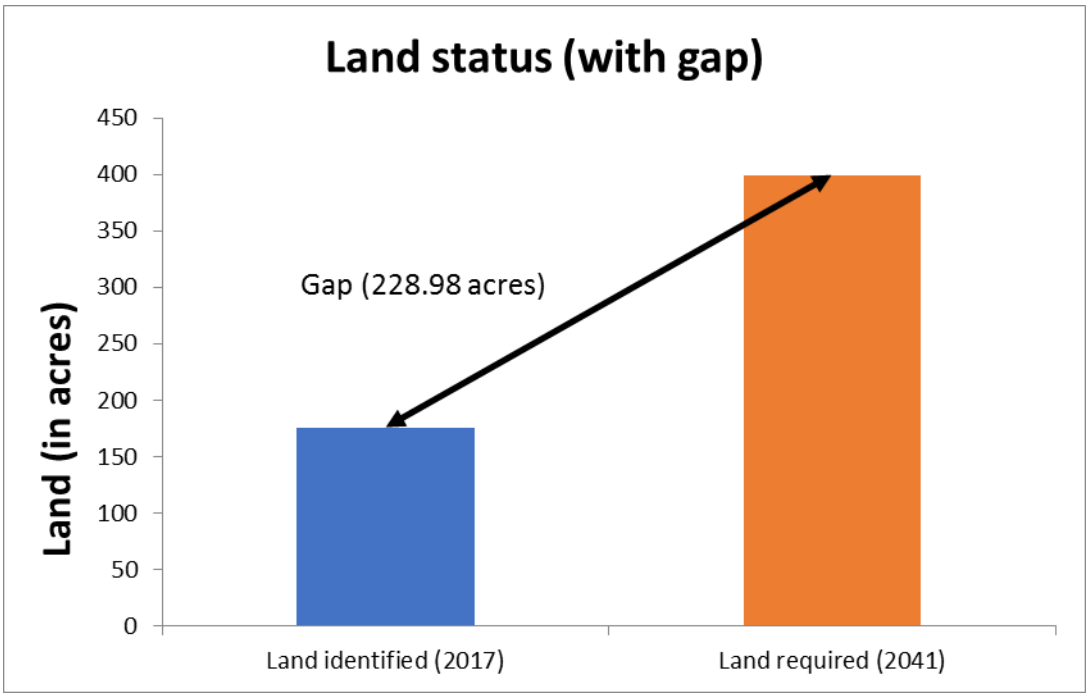
Sr. No.	Name of ULB	Land Required (In Acre)	Land Status (In Acre)				Remark
			Identified	Location / Ownership	Proposed	Location / Ownership / Proposed to Department	
47	Gangotri	1	0.00		0.24	Forest Department	
48	Chinyalisaur (New)	2	0.00		0.00		Yet to Identify
49	Uttarkashi	2	0.00		0.00		Yet to Identify
50	Nauvgaon (New)	2	0.00		0.00		Yet to Identify
51	Purola (New)	2	0.00		0.00		Yet to Identify
52	Dwarhat	2	2.22		0.00		
53	Almora	5	0.00		0.22	Forest Department	
54	Chaukutiya (New)	2	0.00		0.00		Yet to Identify
55	Bageshwar	2	0.00	Forest Department	0.00		
56	Kap Koth (New)	2	0.54	Nagar Panchayat	0.00		
57	Champawat	3	0.00		2.22	Forest Department	
58	Lohaghat	2	0.99	Forest Department	0.00		
59	Tanakpur	2	0.00		1.98	Forest Department	
60	Banbasa (New)	2	0.00		0.22	Irrigation Department	
61	Nainital	5	1.88		0.00		
62	Haldwani	12	9.88	Forest Department	0.00		
63	Lalkuan	2	0.00		1.73	Forest Department	
64	Bhimtal	2	0.05	Gram Panchayat	0.00		

Sr. No.	Name of ULB	Land Required (In Acre)	Land Status (In Acre)				Remark
			Identified	Location / Ownership	Proposed	Location / Ownership / Proposed to Department	
65	Ramnagar (ADB)	8	0.00		2.36	Forest Department	
66	Bhowali	2	0.67	Forest Department	0.00		
67	Kaladhungi	2	0.00		1.54	Forest Department	
68	Didihat	2	0.00		1.11	Forest Department	
69	Pithoragarh	9	1.85	Urban Development Department	0.00		
70	Dharuchula	2	0.00		0.00		Yet to Identify
71	Beri Naag (New)	2	0.00	Revenue Department	0.00		
72	Gangolihaat (New)	2	0.00		0.00		Yet to Identify
73	Munsiyari (New)	2	0.00		0.00		Yet to Identify
74	Kiccha	6	0.00		25.32	Revenue Department	
75	Rudrapur	22	27.17	Nagar Nigam	0.00		
76	Kashipur	17	10.94	Nagar Nigam	0.00		
77	Jaspur	7	2.84	Forest Department	0.00		
78	Mahuadhabra	2	0.78		0.00		
79	Bazpur	3	0.00		0.00		Yet to Identify
80	Khatima	3	0.00		0.00		Yet to Identify
81	Shaktigarh	2	0.00		0.00		Yet to Identify

Sr. No.	Name of ULB	Land Required (In Acre)	Land Status (In Acre)				Remark
			Identified	Location / Ownership	Proposed	Location / Ownership / Proposed to Department	
82	Mahuakheragang	3	0.96	Nagar Palika Parishad	0.00		
83	Kelakhera	2	0.00		0.00		Yet to Identify
84	Sitarganj	3	1.48	Nagar Palika Parishad	0.00		
85	Dineshpur	2	2.47	Revenue Department	0.00		
86	Sultanpur Patti	2	0.00		0.00		Yet to Identify
87	Gadarpur	2	0.00		2.47	Forest Department	
88	Nankamatta	2	0.00		0.00		Yet to Identify
89	Gularbhoj	2	0.00		0.00		Yet to Identify
90	Ranikhet Chiniyanoula (New)	5	2.47		0.00		
91	Bhikiyasain (New)	2	0.00		0.00		Yet to Identify
92	Bindukhatta	2	0.00		0.00		Yet to Identify
Total		**400**	**176.01**		**58.48**		

From the above fact sheet it is quite evident that 42% of the ULBs still have to identify the suitable land site in compliance with the rules and 22% of the ULBs, who have identified some land either of forest or revenue yet to get it transferred. Most of the ULBs have identified land that is inadequate to meet their 30year waste management needs, only 10 of the ULBs have adequate lands available with them.

Figure 4-5Land Gap (Requirement vs Existing)



The above graphical representation clearly indicates the serious concern, that need to be addressed fast with the help of all concerned departments viz. Pollution Control, Forest, Revenue and Urban.

The land availability owing to the land scarcity along with the suitability of the land for development of waste management facility is the key concern for the state. The land identification process and development of waste management facility would be done in compliance with the criteria for site selection provided in the SWM Rules 2016provisions 11 e, f, 12 a and 20. Potential issues relating to the environmental and land clearance shall be taken into account before finalisation of the land for develop of waste processing and disposal facility.

4.4 Resource Availability and Limitation with ULBs:

It was witnessed that almost all the ULBs have severe resource challenges and it primarily relates to;

(a) Competent ULB Staffs
(b) Waste Infrastructure – Storage community bins, transfer stations, waste processing facility, sanitary landfills
(c) GIS mapping of wastes, waste collection vehicles and route plan
(d) Complaint redressal Cell (24 x 7)
(e) Monitoring Mechanism etc.

In the survey, it was found that most of the ULBs are operating without any Executive Officer, sanitary inspectors and support staff like JE, Account Officer or Clerks. The sanitation staff situation is more than worse in various ULBs. The roles of the above raised issues are critical in uplifting the image of any ULB, whereas, the same is lacking below the minimum laid criteria set under the Municipal Acts and Rules. Thus, capacity building the all the ULBs is of utmost importance. All planning should be made on long term basis.

4.5 Summarized Existing SWM Practices and Key Constraints:

Average current Waste Per Capita MSW Generation state (Urban, Floating and Rural combined): 500gms/day

Average current Waste Per Capita MSW Generation in urban areas in state: 300gms/day

Average ULB's Current Municipal Solid Waste Generation (tons / day) including Urban Agglomerations: 915MTPD

Average Floating Population waste generation is 75 gms/day: 1135 MTPD

Current daily lifting and dumping of MSW at dumpsites is approx. 50%

Suitable Land site for developing Landfill and setting compost processing facility is almost 42% short of its requirement by 2041

The awareness level among the ULB officials and public about the waste management is also not adequate
Lack of continuous funding to ULBs for sustainable SWM

The staff, tools and infrastructures that are required in compliance with the SWM rules, 2016 at ULB level are inadequate, need urgent attention

Lack of inter-departmental coordination, makes it even more difficult to identify a suitable land and meet legal compliances

Lack of waste management infrastructure for other wastes are also a threat, which is getting mixed with municipal waste and which has to be diverted from a dumpsite

Lack of transparency, expertise and inefficiency in handling and disposal of solid wastes.

Insufficient cost recovery by collecting user charges.

5 Proposed Action Plan and Strategy to overcome the SWM Challenges:

The State Government has laid out certain goal plans and strategies to overcome the challenges in compliance with the Solid Waste Management Rules, 2016. The main priority under the proposed action plan is summarized as under;

Priority # 1: To ensure that the projects currently sanctioned under Phase–I, arecompleted before December, 2017 by ensuring regular monitoring and evaluation at district and State level and to make it run successfully with the support of Private Partners and State Government inter-departmental coordination.

Priority # 2: To replicate the success & learnings of Phase–I in implementing Phase – II proposed projects. The foremost efforts shall be to ensure that the required land is acquired beforehand and required environmental clearances are obtained prior to the commencement of the projects. The bid process management shall follow simultaneously so to ensure that before entire Phase – II projects are awarded and project commissioning is completed by December 2019.

In accordance, a feasible timeline reflecting on the updated cluster approach, i.e. start and end dates for each cluster project, shall be prepared and shall be agreed with the State Government. The project timeline is important to gauge the project progress against it and to mobilise the necessary funding. Further on, screening the project schedules might be conducive to avoid any bottlenecks in the disposal infrastructure. The processing and disposal facilities proposed for the state shall be built in a systematic sequence, so that they are operational as necessary (e.g. a landfill which is required to dispose rejects from a compost plant must not be constructed after the composting unit).

Priority # 3: To ensure that the DPRs and land acquisition along with Environmental Clearance for Phase – III projects are completed before June, 2020 and bid process is initiated, so that they are completed by June, 2021.

Priority # 4: To simultaneously undertake awareness campaigns with dedicated IEC activities in all 3 Phases.

Priority # 5: To undertake capacity building programs for ULBs and initiatesupportive legislations for effective implementation of 100% handling and scientific disposal of MSW and the practices of 5R's.

To achieve the above priorities, the following strategies are proposed:

- Adopt the principles of the Integrated waste management Hierarchy that promote reduce, reuse and recycling, followed by material recovery and energy recovery. Landfilling is considered only as a last option.
- Waste segregation at source to be made mandatory as per the SWM Rules, 2016.
- Promote decentralized waste management to decrease pressure on land requirements for future waste management.
- Maximize reuse, recycling and material recovery
- Centralized resource recovery from the waste stream post collection through proven waste processing technologies like – Biomethanization, Mechanical Composting, Refuse Derived Fuels (RDF) etc.
- Promote Reuse and recycling through extended producer responsibility and through producers of packaging material as stipulated in the SWM Rules, 2016
- Diversion of Construction Debris to another site for future application (a separate C&D waste processing and disposal arrangement shall be made if sufficient waste quantities are available); no C&D waste shall be mixed with general municipal waste.
- Recovery of O&M expenses through user charges to make Waste Management financially sustainable
- Implement disposal bans on materials that limit opportunities to achieve reuse, recycling or energy recovery
- Expand the monitoring and enforcement of disposal bans and enhance with effective communications to raise awareness of the bans
- Investigate financial and regulatory barriers which prevent or discourage the reuse of materials
- Developing a Community Education and outreach services plan to solicit Public Inputs
- Rigorous IEC activities in all the ULBs to create community awareness regarding effective waste management

- Providing necessary infrastructure, tools and equipment to all ULBs for effective SWM management
- Capacity building of ULBs, Governance Roles and Responsibilities
- State to provide technical and administrative support to the ULBs in compliance with the Environmental Acts and Rules.
- Defining the role and responsibility of Stake holders at state level, formulation of a State Level Committee and having quarterly review meetings
- Stringent Monitoring in the field to ensure effective compliance of operations
- Strict implementation of supporting acts and rules like – Plastic Waste (Management and Handling) Rules, 2016; Biomedical Waste (Management and Handling) Rules, 2016; Construction & Demolition Waste Management Rules, 2016; E-Waste Management and Handling Rules 2016; Hazardous Waste Management and Handling Rules 2016; Environment Protection Act
- Notifying of the supporting bills/ legislation to fill the gap, if there are any like – Anti Littering and Anti Spitting Bill;
- Waste research and audits at frequent intervals, to introduce newer technologies which are ecologically and economically viable and ease to operate
- Integration of informal sector in waste management as required by the SWM Rules 2016
- Prepare an Environmental Plan Management

The integrated waste management hierarchy is the need of the hour. This has to be planned and implemented at every step towards safe and sound waste management practices. The waste through various means whether scientific or traditional need to be minimized, to restrict growth in per capita waste generation i.e. 400-500gms/day if not able to minimize, at least for next 21years. This can further be achieved by adopting the principles of 5R's.

Figure 5-1Principle of 5R's

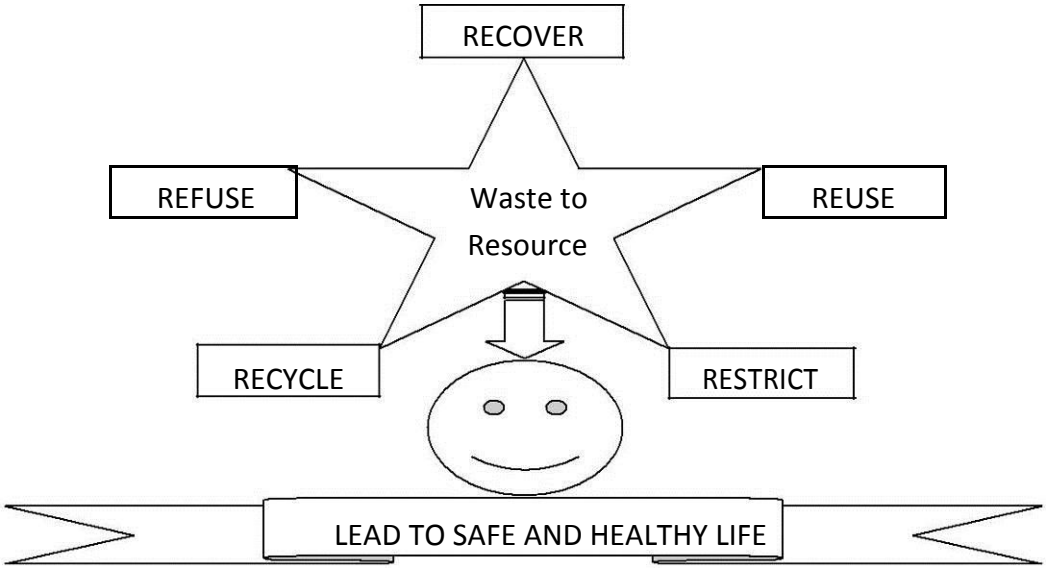
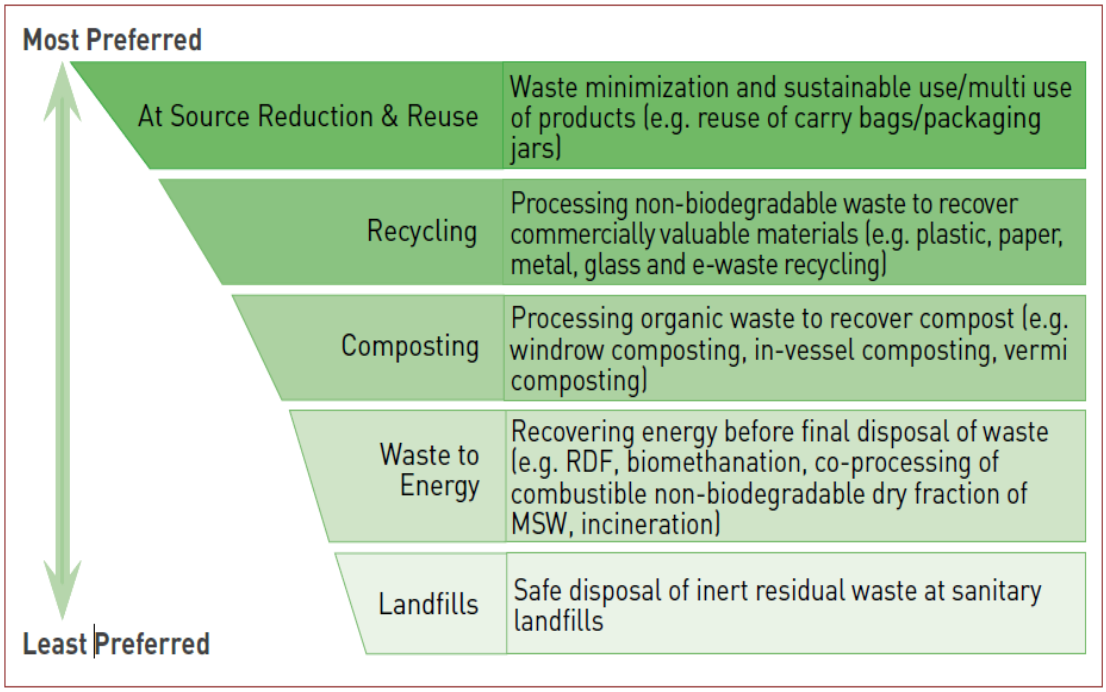


Figure 5-2Integrated Waste Management Hierarchy



The State Government in consultation with the stake holders and consultants have set forth following strategies for effective management of solid waste in compliance of SWM Rules 2016 within the limited resources as under;

5.1 Strategy # Zero Waste by 2040:

With a goal of Zero Waste by 2040, it is essential for every sector and commodities to adopt various means and strategies for increased waste prevention, reduction and diversion. Under a zero waste model, those materials that currently cannot be recycled or composted (roughly 20-30%, depending on the sector), will be redesigned so they can become an input via reuse, recycling, composting. Recognizing the need to re-think waste as a resource is essential now, and in doing so extend the life of the precious and limited landfill.

Zero waste is a goal that is ethical, economical, efficient and visionary, to guide people in changing their lifestyles and practices to emulate sustainable natural cycles, where all discarded materials are designed to become resources for others to use. Implementing Zero Waste will eliminate all discharges to land, water or air that are a threat to planetary, human, animal or plant health.

To achieve zero waste strategy following steps in line with SWM Rules 2016shall be followed:

- Follow the principles of the Integrated Waste Management Hierarchy, as given in the MSWM Manual, 2016(see figure on previous page)
- Maximize recycling of waste at each level by sending the recyclables to appropriate vendors for further processing and utilization.
- The non-recyclable high calorific fractions to be segregated and sent for recycling.
- Set recycling rates and targets for various stakeholders (ULBs, recyclers, manufacturers) for promoting and ensuring recycling.
- All the biodegradable waste shall be segregated and processed to convert it into compost, energy or any other useful product.
- Only the recycling rejects to go for energy recovery through RDF production to co-processing in cementplants or to thermal power plants or for incineration.
- Only the non-usable, non-recyclable, non-biodegradable, non-combustible and non-reactive inert waste and pre-processing rejects and residues from waste processing facilities shall go to sanitary landfill and the sanitary landfill sites shall meet the specifications as per SWM Rules 2016 (Schedule-1), however every effort will be to recycle or reuse the rejects to achieve the desired objective of zero waste going to landfill.
- This action Plan also acknowledges the fact that there would be some residue from processing facility which would require disposal (e.g. cross contaminated

waste with no utilization and fly ash from a waste to energy facility) and there will be need for further research to reach the goal of “zero waste” option, which can be fulfilled only if all residues are used for a purpose.

5.2 Strategy # Arrange for door to door collection of segregated solid waste from all households and all other establishments

Urban local bodies shall arrange for door to door collection of segregated solid waste from all households, commercial, institutional and other non-residential premises. From multi-storage buildings, large commercial complexes, malls, housing complexes, street vendors, etc., which shall be collected from the entry gate or any other designated location.

The segregated waste will be collected in minimum of 3 segregated streams from households, namely in wet (bio-degradable), dry (non-biodegradable) and domestic hazardous waste, in compliance of the SWM Rules, 2016.Sanitary waste will be collected separately on a daily basis. Other segregated streams of collection include Construction & Demolition waste, horticulture waste, bulk waste, street sweeping and drain cleaning waste. Deposit system for domestic hazardous waste will include direct collection from households and also at collection centres notified by the ULBs. There will be alteast one collection system per ward.

5.3 Strategy # Establish a system for segregated transportation of waste

The segregated waste that will be collected from various parts of the city will be transported in a segregated manner to the processing facility to optimize recovery and non-contamination or disposal facility as the case may be.

In accordance with the SWM Rules, 2016, these different fractions will include segregated transportation for bio-degradable waste, non-biodegradable waste, domestic hazardous waste, sanitary waste, street sweeping waste, drain cleaning waste, horticulture waste, C&D waste, etc. as a minimum.

5.4 Strategy #Establish a system for inclusion of informal sector and their integration in waste management practices as per SWM Rules 2016.

The activities of the informal sector (waste picking community and scrap dealers) have a significant role in the collection and recycling of material resulting in a significant impact on overall solid waste management in the city/town. As such, the urban local bodies shall establish a system to recognise organisations of waste pickers and scrap dealers and promote and establish a system for integration of these waste-collectors in organized systems of door to door collection.

Material recovery facilities or secondary storage facilities shall be set up with sufficient space for sorting of recyclable materials to enable authorised waste collectors to separate recyclables from the waste. The system should be developed with the integration of local waste pickers and recyclers for collection of segregated recyclable waste such as paper, plastic, metal, glass, textile from the source of generation or from material recovery facilities.

5.5 Strategy # Promote decentralized waste management

Decentralized systems of waste management have to be promoted the city to achieve the aim of zero waste going to the landfill by 2040. These systems will be initially promoted in apartment complexes, group housing, commercial establishments, restaurants, hotels, government institutes, educational institutes, etc, as per the SWM Rules, 2016 and later extended to cover all user groups including individual households in the city.

The ULB shall formulate by-laws to implement decentralized systems in the city. The ULBs will provide technical backstopping and regular monitoring of these decentralized facilities for their proper functioning. This will be done either through their own staff or through identified local NGOs, technical institutes, service providers, etc. for the monitoring of the functioning of these systems.

5.6 Strategy # Diversion of Construction & Demolition Debris Wastes:

With many recycling advancements, the construction &demolition debris which were earlier considered as a part of municipal waste, shall now be considered as resource component, as per Construction & Demolition Waste Management Rules, 2016.
Various types of construction and demolition waste include wood, drywall, concrete, brick & other mixed debris, cardboard, metals, asphalt, plastic & foam, other packaging material, textiles, etc.

Following table provides general characteristics for Indian C&D wastes found at dumpsites

Table 5-1 Characteristics of C&D waste in India

DEBRIS TYPE	PERCENT
Wood	42.4%
Drywall	27.3%
Concrete	12.0%
Brick & Other Mixed Debris	7.3%
Cardboard	5.4%
Metals	1.8%

Asphalt	1.4%
Plastics & Foam	1.4%
Other Packaging	0.6%
Textiles	0.4%
TOTAL	**100%**

The type of the waste that is recyclable under the C&D category are given in the table below:

a) Asphalt
b) Asphalt & Dirt Mix
c) Asphalt Composition Shingles
d) Bricks: Broken
e) Built-Up Roofing: Tar & Gravel
f) Ceiling Tiles
g) Ceramic Tiles - Recycle
h) Cinder Blocks - Recycle
i) Clay Roofing Tiles - Recycle
j) Concrete
k) Concrete Roofing Tiles
l) Concrete with Rebar
m) Dirt / Clean Fill
n) Dirt with Gravel & Rock
o) Dry Wall / Gypsum / Sheetrock
p) Garage Doors
q) Lava Rock
r) Rock / Gravel: Clean
s) Roof Shingles: Wood
t) Roof Tile: Asphalt
u) Sheetrock / Drywall
v) Sinks: Porcelain/Broken - Recycle
w) Toilets: Broken - Recycle
x) Wood: Treated / Painted

- C&D waste is a matter of ULBs and clusters but also of the civil contractors or the project owner which are responsible for a construction project. According the C&D Rules 2016, the civil contractors are clearly mandated to take care of C&D waste which is generated in the commercial construction area. Privately generated C&D waste – which e.g. can be produced while renovating houses or apartments – are to be dealt of by landlords or by the owner of the apartment or house. Owing to the fact that civil contractors operate across the limits of a ULB, the state wise regulation is advocated.

- Management of construction and demolition waste in the state shall be done in accordance with the construction & Demolition Rules 2016. The state will

device appropriate measures in consultation with expert institutions for management of construction and demolition waste generated including processing facility and for using the recycled products in the best possible manner.

- Each local body shall issue detail directions to the generators and other involved in the process on proper management of construction and demolition waste within its jurisdiction in accordance with the provisions of these rules.
- Each ULB shall make a reasonable estimate on the quantity of construction and demolition waste generated in its jurisdiction and also work out the projections for the future years.
- The ULBs shall ensure separate storage, collection and transportation of construction and demolition wastes.
- The ULBs shall make arrangements for collection and transportation of Construction & Demolition waste either through own resources or by appointing private operators. The ULB shall place appropriate containers for collection of waste and shall transport them at regular intervals or when they are filled to appropriate sites for processing and disposal either through own resources or by appointing private operators;
- Every ULB shall develop the collection centre or alternate collection mechanism for construction and demolition waste and hand it over to the authorized processing facility of construction and demolition waste.
- ULBs also need to ensure that there is no littering of deposition of construction and demolition waste so as to prevent obstruction to the traffic or the public or drains.
- ULBs shall seek detailed plan or undertaking as applicable, from major generator of construction and demolition waste and shall examine and sanction the waste management plan of the generators within a period of one month or from the date of approval of building plan, whichever is earlier from the date of its submission;
- ULB shall also keep a track of the major generation of construction and demolition waste within its jurisdiction and establish a data base and update once in a year;
- ULBs shall create a sustained system of information, education and communication for construction and demolition waste through collaboration with expert institutions and civil societies and also disseminate through their own website;
- ULB shall make provision forgiving incentives for use of material made out of construction and demolition waste in the construction activity including in non-structural concrete, paving blocks, lower layers of road pavements, colony and rural roads.

5.7 Strategy # Extended Producer Responsibility (EPR):

EPR is an environmental policy approach in which a producer's responsibility, physical and/ or financial, for a product is extended to the post-consumer stage of a product's life cycle.

The EPR policy of the state will be in line with the nationwide EPR regulation being formulated by Government of India. The state will formulate a state level authority to monitor the material flow of packaging material from the point of production or entry into the state to the recycling or reuse of those materials. The state will stipulate recycling rates for the packaging material that will enter the state to aim for maximum recycling, in order that its aim of zero waste reaching the landfill can be achieved.

As the EPR is not a subject a state can deal with primarily as long as no nationwide EPR regulation is in place which is, e.g., the case for e-waste. A similar framework will be adopted for the regulation on packaging material, as producers which act across state borders will also need to be considered.

This EPR scheme will include a state level authority to monitor the material flow of packaging material from the point of production or entry into the state to the recycling or reuse of those materials. The state will set-up a Producer Responsibility Organisations (PRO) which will manage and finance the system by levying fees from the producers which use packaging material to bring their products to the point of sales. These PROs will be responsible for making sure that the recycling rates stipulated by the state and declared by the producers are achieved. They will be also responsible for disbursement of fees from the producers to the collectors (mainly waste pickers and informal sector individuals but very likely formalised companies also) to incentivise the collection of the recyclables which are currently ending up in the landfill.
Notwithstanding the EPR scheme, Uttarakhand shall regulate or ban the use of plastic bags or instruct producers on reduce, reuse and recycle of different products within the jurisdiction of Uttarakhand.

5.8 Strategy # Selection of Processing and Disposal Technology

Composting:

Windrow Composting is one of the recommended technology for the ULBs or cluster generating/ receiving waste above 100TPD and have adequate land for setting up a processing facility with landfill provision. Despite its easy operation, windrow composting may be difficult considering the given land scarcity in Uttarakhand because this technology entails a high land demand. Other composting technologies like vermi-composting, aerated in-vessel or static pile composting plants with slightly lesser land

requirement can be proposed.

The MSWM Manual 2016 contains a detailed overview of decentralised composting techniques such as bin composting and box composting. These initiatives can be promoted amongst households for stabilising organic waste. Another option for decentralized composting is Organic Waste Convertor (OWC) which could be used in smaller ULBs and communities. Only strictly segregated organic waste can be used in this process. The system has been widely used, examples include Panaji Municipal Corporation and large scale and Government Pool Residential Complex, New Moti Bagh, New Delhi at colony scale.

Vermi-composting and in Vessel composting options can be opted by the ULB/ Cluster generating/ receiving municipal waste, depending upon the availability of the land. Vermi-composting should be aimed at for very small communities or private households or hotels only. Source separated organic waste must be strictly kept separated from any waste which contains contraries to avoid any potential contamination of this material stream.

Source segregated waste must only be used to produce compost from all technologies of for composting, as the quality of compost produced from mixed waste will not be compatible with FCO 2009, as per SWM Rules, 2016. To produce this high-quality compost, it is recommended that the city should start with vegetable markets, commercial establishments, malls, restaurant waste where source segregation can be easily achieved. For households pure organic waste collection should start with apartment complexes, group housing, societies and then gradually cover all houses in a phased manner, this will ensure 100% segregation at source. To further incentivise source separation, differential user charges could be collected with for e.g., the lower income waste generators paying a lower user charge.

The compost demand in the project area needs to be established prior to setting forth the strategy for composting along with the strategy to phase out the application Rules, 2016. Compost from source segregated organic waste will have high demand with farmers, as this compost will not contain any physical/ chemical contaminants.

Waste to Energy:

The state shall apprise the suitability of waste to energy projects based on the availability of waste, land availability, market for the output products. Other than the energy production, the waste to energy projects may be looked at to reduce the volume of the waste and increase the shelf life of the landfill.

RDF (Refuse Derived Fuel) is a successful option that can be applied in Uttarakhand for

recycling rejects (bales, fluff or pellets). The SWM Rules expect to replace 5 % of the fuels used in cement production and thermal power by RDF, however, the demand for utilization of RDF needs to be generated in Uttarakhand as currently no cement factories or coal fired power plants are operating in the state. The geographical spread of the RDF production in the state and its sales potential in neighbouring states should be evaluated thoroughly. Use of RDF in incineration plants should also be evaluated.

Co-processing of RDF in cement plants is an option for utilization of recycling rejects from waste in Uttarakhand, if the cement industry within the state are ready to substitute their feedstock with RDF produced from municipal waste. In case of cement plants, there are also no post processing rejects from RDF utilization, which makes it a viable option for Uttarakhand, as the SWM Rules, 2016 have restricted construction of landfills in hilly areas. Co-processing in cement has been successfully undertaken by many cities like Hyderabad supplying RDF to ACC cement plant in Wadi, Karnataka.

Waste to incineration technology is an option that could be explored for Uttarakhand, given its geographic location. Land is still required for disposal of post processing rejects in scientific landfills and provision of scientific landfills need to be made. This technology can be successful only if the input waste has a minimum calorific value of 7 MJ/kg, and is free from inerts or C&D waste. However, the minimum recommended capacity of an incineration plant is >500 MTPD of segregated waste, as plants below this scale are very cost intensive and should be installed following the principles of economies of scale. As the total waste generation in the state is less than 500 MTPD of segregated waste, economic viability of such a plant will need to be carefully assessed. Other important aspects with respect to incineration plants include high capital costs, regular Operation & Maintenance in addition to periodic monitoring of flue gas emissions.

Example of a well-established incineration plant in India is the Timarpur-Okhla plant in New Delhi, which has a capacity of 1600 TPD and a power rating of 16 MW. The Ghazipur plant, which is also in New Delhi, has a capacity of 1300 TPD and has a rating of 12 MW.

Biomethanation is also a waste to energy technology for processing segregated organic waste and is suitable for small and large scale applications. (1 TPD-to 500 TPD). This technology can be successfully implemented even with basic segregation, i.e. segregation of wet waste and dry waste. Since the process is intricate, biomethanation plants require skilled personnel and regular service & maintenance.

The Nisarguna Biogas Technology, which is an initiative of Municipal Corporation of Greater Mumbai (MCGM), Stree Mukti Sanghatana (SMS), Bhabha Atomic Research Centre (BARC), waste pickers cooperatives, and the Navi Mumbai Municipal

Corporation (NMMC) provides expertise on small scale biomethanation plants. At present there are 160 Nisarguna biogas plants (capacity 1TPD) operating successfully throughout India. Small scale bio-methanation plants have been installed by Pune Municipal Corporation in 25 wards for management of organic waste.

The state government plans to develop a pilot project for waste to energy at Roorkee, by forming a cluster of 17-18towns with combined waste generation capacity approximately 500MT per day. The expected output would be approximately 1 MW electricity/ ton from the processed wastes and non-leachable inerts, which can be used further for civil construction activities. It is recommended that a detailed study should be conducted for the feasibility of such a project, as the current waste generation for the entire state is approximately 2000 MTPD (urban plus floating population) and considering the fuel potential of 13% (ADB study), the state as a whole will generate approximately 260 MTPD of fuel potential every day, if planned as a central facility for the state for utilization of RDF and recycling rejects.

Though waste to energy project should be encouraged, establishing the economy of scale and financial feasibility of waste to energy projects is equally important. Waste-to-energy facilities require a much higher gate fee than any other technology which of course has to be transferred to and levied from the waste generators.
Sanitary waste will be collected and stored separately and either sent to the nearest biomedical incineration facility or as directed by the State Pollution Control Board.

Regional Landfills:

Since the State is having a great challenge to acquire suitable landfill sites, thus it is proposed to have a regional landfill, where the associated ULBs of a respective cluster will dispose their inerts only, on payment basis.

The rejects from waste to energy plants will also need to be sent to the landfill. There is therefore a need for the state to undertake research and development in the field of waste technologies so that minimum waste goes to landfills and the goal of the state to have “zero waste to landfill by 2040” is achieved.

Domestic hazardous waste will be stored in the appropriate locations till sufficient quantities are collected and then sent to the nearest TSDF facility either within or outside the state or as directed by the State Pollution Control Board.

5.9 Strategy # Major Festival Seasons and Tourism inflow:

During the Char-Dham Yatra, Aradh Kumbh, Kumbh, Nanda Rajjath Yatra, Ganga Isnan,

Kawar, winter snow-fall season, increases the waste load many a times. As per the MoT record 2010-11 the tourist inflow to State was recorded between 250-310Lacs/ Annum, which is almost 2.5times of the total state population.

Owing to the significant tourist inflow into the Uttarakhand, the ULBs with high tourism potential should levy a per capita user charge for collection and management of waste from the tourist visiting the area. This charge can be collected along with the entry charges currently levied by most of the tourist destinations (e.g. at posts placed at main access roads). It is expected that tourists will mainly produce food waste and waste consisting of post-consumer goods, the charge should be contributed towards collection, transportation and management of these waste streams.

Post-consumer good, such as PET bottles or other high value recyclables will certainly be tapped by the informal sector and will find their way to be recycled. In the areas where there is no active informal sector for picking up the recyclable waste (e.g. Muni-ki-Reti and other difficult to access areas), the ULB should try to set-up an own collection system by incentivising collectors offering them to participate in the sales revenues of recyclables. This could be done even by private initiatives, where ULBs contribute the land/ building to accommodate the storage area. The non-biodegradable recyclable materials from the storage area shall be sent for recycling periodically. For the organic waste, as directed by SWM Rules, 2016, ULBs should enact a by-law on the source separation of this waste stream generated by restaurants and hotels which should be managed onsite through decentralized systems. Only in case of paucity of space, the source segregated waste stream should be collected by the city and forwarded to the centralized composting facility.

5.10 Strategy # ULB Clustering for disposal

Since the State have a challenge to acquire suitable landfill sites, thus it is proposed to have regional landfills, where the associated ULBs of a respective cluster will dispose their inerts only, on payment basis.

Construction of landfill on the hill should be avoided as per the SWM Rules, 2016.The state shall facilitate establishment of regional landfill sand or regional treatment centre by conferring with and directing town planning on state and on local level how and where to assign sufficient land for facilities. The exercise of cluster formation has already done for the state. The cluster formed can include ULBs as well as villages in the close vicinity. A transfer station at a suitable enclosed location within the ULB would be setup to collect residual waste from the processing facility and inert waste to be transferred to the regional facility.

If the different jurisdictions allow and clusters can be reshaped (adding ULBs to

clusters/ deleting them to be moved to another cluster, and including villages in the closer vicinity), UDD should confer with the district or the relevant ULB authorities on clustering. E.g. peri-urban villages belonging to the rural jurisdiction or villages which are located along a transport route might be included in the waste management system. Some of the clusters also might need reshaping like, Dineshpur is a stand-alone ULB even though located close to Cluster 9 or Cluster 1; Kaladhungi is suggested to be incorporated into Nainital but is located closer to Haldwani; Ddistance from Bhowali, stand-alone ULB, to Nainital is 12 km only, etc.

On the planning and implementation level the criteria for site selection as per Schedule 1 of the SWM Rules 2016 should be taken into account. It has been recognised though that e.g. the future regional treatment facility of Rishikesh might face some severe resistance from villagers while due to its location close to a potential floodplain of a river it might not be environmentally safe.

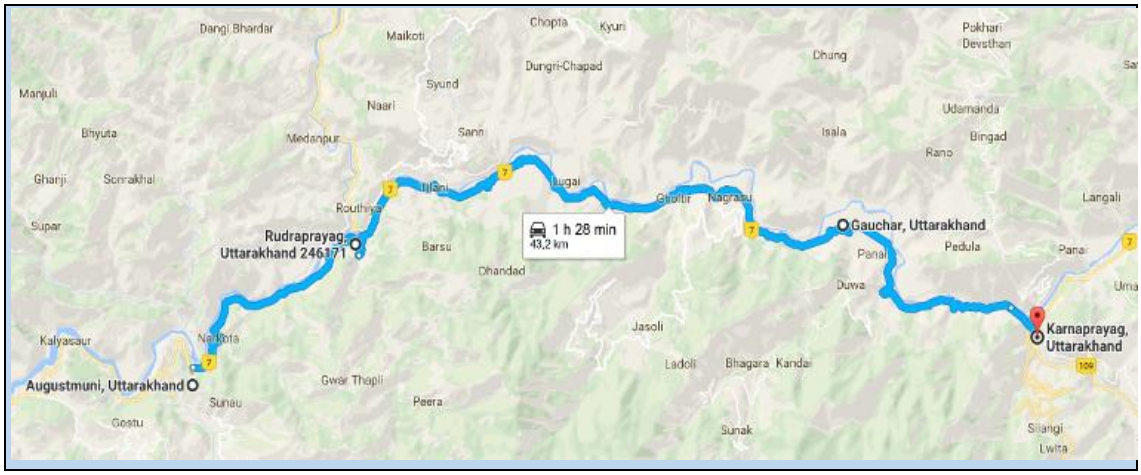
Cluster were formed to utilize the limited available lands with the ULBs to its best in compliance with the laid rules. The criteria of cluster formation were based on following parameters;

- Land Availability
- Distance from Points
  - Proposed for Combined Waste Processing & Landfill
  - Proposed for Combined Waste Processing
  - Proposed for Combined Sanitary Landfill only
- Waste Generation
- Land Road Approach
- Site suitability
- Financial feasibility & sustainability
- Other factors (Legal, Environmental & social aspect)

Following will be the benefits of forming of cluster;

- Waste minimization
- Health benefits
- Production of compost material
- Income from compost, waste paper and recyclables such as plastic and glass.
- Reduced litter
- Reduced pressure on landfill sites
- Reduced impact on waterways and general environment.

For each of the above identified clusters, the regional landfill site should be selected as per the site selection criteria mentioned in schedule 1 of the SWM Rules 2016
The distance matrixes were also made to understand the approach in much detailed manner, which are highlighted as below:



Sr.	Name of the ULB			Distance Matrix (Km)		
1a	Rishikesh	0.0				
1b	Munni-ki-Reti	5.4	0.0			
1c	Narendra Nagar	20.7	15.8	0.0		
1d	Swargasharam Jauk	12.3	12.6	26.8	0.0	
1e	Doiwala	25.5	24.3	36.5	36.4	0.0
	FROM	1a	1b	1c	1d	1e

Sr.	Name of the ULB	Distance Matrix (Km)	
2a	Tanakpur	0	
2b	Banbasa	10.4	0
	FROM	2a	2b

Sr.	Name of the ULB	Distance Matrix (Km)		
3a	Sitarganj	0		
3b	Khatima	27.3	0	
3c	Shaktigarh	11.9	38.8	0
	FROM	3a	3b	3c

Sr.	Name of the ULB	Distance (Km)	
4a	Lohaghat	0.0	
4b	Champawat	23.4	0.0
	FROM	4a	4b

Sr.	Name of the ULB	Distance (Km)	
5a	Berinag	0.0	
5b	Gangolighat	23.8	0.0
	FROM	5a	5b

Sr.	Name of the ULB	Distance (Km)	
6a	Kapkot	0.0	
6b	Bageshwar	22.7	0.0
	FROM	6a	6b

Sr.	Name of the ULB	Distance (Km)	
7a	Chaukutiya	0.0	
7b	Dwarahat	17.0	0.0
	FROM	7a	7b
Note: Bhikiyasain (31km) from Chaukutiya could be clubbed with cluster			

Sr.	Name of the ULB		Distance (Km)			
8a	Mahuakheraganj	0.0				
8b	Sultanpur Patti	16.8	0.0			
8c	Kelakheraganj	32.0	17.3	0.0		
8d	Gadarpur	41.3	26.5	10.3	0.0	
8e	Gularbhoj	49.4	33.5	15	11	0.0
	FROM	8a	8b	8c	8d	8e

Sr.	Name of the ULB	Distance (Km)	
9a	Kotdwar	0.0	
9b	Dogadda	16.2	0.0
	FROM	9a	9b

Sr.	Name of the ULB	Distance (Km)	
10a	Vikasnagar	0.0	
10b	Herbertpur	5.4	0.0
	FROM	10a	10b

Sr.	Name of the ULB	Distance (Km)	
11a	New Tehri	0.0	
11b	Chamba	11.0	0.0
	FROM	11a	11b

Sr.	Name of the ULB		Distance (Km)			
12a	Kashipur	0.0				
12b	Jaspur	15.6	0.0			
12c	Ramnagar	27.1	42.2	0.0		
12d	Mahuadhabra	19.2	3.8	45.8	0.0	
12e	Bazpur	24.3	42.0	49.2	45.6	0.0
	FROM	11a	11b	11c	11d	11e

Sr.	Name of the ULB	Distance (Km)						
13a	Roorkee	0.0						
13b	Manglaur	7.6	0.0					
13c	Jhabrera	17.3	11.0	0.0				
13d	Laksar	21.1	18.7	29.0	0.0			
13e	Landhaura	10.1	3.3	13.8	17.1	0.0		
13f	Bhagwanpur	13.1	20.6	18.7	34.2	23.2	0.0	
13g	Pirankaliyar	23.4	31.0	41.9	34.8	33.5	32.0	0.0
	FROM	13a	13b	13c	13d	13e	13f	13g

Sr.	Name of the ULB	Distance (Km)	
14a	Dehradun	0.0	
14b	Selaqui (new)	7.0	0.0
	FROM	14a	14b

Sr.	Name of the ULB	Distance (Km)	
15a	Haridwar	0.0	
15b	Shivalik Nagar	10.3	0.0
	FROM	15a	15b

Sr.	Name of the ULB	Distance Matrix (Km)				
16a	Haldwani	0				
16b	Lalkuan	17.1	0			
16c	Bhimtal	28.4	41.7	0		
16d	Kiccha	37.1	20	61.7	0	
16e	Rudrapur	31.3	22.9	57	13.1	0
	FROM	16a	16b	16c	16d	16e

5.11 Strategy # Use of modern and mechanized collection system (Underground bin Concept)

The State Government of Uttarakhand has decided to adopt unique practices of waste handling that can improve the sanitation condition drastically and uplift the

State's overall image. Thus, Government has predominantly decided to create entire city of the State as "Bin less State".

Hence, the management of waste through underground developed infrastructure, the "**LEAN WASTE MANAGEMENT SYSTEM"** is looked as an important evolution which would allow for the efficient and cost-effective tackling of one of the more pressing needs of the State of Uttarakhand.
By introducing LEAN WASTE COLLECTION MANAGEMENT SYSTEM (LWCMS) Government intends to optimise rapidly the traditional approach, where waste containers are replaced by underground or semi-underground waste collection containers/ bins. These bin systems have their greater portion placed underground, having only their inlets above ground surface.

Standalone underground or semi-underground collection bins offer great advantages over traditional collection bins, as:

- greater holding capacity than of the same area's surface dumpsters/ bins
- compaction of the waste, increasing their effective capacity by 1.5 to 2.5 times
- improved aesthetics
- high hygienic standards, controlling bacterial development and odor problems
- limited maintenance requirements
- non-flammable thus superior protection against vandalism
- Reduces the frequency of frequent collection and transportation of the waste

The above features can allow for a considerable increase in the collection interval that can lead to the reduction of the operating cost (transportation, labour, etc.) of the service, ranging from 5% to 30%. Furthermore, the minimal capital expenditure required as well as the flexibility in its siting requirements make such systems ideal for the instant replacement of the wheel containers. Especially for the case of Uttarakhand, the implementation of stand-alone semi-underground collection scheme seems to be the most sensible strategy.

The entire municipality is developing on a very fast pace and along with the development of the city the infrastructure and beautification of the city is vital. An efficient solid waste management system is to be essentially designed so as to avoid littering of the city and to avoid spreading

of epidemics. The lean waste management system is an innovative solution which deals with both minimizing the littering and increasing the efficiency of waste collection system. The fact that the waste is not exposed to the public, adds to the aesthetics of the city.

Based on the fast growth rate of the city the higher capacity of the bins would also serve for the future needs of the city. In addition, the higher capacity bins will also ensure that the bins don't overflow during festival seasons when the waste generation is much higher than the average waste generation. Since capacity of bins is more the municipality can reduce the frequency of collection which will help in reduction of operation, maintenance and transportation cost.

With the installation of the "Lean waste management system" the municipality can ensure better hygiene conditions for their workers as they don't have to manually handle the waste which in turn leads to lesser hazardous working conditions and increased man hours. The automated system ensures that the emptying of the bins is performed in a very short duration ensuring that no interference is caused to the traffic nor the pedestrians. Based on the waste generation data, ease of access, and frequency of waste collection four types of semi underground bins are proposed for "Lean Waste Collection System".

Figure 5-3ExistingConditions of Waste Storage Depots

The bin with size 1.5-3.0CuM is ideal for the streets that can be placed at every 400-500m, with road having a width of 3-4m at least in set of two i.e. one bin for dry waste and one bin for wet waste. Deposit system for domestic hazardous waste has to be synchronized with the entire system.

Installation Procedure:

- Pit excavation
- Construction of concrete casing
- Installation of edge protection metallic ring
- Loose filling and closing of the pit surroundings
- Installation of the container

Bin allocation planning in for the Municipality

Some of the important considerations while identifying the location of Lean Waste Collection bins are:

- Free access from the streets: i.e. direct accessibility for a crane mounted tipper truck (min. 5m from the road level)
- Paved Streets

If possible free of elevated electric and telephone lines

Free of parking vehicles to have free access to the bins

Information on underground infrastructure like Sewage lines, cable shafts or other lines

Existing and proposed location of bins/ open littering locations

Important points to consider while planning:

- As the lifting vehicle will require a large area to manoeuvre, only those locations in the city which have adequate space should be considered for these bins.
- State should assess in which ULBs and what terrain will be best suited for these bins. The remaining could continue to use the conventional bins.
- ULB while deciding the location of these bins, should avoid areas where door to door collection has either started or is planned. All forms of bins of large capacity (1 or 3 MT) usually provide users an alternative to waste disposal, and users are not willing to adopt the door-to-door collection system and pay user charges.

Suggestion of collection and transportation infrastructure Truck and Crane system

It is suggested to purchase two tipper trucks (TATA 1613 / Ashok Leyland 1616 / similar versions) mounted with telescopic cranes (Preferably of Hyva make in HB series or Palfinger PK 15500 A or similar capacities) which should be connected to a specialized bin floor trap door opening system (double-hook grab '*GEJO 5 Rev. A*' of M/S Bakker Hydraulics or similar). One of the tipper trucks could be used exclusively for handling wet waste while the other one could be used for dry and e-waste.
Extensive capacity building will have to be undertaken in areas where these bins are installed, to ensure that the correct waste is deposited in the right bin.The municipality should have enough back up facility in case of break-down of lifting mechanism of bin or trucks for optimum functionality of the system.

Installation of Bins

The semi-underground models (GTE 1.5) for dry waste and underground model (GTU 3.0) for wet waste have to be installed after proper excavation and concrete grouting.

Table 5-2Underground bins technical specs

Particular	GTE 1.5	GTU 3.0
Volume (approx. in m3)	1.5	3.0
Height (not inclusive of pickup) (approx. in mm)	2100	2785
Height Visible Section	1150	-
Built in dimensions (∅ x h)	1950 x 950	1960x1960x1800
Weight Concrete outer (approx. in Kgs)	2605	4100
Weight safety platform (approx. In Kg)	-	265
Weight Steel Collection Container (approx. in Kg)	410	615
Total Weight (approx. in Kg)	3015	4980

Figure 5-4Loading and Unloading Mechanism of Semi underground bins

Product details and selection logic

A variety of product options were considered as part of the exercise before arriving at the final product mix. The key considerations were

1. Accessibility for local population
2. Availability of space
3. Waste generation at the locality
4. Maximum possible storage duration
5. Increase in waste generation over a period of time etc.

For wet and dry waste, a higher volume bin would have meant that the collection locations would be too far apart. Accordingly, smaller sized 1.5m3 bins are proposed for the collection of wet and dry waste so as to improve the accessibility.

Figure 5-5Semi Underground Bins Components

5.12 Strategy # Storage and Collection of Domestic Hazardous Waste

Domestic Hazardous Waste includes 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.

The waste generator shall store separately the domestic hazardous waste as per the SWM rules, 2016.

Every ULB shall develop depots for collection of Domestic hazardous waste being generated. Hazardous wastes generated by households should be taken into account for the installation of a proper collection scheme. As their quantity will determine the necessary temporary storage capacity, the quantity should be estimated.

All ULBs shall arrange for the collection of hazardous waste at the door step once a week by own staff or through outsourcing to the extent possible and deposit the collected hazardous waste to the designated hazardous waste deposition or delivery centres. The public should be advised about the collection frequency.

ULB shall ensure safe storage and transportation of the domestic hazardous waste to a hazardous waste disposal facility(TSDF) or as may be directed by the State Pollution Control Board or the Pollution Control Committee;

5.13 Strategy # Phase wise Plan of SWM program implementation:

Since lot of work related to planning, sourcing, procurement and execution etc. are required to implement any program successfully. Thus, with limited resources phased wise planning for implementing State wide SWM practices has been made, which are detailed in table below. Before that it's essential to explain that on what basis/ criteria the phase wise plan was proposed. The criterion was based on following:

(1) Already Approved/ Sanctioned Projects and funds available

(2) Priority ULBs and DPRs in final stage

(3) ULBs producing very little amount of waste and are difficult to club with any ULB because of distance and other geo-technical issues

Table 5-3Project Under Phase – I

(COMPLETION TIME PERIOD: December 2017)

Funding Agency (FA)		SR #	ULB	Project Cost (Cr.)	Population	MSW Generation (MTPD)
Existing	Proposed					
JnNURM	GoI / GoU	1	Nainital	9.31	41377	15.52
	NGRBA GoI/GoU	2	Haridwar	16.72	231139	86.68
		3	Shivalik Nagar	8.61	17307	5.19
	GoI / GoU	4	Dehradun	24.6	583679	218.88
		5	Selaqui	8.61	16880	5.06
(FA) JnNURM UIDSSMT Cluster-1		6	Haldwani	34.88	171351	64.26
		7	Lalkuan		7644	2.29
		8	Bhimtal		7718	2.32
		9	Kiccha		41810	12.54
		10	Rudrapur		154514	46.35

(COMPLETION TIME PERIOD: December 2018)

FUNDING AGENCY	SR #	ULB	Project Cost (Cr.)	Approach	Population	MSW (MTPD)
GoI	11	Kashipur	68.76	CLUSTER -2	121610	36.48
	12	Jaspur			50520	15.16
	13	Ramnagar			54787	16.44
	14	Mahuadhabra			7326	2.20
	15	Bazpur			25513	7.65
	16	Roorkee	56.88	CLUSTER -3	118188	35.46
	17	Manglaur			52994	15.90
	18	Jhabrera			11186	3.36
	19	Laksar			21760	6.53
	20	Landhore			18370	5.51
	21	Bhagwanpur			17304	5.19
	22	Piran Kaliyar			19201	5.76
	23	Pauri	11.39	Integ.	25440	7.63

Note: The Urban Agglomeration(UA) population will need to be considered in each city/ project once the detailed planning undertaken. Phase I includes 69.33% UA population (3,18,920) generating 95.68 MTPD @300gcpd

Table 5-4Project Under Phase – II

(COMPLETION TIME PERIOD: December 2019)

Funding Agency	ULB Sr #	Name of the ULBs din cluster	Total MSW (MTPD)	Population Benefitted	Project Cost (Cr.)
NGRBA	1	Rishikesh**	26.44	70499	**50**
	2	Munni-ki-Reti**	8.59	28636	
	3	Narendra Nagar	1.81	6034	
	4	Swargasharam Jauk**	1.40	4669	
	5	Doiwala	2.61	8705	
CLUSTER – 4		**TOTAL**	**40.85**	**118543**	
GoI / GoU	6	Tanakpur	5.29	17622	**14.01**
	7	Banbasa	2.40	7990	
CLUSTER – 5		**TOTAL**	**7.69**	**25612**	
	8	Khatima	4.53	15087	**23.1**
	9	Sitarganj	5.99	19978	
	10	Shaktigarh	1.89	6309	
CLUSTER – 6		**TOTAL**	**12.41**	**41374**	

Funding Agency	ULB Sr #	Name of the ULBs din cluster	Total MSW (MTPD)	Population Benefitted	Project Cost (Cr.)
GoI / GoU	11	Lohagat	2.38	7926	**12.69**
	12	Champawat	3.31	11029	
CLUSTER - 7		**TOTAL**	**5.69**	**18955**	
GoI / GoU	13	Berinag	2.29	7641	**8.44**
	14	Gangolighat	2.13	7112	
CLUSTER - 8		**TOTAL**	**4.42**	**14753**	
GoI / GoU	15	Kapkot	1.61	5365	**8.55**
	16	Bageshwar	2.72	9079	
CLUSTER - 9		**TOTAL**	**4.33**	**14444**	
GoI / GoU	17	Chaukutiya	1.44	4796	**5.30**
	18	Dwarahat	0.82	2749	
CLUSTER - 10		**TOTAL**	**2.26**	**7545**	
GoI / GoU	19	Mahuakheraganj	3.78	12584	**33.02**
	20	Sultanpur Patti	2.95	9848	
	21	Kelakhera	3.28	10929	
	22	Gadarpur	5.79	19289	

Funding Agency	ULB Sr #	Name of the ULBs din cluster	Total MSW (MTPD)	Population Benefitted	Project Cost (Cr.)
	23	Gularbhoj	1.45	4829	
CLUSTER – 11		**TOTAL**	**17.25**	**57479**	
	24	Kotdwar	9.91	33031	**18.94**
	25	Dogadda	0.73	2423	
CLUSTER – 12		**TOTAL**	**10.64**	**35454**	
	26	Vikasnagar	4.18	13927	**13.66**
	27	Herbertpur	2.93	9771	
CLUSTER 13		TOTAL			
	28	New Tehri	7.20	24012	**17.06**
	29	Chamba	2.33	7771	
CLUSTER 14		TOTAL	**9.53**	**31783**	

Table 5-5Phase II Projects, Under Integrated Approach

Funding Agency	Sr #	ULB	MSW (MTPD)	Benefitted Population	Project Cost (Cr.)
GoI/GoU	30	Kaladhungi	2.28	7611	4.08
	31	Almora*	10.24	34125	18.05
	32	Pithoragarh*	16.81	56044	39.88
	33	Mussoorie*	10.84	28897	14.97
	34	Barkot*	2.02	6720	3.93
	35	Gairsain	2.60	8665	4.78
	36	Munsyari	1.09	3620	2.58
	37	Dharchula	2.11	7039	4.07
	38	Pipalkoti	1.06	3521	2.54
	39	Tharali	1.34	4482	2.96
	40	Nanakmata	2.54	8478	4.70
	41	Ranikhet Chiniyanoula	1.53	5100	3.23
	42	Lamb Gaon	0.70	2330	2.02

Funding Agency	Sr #	ULB	MSW (MTPD)	Benefitted Population	Project Cost (Cr.)
	43	Gaja	0.54	1800	1.79
	Total		**65.68**	**211713**	**126.78**
NGRBA	44	Rudra Prayag**	2.79	9313	5.66
	45	Chinyalisaur**	2.65	8844	4.85
	46	Joshimath**	5.01	16709	10.24
	47	Srinagar**	6.03	20091	10.21
	48	Badrinath**	0.87	2307	3.12
	49	Sri Kedarnath**	0.23	612	1.46
	50	Uttarkashi**	5.24	17480	9.07
	51	Dev Prayag**	0.86	2868	2.19
	52	Augustmuni**	2.21	7367	4.21
	53	Gauchar**	2.39	7955	5.35
	54	Karnaprayag**	2.48	8283	5.33
	55	ChamoliGopeshwar**	6.43	21447	13.88
	56	Ukhimath**	0.88	2920	2.27

Funding Agency	Sr #	ULB	MSW (MTPD)	Benefitted Population	Project Cost (Cr.)
	57	Nandprayag**	0.49	1641	1.94
	58	Kirti Nagar**	0.46	1517	1.67
	59	Gangotri**	0.33	1100	1.84
	TOTAL		**39.35**	**130454**	**83.29**

Note: The Urban Agglomeration(UA) population will need to be considered in each city/ project once the detailed planning is undertaken. Phase II includes 28.18% UA population (1,29,637) generating 38.89 MTPD @300 gcpd.

Option – 1: Shivalik Nagar has been integrated with Haridwar, which is just 10Kms

Option – 3: There is possible cluster formation under Rudraprayag district i.e. Augustmuni, Srinagar, Nandprayag and Gaucher (In process)

* Represent ULBs whose Master Plans are already prepared under ADB

** Represent ULBs under pre-approved NGRBA plan

^ Best option if Kaladhungi integrate with Nainital and Shivalik Nagar

^ with Haridwar

Represents all new ULBs added in 2017

Option 4 Selaqui ULB has been added to Dehradun as it is only 7km from Sheeshambara, Dehradun

Option 5 New Tehri and Chamba have been clustered because distance between both city is 11 Km and land for Sanitary landfill is proposed by the district magistrate at one place for both ULBs.

Option 6 Pipal koti to be clustered with Joshimath or kept separately;
Tharali to be clustered with Karanprayag or to be kept separately; Nanakmatta to be clustered with Tanakpur or kept separately

Table 5-6Projects under Phase – III

(COMPLETION TIME PERIOD: December 2021)

Phased – III projects are all based on integrated approach. Details are appended as below;

Funding Agency	ULB Sr. #	Name of the ULBs	MSW (MTPD)	Population Benefitted	Project Cost (Cr.)
GoI/ GoU	1	Ghansyali	2.33	7775	**4.39**
	2	Pokhri	1.84	6119	**3.86**
	3	Satpuli	1.27	4226	**2.84**
	4	Didihat	1.96	6522	**3.85**
	5	Purola	1.59	5306	**3.31**
	6	Nav Gaon	1.16	3875	**2.69**
	7	Bhowali	1.89	6308	**3.75**
	8	Dineshpur	3.40	11342	**8.03**
	9	Bhikiyasain	1.37	4570	**3.00**
	10	Chamiyala	1.59	5306	**3.31**
GRAND TOTAL			**20.73**	**69120**	**43.42**

Note: The Urban Agglomeration(UA) population will need to be considered in each city/ project once the detailed planning is undertaken. Phase III includes 2.48% UA population (11,411) generating 3.42 MTPD @300 gcpd.

Still with the consultation of respective ULBs possibilities of forming more clusters is under progress. For eg. Rudraprayag can be a possible cluster having other ULBs like: Gaucher, Srinagar, Augustmuni and Karanprayag. Since land availability is a challenge, therefore proposed plan is subject to change, based on its availability.

After the finalisation and reshaping of cluster including the peri-urban areas, the basic information on the detailed infrastructure requirement can be calculated and considered in the capital estimations. While doing so, all the available assets which can be utilised and capital investments for restorations of old dump sites shall also be taken into account. The equipment and collection depot for handling the hazardous waste shall also be included in the capital estimation.

5.14 Strategy Services of Consultant:

It was observed that most of the ULBs have prepared the SWM Detailed Project Report without the help of external consultant, thus such DPRs lack the important components required to preparing a fool proof project report.

Designing and building a landfill, transfer station, recycling center, operation plan etc will

require technical expertise, thus obtaining the help of a consultant to prepare a detailed feasibility of the project is necessary and would prove to be time saving in the long run.

Though the consultants often do have expertise in developing plans in general, they still do not have as much expertise and knowledge of the ULB as compared with ULB officials and locals. Thus, a combined motivated effort should be made to prepare long term action plans. Consultants should be made aware of the ULBs requirements related to the project, provided sufficient information on the town and community. This will ensure that a plan or design developed meet specific needs and situation of each ULB. Suggestions from the client should be carefully weighed by the Consultant and accepted if found suitable.

5.15 Strategy # Determining Role and Responsibility of Stake Holders:

The Role of various stakeholders shall be as per SWM Rules 2016 provisions 4, 11 to 17.The most important role and responsibility of effective implementation of SWM rules compliance lies with district administration. Section 12 of SWM Rules 2016 speaks about the role of District Administration as “The District Magistrate or the Deputy Commissioner of the concerned district shall have the overall responsibility for the enforcement of the provisions of these rules within the territorial limits of their jurisdiction.” Second most important role and responsibility lies with the State Pollution Control Board in enforcing the effective compliance. The State Pollution Control Board shall monitor the compliance, grant authorization for setting and operation of waste processing facility including landfill and shall coordinate with the State Boards, Departments and Committees with particular reference to implement and review of standards and guidelines and compilation of monitoring data.Urban Development Department shall ensure identification and allocation of suitable land for setting up processing and disposal facilities for solid wastes and incorporate them in the city’s master plan. UDD shall also ensure that a separate space for segregation, storage, decentralized processing of solid waste is demarcated in the development plans forgroup housing or commercial, institutional or any other non-residential complex exceeding 200 dwelling or having a plot area exceeding 5,000 square meters.

State shall direct the developers of Special Economic Zone, Industrial Estate, Industrial Park to earmark at least five percent of the total area of the plot or minimum five plots or sheds for recovery and recycling facility.

Urban Development Department shall facilitate establishment of common regional sanitary land fill on cluster basis; Urban Development Department shall notify buffer zone for the solid waste processing and disposal facilities of more than 5 tons per day in consultation with the State Pollution Control Board and start a scheme on registration of waste pickers and waste dealers.

The ULBs shall prepare a solid waste management plan as per this state action plan and strategy on solid waste management. The ULBs shall frame bye-laws incorporating the provisions of the SWM rules 2016 within and ensure timely implementation. ULBs shall prescribe from time to time user fee as deemed appropriate and collect the fee from the waste generators on its own or through authorised agency;

To achieve the implementation, the ULBs or the relevant cluster head, respectively, shall periodically (once a year) report to the UDD on the progress made on both the implementation of the SWM Rules, of the contribution of the stakeholders and on the project implementation to gauge the real against the envisaged progress. The role of the informal sector in management shall be highlighted which is deemed important to make the collection of recyclables and their further use viable.

Since waste management is the responsibility of every generator and not solely of particular person, department, community or ULB. Thus, it's must that role and responsibility of all stake holders should be clearly defined and timely monitored, as indicated by the SWM Rules, 2016, which include the assignment of responsibility to both waste generators and to institutions and to private entities. The concept of partnership in Swachh Bharat has been introduced. Following actions are envisaged for this strategy.

- Bulk and Institutional Generators, Market Associations, event organizers and Hotels and restaurants shall be made responsible for Segregation and Sorting the waste and manage in partnership with Local Bodies.
- All Resident Welfare and Market Associations, Gated communities and institution with an area >5,000 sq. m shall segregate waste at source- in to valuable dry waste like plastic, tin, glass, paper, etc. and handover recyclable material to either the authorized waste pickers or the authorized recyclers or to Urban Local body.
- All hotels and restaurants shall segregate biodegradable waste and set up a system of collection or follow the system of collection set up by local body to ensure that such food waste is utilized for composting / biomethanation.
- Every street vendor shall keep suitable containers for storage of waste generated during the course of his activity such as food waste, disposable plates, cups, cans, wrappers, coconut shells, leftover food, vegetables, fruits etc. and deposit such waste at waste storage depot or container or vehicle as notified by the local authority
- The developers of Special Economic Zone, Industrial Estate, Industrial park to earmark at least 5% of the total area of the plot or minimum 5 plots/ sheds for recovery and recycling facility.

5.16 Strategy # Capacity Building of ULB, Community Education and outreach plan:

Knowledge of new technologies and methods coupled with training at all levels is necessary. Special training and refresher courses would be suggested for unqualified supervisory staff. Short and medium term courses would be suggested for the sanitation workers and supervisory staff focusing on SWM related aspects, like proper use of tools, good practices of sanitation, knowledge about SWM Rules, 2016 health, safety and hygiene related issues, work by involving the community etc.

Elected representatives and officers of implementing agencies need training on good practices of SWM, Private sector participation, Management Information Systems, and other issues related to finance, legal and institutional strengthening.

The state shall arrange for Capacity building of ULBs in partnership with training agencies and other stakeholders in managing solid waste, segregation and transportation or processing of such waste at source as per SWM Rules 2016.

Due to rapidly growing urban population, current institutions are unable to provide an adequate level of services, posing a serious threat to public health and environment. It is experienced that even after setting up of a good system, it is not always necessary to obtain desired results. No city can remain clean, if sanitation work is left entirely on civic body with no cooperation or very little cooperation of people.

Thus Communities should be motivated enough to solve their common problems at local level. Community participation is the process by which individuals and families understand responsibility for their own health and welfare of societies. Communities should be motivated enough to solve their common problems at local level. This enables them to become agents of their own development instead of positive beneficiaries of development aid. The key to the success of a solid waste management system in any city is the cooperation of citizens. Citizens ought to be involved in proper storage, collection and safe disposal of waste.

Communities should also be made aware of health risks associated with improper solid waste management practices along with their role in management of waste. At the same time training and refresher courses are essential for municipal staff and public representatives.

Therefore for effective implementation of SWM practices, three pronged action is required:

(i) Setting up of an efficient system by ULB in association with State Government

(ii) Capacity building of staff, public representatives, NGO etc and

(iii) Mass awareness campaign for waste generators/ community. Ensuring Public Participation, through consistent mass awareness campaign is key to success for SWM. Thematic drives would be taken up by ULBs at regular basis to create public awareness through information, education and communication campaign and educate the waste generators on the following; namely:-

(a) not to litter;

(b) minimise generation of waste;

(c) reuse the waste to the extent possible;

(d) practice segregation of waste into bio–degradable, non-biodegradable (recyclable and combustible),sanitary waste and domestic hazardous wastes at source;

(e) practice home composting, vermi-composting, bio-gas generation or community level composting;

(f) 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 nonbiodegradable waste;

(g) storage of segregated waste at source in different bins;

(h) handover segregated waste to waste pickers, waste collectors, recyclers or waste collection agencies; and

(i) 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.

This would be along drawn exercise as it involves attitudinal changes in people and will have to be done with careful planning, in a phased manner.

(i) Training of the Executive officer, technical staff and sanitary inspectors in understanding the fundamental difference between “scavenging and cleaning” and solid waste management, with adequate stress on end use disposal of garbage. The concept of recovery of resource and energy conservation should remain the focus of the programme. The outcome will be monitored regularly by a qualitative assessment of all candidates who underwent the capacity building program.

(ii) Training of the field staff in scientific collection of waste through proper segregation to keep the waste stream un-mixed. A proper dissemination will be scrutinised by field practice tests.

(iii) Immediately practicing the discipline of collecting inert (road dust, drain silt, debris), littered plastics and its likes, the biodegradable waste in separate trips.

(iv) Organizing workshops and awareness programs in schools, community based organizations for seeking their opinion and support for evolving and practicing waste handling and management.

(v) Evolving relevant literature for circulation backed up with one to one interaction of waste collectors with the community.

(vi) To monitor the effective operation as proposed, we can have a State Level Steering Committee (SLSC) for SWM and PMU at DSP level which will monitor the activities of all 3-stages and can propose remedial actions to the concerned ULBs and also put forth the penalization recommendation to the SLSC, in case if the operator or the ULB continuous fails to meet the necessary compliance as proposed under the Concessional Agreement and SWM Rules,2016

(vii) Key Strategies:

a) Design education and technical assistance program with and for key stake holders to support behaviour and systems change.

b) Create clear, fair regulations (via bylaws and permits) that provide a strong financial incentive for waste prevention and diversion activities.

c) Support the private sector to expand or create new collection and processing services for enhanced recycling and composting.

e. A milestone plan for the IEC and capacity building measures shall be developed by the state with specific topics of each program to be launched Also capacity building plans for ULBs shall take into consideration the recently launched Swachchta App and E-Courses for SWM practices under SBM by MoUD.

f. Involvement of Private sector in IEC and capacity building measures community Participation: Thematic drives on cleanliness and litter free city will be organized by ULBs in coordination with all stakeholders and community members. ULBs shall direct waste generators not to litter i.e throw or dispose of any waste such as paper, water bottles, liquor bottles, soft drink canes, tetra packs, fruit peel, wrappers, etc., or burn or burry waste on streets, open public spaces, drains, waste bodies and to segregate the waste at source as prescribed under these rules and hand over the segregated waste to authorised the waste pickers or waste collectors authorised by the local body. ULBs shall also facilitate formation of Self Help Groups and thereafter encourage integration in solid waste management practices.

5.17 Strategy # Fund Allocation:

It's a key component of every action plan. The fund allocation for the smooth and trouble free project commissioning and operation is required in two stages;

1) Capital Expenses (One time/ Phased wise) – Short term

2) Operation and Maintenance (recurring/ continuous) – Ongoing

The Capital expenses which include the Pre-project planning expenses, planning period expense, cost on various civil, mechanical, automobile infrastructure and legal expense etc. These costs can be met through the following means:

a. Grant from Central (upto 50% or more)
b. Grant from State (upto max.50%)
c. Grant from ULB (upto max. 30%)
d. Investment by the private partner (upto 100%)

External grants and financing sources shall be taken into consideration to meet the financial viability of different project. Funding options through CSR, private sector participation shall be explored.

5.18 Strategy # Determining of User Fee:

One of the serious most concern for the state is to ensure that each of its proposed SWM projects become financially self -sustainable. This is possible only when the waste resource is fully capitalized by means of sale of compost, recyclables, RDF and recovering 100% user fee from the waste generators under Polluters to pay principal. This is one of the toughest tasks, as most of the failure of SWM project was because of this factor only.

The Government has to understand that only in bigger SWM projects i.e. where the waste generation capacity is above 100MTPD, will be beneficial to a PPP operator, if the operator invests partially on the project else in rest of the case, ULBs have to meet the expense on their own. Thus a budgetary provision needs to be taken to meet the gap and keep the project in operational mode.

A model fee calculation scheme shall be prepared to accommodate the needs of the ULBs and clusters to anticipate the fees they have to leverage from the waste generators. This calculation shall take into consideration the loan conditions and should target at full recovery of the costs incurred while providing the waste management services.

Low income housing areas which cannot sustain the service provision shall be cross-subsidised in that calculation but provisions should be made for the floating populations. Such tool could then be easily adopted by each ULB or cluster. A transparent accounting system which should

cover the entire service chain (street cleaning, collection, transport, recycling and disposal) which should not veil any costs is regarded as extremely important.

Recovery of user fee from waste generator can be made through merging the total expense in the utility bills of the waste generator either in water or electricity; else recovering petty amount from door to door will be too costly to the operator.

5.19 Strategy # Reward and Award:

The motivational strategy involves two approaches (i) Punishment and (ii) Reward. The first approach will develop fear, which is good to certain extend but in long runs compel the defaulter to revolt against the same and thus leads to distraction. The second approach though is not quick result oriented but these initiatives ones gather momentums then it lead to success. Either people or an organization, everyone loves getting “recognized”.

Thus, State plans to welcome suggestions globally to identify the best mechanism of rewarding the person, community or an organization that set an example of best waste management practices. The ULB too shall be rewarded if it ensures best MSW rules compliance and achieve the baseline service level benchmarks developed by MoUD, highlighted as below:

Table 5-7Baseline service level benchmarks developed by MoUD

Sr	Performance Indicator	Norms	Rationale
1	Household level coverage Of SWM services through door-to-door collection of MSW	100%	This indicator provides the coverage of door to door solid waste collections services. Door step level collection is an essential and critical starting point in the entire chain of specific MSWM services.
2	Efficiency of collection of MSW	100%	While the indicator is well understood, the reliability varies significantly on account of different methods used for measurement. Collection efficiency should measure waste collected in normal course by the SWM system. Typically the uncollected waste tends to gradually find its way into recycling, or is strewn along the roads, clogs the drain or in case of organic waste, it putrefies and degrades, hence the significance of collection efficiency indicator.
3	Extent of segregation of MSW (segregation should be at least separation of wet waste and dry waste at the source. Ideally the segregation should be in the following categories – biodegradable, non-degradable and hazardous domestic waste like battery etc.)	100%	Segregation of waste is a critical requirement for sustainable solid waste management system. Segregation enables recycling, reuse, treatment and scientific disposal of the different components of waste. Segregation of waste should ideally be at source and should then also be transported in a segregated manner up to the point of treatment and / or disposal. If waste is received at these points in a segregated manner, it can be safely assumed; that it has been segregated at source and transported so while the converse may not be true. Therefore, segregation is being measured at this point of receipt, rather than at point of collection.

4	Extent of MSW recovered	80%	Environmental sustainability demands that maximum extent of waste should be recycled, reused or processed. While the processing, recycling and reuse should be carried out without creating any health and environmental hazards, the total quantum of waste recovered is in itself a key performance parameter. Therefore, measurement of this indicator is critical. The benchmark value for this indicator will depend on the amount of inert matter comprised in the waste collected by the ULB.
5	Extent of scientific disposal of MSW	100%	Inert waste should finally be disposed at landfill sites, which are designed, built operated and maintained as per standards laid down in prevailing laws and manuals of nodal agencies. This includes collection and treatment of leachate at the landfill site. Extent of compliance should be seen against total quantum of waste that is disposed in landfills. This is a critical performance parameter from an environmental sustainability perspective
6	Extent of Cost recovery for the ULB in MSWM services	100%	Financial sustainability is a critical factor for all basic urban services. In services such as SWM, some benefits are received directly by the consumers, while some other benefits accrue indirectly through a cleaner and sustainable environment, apart from public health benefits. Therefore, costs related to SWM may be recovered through a combination of taxes and user charges. In case of SWM, there is potential to supplement user charges with revenues that can be gained from recycling, reuse and conversion of waste to either compost or directly to energy. Therefore, it is critical for measuring overall cost recovery.

7	Efficiency in redressal of customer complaints	80%	It is important that in essential services such as SWM, the utility has effective systems to capture customer complaints/ grievances, escalate them internally for remedial action and resolve them. While many ULBs/ utilities have put in place systems to capture complaints, much more work needs to be done to put in place back end systems for satisfactorily resolving those complaints in a timely manner. As SWM is an essential service, the benchmark time for redressal is 24hours or the next working day
8	Efficiency in collection of MSWM related user charges	90%	For a utility, it is not just enough to have an appropriate tariff structure that enables cost recovery objectives, but also efficient collection of revenues that are due to the utility. It is also important that the revenues are collected in the same financial year, without allowing for dues to get accumulated as arrears

5.20 Strategy # Promotion of Compost

Urban Development Department in coordination with the Department of Agriculture and Department of Fertilizers through appropriate mechanisms shall ensure promotion of co-marketing of compost with chemical fertilisers.

5.21 Strategy # Waste Management during an event and mass gathering

ULBs will be ensuring that no person or organisation shall organise an event or gathering of more than one hundred persons at any unlicensed place without intimating the local body, at least three working days in advance and such person or the organiser of such event shall ensure segregation of waste at source and handing over of segregated waste to waste collector or agency as specified by the local body.

5.22 Strategy # Bio-remediation/Capping and closure of old dumpsites

ULBs will investigate and analyse all old open dumpsites and existing operational dumpsites for their potential of biomining and bio-remediation and where ever feasible, take necessary actions to bio-mine or bio-remediate the sites. In absence of the potential of bio-mining and bio-remediation of dumpsite, it shall be scientifically capped as per SWM Rules 2016

5.23 Strategy # State Level Advisory Body in compliance to SWM Rules, 2016

Urban Development Department, Government of Uttarakhand shall constitute a State Level Advisory Body in accordance with the SWM Rules 2016.

5.24 Strategy # Integrated In-house mechanism of handling sewerage and waste:

Under the town planning an approach is set to be incorporated which ensures that every upcoming township projects, community halls and facilities either residential or commercial, should have their own integrated sewerage system to collect and process the incoming sewage and safe handling and management of municipal solid waste as per CPHEEO guidelines.

5.25 Strategy # Tipping fee applicable only on the processed MSW:

Since the main objective of the State Government is to encourage minimization of the waste reaching to landfills, thus it is possible only when the recovery of waste resource material is maximized by adopting various scientific means and approaches which also involve the principle of 5R's. Thus, the State Government has decided to encourage payment of tipping fee against collection and transportation of MSW on the processed waste output for compost or RDF.

Till the processing facility is not in operation, the incentivized payment for meeting the partial cost of collection and transportation of the MSW shall be paid in certain percentage of the agreed tipping fee only for a particular period decided initially with the Operator at the bid stage. If the processing facility by that time is not commissioned then the incentivized payment shall be made in reverse manner and after 9 months the contractor's agreement shall be revoked and will be handed over to the second successful bidder (L2).

As private investment into the waste sector is appreciated, it can be achieved by a fair risk sharing between the private operator and the public body only, the tipping fee modality should accommodate commodity market variations. Sharing revenues from sales of recyclables or compost between the public body and the private operator and emphasising quality aspects, such as plant availability, product quality, rather than monetary ones can be included in the tipping fee modality.

5.26 Strategy # Cluster Unit Model – 3 Staged Operation:

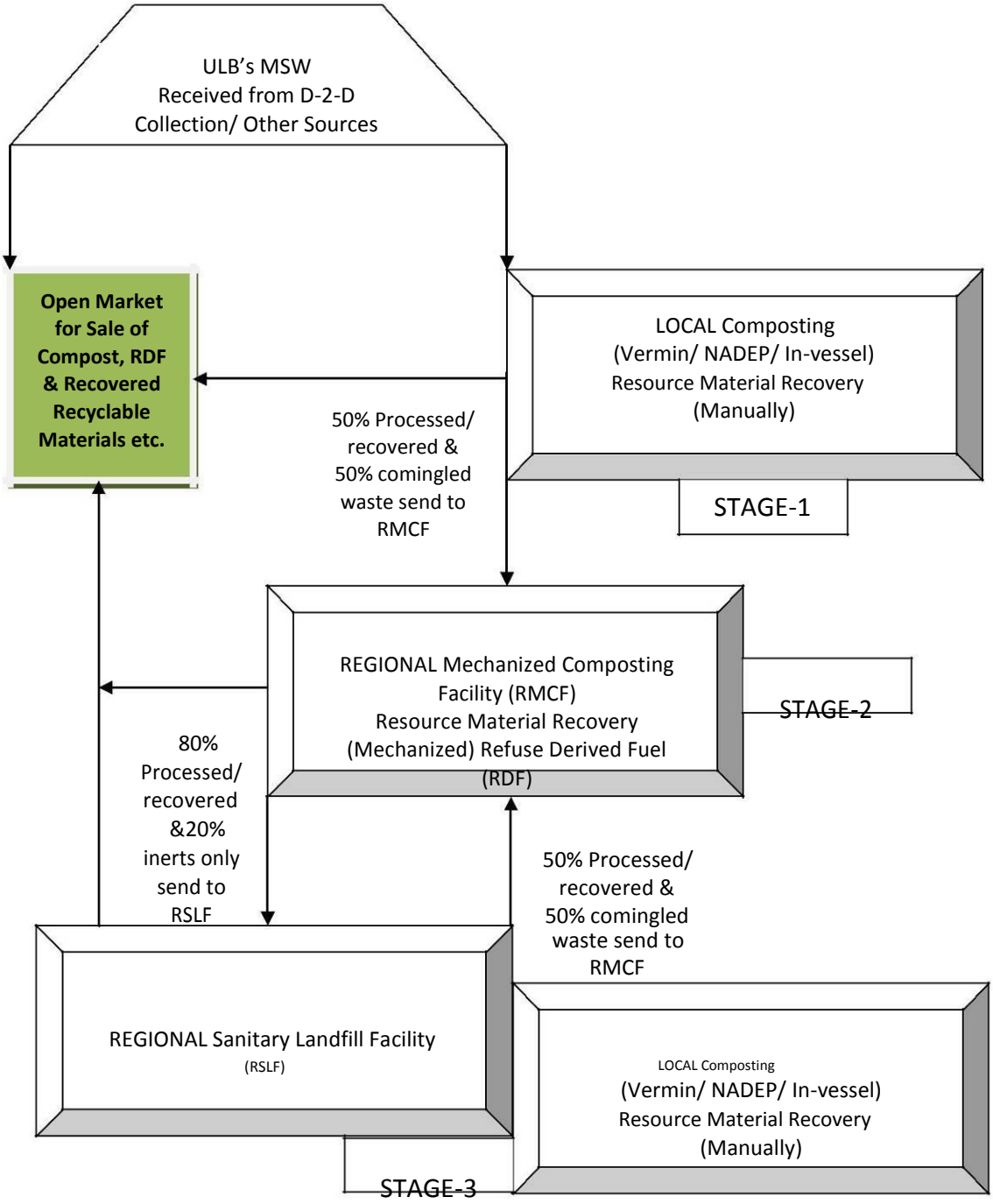
The uniqueness of this model shall be as follows;

- Door to Door Collection of Waste in segregated manner in every ULB shall be must
- Local Composting and Material Recovery Facility shall be provided so that the ULBs utilizing their own resources or with the help of NGOs can recover the maximum resources for the received wastes generating some financial benefits. Depending on the demand and the processing capacity available locally, decentralised MRFs or composting plants can be set up to limit the burden of transport
- Comingled waste left out after recovery, and rejects from recycling shall be send to the Regional Composting Facility (RCF), where the waste along with its own waste shall be processed. The processed output could be a compost, recyclable/ saleable and RDF material. The inerts shall be transported further to the Regional Sanitary Landfill (RSLF).
- The RSLF shall be designed to accommodate 20% maximum of the total cluster's MSW generation for 30years.

- Establishing RMCF & RSLF will depend upon the distance between the ULBs (A general guidelines is to keep max. permissible distance in Plains as35Kms and in Hills – 15Kms) However, given the land scarcity and land suitability criteria , the distance to a RSLF may be defined on a case by case basis after evaluating all options of decentralised processing , including recyclable and recoverable materials and forwarding only rejects transfer to the regional facility. The impact of distance and, hence, transport costs shall be assessed against the availability of land and additional capital cost required to set up local facilities which also shall be accomplished on a case by case base.
- All the potential sites for developing waste processing and disposal facility should be identified at the earliest and a timeline should be provided to allow for a proper planning and fund allocation process. Where additional land can be made available for a regional facility, the same may be blocked for purposes of planning and future utilization.
- Given that Uttarakhand is composed of 93% hilly and 7% plain area only and that areas to accommodate SWM facilities are scarce in the whole state in general and in particular in the mountains, a special waste management approach shall be foreseen for the hilly regions. Particularly the impact of distance and, hence, transport costs has to be assessed against the availability of land and additional CAPEX required to set up local facilities which has to be accomplished on a case by case base.
- Transportation of comingled and inerts material to regional processing/ disposal site shall be based on waste quantity and will be transported only when 6-8tons of post processed waste material is accumulated.
- Such processes will ensure maximum recovery of waste material from the stream and will make the entire process transparent and self-sustainable.
- The life of the RSLF shall too be increased, ensuring optimum utilization of the limited resources.

A flow chart is provided on the next to illustrate the entire process in details;

Figure 5-6Cluster Units 3 Staged Model

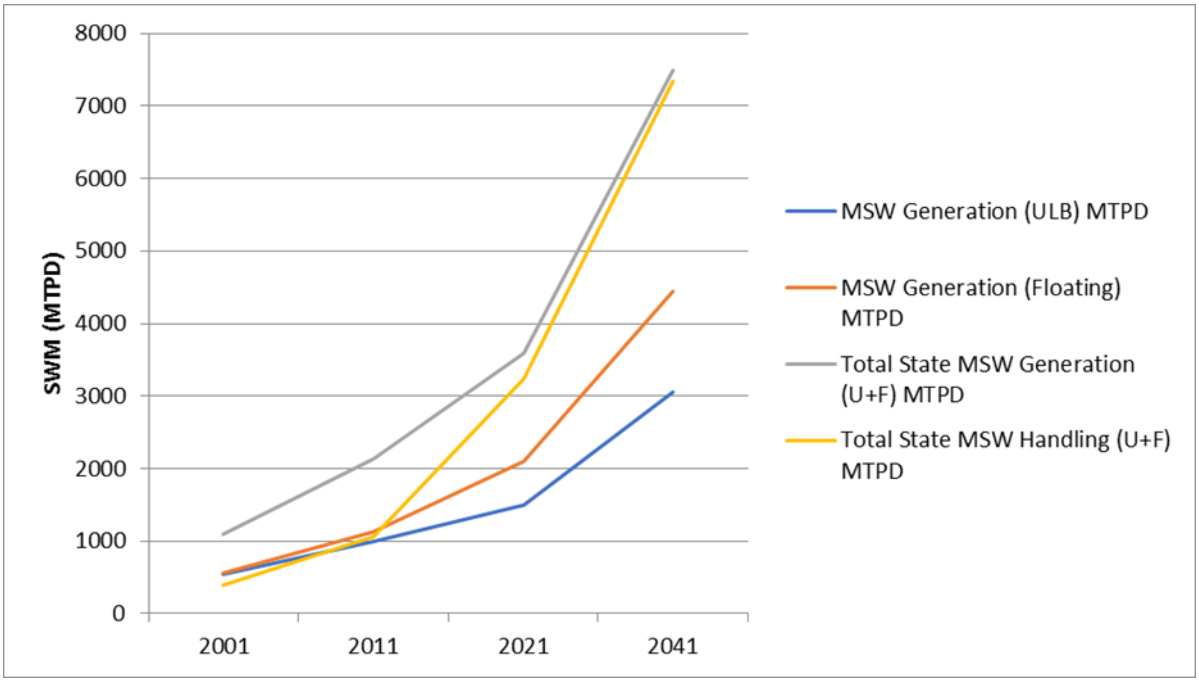


6. Aftermath of the implementation of Proposed Action Plan:

Following results are expected if the proposed action plan it put at place;

- Clean and Green Cities
- Decentralized approach of primary collection system through Resident Communities
- Sustainable Development through Resource Recovery
- Meeting International hygiene and sanitation city standard Pollution free rivers
- Effective compliance of Municipal Solid Waste Management Rules, 2016 which shall be monitored by UDD by requesting annual reports on the implementation of the duties as per provisions 4 and 15.
- Rise in civic sense awareness, personal and community hygiene Reduction of waste generation per capita, and maximize the diversion to waste to resource
- Achieving 98% compliance of waste generation and disposal
- Rise in awareness level about sanitation and personal hygiene

Figure 6-1 Waste Management Trend after project completion



Head	Value	Years			
		2001	2011	2021	2041
MSW Generation (ULB)	MTPD	545	994	1492	3054
MSW Generation (Floating)	MTPD	557	1135	2100	4443
Total State MSW Generation (U+F)	MTPD	1102	2129	3592	7497
Total State Waste Handling (U+F)	MTPD	386	1064	3233	7347
Total MSW Handling Gap for (U+F)	MTPD	716	1064	359	150
Handling Gap	%	35%	50%	10%	2%

7. Good Practices Initiated by the State towards SWM Compliance and in line with the proposed Action Plan:

- Launch of Rastriya Swachata Abhiyane, by Hon'ble Chief Minister of State
- Restructuring of the ULBs – proposed creation of extra 1800 post of Safai Karamchari, which has now been renamed as "Paryavaran Mitra"
- Allocation of funds under the 13th Finance Commission for undertaking SWM activities in ULBs
- Direction issued to all ULBs to identify the suitable land fill sites on priority basis Plastic Compacting Machines at 16 ULBs have been installed, Joshimath a success story
- Under SPA, funds were released to many ULBs for sourcing tools, equipment, vehicle and erecting necessary infrastructure in compliance with MSW Rules, 2000
- State Government has made a State Policy in compliance with the Municipal Solid Waste Management & Handling Rules, 2000.
- State Government has made a Draft bill on Anti Littering & Anti Spitting, which is under review and will soon be notified.
- State Government has issued directions in the form of following GOs regarding effective solid waste management and implementation of SWM Rules 2016, few are listed as below:

    a. Direction has been issued to all ULBs for the constitution of Mohalla Sanitation Committees in order to ensure door to door collection of solid waste through GO # 205 dated 3/07/2003.
    b. Generation of waste has been categorized into 10 categories and directives for solid waste management have also been issued through GO # 558 dated 4/4/2007.
    c. State Govt GO # 86-IV-03-2010-13(11)/2001 dated 9/8/2010 has prohibited the burning of plastic material and waste.
    d. GO No. 94, Dated 13-1-2016, regarding plastic ban and proper disposal of MSW
    e. GO No. 2187, Dated 29-12-2017, regarding ban on burning of waste
    f. Go No. 2188, Dated 29-12-2016, regarding identification of land for disposal of solid waste)
    g. Formation of district level committee vide GO No. 293, dated 18-2-2016 regarding identification of Land for scientific disposal of waste
    h. Go No. 421, Dated 14-3-2016 regarding authorization from pollution control board for swm processing plant and submission of annual report)
    i. GO No.2189, Dated 29-12-2016 regarding fixing responsibility of

waste generators in accordance with SWM, Rules 2016

j. GO No. 356, Dated 26-2-2016, 2191, Dated 29-12-2016 regarding laving User Charges on "Polluters to pay principle" in accordance with SWM, Rules 2016
k. State government has promulgated "The Uttarakhand Anti Littering and Anti Spitting Act, 2016" with effect from 30 November, 2016. In which specific provisions have been made for prohibiting littering, urinating or defecating by pets or humans in open. Contravention of the act invokes a penalty of maximum of Rs. 5000 or imprisonment upto six months or both.

- Direction has been issued by Chief Secretary, Govt of Uttarakhand vide GO # 85 dated 17/1/2011 to ensure awareness drive and community participation for solid waste management and environmental sanitation.
- The State Government has implemented Nirmal Nagar Puraskar Yojana in 2010 to encourage ULBs for SWM works. Proposals of six ULBs have been selected out of total 18 proposals submitted by ULBs through District Magistrate. These selected ULBs were awarded with cash price of Rs.1.40Cr. ranging from Rs.50.00 to 10.00Lacs.
- Capacity Building Programmes have regularly been organized for ULB officers, staff and elected representatives, few are as under:

a. 1st Training Program on City Sanitation Plan including SWM in coordination with GIZ at Doon University in November 2016
b. 2nd Training Program on City Sanitation Plan including SWM in coordination with GIZ at Doon University in April 2017
c. 3rd Training Program on City Sanitation Plan including SWM in coordination with GIZ at Doon University in July 2017
d. Two Workshops, one each in Kumaon and Garhwal Division, on solid waste management has been organized on 17-19th November 2009.
e. 5 days training on Municipal Solid Waste in context to Community Participation at ATI Nainital from 5-9th January 2010.

8 Way Forward:

The state shall prepare a milestone plan for the project implementation and fund disbursement in due consultation with the ULBs or the cluster representatives. Project progress should be gauged against the milestone plan. The milestone plan should be updated regularly. It is recommended to update the SWM Action Plan every five years, in order to undertake course correction measures. .
ULBs to identify 3-4 sites available within their geographical limitation for the proposed SWM activities and initiate acquisition process with the concerned authority, sites shall later be ranked as per their suitability for development of Waste management facilities

- Concerned district magistrate must seriously initiate to help ULBs to acquire suitable and desired size land for the management of municipal wastes. The concerned DM need to make a combined departmental approach to save time and resources
- Capacity building of ULBs and initiating rigorous IEC activities involving stake holders
- Setting up of site clearance committee by the State Board/ Committee or State Urban Development Department for advising on suitability of site for waste processing and disposal
- Monitoring and implementation of action plan is required at State Level, District Level and at Municipal Level (Mechanism need to be identified)
- Appointment of Project Management Consulting Unit for (a) Kumaon Region (b) Garhwal Region, so to initiate the below activities in compliance with the MSW Rules, 2000 and in accordance with the State's MSW time bound Action Plan;
- Meeting with Stake holders and various departmental officers
- Preparation of Detailed Project Reports
- Land identification for setting of proposed facility and landfill (Preferential – Regional basis) and rehabilitation or reclamation of old dump site followed by capping and plantation
- Geo hydro technical & Contouring survey of the proposed compost and landfill site
- IEE / EIA for the proposed landfill
- Detailed drawing and cost estimation
- PIC review, approval
- Submission of final DPR & RFP, incorporating the feedbacks
- Preparation of Bid Documents and pre & post bid process management and supervision till final commission of the projects and handing over Certificate of Completion to the ULB
- The ULBs and clusters shall prepare progress reports regularly, at least once a year, to update UDD about the implementation and the execution of the projects. Further on, a regular – at least quarterly – update shall be furnished on the disbursement and on the funding requirements.

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