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## Abbreviations

<b>ADB</b>	Asian Development Bank
<b>APCF</b>	Asia Pacific Carbon Fund
<b>BOT</b>	Build Operate Transfer
<b>BOOT</b>	Build Own Operate Transfer
<b>CPF</b>	Community Participation Fund
<b>CPHEEO</b>	Central Public Health and Environmental Engineering Organisation
<b>C&amp;T</b>	Collection & Transportation
<b>CPCB</b>	Central Pollution Control Board
<b>CDM</b>	Clean Development Mechanism
<b>CER</b>	Certified Emission Reductions
<b>DEA</b>	Department of Economic Affairs (India)
<b>DTDC</b>	Door-to-door-collection
<b>DPR</b>	Detailed Project Report
<b>DSCR</b>	Debt Service Coverage Ratio
<b>Eurostat</b>	Statistical Office for the European Countries
<b>EOI</b>	Expression of Interest
<b>FIRR</b>	Financial Internal Rate of Return
<b>GOI</b>	Government of India
<b>GHG</b>	Green House Gas
<b>IIPDF</b>	India Infrastructure Project Development Fund
<b>ICE</b>	Information, Communication, Education
<b>IMTF</b>	Inter-Ministerial Task Force
<b>IPFA</b>	International Project Finance Association
<b>JNNURM</b>	Jawaharlal Nehru Urban Renewal Mission
<b>LOI</b>	Letter of Intent
<b>MOF</b>	Ministry of Finance
<b>MOUD</b>	Ministry of Urban Development (India)
<b>MOEF</b>	Ministry of Environment & Forests (India)
<b>MNES</b>	Ministry of Non-Conventional Energy Sources (India)
<b>MOA</b>	Ministry of Agriculture (India)
<b>MSWM</b>	Municipal Solid Waste Management
<b>MRTS</b>	Mechanised Refuse Transfer Station
<b>MT</b>	Metric Tones
<b>NGO</b>	Non-Government Organisation
<b>NUSP</b>	National Urban Sanitation Policy
<b>NPV</b>	Net Present Value
<b>O&amp;M</b>	Operations & Maintenance
<b>PFI</b>	Project Finance Initiative
<b>PPP</b>	Public Private Partnership
<b>PIM</b>	Project Information Memorandum

<b>PIOP</b>	Project Implementation & Operations Plan
<b>RFQ</b>	Request for Qualification
<b>RFP</b>	Request for Proposal
<b>RDF</b>	Refuse Derived Fuel
<b>RMU</b>	Risk Management Unit
<b>SPCB</b>	State Pollution Control Board
<b>SLNA</b>	State Level Nodal Agency
<b>SPV</b>	Special Purpose Vehicle
<b>TA</b>	Technical Assistance
<b>TPD</b>	Tones per Day
<b>TCLP</b>	Toxicity test for leachates
<b>ULB</b>	Urban Local Body
<b>UIDSSMT</b>	Urban Infrastructure Development Scheme for Small and Medium Towns
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>VGF</b>	Viability Gap Funding

## About this document

This document covers Volume IV of the Toolkit for Public Private Partnerships (PPPs) in Municipal Solid Waste Management (MSWM) and is an effort to assess the baseline status of municipal solid waste management system in select Satellite Towns in the country. The Satellite Towns has been nominated under the Centrally Sponsored Scheme for Urban Infrastructure Development in Satellite Towns (CSSUIDST) of the Seven Mega Cities of India in view of its friendly and pro-poor approaches.

The report outlines the assessment of the existing municipal solid waste management system in the satellite towns covering aspects on situational analysis relating to waste quantity and quality, identification of key issues for provision of SWM services, prioritization of projects, establishing the commercial viability of the identified projects, and finally deciding the service delivery option in accordance with the “steps” highlighted in the Section I of this toolkit.

The objective of this exercise is two-fold; one is to identify the key issues /or gaps in the MSWM system in the select Satellite Towns, thus highlighting projects to be taken up on priority basis; second is to provide working case studies to showcase the utility of the “Process Toolkit” (Section I of this Toolkit) for implementing projects relating to the provision of MSWM services in the country.

It is emphasised here that this report is a compilation of these baseline case studies; its analysis and conclusions does not purport to be either a comment, opinion or criticism of any actual practice or decisions referred to in them, but is intended to provide insights on the probable solutions to improve service delivery for provision of SWM services with private sector participation as one of the likely option for improvement in services.

# 1. Baseline SWM Status – Hoskote

## 1.1 Hoskote City – an overview

Hosakote is a Town Municipal Council (here after “HTMC”) in Bangalore Rural District. It is situated along the Bangalore- Chennai Highway NH-4, at a distance of 27 Kms from Bangalore. Hosakote Town Municipal Council (HTMC) serves a population of 47,627 in 2009 which has grown from 36,323 in 2001 census.

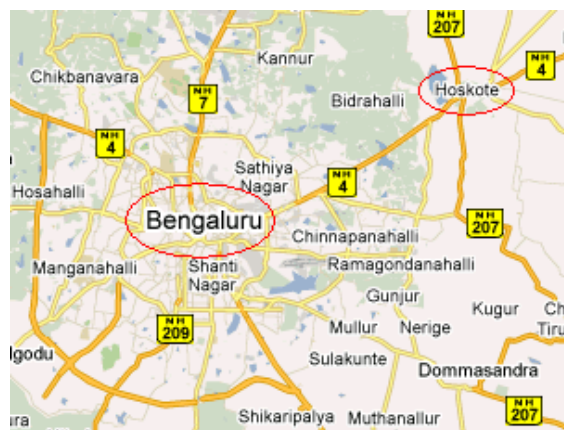
Hoskote town is located at 13.07°N 77.8°E and has an average elevation of 875 metres (2,870 feet).

Hoskote Town Municipal Council covers an area of 18.25 sq km, out of which 2.5 sq km is occupied by slums. The slum population is estimated at around 2000 people in 2009. The main decision-making body of HTMC is the Council, comprising elected representatives, while the administrative wing is headed by the Chief Officer who looks after the day-to-day operations.

The Hoskote town is divided into 23 wards. Hoskote Town Municipality Council manages delivery of municipal solid waste services in all 23 wards which falls under its limits.

As of 2001 India census, Hoskote had a population of 36,333. Males constitute 52% of the population and females 48%. Hoskote has an average literacy rate of 70%, higher than the national average of 59.5%: male literacy is 74%, and female literacy is 65%. Hoskote has 12% of its population under 6 years of age.

Lying on NH 4, and about 36 km from Bangalore City(MAJESTIC), Hoskote is well connected to Bangalore by buses (BMTC as well as KSRTC buses). The nearest railway stations to Hoskote are the Krishnarajapuram and Whitefield railway stations. Hoskote is a popular destination for birdwatchers and parasailers



## 1.2 Initial Assessment and Need Analysis

### 1.2.1 Situational Analysis

#### 1.2.1.1 MSW Inventory:

**MSW Generation** – The current per capita per day waste generation for the Hoskote town is about 0.25 kg/capita/ day. It is estimated that there are around 21,066 households in the town and the average household size is around 4.5 persons. Taking these parameters into account the total municipal waste generation in the city comes around 23.6 tons per day (TPD). Further, the field investigations by the ULB estimate that the municipal solid waste

generation in the town is to the tune of 19.8 TPD. The gap may be attributed to the additional waste generation in the slum areas and market /or commercial establishments in the city.

**MSW Characteristics** –The physical composition of the MSW generated in the city indicates that organic portion in the waste is in the range of 50-60% of the total waste which can be converted into organic matter using composting technology. The organic waste predominantly includes vegetable waste. The recoverable/recyclable components (paper and plastic) in the waste are around 20-30% of the total solid waste generation, which needs to be recovered before final disposal of the MSW into landfill site and the rest around 20% is the inert /or final rejects.

**1.2.1.2 Gap Analysis in the Existing MSWM system:**

The gaps in the existing systems are assessed in line with the service level benchmark norms and design criteria as per Municipal Solid Waste (Management & Handling) Rules as discussed in detail in “Section 4.1.2” of Volume I of this toolkit.

The existing MSWM system includes door to door collection of municipal solid waste by sweepers. It is estimated that around 16 tons per day of municipal solid waste is collected, which is around 80% of the total waste generation in the town.

Broadly, the MSWM services in the town include; primary collection, street sweeping and waste transportation for final disposal.

At present, the primary collection and street sweeping is jointly taken care by HTMC’s employees as well as through Contractors. HTMC employs about 28 employees (including Supervisors and Poura Karmikas). Apart from this, there are about 49 contractor employees involved in waste collection and street sweeping activities in the city. Total road length in the city is around 62 km and everyday around 46 km is cleaned by sweepers.

Waste collection points include 11 containers (each having 1 ton capacity) and 47 cement bins (each having 500 kg capacity). HTMC owned two tractors and one dumper placer for transferring the solid waste and additionally two tractors and two dumper placers are hired from private operator. Tractors are used to transfer the waste from cement bins whereas dumper placer is used for transferring two containers at a time.

HTMC area is categorized into three types for collection and transfer based on the quantum of waste generation and is indicated in the below table:

**Exhibit 1.1 – Waste Collection Frequency and Waste Collected in HTMC area**

Category	Frequency of collection and transfer	Quantity of waste per day (TPD)
Type A	Every day	13
Type B	Once in 2 days	4

<b>Type C</b>	Once in 4 days	2
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*Source: Hoskote municipal officials*

Based on the primary interactions with Hoskote municipality officials, IMAcS has assessed the current MSWM system in the town. Exhibit 1.2 below presents the key performance indicators of the existing MSWM system in Hoskote and the inferences therein:

**Exhibit 1.2 – Key Performance indicators of MSWM system in Hoskote**

S. No	SWM Activity	Service Level Benchmarks Norms	MSWM Services in Hoskote	Key Inferences
1	Source storage with bin systems & Source segregation	100%	0%	<ul style="list-style-type: none"> <li>✓ There is no separate bin system of storing waste at source and no segregation at source is currently being followed.</li> <li>✓ People in general are not aware of the benefits of developing such a practice indicating lack of awareness creation mechanism.</li> </ul>
2	Primary Door to door collection	100%	70%	<ul style="list-style-type: none"> <li>✓ The MSW is collected from door to door by sweepers and transfer to the transport vehicles.</li> <li>✓ Collection efficiencies are low and need to be improved substantially with complete coverage of city area under primary collection.</li> </ul>
3	Segregation at secondary storage points	100%	70%	<ul style="list-style-type: none"> <li>✓ There are 11 containers with 1.0 ton capacity and 47 capacity bins of 0.5 ton capacity for secondary waste storage.</li> </ul>
4	Transportation of MSW	100%	70%	<ul style="list-style-type: none"> <li>✓ HTMC owns two tractors and one dumper placer. Out of this, one tractor is around 18 years old and other one is 9 years old. While the dumper placer is new and is just 2 years old. Hence there is a need to invest in new tractor vehicles.</li> </ul>

				<ul style="list-style-type: none"> <li>✓Further, HTMC hires two tractors and two dumpers from private players for waste transportation.</li> <li>✓Each tractor vehicle is utilized in two shifts and makes two trips per shift.</li> <li>✓The average total distance covered by each tractor is 6 km per trip.</li> </ul>
5	Treatment & processing of MSW	100%	0%	<ul style="list-style-type: none"> <li>✓There is no treatment or processing of MSW collected.</li> <li>✓The bio-degradable waste portion in the total solid waste is around 10.0 TPD and it suitable for converting into compost..</li> </ul>
6	Extent of MSW recovered	80%	(no formal system, but informal system do exist)	<ul style="list-style-type: none"> <li>✓The physical composition suggests considerable amount of recyclable / recoverable from the MSW to the tune of 4-5 TPD.</li> <li>✓However, there is no formal recoverable system in the town and the informal stakeholders such as ragpickers, kabariwalas generally extracts the recyclables from the solid waste.</li> </ul>
7	Extent of Cost Recovery for the ULB in MSWM services	100%	0%	<ul style="list-style-type: none"> <li>✓No service charges are levied.</li> </ul>
8	Scientific Disposal of MSW	100%	0%	<ul style="list-style-type: none"> <li>✓The waste is being dumped at the Kalahalli which is around 3 km from the main city having total area of 12 acres.</li> </ul>
9	Efficiency in redressal of	80%	50%	<ul style="list-style-type: none"> <li>✓Customer compliant redressal system in the town with</li> </ul>

	customer complaints			personal visits by people to HTMC. ✓ Around 300 complaints received in the year 2009-10 by HTMC.
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### 1.2.1.3 Existing Physical Assets & Human Resources

**Physical Assets** – The Hoskote municipality has total two tractors and one dumper placer for transportation of MSW. One of the tractors is around 18 years old and other one is around 9 years old, whilst the dumper place is just 2 years old. Additionally HTMC hires two tractors and two dumper placers from private players.

**Human Resources** – The SWM department in HTMC is headed by Environmental Engineer. The key officials include Senior Health Inspector and Junior Health Inspector who are responsible for supervising SWM activities within HTMC. Exhibit 1.2 below outlines the human resources availability and work allocation for the provision of MSWM services in the town:

**Exhibit 1.3 – Manpower availability for provision of SWM services in Hoskote**

S No	Category of Manpower	Departmental		Nature of work assigned
		Total Number provided	Permanent/ Contract	
<b>1</b>	<b>Road sweeping, waste collection &amp; transfer</b>			
a	Sweepers	74	Out of this 48 are on contract	Street sweeping, waste collection and loading to tractors vehicles
b	Supervisors	3	Out of this one is on contract	
b	Drivers/Operators	5	3 on contract (2 for tractor and one for dumper placer)	Transportation of MSW to landfill
<b>2</b>	<b>Administrative /Monitoring</b>			
a	Health Inspectors	2	---	Administration & monitoring of daily activities relating to
b	Environmental	1	---	

	Engineer			MSWM system
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#### 1.2.1.4 ULB Budget Analysis

The annual budget for the provision of MSWM services in the city for last three financial years is highlighted in Exhibit 1.4 below. As shown the capital and revenue expenditure for the corresponding years are also highlighted.

**Exhibit 1.4 – Financial Analysis: Annual Budget, Capital & Revenue Expenditure in HTMC**

(in Rs lakh)	2008-09	2009-10	2010-11
Annual Budget for MSWM services	90.0	50.0	95.0
Capital Expenditure for MSWM	10.0	0	93.0
Revenue Expenditure for MSWM	76.0	NA	NA

Source: Hoskote' municipal officials

As shown, every year there is a budget allocation for provision of MSWM services in the city, which is mainly utilized for revenue expenses relating to MSWM services rather than investment in creation of assets or procurement of equipment, vehicles relating to municipal solid waste management.

However, in the financial year 2010-11, there is proposal for investing around 69 lakh for construction of basic infrastructure facilities in the existing landfill such as boundary wall, approach roads, watchman shed and bore well. Also around 24 lakh is budgeted for procurement of new vehicles like JCB etc to be utilized in the landfill site.

### 1.3 Identification of Key Problems:

The projects identified at the end of the exercise are indicative and the ULB would be required to review the projects in detail and carry out a consumer survey for the entire chain of MSWM service to identify the project scope and to prioritize the projects for implementation.

The section below outlines the key issues/gaps identified in the existing MSWM system in Hoskote along with reasons for service level gaps:

- i. Low MSW collection efficiency, around 70% against benchmark norm of 100%. However, there is no system of door-to-door collection in the city.
- ii. No waste segregation at source and at secondary points leading to mixing of waste.
- iii. No treatment facility for processing of MSW collected.
- iv. No sanitary landfill facility for scientific disposal of MSW collected

The above identified issues/gaps in the existing municipal solid waste system are primarily due to following reasons:

- i. Inadequate human resources to carry out MSWM activities. As indicated in section above, the ULB has only 74 workers, out of 48 are on contractual basis, to carry out road sweeping along with collection and pre-transportation to the transport vehicles.
- ii. Inadequate machinery, equipment for collection & transportation, thereby affecting the MSW services. Moreover, the existing fleet of vehicles (2 nos.) is in use for last 9&18 years.
- iii. There is a complete lack of any awareness creation mechanism coupled with lack of efficient customer compliant management in the town.
- iv. Inadequate technical capacity/capability for development of a waste processing and/or sanitary landfill facility.

#### 1.4 Determine Core Objectives & Prioritization

As per the discussions of IMaCS' team with Hoskote Municipality officials on the issues/gaps in the existing MSWM system as well as on the prioritization of projects, following is the list of key investment areas identified to comply with the MSW Rules and to improve the aesthetic environment of the town:

- i. **Awareness creation mechanism for community participation in MSWM activities** – with investment in the IEC activities to educate people on MSW Rules compliance like source segregation, avoiding littering on streets, using community bins etc.
- ii. **Creation of an assets** –
  - a. Investment in development of a processing facility, to comply with Rules and gain transport efficiency with reduced load to dumpsite.
  - b. Investment in conversion of existing dumping ground into sanitary landfill
  - c. Investment in procurement of vehicles, equipment and tools for collection & transportation of municipal solid waste in the city
  - d. Investment in basic infrastructure at the existing landfill site; boundary wall, roads etc

#### 1.5 Technical Option Analysis

**Collection and transportation** – the door-to-door collection shall be initiated with introduction of pushcarts/handcarts for narrow roads in the town to increase coverage and efficiency of primary waste collection.

**Project facilities** – since the waste generation is less in the town, it is recommended to have one facility encompasses various activities such as secondary storage (unloading of waste collected and loading of inert/reject for disposal to landfill), segregation area, processing zone for bio-degradable waste and recycling zone for debris collected.

The *secondary storage facility* should ideally be a conventional transfer station with ramp and platform for loading and unloading of waste. The organic waste which is around 10 TPD can be converted into compost using methods like vermiculture and only the inert/reject should be disposed of to the landfill site.

## 1.6 Commercial Viability Assessment:

As discussed in the preceding sections, the following 3 (three) major areas/aspects which need investment to match the desired service level benchmarks for the provision of MSWM services:

- i. Upgrading of existing collection & transportation system with investment in primary collection vehicles/equipment and transportation vehicles;
- ii. Development of project facilities including secondary storage and waste composting facility;
- iii. Development of engineered sanitary landfill facility.

As mentioned in the Section I of the toolkit, for establishing the commercial viability of the project the first step is to determine the probable financial sources and costs associated with the identified scope of work. This section presents broad indicators on the financial assessment of the identified project options (ii) and (iii), as the option (i) has already been considered for implementation under funds available from Finance Commission Grants.

It is envisaged that the capital investment requirement for provision of MSWM service over next 5 years, till 2015 is to the tune of Rs 5-7 crore. The financial sources include grants from centre & state government up to 80% & 10% of the total project cost respectively under satellite town development scheme.

The financial sources for option (ii) & (iii) other than grants/transfers can be the user charges for primary collection of MSW and this should also include rationalized charges from agencies/users, generating and throwing construction waste in the town and also revenues from sale of the compost and recyclables etc.

Given the scenario with 90% of the total project cost can be funded via centre/state grants coupled with probable revenue streams from user charges, sale of by-products like compost,

recyclables, prima facie, it appears that the projects with option (ii) and option (iii) above are commercially viable.

## 1.7 Service Delivery Options Analysis:

As highlighted there are two separate projects identified for provision of MSWM service; one on collection & transportation with upgraded fleet system, and second on development of project facilities including secondary storage, compost facility and sanitary landfill site.

However, the scale of the operations/investments is not significant to likely evince the interest of the private player for development of either an integrated MSWM system or an integrated processing and disposal system. Further, the ULB has already made some investment for procurement of transportation fleet for collection & transportation of MSW, it may be prudent to upgrade this system as handing over of the equipment/fleet to the private player and in that matter also integration of existing manpower in case of option of PPP may need designing of complex contract documents.

## 2. Baseline SWM Status – Lake Town

### 2.1 Introduction – New Town:

The New Town Area is located in close proximity to the city of Kolkata and falls within Rajarhat and Bhangar II Blocks in North 24 and South 24 Paraganas District respectively. The New Township area is very close to NH-34 which is connected to North Bengal. The townships also falls within 6 km of Bidham Nagar and Dumdum railway stations.

The Genesis process of New Town area is described below:

- May 1993 – The Department of Housing, GoWB constituted a Technical Committee for preparation of a preliminary report. Kolkata Metropolitan Development Authority (KMDA) has been entrusted the task for preparation of a Concept Plan for New Town.
- May 1994 – Technical Committee accepted the concept plan of KMDA
- Sept 1995 – The task force prepared a draft project report based on suggested structure of IIT-Kharagpur (ARP)
- May 1996 – IIT-Kharagpur submitted Master Land use plan based on suggested structure plan, further studies were taken up by I&WD, MED and PHED
- May 1999 – On the basis of all the studies conducted, a restructured maste land use plan was drawn up and development initiated by DoH, GoWB.



New Town was formed from village of Gopalpur-Rajarhat and as per Census 1991 this area was classified as rural area. As per Census Report 2001, the area is classified as Urban Area comprising of 27 wards consisting of a population of 2.71 lakh. Further, the sex ratio of New Town is 938 as compared to that of West Bengal 934 and India average of 933.

### 2.2 Initial Assessment and Need Analysis

#### 2.2.1 Situational Analysis

##### 2.2.1.1 MSW Inventory:

**MSW Generation** – The New Township area of Kolkata has been planned for a total design population of 10 lakh with an overall density of 244 persons per hectare along with a floating population of 5 lakh. As per Census 2001, the total workers in the town were around 94000 and non-workers were estimated at 177,810. It is estimated that the per capital generation in the area is in the range of 0.2-0.3 kg per capita per day. Considering this, the total estimated solid waste generation in the town is about 54 tons per day.

**MSW Characteristics** – The New Town area has been divided into four parts out of which Action Areas I, II and III are under construction. Keeping the present development profile of the New Town, it is observed that bulk of solid wastes generated in the area originates from households rather than from commercial, institutional or industrial premises. Of the waste from households, a substantial proportion consists of various putrescible materials with ash, dust and sand (combined) forming another significant proportion. The glass, metals (mostly cans and bottle corks), and textiles form only a minor proportion of the waste generated. The solid waste in and around the construction sites of New Township area are mainly of demolition and construction wastes, rubbish, brick material in small quantity, etc along with household wastes emanating from the existing residential complexes.

**2.2.1.2 Gap Analysis in the Existing MSWM system:**

The gaps in the existing systems are assessed in line with the service level benchmark norms and design criteria as per Municipal Solid Waste (Management & Handling) Rules as discussed in detail in “Section 4.1.2” of Volume I of this toolkit.

Existing MSWM system – in many of the areas in the New Township, the present habitation has their own MSW collection system. Further, solid waste disposal site exists in nearby area but still crude dumping is prevailing in the town, which needs immediate attention by the authorities.

There is a pressing need to design for storage, collection, transportation and scientific disposal of solid waste as the quantity of MSW is expected to continuously increase given the fact that the township is in the development phase. At present there is no formal system for MSWM services in the New Township area.

**Exhibit 2.1 – Key Performance indicators of MSWM system in Hoskote**

S. No	SWM Activity	Service Level Benchmarks Norms	MSWM Services in New Township	Key Inferences
1	Source storage with bin systems & Source segregation	100%	0%	✓There is no separate bin system of storing waste at source and no segregation at source is currently being followed.
2	Primary Door to door collection	100%	30%	✓Gradually, individual housing authority shall be responsible for collection of waste within the society.
3	Segregation at secondary storage points	100%	0%	✓There is no format system of segregation either at source or at these collection points

				before final disposal.
4	Transportation of MSW	100%	30%	✓ No formal system prevails.
5	Treatment & processing of MSW	100%	0%	✓ There is no treatment or processing of MSW collected.
6	Extent of MSW recovered	30%	NA	✓ No formal system prevails
7	Extent of Cost Recovery for the ULB in MSWM	100%	0%	✓ There is no service charge for MSWM activities in the city.
8	Scientific Disposal of MSW	100%	0%	✓ The waste is being dumped at the low lying areas without any treatment and the landfill site is not scientifically developed.
9	Efficiency in redressal of customer compliants	80%	0%	✓ No official/formal system of customer compliant redressal in the town.

### 2.2.1.3 ULB Fiscal/Budget Analysis

The projected financial operating plan for New Township area prepared by the West Bengal Housing Infrastructure Development Corporation (HIDCO), Government of West Bengal indicates that the New Township would be revenue surplus for next 7 years starting 2010. The projections on “**revenue account**” and “**capital account**” for New Township are highlighted in Exhibit 2.2 below:

**Exhibit 2.2 – Projections on Revenue and Capital Account for New Township**

(Rs in Millions)	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Revenue (Surplus/Deficit)	318.86	465.51	568.07	558.32	688.11	789.98	914.52
Capital Account	(224.46)	153.22	2440.38	2901.68	(3347.91)	92024.40)	91377.07)

(Surplus/Deficit)							
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Source: CDP, New Township

As indicated, there is a deficit in capital account for few years during the 7 years projected time horizon.

### 2.3 Identification of Key Problems:

The projects identified at the end of the exercise are indicative and the ULB would be required to review the projects in detail and carry out a consumer survey for the entire chain of MSWM service to identify the project scope and to prioritize the projects for implementation.

The section below outlines the key issues/gaps identified in the existing MSWM system in New Township area along with reasons for service level gaps:

- i. Low MSW collection efficiency, around 30% against benchmark norm of 100%.
- ii. No waste segregation at source and at secondary points leading to mixing of waste.
- iii. No treatment facility for processing of MSW collected.
- iv. No sanitary landfill facility for scientific disposal of MSW collected
- v. Lack of efficient customer compliant management

The above identified issues/gaps in the existing municipal solid waste system are primarily due to lack in technical, managerial, administrative, financial resources, adequate institutional arrangement and the technical know-how of managing municipal solid waste.

### 2.4 Determine Core Objectives & Prioritization

Following is the list of key investment areas identified to comply with the MSW Rules and to improve the aesthetic environment of the town:

- iii. **Awareness creation mechanism for community participation in MSWM activities** – with investment in the IEC activities to educate people on MSW Rules compliance like source segregation, avoiding littering on streets, using community bins etc.
- iv. **Upgrading existing storage & collection system** – with investment on closed street/community bins, equipment, pushcarts, transportation trucks etc.
- v. Development of a processing facility, to comply with Rules and gain transport efficiency with reduced load to dumpsite.
- vi. Development of an engineered sanitary landfill site.

### 2.5 Technical Option Analysis

**Collection and transportation** – it is recommended that community participation should be established using housing board associations and local communities for storage of waste at source. Also primary door-to-door collection should be provided with transportation of collected waste in segregated manner using containerized handcarts/push carts for DTDC. There is a need to establish secondary collection points for final transportation of primary collected waste in segregated manner to the integrated processing and disposal site for further treatment.

**Project facilities (integrated processing and disposal facility)** – since the organic waste is expected to be 35-40% in the total MSW generated in the town, it is recommended to have an integrated processing and disposal facility in the town. Due to lower waste quantities, the processing can be done using anaerobic composting, vermin-composting etc.

## 2.6 Commercial Viability Assessment / Service Delivery Option Analysis:

As discussed in the preceding sections, the following two major areas/aspects which need investment to match the desired service level benchmarks for the provision of MSWM services:

- iv. Upgrading of existing collection & transportation system with investment in primary collection vehicles/equipment and transportation vehicles;
- v. Development of an integrated processing & disposal facility in the town.

As observed, there is no MSWM system in the town as such hence; there is no liability in terms of existing manpower inventory and equipment with the authorities. Considering this, it may be noted that the complete integrated MSWM system can be developed on PPP format with a single player given the responsibility of primary collection along with community participation, waste transportation, road sweeping, processing and scientific disposal of waste.

Further given the fact, that the projected capital account for New Township area indicates deficit in few years in the next 7 years time horizon, the PPP format for development of integrated MSWM system would also assist in bringing in the desired capital investment for solid waste management system from the private sector, which has been estimated to the tune of Rs 39crore.

## 2.7 Project Structuring:

The above mentioned structure wherein the private operator would make investment in the development of an integrated MSWM system and would also oversee the operations and maintenance of the project facility, the feasible PPP structure for this component of the MSWM system is that of the Built-Operate-Transfer format with transferability aspect of the project facilities back to the ULB at the end of the concession period.

In this PPP structure, the ULB should provide land for creation of such project facilities at nominal lease rental basis and private operator would need to construct and operate & maintain the project facilities for the identified concession duration (generally between 15-20 years). The arrangement also allows for performance monitoring with capping of the maximum waste (inert/reject) to the landfill after processing and/or recycling of the incoming waste to the project facility.

Further, the bidding criteria for PPP project can be on Lowest Tipping Fee (Rs/MT) basis. This is also in line with the fact that the projected revenue account for the New Township area indicates surplus in the coming years and hence the authorities shall be in position to comfortably service their obligation of revenue expenditure relating to solid waste management in terms of tipping fee to the private operator for the provision of MSWM services in the town.

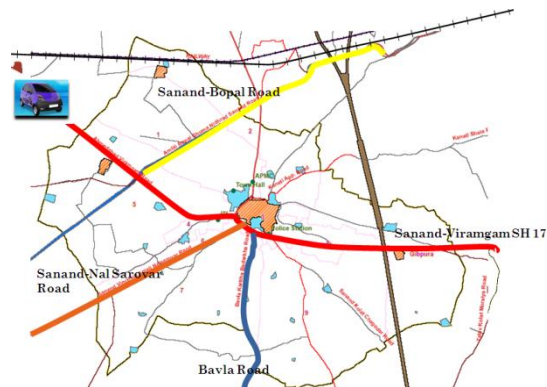
## 2.8 Procurement:

After identification of the project structure, the next stage is to plan the procurement process. This would entail activities like determining the technical and financial evaluation criteria, choosing between single and two-stage procurement process, preparation of bid documents including instruction to bidders, project information memorandum, evaluation criteria & process, duration of the process, bidding parameters, the performance indicators, payment terms etc. The details on the procurement process along with model request for qualification/proposal, model project information memorandum, term sheet templates has been provided in the Volume IV of this toolkit.

## 3. Baseline SWM Status – Sanand

### 3.1 Introduction – Sanand

The Sanand municipality has been nominated as a satellite town to the city of Chennai under the Centrally Sponsored Scheme for Urban Infrastructure Development in Satellite Towns (CSSUIDST) of the Seven Mega Cities of India in view of its friendly and pro-poor approaches. Sanand is a class three town (as per the census of India 2001) located about 24 km from Ahmedabad city on the Ahmedabad-Viramgam Highway.



It is the taluka headquarter of Sanand taluka, situated in Ahmedabad district. Sanand Nagar Palika (SNP) boundary falls within the boundary of Ahmedabad Urban Development Authority (AUDA) and was classed as a growth centre of Ahmedabad before attaining the status of a satellite town in 2009 by Ministry of Urban Development, GoI. AUDA is responsible for planning and development in the area.

Sanand has attained importance in recent times as it is in close proximity to the Delhi-Mumbai Freight Corridor and the adjoining Special Economic Zones (SEZ). Furthermore, re-location of Tata's Nano Plant from Singur, West Bengal to Sanand, Gujarat has suddenly highlighted the vital location of this town with reference to industrial development. The Tata Group's industrial establishment is supposed to boost up the employment generation in this region and the plant was inaugurated recently on 1st June, 2010.

Sanand Municipality has an area of 40.42 sq. km and divided in to 9 (nine) wards. Geographically, the town is location at a latitude of 22°58'60" N and longitude of 72°22'66" E.

Sanand being located in the western part of India has a dry climate. Temperature varies from 43°C to 47°C in the summers and 5.3°C to 16 °C in the winters. The rainfall in the area is restricted to the monsoon from June to September. Average annual rainfall of Sanand city is 750 mm which is almost equal to Ahmedabad district average annual rainfall (Census of India, 2001).

After the implementation of Panchayati Raj since April 01, 1963, Sanand Municipality was converted to Nagar Panchayat under the 1961 Gujarat Adhiniyam and became Nagarpalika on April 15, 1994.

The population as per the 2001 census was 33,687 with an average population density of 802 people per sq. km. The gender ratio as per Census of India, 2001 records is 891. Sanand has an average literacy rate of 81.7%, higher than the state average of 81.4%.

The work force participation in the town was 33.1% in 2001. Total 95% of Sanand Town's working population is main worker and remaining is marginal workers as per census 2001. It has been observed that majority of working population employs in **manufacturing and service sector**. Only 3%

of working population is engaged in cultivation on the land owned by them or held from Government and 17% of working population employs as agricultural labors who worked on another person’s agriculture land for wages indicating that small proportion of working population employs in primary sector of economy.

Exhibit 3.1 below highlights the past trends in the population growth and projection on the decadal growth rates.

**Exhibit 3.1 – Trends in the decadal growth rates in the population**

Year	Area in Sq Km	Total Population	Male	Female	Decadal change (%)	Density (person/sq km)
1951	1.29	10623	5472	5151		263
1961	1.29	14315	7462	6853	34.75	354
1971	40.42	18985	9949	9036	32.64	470
1981	40.42	22465	11664	10801	18.33	556
1991	40.42	25674	13504	12170	14.28	635
2001*	40.42	33687	17178	15239	31.21	802
2010**	40.42	**50160	-	-	**48.90	**1241
2017**	40.42	**70000	-	-	**39.50	**1731
2021**	40.42	**98000	-	-	**40.00	**2425
2031**	40.42	**150000	-	-	**53.10	**3711

\*SNP including Gibpura; \*\*Estimations (CEPT analysis)

Source: Census of India, 2001

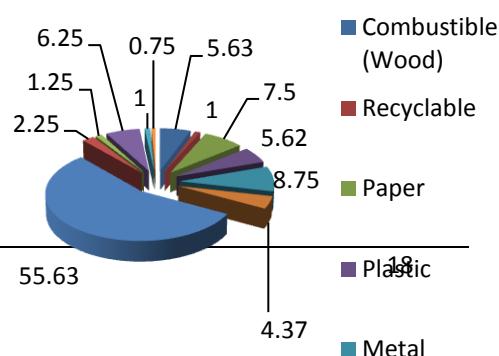
### 3.2 Initial Assessment and Need Analysis

#### 3.2.1 Situational Analysis

##### 3.2.1.1 MSW Inventory:

**MSW Generation** – The current per capita per day waste generation for the Sanand town is about 0.2 kg/capita/ day. Is it estimated that there are around 16,418 households in the town and the average household size is around 4 persons. Taking these parameters into account the total municipal waste generation in the city comes around 13.14 tones per day (TPD). Further, the field investigations by the ULB estimate that the municipal solid waste generation in the town is to the tune of 16.0 TPD. The gap may be attributed to the additional waste generation in the slum areas and market /or commercial establishments in the city.

**MSW Characteristics** – The Exhibit 3.2 below outlines the MSW composition in Sanand municipality and as shown the construction waste



is the largest contributor (around 55%) to the total MSW in the town:

**Exhibit 3.2 – Physical composition of MSW in Sanand**

Type	% Content
Brick stone	55.63
Metal	8.75
Paper	7.50
Textiles	6.25
Combustible	5.63
Plastic	5.62
Glass	4.37
Food waste	2.25
Vegetable	1.25
Recyclable	1.00
Ash	1.00
Miscellaneous	0.75
<b>Total</b>	<b>100</b>

The physical composition of the MSW generated in the city indicates that organic portion in the waste is in the range of 25-30% of the total waste which can be converted into organic matter using composting technology. The recoverable/recyclable components in the waste are also around 20-25% of the total solid waste generation, which needs to be recovered before final disposal of the MSW into landfill site.

### 3.2.1.2 Gap Analysis in the Existing MSWM system:

The gaps in the existing systems are assessed in line with the service level benchmark norms and design criteria as per Municipal Solid Waste (Management & Handling) Rules as discussed in detail in “Section 4.1.2” of Volume I of this toolkit.

The existing MSWM system includes door to door collection of municipal solid waste by sweepers. A recent Survey of 16,418 households in the town estimated that door to door waste collection of the complete Nagar Palika is around 67 per cent.

The MSW collected is then simultaneously transferred to the transport vehicles and there is no segregation system for the solid waste at the source point. The collected MSW is dumped at the Madhavnagar landfill site having area of 41,988 sq m, around 4 km from the city. There is no current treatment or processing of MSW facility and also the landfill is not engineered landfill. The estimates indicate that the current landfill can still accommodate the MSW for next 5-6 years only.

Based on the assessment of the City Development Plan (CDP) for Sanand and primary interactions with Sanand municipality officials, IMaCS has assessed the current MSWM system in Sanand. Table below presents the key performance indicators of the existing MSWM system in Sanand and the inferences therein:

Exhibit 3.3 – Key Performance Indicators for MSWM services in Sanand

S. No	SWM Activity	Service Level Benchmarks Norms	MSWM Services in Sanand	Key Inferences
1	Source storage with bin systems & Source segregation	100%	0%	<ul style="list-style-type: none"> <li>✓ There is no separate bin system of storing waste at source and no segregation at source is currently being followed.</li> <li>✓ People in general are not aware of the benefits of developing such a practice indicating lack of awareness creation mechanism.</li> <li>✓ Proper bin system needs to be implemented for source storage and segregation along with IEC activities.</li> </ul>
2	Primary Door to door collection	100%	67%	<ul style="list-style-type: none"> <li>✓ The MSW is collected from door to door by sweepers and transfer to the transport vehicles.</li> <li>✓ As per Citizen Report card, around 62% of survey responded for regular Door to door collection of garbage.</li> <li>✓ Collection efficiencies are low and need to be improved substantially with complete coverage of city area under primary collection.</li> <li>✓ Moreover, people are habituated to throw the waste on the roads or in the existing drains and efforts are needed to change the habits of people with a proper IEC strategy.</li> </ul>
3	Segregation at secondary storage points	100%	0%	<ul style="list-style-type: none"> <li>✓ There are no secondary storage points in the towns and the waste collected is transported directly to the landfill site.</li> <li>✓ Hence, there is no segregation activity primarily due absence</li> </ul>

				<p>of any processing facility and storage points.</p> <ul style="list-style-type: none"> <li>✓ However, with the proposal of setting up a processing facility and development of Regional Landfill site, the waste segregation assumes crucial significance and needs to be integrated with proposed MSWM system for overall efficiency of the system.</li> </ul>
4	Transportation of MSW	100%	67%	<ul style="list-style-type: none"> <li>✓ With the help of 5 tractors, 2 tempos and 2 trailers, the solid waste is collected and disposed off to the existing dump yard at Madhavnagar site around 4 km from the city.</li> <li>✓ Though, the compliance rate is comparably better than other SWM activities, there is a pressing need for investment in scientific &amp; systematic waste transportation with covered vehicles.</li> </ul>
5	Treatment & processing of MSW	100%	0%	<ul style="list-style-type: none"> <li>✓ There is no treatment or processing of MSW collected.</li> <li>✓ The bio-degradable waste portion in the total solid waste is around 3-4 TPD and it suitable for converting into compost..</li> </ul>
6	Extent of MSW recovered	80%	(no formal system, but informal system do exist)	<ul style="list-style-type: none"> <li>✓ The physical composition suggests considerable amount of recyclable / recoverable from the MSW to the tune of 4-5 TPD.</li> <li>✓ However, there is no formal recoverable system in the town and the informal stakeholders such as ragpickers, kabariwalas generally extracts the recyclables from the solid</li> </ul>

				waste.
7	Extent of Cost Recovery for the ULB in MSWM services	100%	(very nominal charge of Rs 100 per house per annum)	<ul style="list-style-type: none"> <li>✓The service charge for MSWM activities in the city is collected through the property tax.</li> <li>✓The charge for SWM services is fixed at nominal amount of Rs 100 per house per annum and is same for both residential and commercial properties.</li> </ul>
8	Scientific Disposal of MSW	100%	0%	<ul style="list-style-type: none"> <li>✓The waste is being dumped at the Madhavnagar landfill site but this site is not scientifically prepared.</li> <li>✓The Site area is ~48,000 sq m and is around 4 km from the main city.</li> <li>✓The existing proposal for development of a regional engineered landfill site for waste disposal requires capital investment and is expected to improve the compliance rate with MSW Rules. s</li> </ul>
9	Efficiency in redressal of customer compliants	80%	0%	<ul style="list-style-type: none"> <li>✓No official/formal system of customer compliant redressal in the town.</li> </ul>

### 3.2.1.3 Existing Physical Assets & Human Resources

**Physical Assets** – The Sanand municipality has total 7 (seven) tractors, 3 (three) trailers and 2 (two) mini-tempos for transportation of MSW, which have been procured in the span of last 5 (five) years, either through grant by state government or through internal budget of the Sanand Nagarpalika as detailed in Exhibit 3.4 below:

**Exhibit 3.4 – Details on the Physical Assets for provision of SWM services in Sanand**

Year	No.	Vehicle type	Given by	Through
2004-05	2	Tractor	Sanand Nagarpalika	Budget
2005-06	NIL	-	-	-
2006-07	NIL	-	-	-

2007-08	3	Tractor	Govt. of Gujarat	Grant
2008-09	2	Tempo	Sanand Nagarpalika	Budget
2009-10	2	Trailer	Govt. of Gujarat	Grant
2009-10	2	Tractor	Sanand Nagarpalika	Budget

Source: Sanand ULB Officials

**Human Resources** – The sanitary department staff consists of one Sanitary Inspector, one Asst. Sanitary Inspector. There are around 30 sweepers working in the department for collection of MSW, out of which around 5 are on contractual basis. Also there are some 7 drivers working for transportation of MSW, out of which around 5 are on permanent basis and rest on contractual basis. The road sweeping & disposal of street waste is being carried out twice per day.

The Exhibit 3.5 below outlines the human resources availability and work allocation for the provision of MSWM services in the town:

**Exhibit 3.5 – Human Resource Availability for provision of MSW services in Sanand**

S No	Category of Manpower	Departmental		Nature of work assigned
		Total Number provided	Permanent/ Contract	
<b>1</b>	<b>Road sweeping, waste collection &amp; transfer</b>			
a	Sweepers	30	5 on contract	Primary collection of MSW from door-to-door
b	Drivers/Operators	7	2 on contract	Transportation of MSW to landfill
<b>2</b>	<b>Administrative /Monitoring</b>			
a	Sanitary Inspector	1	---	Administration & monitoring of daily activities relating to MSWM system
b	Asst. Sanitary Inspector	1	---	

#### 3.2.1.4 ULB Fiscal/Budget Analysis

This section highlights the municipal finances of Sanand Nagarpalika over the last 5 (five) years starting from the financial year 2004-05 as follows:

**Exhibit 3.6 – Highlights on the Municipal Finances of Sanand during 2004-05 to 2008-09**

Particular (Rs Lakh)	2004-05	2005-06	2006-07	2007-08	2008-09	CAGR
Opening balance	84.74	106.11	127.67	341.18	409.61	
Revenue Account						

<b>Revenue Income</b>	155.56	188.30	194.15	261.15	280.23	<b>16%</b>
<b>Revenue Expenses</b>	122.55	140.24	152.36	195.66	214.81	<b>15%</b>
Revenue surplus / deficit	<b>33.01</b>	<b>48.06</b>	<b>41.79</b>	<b>65.50</b>	<b>65.42</b>	
Capital Account						
<b>Capital Income</b>	61.56	85.01	321.47	143.33	273.07	<b>45%</b>
<b>Capital Expenditure</b>	73.20	111.50	149.75	140.40	184.23	<b>26%</b>
Capital surplus / deficit	<b>-11.64</b>	<b>-26.50</b>	<b>171.72</b>	<b>2.93</b>	<b>88.84</b>	
Closing balance	<b>106.11</b>	<b>127.67</b>	<b>341.18</b>	<b>409.61</b>	<b>563.87</b>	

Source: Sanand Municipality CDP

As shown above, the revenue income & expenditure have grown steadily. The Sanand Municipality is able to maintain revenue surplus, 21% of the total revenue income. Capital income has increased substantially due to various grants/transfers from the State Government. On the other hand capital works have been executed at slow pace, resulted to the notable surplus in closing balance of 2008-09. The Revenue Account & Capital Account of Sanand Municipality are as follows:

*Revenue Income* – The Exhibit 3.7 shows revenue income of Sanand Municipality for last five years and inferences are listed below:

**Exhibit 3.7 – Revenue Income of Sanand Municipality during 2004-05 to 2008-09**

Particular	2004-05	2005-06	2006-07	2007-08	2008-09
<b>Rs. Lakh</b>					
<b>Revenue Income</b>					
<b>Tax income</b>	30.16	54.74	66.78	66.14	87.01
<i>% of total Income</i>	19%	29%	34%	25%	31%
<b>Non tax income</b>	18.31	26.61	23.84	17.73	37.36
<i>% of total Income</i>	12%	14%	12%	7%	13%
<b>Grants and transfers</b>	102.50	101.73	94.22	161.22	142.38
<i>% of total Income</i>	66%	54%	49%	62%	51%
<b>Interest income</b>	0.66	2.31	6.46	9.61	11.28
<i>% of total Income</i>	0%	1%	3%	4%	4%
<b>Other income</b>	3.93	2.92	2.86	6.45	2.20
<i>% of total Income</i>	3%	2%	1%	2%	1%
<b>Total</b>	<b>155.56</b>	<b>188.30</b>	<b>194.15</b>	<b>261.15</b>	<b>280.23</b>

Source: Sanand Municipality CDP

- a. Grant/transfers from the state government contribute more than half to the total revenue income, followed by Tax income ( increased significantly due to major tax collection drive)

- b. Tax income mainly comes from property tax (64% of the total tax income) and water tax (36%). Income from both taxes has been increased 25% & 15% respectively in last 5 years.
- c. 57% of the total Non tax revenue comes from public service charges and fees while rest is generated through rent on municipality's own properties.
- d. Share of interest income up by 4% in last 2 year showing amount invested as fixed deposit.

**Revenue Expenditure** – The Exhibit 3.8 below shows revenue expenditure of Sanand Municipality for last five years and inferences are listed:

**Exhibit 3.8 – Revenue Expenditure of Sanand Municipality for 2004-05 to 2008-09**

Particular (Rs Lakh)	2004-05	2005-06	2006-07	2007-08	2008-09
<b>Establishment Expenses</b>	79.39	91.47	89.64	96.79	98.76
<i>% of total Expenses</i>	65%	65%	59%	49%	46%
<b>Administration &amp; General Expenses</b>	30.75	36.33	51.59	71.48	86.20
<i>% of total Expenses</i>	25%	26%	34%	37%	40%
<b>Repairs &amp; Maintenance of Fixed Assets</b>	12.41	12.44	11.14	24.62	29.81
<i>% of total Expenses</i>	10%	9%	7%	13%	14%
<b>Other expenses</b>	0.00	0.00	0.00	2.77	0.05
<i>% of total Expenses</i>	0%	0%	0%	1%	0%
<b>Total</b>	<b>122.55</b>	<b>140.24</b>	<b>152.36</b>	<b>195.66</b>	<b>214.81</b>

Source: Sanand Municipality CDP

- a. 81% of total establishment expenses are made towards salary and wages while Provident Fund contribution was around 9% of the total such expenses.
- b. Electricity comprises around 76% of the total admin expenses, followed by petrol/diesel expenses (5%), deposits (4%) and contingency expenses (4%)
- c. Total R&M expense – In 2004-05, maintenance of vehicles & transportation equipments (51% of the total R&M), roads/bridges/street lights (16%), sewerage lines (12%), water supply (9%). However, in 2008-09, water works (45%), roads/bridges/street lights (26%), maintenance of vehicle and transportation equipments (7%).

**Capital Income** – The Exhibit 3.9 below shows the capital account of last five years. Although the Municipality has borrowed some amount since last two years, the capital works are primarily dependent on Government grants and contribution:

**Exhibit 3.9 – Capital Account of Sanand Municipality during 2004-05 to 2008-09**

Particular	2004-05	2005-06	2006-07	2007-08	2008-09
<b>Rs. Lakh</b>					

<b>Grant and Contribution</b>	61.56	85.01	321.47	126.26	239.70
<b>% of total Income</b>	100%	100%	100%	88%	88%
<b>Loans and borrowings</b>	0.00	0.00	0.00	17.07	33.37
<b>% of total Income</b>	0%	0%	0%	12%	12%
<b>Total</b>	<b>61.56</b>	<b>85.01</b>	<b>321.47</b>	<b>143.33</b>	<b>273.07</b>

Source: Sanand Municipality CDP

- The capital income grants are mainly spent on road/water supply/sewerage & sanitation.
- The capital income utilization ratio has been reduced from 1.18 in FY05 to 0.67 in FY09. It shows lower pace of asset creation and thus excess of capital grant till FY09.
- The capital account has been in surplus since last three years.

**As per above assessment of Municipal financial status issues addressed are listed below:**

- Despite increasing Tax revenue, the ULB is highly relying on Government grants/transfers as more than 50% working capital is being financed from this source.
- The revenue surplus to revenue income ratios is as low as 21% against the standard 40%.
- On capital account part, the capital income utilization should be increased up to optimum level which is around 80% - 90% in urban finance.
- Capital expenditures mostly have been made in three sectors namely Roads, water supply and sewerage & sanitation.
- Currently the Tax income comprises only Property & Water tax. There is a pressing need to include more variants of municipal tax such as conservancy tax, solid waste management cess etc. to increase revenue from own sources.

### 3.3 Identification of Key Problems:

The projects identified at the end of the exercise are indicative and the ULB would be required to review the projects in detail and carry out a consumer survey for the entire chain of MSWM service to identify the project scope and to prioritize the projects for implementation.

The section below outlines the key issues/gaps identified in the existing MSWM system in Sanand along with reasons for service level gaps:

- Low MSW collection efficiency, around 67% against benchmark norm of 100%.
- No waste segregation at source and at secondary points leading to mixing of waste.
- No treatment facility for processing of MSW collected.
- No sanitary landfill facility for scientific disposal of MSW collected

- v. Lack of efficient customer compliant management

The above identified issues/gaps in the existing municipal solid waste system are primarily due to following reasons:

- i. Inadequate human resources to carry out MSWM activities. As indicated in section above, the ULB has only 30 workers, out of 5 are on contractual basis, to carry out road sweeping along with collection and pre-transportation to the transport vehicles.
- ii. Inadequate machinery, equipment for collection & transportation, thereby affecting the MSW services.
- iii. There is a complete lack of any awareness creation mechanism coupled with lack of efficient customer compliant management in the town.
- iv. Inadequate technical capacity/capability for development of a waste processing and/or sanitary landfill facility.

### 3.4 Determine Core Objectives & Prioritization

As per the discussions of IMaCS' team with Sanand Municipality officials on the issues/gaps in the existing MSWM system as well as on the prioritization of projects, following is the list of key investment areas identified to comply with the MSW Rules and to improve the aesthetic environment of the town:

- vii. **Awareness creation mechanism for community participation in MSWM activities** – with investment in the IEC activities to educate people on MSW Rules compliance like source segregation, avoiding littering on streets, using community bins etc.
- viii. **Upgrading existing storage & collection system** – with investment on closed street/community bins, equipment, pushcarts, transportation trucks etc.
- ix. **Creation of an Infrastructure** –
  - a. Investment in development of a processing facility, to comply with Rules and gain transport efficiency with reduced load to dumpsite.
  - b. Investment in recycling with a system like crusher to recycle the construction waste and use it as coarse or fine aggregate back in construction, this will also reduce load to landfill site.
- x. **Conversion of existing Madhavnagar dump yard into sanitary landfill** – with investment in the remediation of the existing dump yards.
- xi. **Creation of a Regional Sanitary Landfill site** – there is a proposal by Gujarat Urban Development Corporation (GUDC) for development of a regional sanitary landfill site in

Kodaliya village for managing the MSW of 3 (three) ULBs namely; Bawala, Dholka, and Sanand. The proposed site is around 20 km away from Sanand. This site will also have a facility for processing & treatment of MSW collected.

### 3.5 Technical Option Analysis

**Sorting and segregation** – the applicable rules recommends that the sorting of waste at the source must be accorded the highest priority by the ULBs. However, in the case of Sanand, due to low waste generation in the town and source segregating/sorting is not developed, it is recommended to have sorting/segregation activities carried out at the community bins level manually by the sweepers collecting the waste from the households and should be transported separately in a segregated manner to the proposed processing/disposal facility.

**Collection and transportation** – the waste in the town comprises mostly the construction waste and it is recommended to have metal containers instead of plastic containers to collect the waste. Further, for door-to-door collection the current system of tractor/trailers can be upgraded with introduction of pushcarts/handcarts for narrow roads in the town to increase coverage and efficiency of primary waste collection.

**Project facilities** – since the waste generation is less in the town, it is recommended to have one facility encompasses various activities such as secondary storage (unloading of waste collected and loading of inert/reject for disposal to landfill), segregation area, processing zone for bio-degradable waste and recycling zone for debris collected.

The *secondary storage facility* should ideally be a conventional transfer station with ramp and platform for loading and unloading of waste. The organic waste which is around 4-5 TPD can be converted into compost using methods like vermiculture and only the inert/reject should be disposed of to the landfill site. Further, significant portion of the waste in the town is the construction waste which can be recycled using a system like crusher and using it again as coarse or fine aggregate back in construction as has been successfully implemented in various parts of the country.

### 3.6 Commercial Viability Assessment:

As discussed in the preceding sections, the following 3 (three) major areas/aspects which need investment to match the desired service level benchmarks for the provision of MSWM services:

- i. Upgrading of existing collection & transportation system with investment in primary collection vehicles/equipment and transportation vehicles;
- ii. Development of project facilities including secondary storage, waste composting facility, and construction waste recycling facility; and

- iii. Development of engineered sanitary landfill facility, which is proposed to be a Regional Sanitary landfill to be developed by GUDC.

As mentioned in the Volume I of the toolkit, for establishing the commercial viability of the project the first step is to determine the probable financial sources and costs associated with the identified scope of work. This section presents broad indicators on the financial assessment of the identified project options (i) and (ii), as the option (iii) is proposed to be developed by a separate agency, Gujarat Urban Development Corporation.

It is envisaged that the capital investment requirement for provision of MSWM service over next 5 years, till 2015 is to the tune of Rs 5 crore. The financial sources include grants from centre & state government up to 80% & 10% of the total project cost respectively under satellite town development scheme.

The financial sources for option (i) other than grants/transfers can be the user charges for primary collection of MSW (*currently a nominal annual SWM cess of Rs 100 per household is collected along with property tax*), and this should also include rationalized charges from agencies/users, generating and throwing construction waste in the town. For option (ii) the financial sources other than grant/transfers can be the revenues from sale of the compost and recyclables etc.

Given the scenario with 90% of the total project cost can be funded via centre/state grants coupled with probable revenue streams from user charges, sale of by-products like compost, recyclables, prima facie, it appears that the projects with option (i) and option (ii) above are commercially viable.

### 3.7 Service Delivery Options Analysis:

As highlighted there are two separate projects identified for provision of MSWM service; (i) collection & transportation with upgraded fleet system, and (ii) development of project facilities including secondary storage, compost facility and construction waste recycle facility. These can either be developed as separate projects or as an integrated project with option of public funding or via PPP format.

Since, the ULB has already made some investment for procurement of transportation fleet for collection & transportation of MSW, it may be prudent to upgrade this system as handing over of the equipment/fleet to the private player in case of option of PPP may need designing of complex contract documents. Another crucial aspect merit consideration is the relocation of existing manpower /or meaningful involvement in case of PPP option, to avoid any bottlenecks in the system at latter stage. Considering above aspects, the ULB may consider keeping the first option of collection & transportation to be funded and managed by its own sources, given the fact the ULB has maintained revenue surplus consistently for last 4-5 years.

However, given the scale of waste generation in the town it is recommended to develop compost facility with community participation as it is highly unlikely that such small scale (4-5 TPD) will evince the interest of private sector for investments.

## 4. Baseline SWM Status – Sonapat

### 4.1 Introduction - Sonapat

Sonapat town is located at 77°01' Longitude and 28°57' Latitude. It is at a distance of 52 kilometers by road and 44 kilometers by rail from National Capital, Delhi. The administrative limits of the Municipal Council Sonapat encompasses an area of 28.32 sq km and is the largest town of the district.

The population density of the town is estimated at 7,947 persons per sq km as per 2001 census. Exhibit 4.1 below outlines the population and trend of density in the town. As shown the gross density has been steadily increasing from 1,620 persons per sq km in 1961 to 7,947 persons per sq km in 2001.

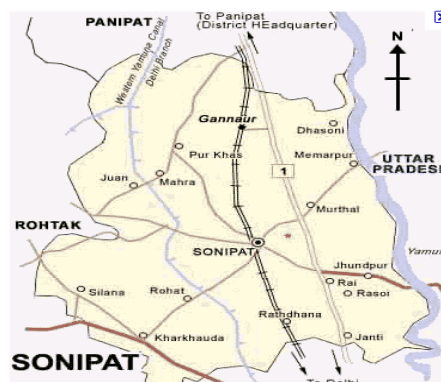


Exhibit 4.1 – Population and trend in density in Sonapat

Year	Population	Gross density (persons/sq km)
1961	45,882	1620
1971	62,393	2203
1981	109,369	3862
1991	143,922	5081
2001	225,074	7947

Source: DPR SWM, Sonapat

The town is divided into 35 wards for the ease of administering the maintenance works. Out of this, only 31 wards fall under Municipal Council and rest four wards are considered under outer growth. The demographic characteristics of these wards indicate that distribution of area and population is non uniform across wards. The internal wards near the old city have relatively higher density as compared to outer parts of the town.

### 4.2 Initial Assessment and Need Analysis

#### 4.2.1 Situational Analysis

##### 4.2.1.1 MSW Inventory:

**MSW Generation** – The per capita generation rate of Sonapat town is estimated at 333 grams per person per day, which is high as per standards of CPHEEO. It is estimated that the

Municipal Council of Sonapat generates around 110 tons of municipal solid waste every day. The major sources of solid waste generation in town are household domestic waste, commercial establishments, markets, hotels and restaurants etc.

**MSW Characteristics** – Exhibit 4.2 below outlines the MSW composition in Sonapat town:

**Exhibit 4.2 – MSW Composition in Sonapat Town**

S No	Description	Percentage values (%)
1	Organic (compostable)	50%
2	Recyclable	10-15%
3	Inert/Debris	12%
4	Moisture	22.30%

*Source: DPR SWM, Sonapat*

The physical composition of the MSW generated in the town indicates that majority of the waste around 50% is organic in nature which can be composted. The recoverable/recyclable components in the waste are also around 10-15% of the total solid waste generation, which needs to be recovered before final disposal of the MSW into landfill site.

#### 4.2.1.2 Gap Analysis in the Existing MSWM system:

The gaps in the existing systems are assessed in line with the service level benchmark norms and design criteria as per Municipal Solid Waste (Management & Handling) Rules as discussed in detail in “Section 4.1.2” of Volume I of this toolkit.

Existing MSWM system – the scientific and systematic storage of waste at source is not in practice and in the absence of the desirable system of storage of waste at source; the waste is thrown on the streets, treating streets as receptacle of waste. No segregation of non-biodegradable / or recyclable waste is done either at the source or at the streets. This hampers the composting process, when non-biodegradable waste is dumped along with biodegradable waste.

The municipal council is responsible for collection, transportation and disposal of municipal solid waste. In the town there is no scientific and systematic storage of waste at the source. There are around 25 community bins provided by the council in the town, however, the conditions of these sites are no environmental friendly.

Around 30 dumpers collect these and dispose by land filling at sites near by-pass Sehrawat Hospital behind ITI campus.

Sonapat Municipal Council has so far adopted only dumping as method of disposal of the waste material. Currently, the waste is just dumped without segregation of organic and

inorganic waste leading to unhygienic condition with bad odor and posing serious threat to environment and to the public health.

Based on the assessment of the Detailed Project Report (DPR) for SWM in Sonapat town, IMAcS has assessed the current MSWM system in the town. Exhibit 4.3 below presents the key performance indicators of the existing MSWM system in Sonapat and the inferences therein:

**Exhibit 4.3 – Key Performance Indicators of MSWM system in Sonapat**

S. No	SWM Activity	Service Level Benchmarks Norms	MSWM Services in Sonapat	Key Inferences
1	Source storage with bin systems & Source segregation	100%	0%	<ul style="list-style-type: none"> <li>✓ There is no separate bin system of storing waste at source and no segregation at source is currently being followed.</li> <li>✓ People in general are not aware of the benefits of developing such a practice indicating lack of awareness creation mechanism.</li> <li>✓ Proper bin system needs to be implemented for source storage and segregation along with IEC activities.</li> </ul>
2	Primary Door to door collection	100%	27%	<ul style="list-style-type: none"> <li>✓ Municipal council has 63 tricycle rickshaws, 121 handcarts for primary collection.</li> <li>✓ However, collection efficiencies are significantly low and need to be improved substantially with complete coverage of city area under primary collection.</li> </ul>
3	Segregation at secondary storage points	100%	0%	<ul style="list-style-type: none"> <li>✓ There are around 47 temporary collection points in the town.</li> <li>✓ But there is no format system of segregation either at source or at these collection points before final disposal.</li> </ul>
4	Transportation of MSW	100%	50%	<ul style="list-style-type: none"> <li>✓ With the help of 3 tractor trolleys, 2 dumper placer and 2</li> </ul>

				loader dumper, the solid waste is collected and disposed off to the existing dump yard within the city.
5	Treatment & processing of MSW	100%	0%	<ul style="list-style-type: none"> <li>✓There is no treatment or processing of MSW collected.</li> <li>✓The bio-degradable waste portion in the total solid waste is around 55 TPD and it suitable for converting into compost.</li> </ul>
6	Extent of MSW recovered	30%	(no formal system, but informal system do exist)	<ul style="list-style-type: none"> <li>✓The physical composition suggests considerable amount of recyclable / recoverable from the MSW to the tune of 11-17 TPD.</li> <li>✓However, there is no formal recoverable system in the town and the informal stakeholders such as ragpickers, kabariwalas generally extracts the recyclables from the solid waste.</li> </ul>
7	Extent of Cost Recovery for the ULB in MSWM services	100%	0%	✓There is no service charge for MSWM activities in the city.
8	Scientific Disposal of MSW	100%	0%	✓The waste is being dumped at the low lying areas without any treatment and the landfill site is not scientifically developed.
9	Efficiency in redressal of customer compliants	80%	0%	✓No official/formal system of customer compliant redressal in the town.

#### 4.2.1.3 Existing Physical Assets & Human Resources

**Physical Assets** – The Sonapat Municipal Council has following equipment, vehicles for the provision of MSWM services in the town, which have been procured either through grant by state government or through internal budget:

**Exhibit 4.4 – Details on Physical Assets for provision of SWM services in Sonapat Municipality**

S. No	Description	Numbers available
1	Tricycle Rickshaw	63
2	Hand carts	121
3	Tractor Trolley	3
4	Dumper Placer	2
5	Loader Dozer	2

Source: DPR SWM, Sonapat

**Human Resources** – Exhibit 4.5 below outlines the human resources availability and work allocation for the provision of MSWM services in the town:

**Exhibit 4.5 – Details on manpower for provision of SWM services in Sonapat Municipality**

S No	Category of Manpower	Departmental		Nature of work assigned
		Total Number provided	Permanent/ Contract	
<b>1</b>	<b>Road sweeping, waste collection &amp; transfer</b>			
a	Sweepers	201	permanent	Primary collection of MSW from door-to-door
b	Sanitary Inspector	10	permanent	Monitoring of services

#### 4.2.1.4 ULB Fiscal/Budget Analysis

The expenditure for the Nagar Palika Parishad Sonapat related to Solid Waste Management is mainly on salary and wages, consumables (petrol, diesel etc.), vehicle repair, contingency. There is no such revenue generation from solid waste management. The expenditure statement of Nagar Palika Parishad since 2008-09 is shown in Exhibit 4.6 below:

**Exhibit 4.6 – Income and Expenditure since 2008-09 for Sonapat Municipality**

Year	Income (Rs in lakh)	Expenditure (Rs in Lakh)
2008-09	1,395.95	1,966.65
2009-10	1,340.12	2,086.34

Source: DPR SWM, Sonapat

### 4.3 Identification of Key Problems:

The projects identified at the end of the exercise are indicative and the ULB would be required to review the projects in detail and carry out a consumer survey for the entire chain of MSWM service to identify the project scope and to prioritize the projects for implementation.

The section below outlines the key issues/gaps identified in the existing MSWM system in Sonapat along with reasons for service level gaps:

- i. Low MSW collection efficiency, around 30% against benchmark norm of 100%.
- ii. No waste segregation at source and at secondary points leading to mixing of waste.
- iii. No treatment facility for processing of MSW collected.
- iv. No sanitary landfill facility for scientific disposal of MSW collected
- v. Lack of efficient customer compliant management

The above identified issues/gaps in the existing municipal solid waste system are primarily due to lack in technical, managerial, administrative, financial resources, adequate institutional arrangement and the technical know-how of managing municipal solid waste.

### 4.4 Determine Core Objectives & Prioritization

Following is the list of key investment areas identified to comply with the MSW Rules and to improve the aesthetic environment of the town:

- xii. **Awareness creation mechanism for community participation in MSWM activities** – with investment in the IEC activities to educate people on MSW Rules compliance like source segregation, avoiding littering on streets, using community bins etc.
- xiii. **Upgrading existing storage & collection system** – with investment on closed street/community bins, equipment, pushcarts, transportation trucks etc.
- xiv. Development of a processing facility, to comply with Rules and gain transport efficiency with reduced load to dumpsite.
- xv. Development of an engineered sanitary landfill site.

## 4.5 Technical Option Analysis

**Sorting and segregation** – the applicable rules recommends that the sorting of waste at the source must be accorded the highest priority by the ULBs. The source storage system is proposed with households storing their waste in plastic covered bins to be handed over daily to sanitary workers engaged in door-to-door collection. Till the system gets established, it is recommended to have sorting/segregation activities carried out at the community bins level manually by the sweepers collecting the waste from the households and should be transported separately in a segregated manner to the proposed processing/disposal facility.

**Collection and transportation** – it is recommended that secondary storage around 83 numbers of community bins of 3.5 cum capacity and 83 numbers of 1,100 litre capacity mobile bins to be provided in the town separately for dry waste. For primary collection of waste, it is proposed to provide 103 numbers of tricycle trolleys each with bins to be used for door-to-door collection in Sonapat residential colonies. Further, around 6 numbers of dumper placer to be used for lifting the containers placed at discrete locations and transport to sanitary landfill site for treatment and disposal. In addition to this, around 8 tractor trolleys to be used for collecting solid waste from commercial vegetable and fruit markets and carry up to disposal site.

**Project facilities (integrated processing and disposal facility)** – since the organic waste is more than 50 tons per day in the total waste generation in the town. It is recommended to have an integrated processing and disposal facility in the town. Further, it is estimated that the existing dumping yard will be exhausted in next 4-5 years, there is a pressing need to identify land for development of integrated processing and disposal facility in the town.

## 4.6 Commercial Viability Assessment / Service Delivery Option Analysis:

As discussed in the preceding sections, the following two major areas/aspects which need investment to match the desired service level benchmarks for the provision of MSWM services:

- iv. Upgrading of existing collection & transportation system with investment in primary collection vehicles/equipment and transportation vehicles;
- v. Development of an integrated processing & disposal facility in the town.

As mentioned in the Volume I of the toolkit, for establishing the commercial viability of the project the first step is to determine the probable financial sources and costs associated with the identified scope of work. This section presents broad indicators on the financial assessment of the identified project options (i) and (ii) as mentioned above.

**Option 1** - It is envisaged that the capital investment requirement for procurement of primary collection, storage and transportation vehicles would be to the tune of Rs 487.14 lakh. As the Sonapat Municipal Council has around 201 permanent sanitary workers and 10 sanitary inspectors on board for provision of MSWM service, to avoid hassles of relocating the existing workers or entering into complex arrangement with private players for absorption of existing workers into MSWM services, it is recommended that the collection and transportation of MSW should continue to be the responsibility of Municipal Council. The procurement of equipment, vehicles can be done with the assistance of finance commission grants or partly from funds available under Satellite Towns Development Scheme of Ministry of Urban Development, Gol.

However, in case there is a specific requirement of managing the MSWM services with additional manpower and/or vehicles requirement for collection and transportation, gradually it can be taken up with engagement of private player in specific areas/wards with service /or management contract agreements among Municipal Council and private operator.

**Option 2** – for development of integrated processing and disposal facility, it is envisaged that the total capital investment requirement would be to the tune of Rs 1,252.12 lakh with break-up of Rs 478.74 for development of compost plant, landfill site development works (road, drains, wall, sheds, water supply etc) of Rs 357.38 lakh and development of sanitary landfill facility of Rs 391.40 lakh.

The financial sources include grants from centre & state government up to 80% & 10% of the total project cost respectively under satellite town development scheme. The remaining 10% (Rs 125 lakh) around is expected to be ULB' own contribution, however, this portion of investment can be routed via PPP option also by engaging private service operator to make capital investment in the project.

The financial sources for provision of MSWM services other than grants/transfers can be the user charges for primary collection of MSW and this should also include rationalized charges from agencies/users, generating and throwing construction waste in the town and revenues from sale of the compost and recyclables etc.

Given the scenario with 90% of the total project cost can be funded via centre/state grants coupled with probable revenue streams from user charges, sale of by-products like compost, recyclables, prima facie, it appears that the projects with Option-2 above is commercially viable under PPP route.

#### 4.7 Project Structuring:

The above mentioned structure wherein the private operator would make investment in the development of an integrated processing and disposal facility and would also oversee the operations and maintenance of the project facility, the feasible PPP structure for this

component of the MSWM system is that of the Built-Operate-Transfer format with transferability aspect of the project facilities back to the ULB at the end of the concession period.

In this PPP structure, the ULB should provide land for creation of such project facilities at nominal lease rental basis and private operator would need to construct and operate & maintain the project facilities for the identified concession duration (generally between 15-20 years). The arrangement also allows for performance monitoring with capping of the maximum waste (inert/reject) to the landfill after processing and/or recycling of the incoming waste to the project facility.

The details of the obligations, risks and payment arrangements under the BOT contract have been provided in Volume IV of this toolkit along with the term sheet for this contract structure.

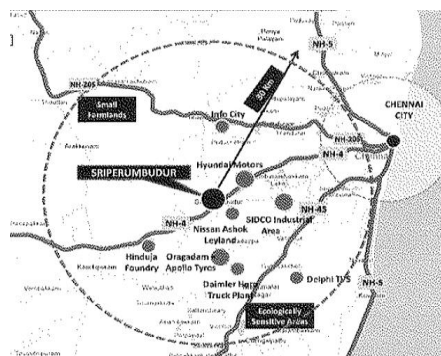
#### 4.8 Procurement:

After identification of the project structure, the next stage is to plan the procurement process. This would entail activities like determining the technical and financial evaluation criteria, choosing between single and two-stage procurement process, preparation of bid documents including instruction to bidders, project information memorandum, evaluation criteria & process, duration of the process, bidding parameters, the performance indicators, payment terms etc. The details on the procurement process along with model request for qualification/proposal, model project information memorandum, term sheet templates has been provided in the Volume IV of this toolkit.

## 5. Baseline SWM Status – Sriperumbudur

### 5.1 Introduction - Sriperumbudur

The Sriperumbudur municipality has been nominated as a satellite town to the City of Chennai under the centrally sponsored Scheme for Urban Infrastructure Development in Satellite Towns (CSSUIDST) of the Seven Mega Cities of India in view of its friendly and pro-poor approaches. It is a Class IV town located about 45 km, south west of Chennai on the Chennai-Bengaluru NH-4. It is a Taluk head quarter town and well connected by transport arteries connection various towns in the region. The nearest airport is located at Chennai, nearest railway station are Avadi and Thiruvallur. The nearest port is Chennai port and the airport is Meenambakkam.



The town extends over 19.39 sq km with 15 wards and is Selection Grade Town Panchayat. Geographically, the town is located at 12°58' N and 79°56' E. The town lies in the eastern coastal plains of South India. The town and its surroundings are endowed with several water bodies such as the Sriperumbudur Lake, Elaneer Kulum and Perumal Koil Kulum, which sustain the agricultural activities of the town.

The town Panchayat was constituted in the year 1944 as a First Grade Town Panchayat and was upgraded to the status of Special grade in 2004. It reached its current status of Selection grade town Panchayat during the year 2006. The Town Panchayat functions with an elected council of 14 ward councilors and a Chairman. The population as per the 2001 census was 27,645.

### 5.2 Initial Assessment and Need Analysis

#### 5.2.1 Situational Analysis

##### 5.2.1.1 MSW Inventory:

**MSW Generation** – The Sriperumbudur municipality generates a total of around 5.81 tons per day of Municipal Solid Waste (MSW).

**MSW Characteristics** – The physical composition of the MSW generated in the city indicates that the organic portion in the waste is in the range of 40-45% of the total waste, which can be converted into organic matter using composting technology. The recoverable/recyclable components in the waste are around 20-30% of the total solid waste generation, which needs to be recovered before final disposal of the MSW into a landfill site, and the rest around 30% is the inert /or final rejects.

### 5.2.1.2 Gap Analysis in the Existing MSWM system:

The gaps in the existing systems are assessed in line with the service level benchmark norms and design criteria as per Municipal Solid Waste (Management & Handling) Rules as discussed in detail in “Section 4.1.2” of Volume I of this toolkit.

The household waste produced is collected door to door in 9 wards by the SHGs and sanitary workers. Around 11 vehicles are used for door to door collection. A total of 22 sanitary workers including SHGs are involved in street sweeping and other waste collection activities. Around 4.83 TPD is collected against total waste generation of 5.81 TPD in the town.

The collected waste is segregated at source by sanitary workers and brought to the compost yard of 0.98 acres area at Sellaperumal (ward 9). The transportation infrastructure includes; (i) mini tipper lorries (1 no), (ii) tractor trailer (1 no), (iii) tricycles (11 nos.).

The segregated waste transported to the compost year in ward 9 is processed and allowed for aerobic decomposition. The bio-compost produced is packed and sold at a cost ranging Rs 3.0 to Rs 4.0 per kg. The segregated inert waste from processing facility is dumped in the puramboke land near the compost yard

Based on the primary interactions with Sriperumbudur municipality officials, IMAcS has assessed the current MSWM system in the town. Exhibit 5.1 below presents the key performance indicators of the existing MSWM system in Sriperumbudur and the inferences therein:

**Exhibit 5.1 – Key performance Indicators for SWM in Sriperumbudur**

S. No	SWM Activity	Service Level Benchmarks Norms	MSWM Services in Sriperumbudur	Key Inferences
1	Source storage with bin systems & Source segregation	100%	0%	<ul style="list-style-type: none"> <li>✓ There is no separate bin system of storing waste at source and no segregation at source is currently being followed.</li> <li>✓ People in general are not aware of the benefits of developing such a practice indicating lack of awareness creation mechanism.</li> </ul>
2	Primary Door to door collection	100%	77%	<ul style="list-style-type: none"> <li>✓ The MSW is collected from door to door by tricycles partially and partly with the help of tractors in 9 wards out of total 14 wards.</li> <li>✓ Collection efficiencies are low</li> </ul>

				<p>and need to be improved substantially with complete coverage of city area under primary collection activity</p> <p>✓ Moreover, people are habituated to throw the waste on the roads or in the existing drains and efforts are needed to change the habits of people with a strong IEC strategy.</p>
3	Segregation at secondary storage points	100%	80%	<p>✓ The collected MSW is partly segregated at the temporary site for compost yard.</p> <p>✓ Waste segregation needs special attention as the efficiency of the processing plant would depend majorly on the success of this activity</p>
4	Transportation of MSW	100%	77%	<p>✓ With the help of 5 tractors the MSW is collected and temporarily disposed off into the existing compost yard at Sellaperumal Nagar in ward 9.</p> <p>✓ Though compliance rate is at satisfactory levels, there is a need for investment in scientific and systematic waste transportation with covered vehicles.</p>
5	Treatment & processing of MSW	100%	70%	<p>✓ There is waste processing through composting process at processing facility set up in the land area of 0.98 acres at Sellaperumal Nagar</p>
6	Extent of MSW recovered	80%	(no formal system, but informal system do exist)	<p>✓ There is no formal recoverable system in the town and the informal stakeholders such as ragpickers, kabariwalas generally extracts the recyclables from the solid</p>

				waste.
7	Extent of Cost Recovery for the ULB in MSWM services	100%	0%	✓ No service charges are levied.
8	Scientific Disposal of MSW	100%	0%	✓ There is no sanitary landfill allocated for dumping of the waste and waste is being dumped at the puramboke site allocated temporarily near the existing for compost yard. ✓ Stringent environmental laws compliance needed with investment in identifying suitable land and scientific disposal of waste in sanitary landfill
9	Efficiency in redressal of customer complaints	80%	0%	✓ No formal customer compliant redressal system in the town.

#### 5.2.1.3 Existing Physical Assets & Human Resources

**Physical Assets** – The Sriperumbudur municipality has one mini tipper lorry, one tractor trailer, and 11 nos. of tricycles for waste collection and transportation to the dumping ground.

**Human Resources** – A total of 22 sanitary workers including SHGs are involved in street sweeping and other waste collection activities.

#### 5.2.1.4 ULB Budget Analysis

Sriperumbudur Town Panchayat maintains a Town Panchayat fund for managing the finances of the Town Panchayat. The accounts for the Town Panchayat fund were maintained on cash based single entry system till the year 1999-2000. From April 01, 2000 onwards, accrual based double entry book keeping system was implemented. Exhibit 5.2 below summarizes the finances of Sriperumbudur Town Panchayat for the last 5 (five) years.

#### Exhibit 5.2 – Financial Analysis of Sriperumbudur Town

Particulars (in lakhs)	2004-05	2005-06	2006-07	2007-08	2008-09
<b>Total Income</b>	<b>129.22</b>	<b>222.60</b>	<b>309.44</b>	<b>375.64</b>	<b>325.70</b>
Operating Expenditure	77.23	151.78	246.20	307.95	250.50
Finance Expenses	16.82	7.40	13.90	5.15	5.14
Surplus before	60.41	144.38	232.30	302.80	245.38
Depreciation	0.00	31.69	50.34	38.16	27.29
<b>Total Expenditure</b>	<b>68.81</b>	<b>107.91</b>	<b>127.48</b>	<b>111.00</b>	<b>107.63</b>
<b>Surplus for the Year</b>	<b>60.41</b>	<b>112.69</b>	<b>181.96</b>	<b>264.64</b>	<b>218.07</b>

- a. In the case of Sriperumbudur Town Panchayat, it is observed that the Town Panchayat has shown Net Surplus in all the last 5 (five) years. The surplus is mainly because of increase in land tax collected over the last few years. The huge appreciation in the value of land due to its proximity to Chennai has resulted in increased collection of land transfer duty during the last few years.
- b. But the income from other own sources has not increased much over the years. This implies that the Town Panchayat needs to undertake lot of fiscal reforms and full leverage of its assets over the next few years to improve its financial strength
- c. The total loans of the Town Panchayat as on 31<sup>st</sup> March 2008 stands as below:

Particulars	Amount (in Rs lakh)
Loan from Government	23.71
Loan from LIC	14.53
<b>Total</b>	<b>38.24</b>

- d. As against the same, the contribution by Town Panchayat, contribution by Government and Grants from Government as on 31<sup>st</sup> March 2009 stands as below:

Particulars	Amount (in Rs lakh)
Contributions from private parties	5.94

Contributions by Government	49.67
Grants from Government	219.87
<b>Total</b>	<b>275.48</b>

- e. Is it observed from the above that around 40% of the fixed assets excluding Land have been funded by means of Contributions and Grants from Government over the years and the balance by way of loans.
- f. The average current collection efficiency of the Town Panchayat is reasonable good, with 75% efficiency in Property tax, and more than 90% efficiency in profession tax, water charges and other income.
- g. The broad financial analysis of the Sriperumbudur Town Panchayat finances reveal that the Town Panchayat has vast scope for increasing its own sources of income and collection efficiency for servicing the additional borrowings in the future. Besides, the huge income from Assigned Revenues can help the Town Panchayat to undertake major developmental projects in the coming years.
- h. Besides, the Town Panchayat also has very low borrowings at around Rs 40 lakh and is not fully leveraged. The Town Panchayat can resort to further borrowings for new projects identified.

### 5.3 Identification of Key Problems:

The projects identified at the end of the exercise are indicative and the ULB would be required to review the projects in detail and carry out a consumer survey for the entire chain of MSWM service to identify the project scope and to prioritize the projects for implementation.

Based on the status of the solid waste management system, key service level benchmarks and the resultant inferences, the following appears to need investment on a priority basis:

- Absence of sanitary landfill site.
- Only 9 (nine) wards out of 14 (fourteen) wards covered under door to door collection system
- Low collection efficiency of around 77%
- Inadequate sanitary workers for solid waste collection

- Street sweeping is confined to only main roads and junctions of the city; proper identification of road including road lengths, width, utilization with population density etc needed to fix up the frequency and need for manpower deployment.
- Inadequate machinery, equipment and manpower thus significantly affecting the services.
- Inadequate community bins and/or common dumpers in all the wards of the city
- Investment in setting up of a treatment plant for organic waste
- Identification of suitable land for the engineered landfill site and its acquisition for implementing sanitary landfill system; due to low scale a regional approach to sanitary landfill seems more appropriate.

#### 5.4 Determine Core Objectives & Prioritization

1. **Collection efficiency:** The municipality plans to improve the waste collection efficiency with increased area coverage from current 9 wards to all 14 wards in the town.
2. **Disposal facility:** There is a need for development of engineered sanitary landfill, which can be taken up on regional approach, given the low scale of waste generation in the town.

#### 5.5 Technical Option Analysis

**Collection and transportation** – this can be improved with investment in the adequate equipment, tools and vehicles for waste collection and transportation.

- Implementation of ‘Door to Door Collection System’ in 5 more wards to cover the entire town.
- Installation of ‘Community Storage Bins’.

The present system of primary collection to be phased out by introducing Multi-bin carts (Push carts / Tricycles), semi mechanized systems like refuse collectors and separate collection vehicles to collect the non-biodegradable waste stored in separate bins.

Project Facilities – the municipality has proposed for development of regional landfill site, which seems a practical approach for smaller towns like Sriperumbudur to gain economies of scale.

#### 5.6 Commercial Viability Assessment:

The Municipality proposed to procure 37 nos. of small vehicles of 160 litres capacity for door-to-door collection system along with 9 nos. of large community bins of 1100 litres capacity. Other than this, there is a proposal for procuring 18 nos. of compactor bins of 1.1 cubic meter capacity along with one compactor vehicles for waste transportation. The total capital investment for procurement of these equipment and vehicles is estimated at around Rs. 70 lakh to be funded under Finance Commission Grant.

Further, it is proposed that there is a need for development work in the existing and proposed compost yard area in the town. The total capital investment for refurbishment and establishing of new compost yard will be around Rs. 300 lakh. The financial sources for this may include grants from centre & state government up to 80% & 10% of the total project cost respectively under satellite town development scheme.

The municipality may initiate the collection of nominal user charges from the households in the town for provision of door-to-door collection and there is also a need for rationalized charges from commercial establishments/ markets etc. Furthermore, revenues from sale of by-products and/or sale of recyclables extracted from the waste can also contribute to the revenue streams.

Given the scenario with 90% of the total project cost can be funded via centre/state grants coupled with probable revenue streams from user charges, sale of by-products like compost, recyclables, prima facie, it appears that the above identified projects are commercially viable.

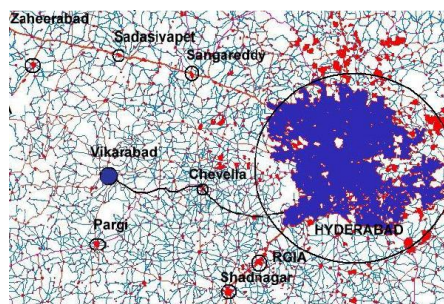
## 5.7 Service Delivery Options Analysis:

As highlighted the waste generation in the town is less than 6 tones per day and is highly unlikely to attract any investment from the private sector due to insignificant quantities. It is therefore recommended that the ULB should build on its internal capacity in terms of manpower to look after the day-to-day activities relating to primary collection, transportation and disposal. Further community participation should be explored for development of composting facility. However, to address the sanitary disposal of the waste, a more practical regional approach for development of regional landfill facility needs to be pursued along with adjoining ULBs.

## 6. Baseline SWM Status – Vikarabad

### 6.1 Introduction - Vikarabad

The Vikarabad municipality has been nominated as a satellite town to the City of Hyderabad under the centrally sponsored Scheme for Urban Infrastructure Development in Satellite Towns (CSSUIDST) of the Seven Mega Cities of India in view of its friendly and pro-poor approaches. It is the Mandal as well as Revenue Division headquarter, located 68 km from the City of Hyderabad and is on Secunderabad-Mumbai railway line.



The Vikarabad municipality was constituted as a Grade III Municipality by merging five Gram-panchayats in the year 1987. The Municipality was observed as Nagar-panchayat according to the population & income in the year 1995 and subsequently upgraded as Grade-II Municipality in the year 2001.

The population as per 2001 census was 42,410. The total number of households is 8,850 and the town is divided into 28 election wards and elections were held in the year 2005. It is estimated that the Vikarabad town will cater to a population of around 5.0 lakh by the end of the twenty year horizon period (2030). The centrally sponsored Scheme aims to have the entire infrastructure in place in the town within next 5-10 years as the municipality will attain a gradual increase in the population in the next 20 years. The past trend and projections in the population are shown in Exhibit 6.1 below:

**Exhibit 6.1 – Past trend and projections in population for Vikarabad Municipality**

Year	1991	2001	2010	2015	2020	2025	2030
Population	39,215	42,410	~60,000	1,00,000	1,50,000	3,00,000	5,00,000

Source: Vikarabad Municipal Council, Census of India

The municipality with approximately 64 sq km coverage has a gross density of 678 persons per sq km as per the 2001 census and the current estimates (2010) put this density at 1,008 persons per sq km. This gross density when compared to that of Hyderabad, which stands at 7993, is very low.

## 6.2 Initial Assessment and Need Analysis

### 6.2.1 Situational Analysis

#### 6.2.1.1 MSW Inventory:

**MSW Generation** – The Vikarabad municipality generates total of around 21.30 tons per day of Municipal Solid Waste (MSW).

**MSW Characteristics** –The physical composition of the MSW generated in the city indicates that organic portion in the waste is in the range of 30-40% of the total waste which can be converted into organic matter using composting technology. The recoverable/recyclable components in the waste are around 20-30% of the total solid waste generation, which needs to be recovered before final disposal of the MSW into landfill site and the rest around 40% is the inert /or final rejects.

#### 6.2.1.2 Gap Analysis in the Existing MSWM system:

The gaps in the existing systems are assessed in line with the service level benchmark norms and design criteria as per Municipal Solid Waste (Management & Handling) Rules as discussed in detail in “Section 4.1.2” of Volume I of this toolkit.

The MSW in the town is collected from door to door by tricycles partially and some with the help of tractors. The municipality has total of 5 (five) tractors, which are utilized for MSW collection and transportation to the temporary compost yard at Mekala gandi, however, there is no current treatment or processing of MSW at that site. Furthermore, there is no Sanitary Inspector in the municipality and the post is lying vacant and the SWM services are under the Bill Collector for the time being.

The Vikarabad municipality has 22 notified slums with a population of 28,570 which comprises 44.2 per cent of total city population (*source: slum wide survey conducted by MEPMA in the year 2009*). However, the municipal service of garbage collection and disposal is available to only 31 per cent of these areas. Around 44 per cent of the poor settlements do not have any kind of solid waste disposal system and ~17 per cent of the slums manage to dispose of their generated MSW by individual or community efforts.

Based on the primary interactions with Vikarabad municipality officials, IMAcS has assessed the current MSWM system in the town. Exhibit 6.2 below presents the key performance indicators of the existing MSWM system in Vikarabad and the inferences therein:

**Exhibit 6.2 – Key Performance Indicators of MSWM system in Vikarabad**

S. No	SWM Activity	Service Level Benchmarks	MSWM Services in	Key Inferences
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		Norms	Vikarabad	
1	Source storage with bin systems & Source segregation	100%	0%	<ul style="list-style-type: none"> <li>✓ There is no separate bin system of storing waste at source and no segregation at source is currently being followed.</li> <li>✓ People in general are not aware of the benefits of developing such a practice indicating lack of awareness creation mechanism.</li> </ul>
2	Primary Door to door collection	100%	70%	<ul style="list-style-type: none"> <li>✓ The MSW is collected from door to door by tricycles partially and partly with the help of tractors.</li> <li>✓ Collection efficiencies are low and need to be improved substantially with complete coverage of city area under primary collection activity</li> </ul>
3	Segregation at secondary storage points	100%	30%	<ul style="list-style-type: none"> <li>✓ The collected MSW is partly segregated at the temporary site for compost yard.</li> <li>✓ Waste segregation needs special attention as the efficiency of the processing plant would depend majorly on the success of this activity.</li> </ul>
4	Transportation of MSW	100%	97%	<ul style="list-style-type: none"> <li>✓ With the help of 5 tractors the MSW is collected and temporarily disposed off into the existing compost yard cum dump yard at Mekala Gandhi site.</li> <li>✓ Though compliance rate is at satisfactory levels, there is a need for investment in scientific and systematic waste transportation with covered vehicles. The average total distance covered by each tractor is 6 km per trip.</li> </ul>

5	Treatment & processing of MSW	100%	0%	<ul style="list-style-type: none"> <li>✓There is no treatment or processing of MSW which is dumped at the prescribed compost cum dump yard.</li> <li>✓There is a noticeable investment need in terms of setting up of a processing plant for treatment of waste before disposal thereby reducing load to the dump yard with lesser rejects</li> </ul>
6	Extent of MSW recovered	80%	(no formal system, but informal system do exist)	<ul style="list-style-type: none"> <li>✓There is no formal recoverable system in the town and the informal stakeholders such as ragpickers, kabariwalas generally extracts the recyclables from the solid waste.</li> </ul>
7	Extent of Cost Recovery for the ULB in MSWM services	100%	0%	<ul style="list-style-type: none"> <li>✓No service charges are levied.</li> </ul>
8	Scientific Disposal of MSW	100%	0%	<ul style="list-style-type: none"> <li>✓There is no sanitary landfill allocated for dumping of the waste and waste is being dumped at the site allocated temporarily for compost yard</li> <li>✓Stringent environmental laws compliance needed with investment in identifying suitable land and scientific disposal of waste in sanitary landfill</li> </ul>
9	Efficiency in redressal of customer complaints	80%	0%	<ul style="list-style-type: none"> <li>✓No formal customer compliant redressal system in the town.</li> </ul>

### 6.2.1.3 Existing Physical Assets & Human Resources

**Physical Assets** – The Vikarabad municipality has total five tractors for waste collection and transportation to the dumping ground.

**Human Resources** – The SWM department in the town is headed by Environmental Engineer. However, the key official position of Sanitary Inspector is vacant and Bill Collector is the nodal person for SWM services in the town.

### 6.2.1.4 ULB Budget Analysis

This section highlights the municipal finances of Vikarabad municipality over the last 5 (five) years starting from the financial year 2005-06:

Revenue income of Viakarabad municipality has grown from a level of Rs 163.29 lakh in the year 2005-06 to Rs 179.62 lakh in the year 2008-09. During this period, Vikarabad municipality consistently maintained a revenue surplus.

The Schemes income was Rs.104.87 lakh for the year 2005-06 and Rs.276.23 lakh for the year 2008-09. The schemes in Vikarabad municipality comprises of loans, grants (major share) and contribution in the form of sale proceeds of assets and contribution (donations for water supply, sewerage connections and deposits works, etc.)

The capital account has witnessed a surplus – implying non-utilization of the grants on capital works. It is observed that that capital expenditure has been consistent during the review period. During 2005-06, the capital expenditure was around Rs 1.0 crore, which increased to Rs 3.7 crores in 2006-07 and then maintained around a crore in the year 2007 – 2009. The rise was primarily attributed to higher allocation for road and drain works in the municipality. The Exhibit 6.3 below highlights the Revenue Receipts in Rs lakh.

**Exhibit 6.3 – Details on Revenue Receipts for Vikarabad Municipality**

Year	Tax	Non-Tax	Transfers	Total
2005-06	58.41	48.10	54.50	161.31
2006-07	46.95	36.55	89.14	172.64
2007-08	56.14	36.16	75.96	168.26
2008-09	64.89	65.62	48.31	178.82

Exhibit 6.4 below highlights the Revenue Expenditure of Vikarabad. As shown the establishment expenditure alone accounts for approximately 65% of revenue expenditure. In comparison with revenue income, over 70% is utilized for payment of salaries and pensions. For the assessment period, revenue expenditure grew at an average rate of 15%, while the corresponding growth in revenue income was 20%. The O&M expenditure of all section together accounts for 20% of the total revenue expenditure. The major component in this accounts for road maintenance.

**Exhibit 6.4 – Details on the Revenue Expenditure of Vikarabad Municipality**

Year	Establishments (wages & salaries)	Operations & Maintenance	Others	Total
2005-06	86.71	19.19	45.89	151.79
2006-07	108.54	18.63	61.73	188.90
2007-08	114.46	14.62	60.54	189.62
2008-09	127.34	15.45	93.39	236.18

Exhibit 6.5 below highlights the Capital Income/Receipts comprising loans, grants and own contributions. As shown during the review period capital income was inconsistent due to irregular flow of scheme specific grants.

**Exhibit 6.5 – Details on Capital Income & Receipts for Vikarabad Municipality**

Year	State Government Grants (in Rs. Lakh)
2005-06	104.87
2006-07	315.63 (includes 67.68 loan)
2007-08	102.00
2008-09	276.23

The Capital Expenditure as shown in Exhibit 6.6 below has been directed majorly for roads, special works and other grant works for improvement of slums. The overall status of the capital account indicates net surplus. The positive implication depends on the perspective that there is a surplus available to take up capital projects in near future and negative connotation due to the fact that municipality did not utilize the grants assigned and hence some may have to be returned to the respective financial accounts.

**Exhibit 6.6 – Details on Capital Expenditure for Vikarabad Municipality**

Year / Head	2005-06	2006-07	2007-08	2008-09
Capital Grants	104.87	383.31	102.00	276.23
Capital Expenditure	99.7	373.08	102.12	110.7
% of Utilization of Grants	95.07%	97.33%	100.12%	40.08%

The key highlights of the assessment of Vikarabad Municipality Financial are as follows:

- i. **Revenue Income** – Vikarabad municipality on an average has generated 70% of revenue income through its own sources, which is a commendable feat. Dependency on assigned avenues is only to the extent of 30 percent by way of assignments or transfers from GoAP, which is an indirect form of own-source revenues. However, realization of these amounts is dependent on timely transfers from GoAP.
- j. **Revenue Expenditure** – It is observed that about 65% of revenue income is spent on salaries both for regular and contract workers. From the year, 2009-10, the government of Andhra Pradesh has taken a decision to pay the salaries of regular employees through the revenue account of the state. This would mean that at least 70% of the current expenses on establishment would be available to take up capital works. As per the trends, the municipality is raising around 1.75 crore on an average through taxes, non taxes and transfers and spending close to 1.25 crore on salaries. With the current initiative of the government, it is estimated that the municipality will save at least Rs 75 lakh per annum.
- k. **Capital Account status** – As of date, the capital account has surplus on account of schemes. However, there are a number of schemes that need to be taken up yet and pending bills that have to be cleared. Hence fund the capital works will even out eventually. Nevertheless, all the capital works in the municipality have been taken up only as part of grants be it plan or non plan. There are little or no capital works taken up by the municipality by their own funds, with the above analysis of the revenue expenditure, it will be possible in future to take up **capital works at least to a tune of 50 lakh** in the municipality.

### 6.3 Identification of Key Problems:

The projects identified at the end of the exercise are indicative and the ULB would be required to review the projects in detail and carry out a consumer survey for the entire chain of MSWM service to identify the project scope and to prioritize the projects for implementation.

The section below outlines the key issues/gaps identified in the existing MSWM system in Vikarabad along with reasons for service level gaps:

- i. Irregular MSW collection in all the areas of the city has led to inefficient collection system; investment is required in implementing two-bin system for source storage and segregation along with scientific primary collection system including tricycles and common dumpers.
- ii. Waste generated from the vegetable markets and hotels in the city lack adequate storage facilities.
- iii. Street sweeping is confined to only main roads and junctions of the city; proper identification of road including road lengths, width, utilization with population density etc needed to fix up the frequency and need for manpower deployment.
- iv. Inadequate machinery, equipment and manpower thus significantly affecting the services.
- v. Inadequate community bins and/or common dumpers in all the wards of the city
- vi. Investment in setting up of a treatment plant for organic waste
- vii. Identification of suitable land for the engineered landfill site and its acquisition for implementing sanitary landfill system; due to low scale a regional approach to sanitary landfill seems more appropriate.

## 6.4 Determine Core Objectives & Prioritization

1. **Collection efficiency:** The municipality plans to take up privatization of MSW collection with door to door waste collection by dividing the town in three zones.
2. **Processing and Disposal:** The treatment and disposal shall include composting the organic matter of the MSW and there is a need for development of sanitary landfill for which the municipality has already initiated the land alienation proposals for waste dumping at Ananthagiripally to an extent of 9.0 acres.

## 6.5 Technical Option Analysis

**Collection and transportation** – the following measures shall be introduced for improving the primary collection:

- Phased implementation of ‘Door to Door Collection System’ through community organizations and municipality by mobilizing, facilitating, organizing and supporting community activities with the help of SHGs and local NGOs.
- Installation of ‘Community Storage Bins’.

- Placement of dumper containers sufficient in number at markets for ensuring that all the vendors put the waste in the containers.

The present system of primary collection to be phased out by introducing Multi-bin carts (Push carts / Tricycles), semi mechanized systems like refuse collectors and separate collection vehicles to collect the non-biodegradable waste stored in separate bins.

**Project facilities** – since the waste generation is less in the town, it is recommended to have one integrated facility for processing and disposal at already identified Ananthagiripally landfill site. Given the quantum of waste generation in the town, it is recommended to have a compost plant for conversion of organic matter of MSW in to manure.

## 6.6 Commercial Viability Assessment:

The Municipality proposed to procure 16 Dumper Bins, one Dumper placer with two bins and Autos and tricycles for primary and secondary collection of waste, mechanized road sweeping vehicle, and new vehicles for waste transportation under Twelfth Finance Commission (TFC) Grants. Recently tractors & trolleys for SWM were procured by the Municipality with a cost of Rs 18 lakh. As of today, dumper placers and dumper bins are being procured with an outlay of Rs 30 lakh.

It is estimated that the development of compost yard at Ananthairipally including the sheds, internal roads, approach road and other related works for MSW treatment will required a capital investment of Rs 60 lakh. Further, the development of sanitary landfill would require capital investment to the tune of Rs 10 crore in the Phase-1 (initial 2 years).

Hence, it is envisaged that the capital investment requirement for provision of MSWM service over next 2-4 years, till 2015 is to the tune of Rs 10-12 crore. The financial sources include grants from centre & state government up to 80% & 10% of the total project cost respectively under satellite town development scheme.

The municipality may initiate the collection of nominal user charges from the households in the town for provision of door-to-door collection and there is also a need for rationalized charges from commercial establishments/ markets etc. Furthermore, revenues from sale of by-products and/or sale of recyclables extracted from the waste can also contribute to the revenue streams.

Given the scenario with 90% of the total project cost can be funded via centre/state grants coupled with probable revenue streams from user charges, sale of by-products like compost, recyclables, prima facie, it appears that the above identified projects are commercially viable.

## 6.7 Service Delivery Options Analysis:

As highlighted there are two separate projects identified for provision of MSWM service; one on collection & transportation with upgraded fleet system, and second on development of project facilities including secondary storage, compost facility and sanitary landfill site.

However, the scale of the operations/investments is not significant to likely evince the interest of the private player for development of either an integrated MSWM system or an integrated processing and disposal system. Further, the ULB has already made some investment for procurement of transportation fleet for collection & transportation of MSW, it may be prudent to upgrade this system as handing over of the equipment/fleet to the private player and in that matter also integration of existing manpower in case of option of PPP may need designing of complex contract documents.

Another aspect which needs due consideration is exploring the possibility of development of a regional sanitary landfill site to achieve the economies of scale and investment.