

# CITY SANITATION PLAN

## *for SINNAR Municipality*

# Report on town diagnostics for sanitation services and nature of capacity building support needed

## Section III: Sinnar

30<sup>th</sup> May 2014

CEPT University

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② Current status of sanitation

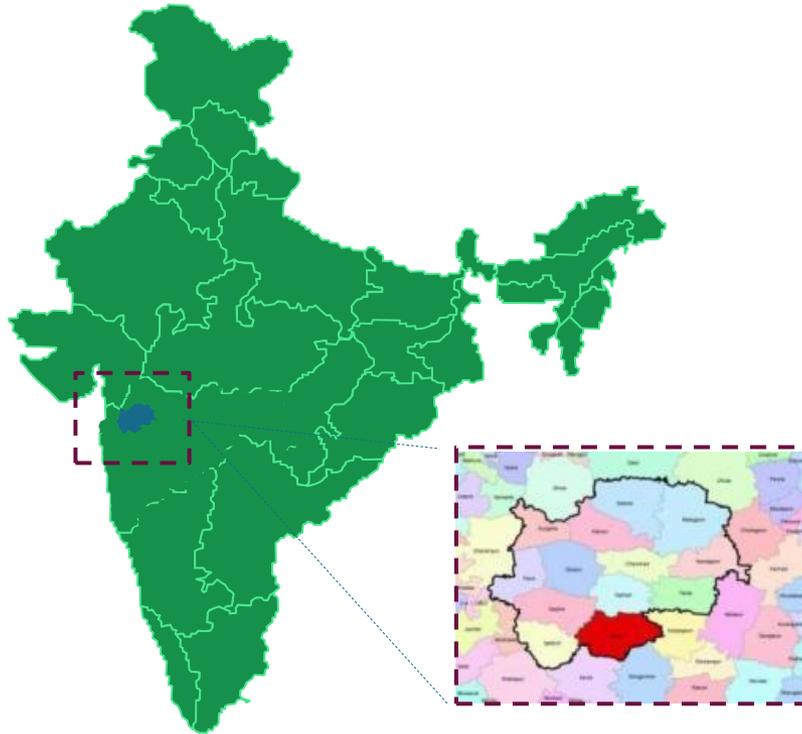
③ Recommendation solutions

④ ULB institutional assessment and areas for capacity building

⑤ Financial capacity assessment

# Sinnar is a Class C town of ~65,000 people located in the Nashik district of Maharashtra

## Location

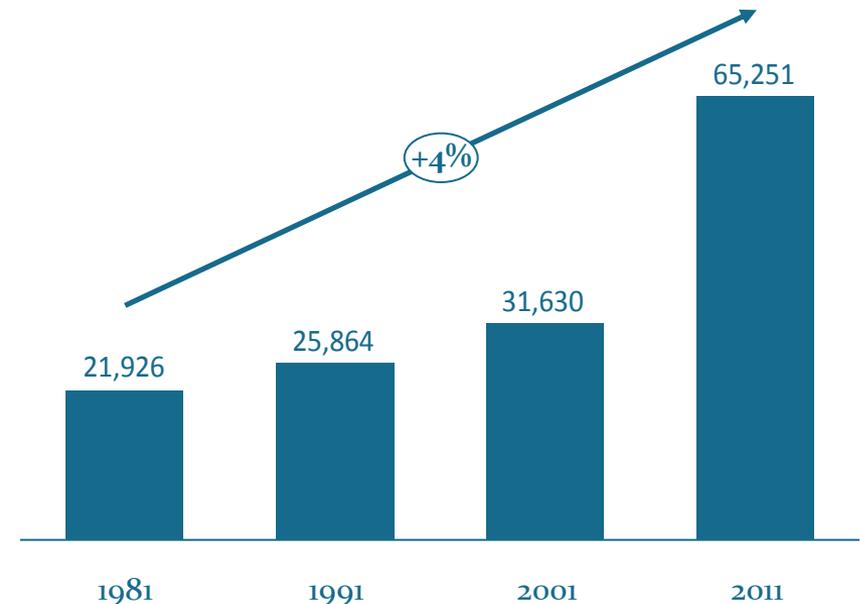


- **Class 'C' city** located 30 Km south-east of the city of Nashik in Maharashtra
- **A historical town**, and was the headquarter of a sub-division in the historical district of Sangamner
- The municipal area has grown from **~5 Sq. Km. in 2001 to ~51 Sq. Km. in 2011**

## Demographics

### Population of Sinnar Municipal Council

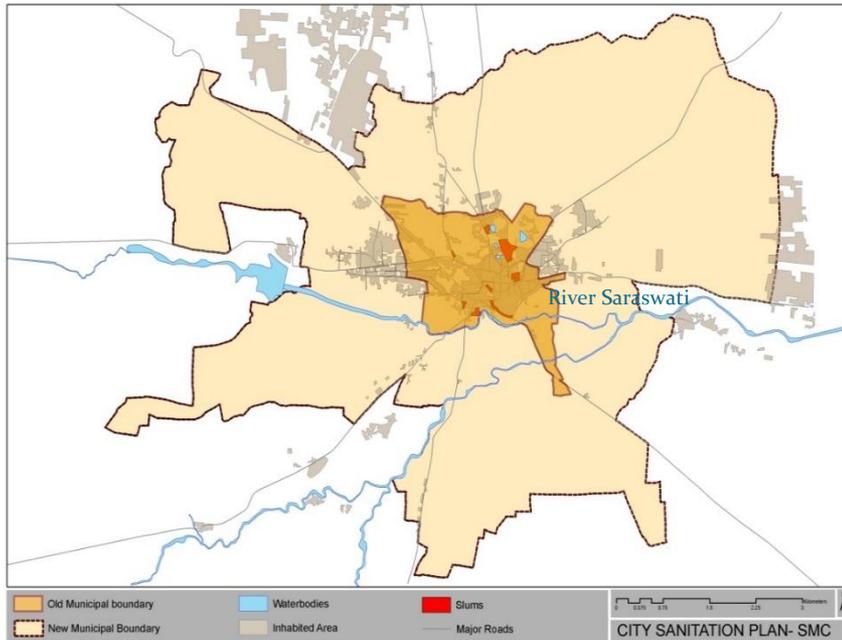
(Census data)



- Has **~13,000 households** with an average household size of ~5 persons
- The population density in Sinnar is ~1,200 inhabitants per Sq. Km.
- **Population growth has been fast** (more than 100% between 2001 and 2011) due to **industrial developments in the area and expansion of municipal boundary in 2009**

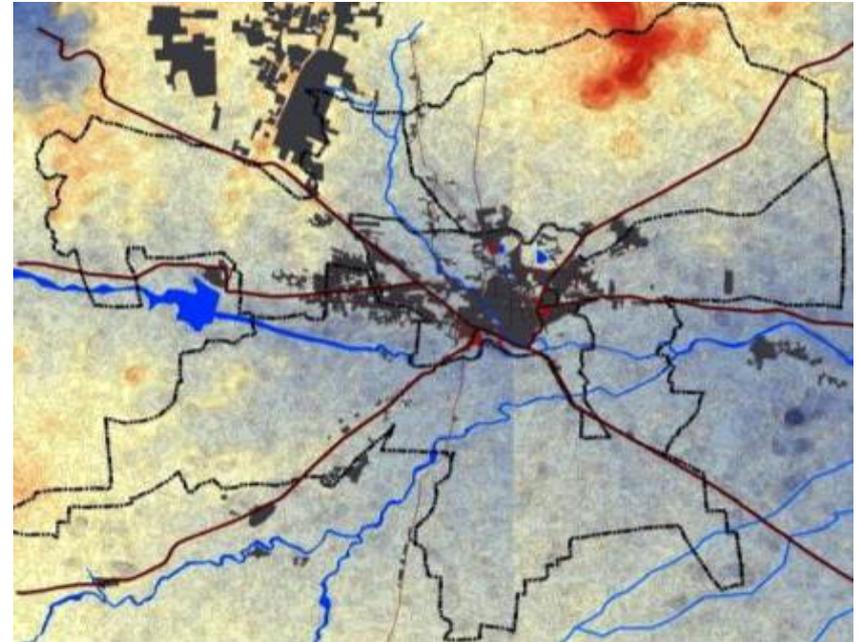
# Sinnar is located on the banks of river Saraswati and has grown rapidly due to recent industrial development

## Demographic details



- Sinnar has **experienced major demographic change** in the last decade
- This is mainly due to the **flourishing industrial zones, east and north-west of Sinnar**
- **New areas** have come up along the **western and eastern side of the city** along a few major roads

## Topography



- In the old town area, **terrain is gradually sloping towards the major water bodies**
- Due to this, this area has a **good drainage system of open and covered drains**

# For administrative purposes, Sinnar is divided into 6 prabhags

## Administrative Map of Sinnar

Newly developing residential area with agricultural land on the western side  
**Population: 13,659**

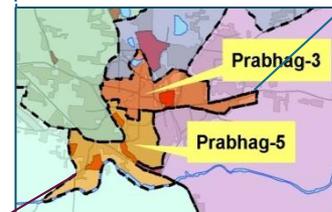
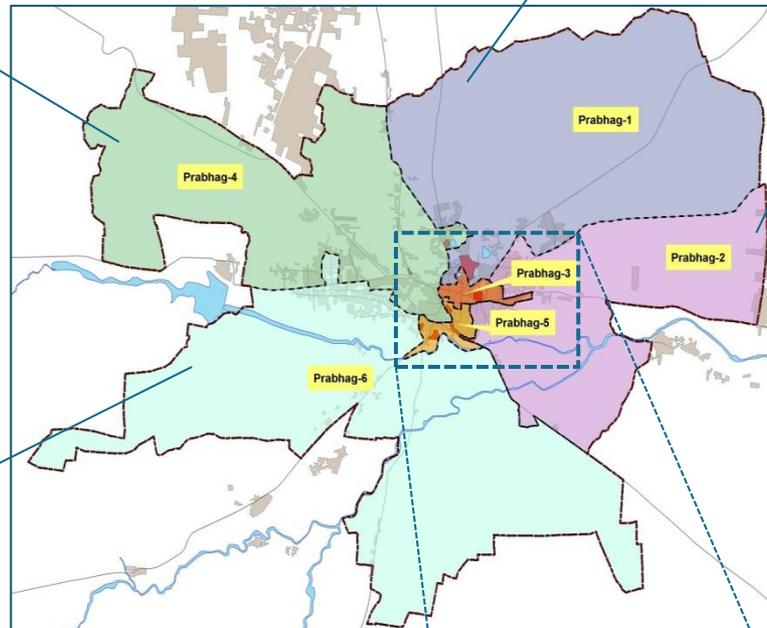
Newly developing residential area with major growth expected in the future  
**Population: 10,943**

Newly developing residential area with agricultural land on the eastern side  
**Population: 12,211**

Major agricultural area of Sinnar, south of the river Saraswati  
**Population: 15,486**

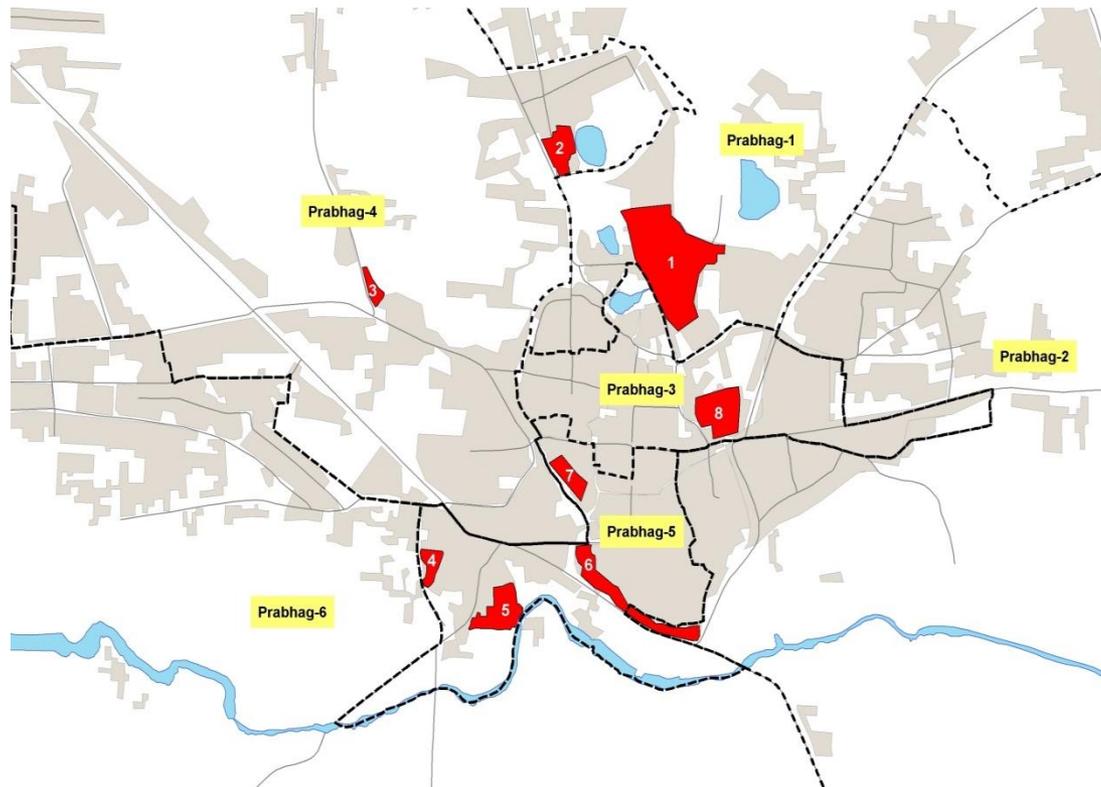
Part of the old town area of Sinnar, with high density of housing, forms the core of the city  
**Population: 6,579**

Part of the old town area in Sinnar, with high density of housing  
**Population: 6,373**



# 10% of the total population lives in 8 large slum areas

Map of Sinnar Municipal Council with slum pockets



S. No.	Name of the slum	Population
1	Makadwadi	2610
2	Talwadi	930
3	Devi road	490
4	Bhoigalli	260
5	Tambeshwar nagar	395
6	Apnagarage	960
7	Satpirbhilati	170
8	Indirinagar	835

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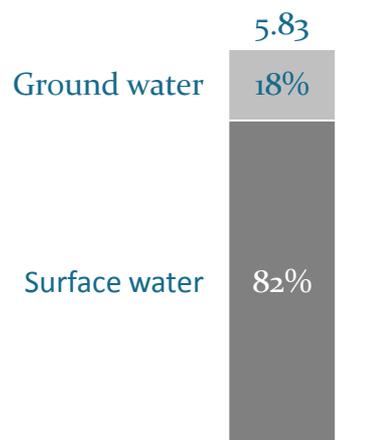
④ ULB institutional assessment and areas for capacity building

⑤ Financial capacity assessment

# Sinnar faces a severe shortage of water, and only ~40% of households have a water supply connection

## Source of water supply

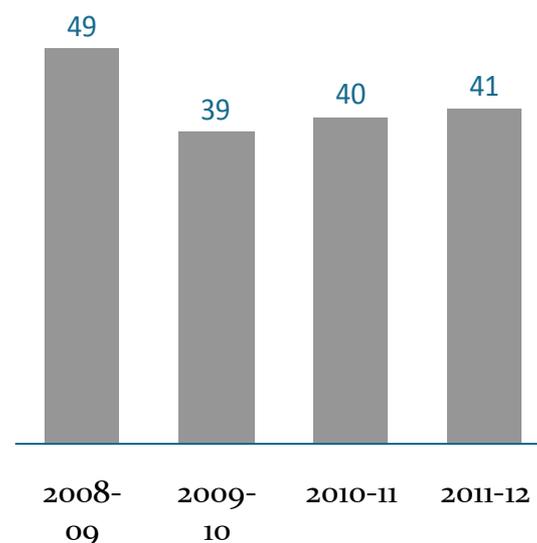
(in MLD)



- The **major source of water supply is River Darna**, which constitutes 82% of the total water supply
- Surface water is treated at a **water treatment plant** in Malegaon of 6.15 MLD capacity
- The main source of ground water are the **7 private wells** and **1 bore well**

## Coverage of water supply connections

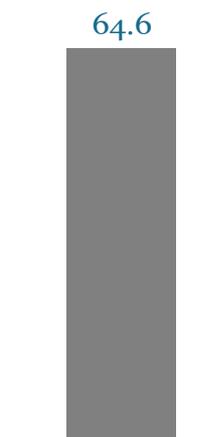
(in % of total households)



- **The percentage of households provided water supply connections has remained constant** over the last three years, covering only 40% of the total households

## Per capita availability of water in Sinnar

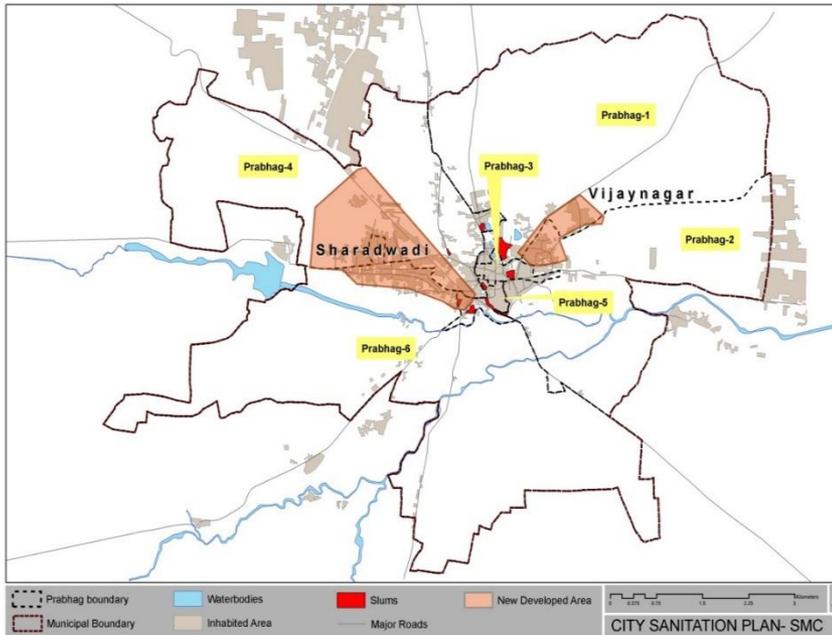
(in LPCD, 2011-12)



- The per capita availability of water is much lower than the Code of Basic Requirements of Water Supply set at 100-150 LPCD by the **Bureau of Indian Standards (BIS)**
- It also **much lower** than the **service level benchmarks** set by the Govt. of India at **135 LPCD**

# To increase the availability of water, the government has proposed a water supply project in Sinnar

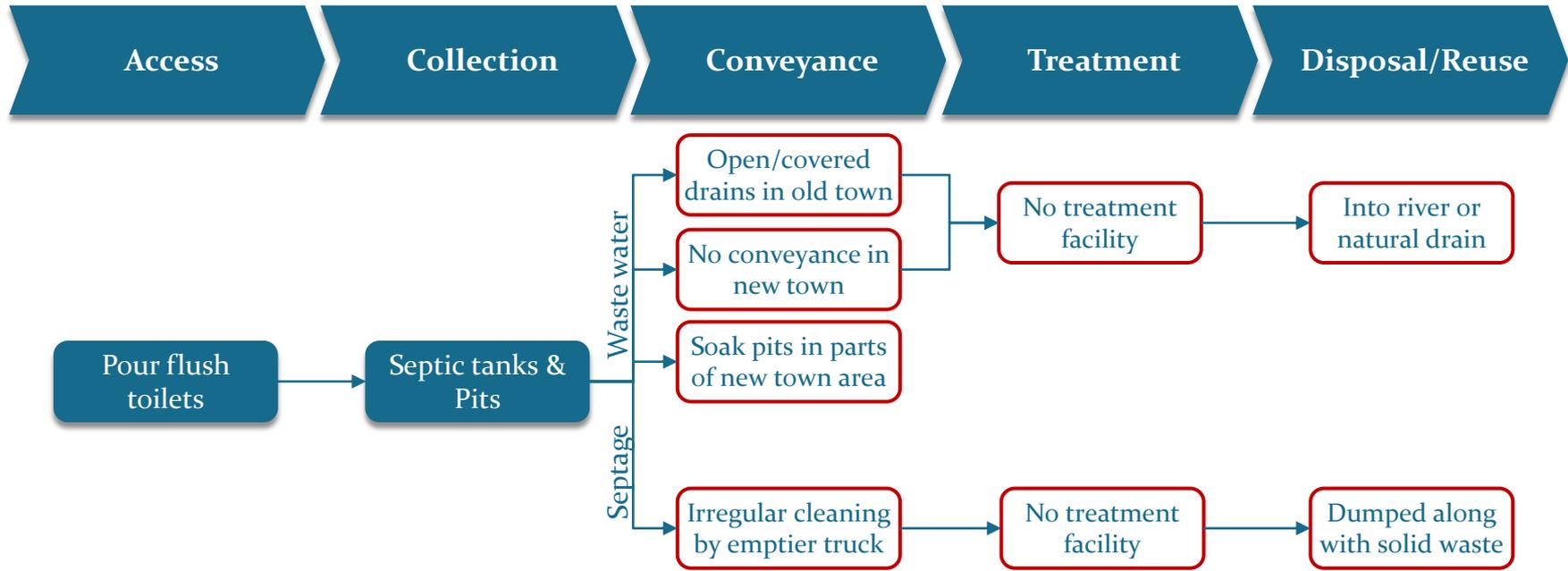
## Proposed location of the water supply project



## Details of Water supply project

- The Government of Maharashtra, under the **Maharashtra Sujal Nirmal Abhiyan (MSNA)** program, has proposed a **water supply project in Sinnar** to increase the per capita availability of water
- **Sharadwadi**, a newly developed area in Sinnar, has been considered as a **proposed location**
- The project includes an **Elevated Storage Reservoir (ESR)** of 1.3 million litre capacity, a distribution system and other allied works
- The project is designed to cater to the population in 2042
- The scheme involves an investment of **INR ~120 Million**
- It is **currently being executed** and is likely to be **completed by 2016**

# There are significant gaps across the sanitation value chain in Sinnar (1/2)



Pour flush toilets



Septic tanks



Open/closed drains



No treatment



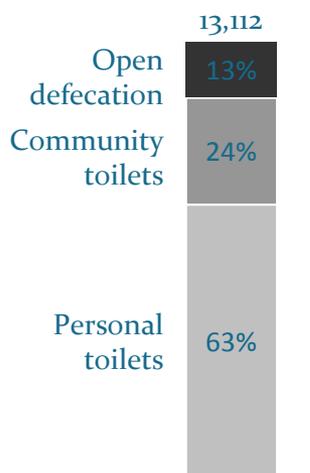
River Saraswati



# There are significant gaps across the sanitation value chain in Sinnar (2/2)

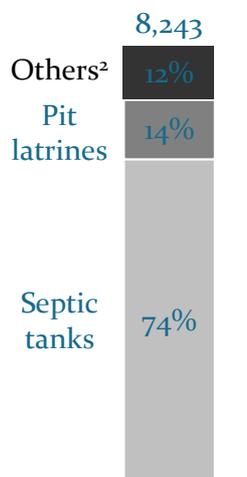
## Access

Access to type of sanitation  
(Number of HH)



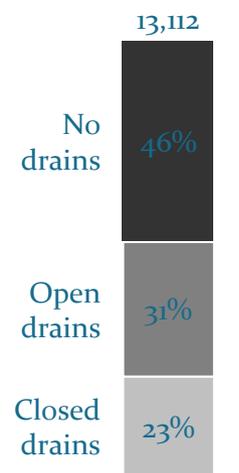
## Collection

Method of collection of waste<sup>1</sup>  
(Number of HH)



## Conveyance

Methods of conveyance of waste  
(Number of HH)



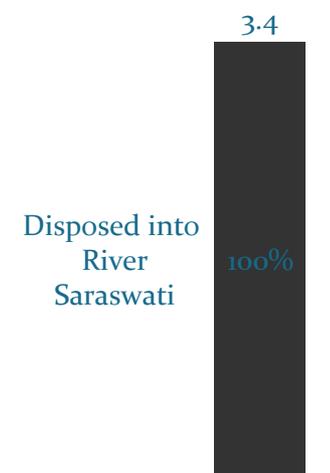
## Treatment

Treatment of wastewater  
(in MLD)



## Disposal/Reuse

Disposal of waste  
(in MLD)



- ~1658 HH practice OD in Sinnar
- ~3211 HH are dependent on community toilets
- 21% of non-slum HHs are also dependent on community toilets

- ~1,000 HH with access to individual toilets depend on primitive method of collection of waste
- Septic tanks are over sized and lack access manhole covers

- ~6,000 HH have no drains for conveyance of wastewater
- Only ~4% of septic tanks are cleaned per year

- ~3.4 MLD of waste water is untreated
- No treatment facility for fecal sludge

- ~3.4 MLD of wastewater is dumped into river Saraswati
- Fecal waste is dumped into the open solid waste dump site

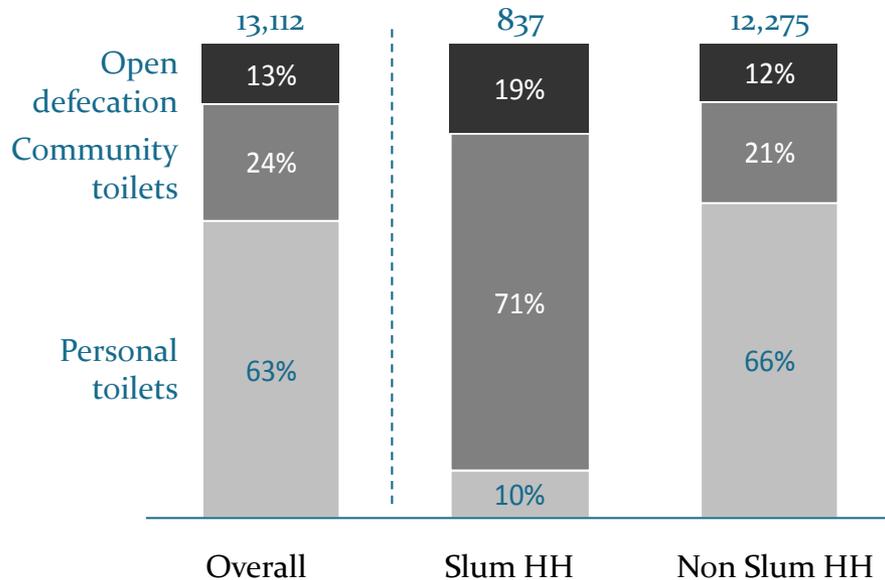
Note: (1) Collection only for HH with individual toilets, (2) Includes primitive methods such as latrines serviced by animals

Source: Census of India 2011, PAS data 2011, City Sanitation Plan of Sinnar, PAS Project – CEPT University

# Access: 13% of households practice open defecation in Sinnar and another 24% are dependent on community toilets

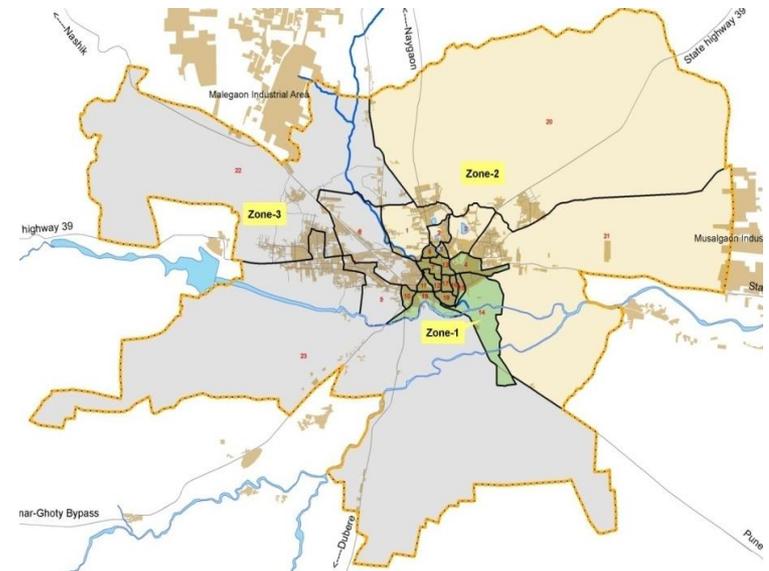
## Access to types of sanitation facility in Sinnar

(Number of HH)



- 1,658 households practice open defecation in Sinnar
- 8,243 households have access to individual toilets
- 3,211 households are dependent on community toilets, ~158 of them in slum areas
- Lack of availability of finance, space constraints and legal clearances are cited as the main barriers to adoption of individual toilets

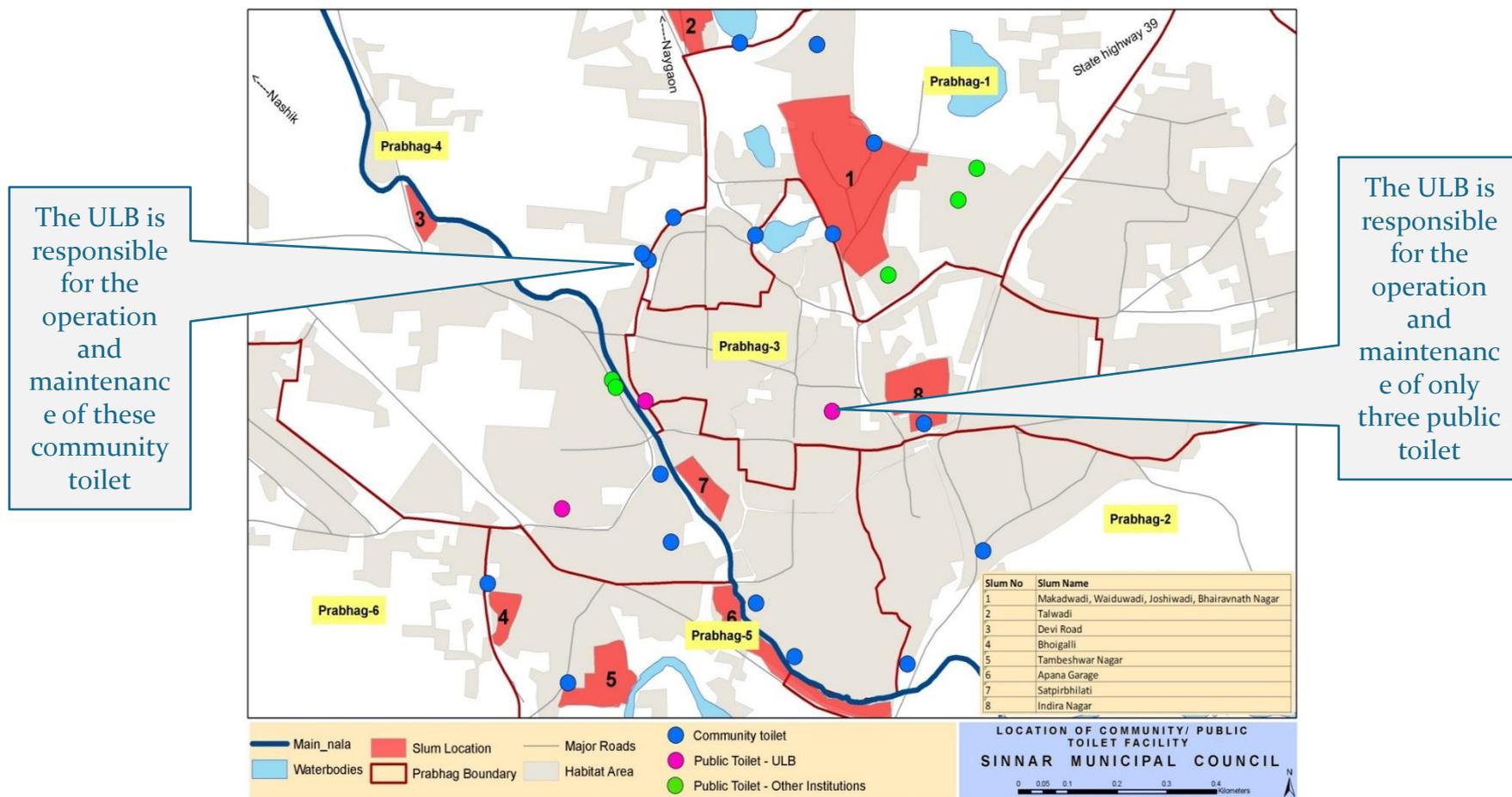
## Current status of access to toilets in Sinnar



- In zone 1, due to space constraints, only 44% of households have personal toilets and there is a high rate of open defecation and dependence on community toilets
- Zone 2 is a newly developed area and 55% of households have personal toilets
- Zone 3 consists of newly constructed houses, and 77% of households have personal toilets

# Access: There are 18 community toilet blocks in Sinnar and 3 public toilets

## Location of community toilets and public toilet in Sinnar



# Access: Community and public toilet blocks are in poor condition and lack regular upkeep and maintenance

## Community toilets



- There are **18 community** toilet blocks, serving ~3,211 households
- Community toilets are also located in **non-slum areas**
- An audit in 2013 found that **community toilets were in poor condition** and only 280 of 322 the seats are functional
- A few community toilet blocks **do not have electricity** making them unsafe for women and children at night
- All Community toilet facilities are **free to use** and are **maintained by private contractors**

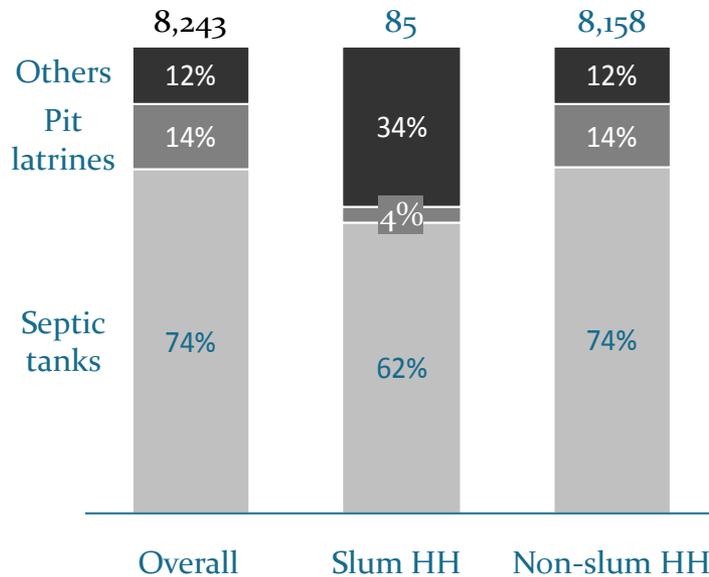
## Public toilets



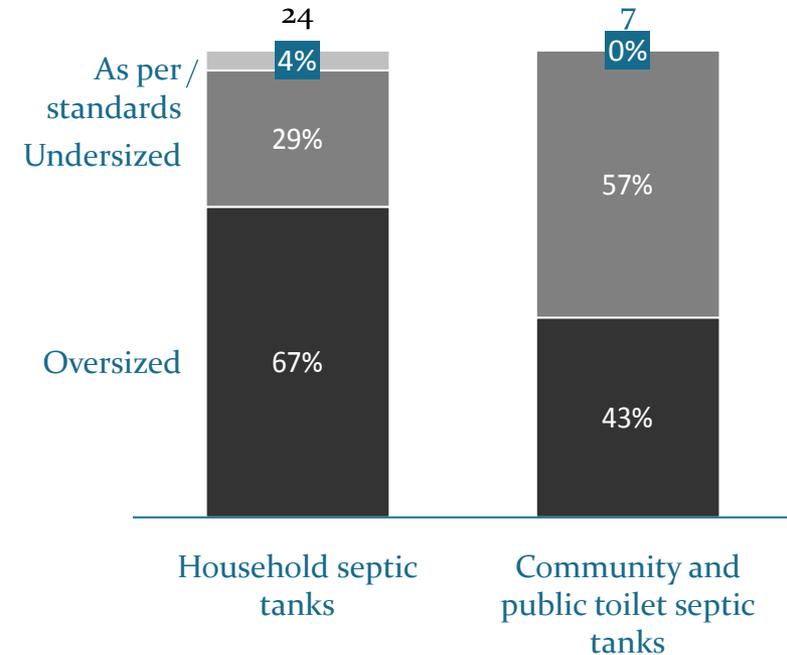
- Currently, there are **3 public toilets in Sinnar** which are **under ULB purview**
- Public toilets are in poor condition with **41 of 48 seats being functional**
- The public toilets are operational 24x7, however **clogging of toilet pans and poor availability of water limit their use**
- All public toilets are managed by a **private contractor and are free to use**

# Collection of septage: 74% of individual toilets depend on septic tanks which are largely oversized

Method of collection of waste for all households  
(in HH)



Sample assessment of septic tanks in Sinnar  
(Numbers)



- Most personal toilets are **connected to septic tanks for the collection of waste**
- Septic tanks usually have **2-3 chambers and are placed under the toilets**
- As a result they **lack manhole covers** making access difficult

- A sample survey found that septic tanks connected to personal toilets are **largely oversized** and do not meet the standards prescribed in IS codes and CPHEEO' manuals
- As a result, they are **infrequently cleaned**
- **Septic tanks** connected to **community and public toilets** were largely **undersized and cleaned too frequently**

Note (i) The Central Public Health and Environmental Engineering Organization (CPHEEO) is the technical wing of the MoUD and deals with the matters related to urban water supply and sanitation

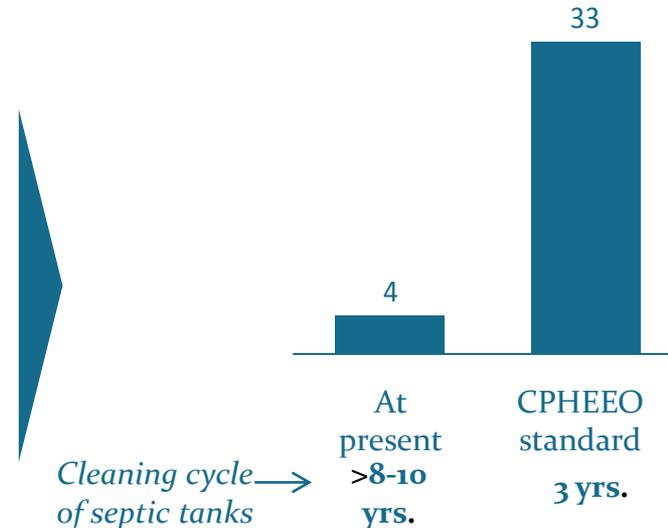
# Conveyance of septage: Only 4% household septic tanks are cleaned annually as compared to the service standards of 33%

## Existing septage conveyance mechanism in Sinnar



- ❑ Sinnar has only **1 suction emptier truck of 3000 liter capacity**, for cleaning all septic tanks in the town
- ❑ The truck is **owned and operated by the ULB** that **charges INR 400-800 / trip** for cleaning 1 septic tank
- ❑ The truck also cleans **community and public toilet septic tanks once a week**
- ❑ **There is no regulated schedule for cleaning**, and households call the ULB when the septic tanks fill up

## Number of septic tanks cleaned annually by the Sinnar ULB (As a % of total septic tanks)



- ❑ Only **4% of tanks are cleaned annually**, far below the **service standards of 33%** recommended by the CPHEEO manual<sup>1</sup> and the MoUD Advisory on Septage Management
- ❑ Due to **infrequent cleaning**, **septage begins to solidify** in tanks
- ❑ As the septic tank fills up, **fecal matter along with effluents** is released into the drains
- ❑ This leads to **high levels of Biochemical Oxygen Demand (BOD)** in wastewater, much higher than the prescribed limits of the **Central Pollution Control Board**

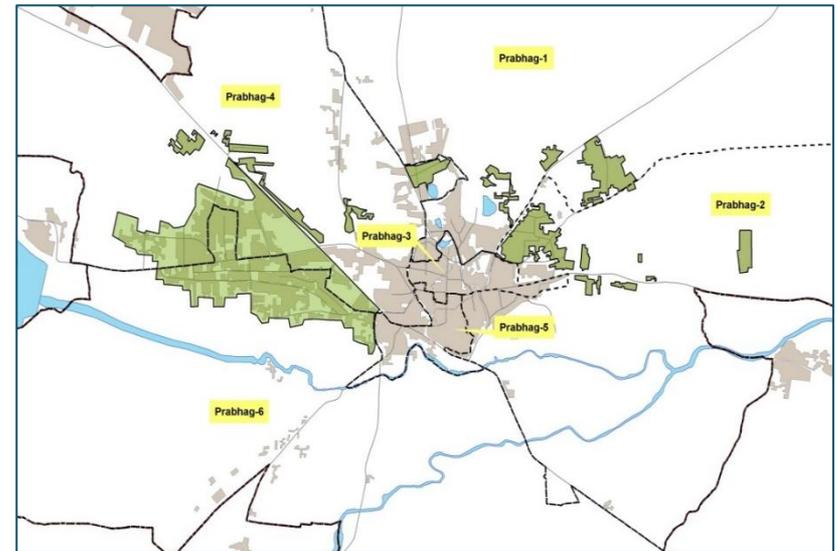
Note (1) The Central Public Health and Environmental Engineering Organization (CPHEEO) is the technical wing of the MoUD and deals with the matters related to urban water supply and sanitation

# Wastewater collection and conveyance: ~40% of households have no drains for the conveyance of waste water

## Method of collection and conveyance of wastewater (As a percentage of total HH)



## Map of Sinnar with conveyance mechanisms

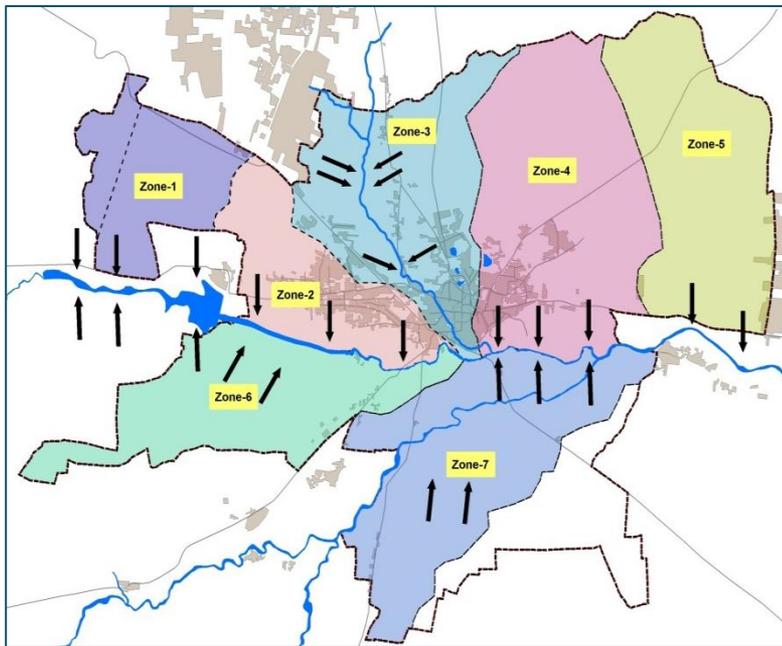


- Area with no network of conveyance system
- The old town area has a good network of open and closed drains running parallel to roads
- However **solid waste blocks drains** all over the town
- The drainage system in new areas is limited in coverage** and wastewater is discharged into soak pits or into the open

- ~**5,990 households** in Sinnar have no drainage system for the conveyance of wastewater
- There is **no appropriate mechanism for conveyance of grey and black water**, and both of which flow into drain channels along the streets

# Wastewater treatment and disposal: All wastewater is dumped without treatment into the river Saraswati

## Quantity of Wastewater generation in Sinnar by clusters



Zone	Wastewater generated in 2012 (MLD)
2	1.01
3	1.35
4	1.01
1,5,6,7	Negligible (sparsely inhabited)
<b>Total</b>	<b>3.36</b>

There is no treatment facility for septage or wastewater

## Wastewater treatment

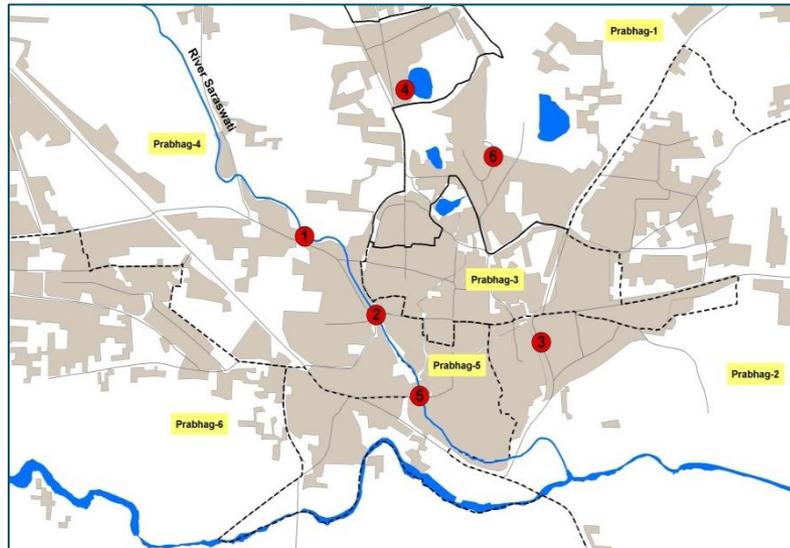
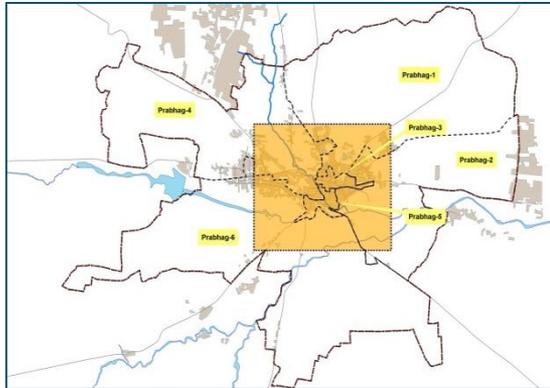
- ~3.4 MLD of wastewater is generated in Sinnar and goes untreated due to lack of any centralized or decentralized treatment facility
- The town slopes towards the river Saraswati, and due to lack of soak-pits and treatment facilities **all the wastewater drains into the river**
- Based on a **sampling of wastewater** done in Sinnar, the level of BOD in wastewater was found to be **higher** than the CPCB standards in all **5 sampled locations**

## Crude disposal of waste water



# Sample tests of wastewater show that key indicators of pollution exceed the prescribed limited by the Central Pollution Control Board (CPCB)

## Location of sample collection for wastewater testing



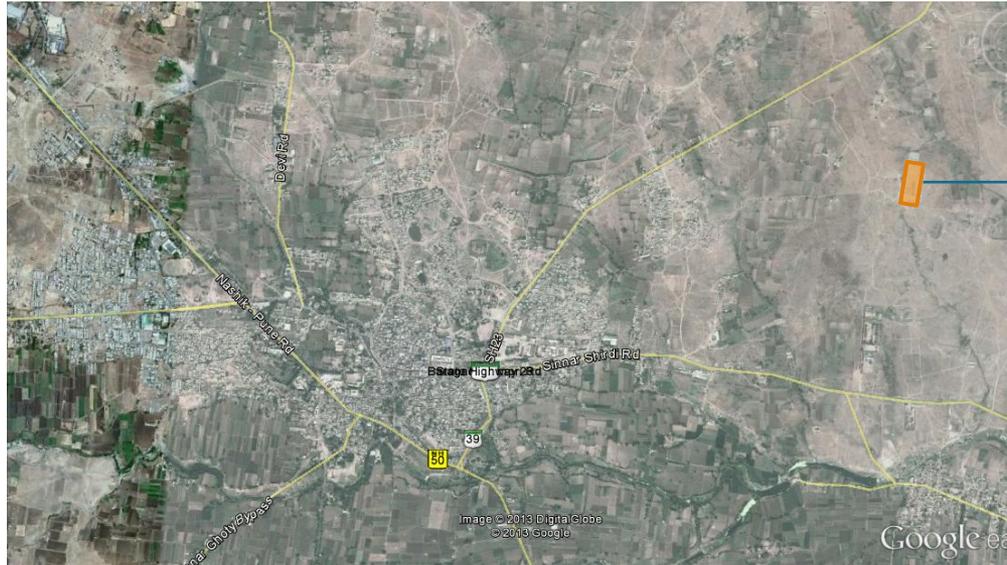
## Test results

- **Samples of wastewater** from 5 locations in Sinnar were checked and the levels of **Biochemical Oxygen Demand (BOD)**, **Chemical Oxygen Demand (COD)**, **Total Suspended Solids (TSS)** and **pH count** was assessed
- The level of BOD and COD was much higher than the prescribed limits of the **Central Pollution Control Board at all locations**
- However the pH count was found to be within the limits

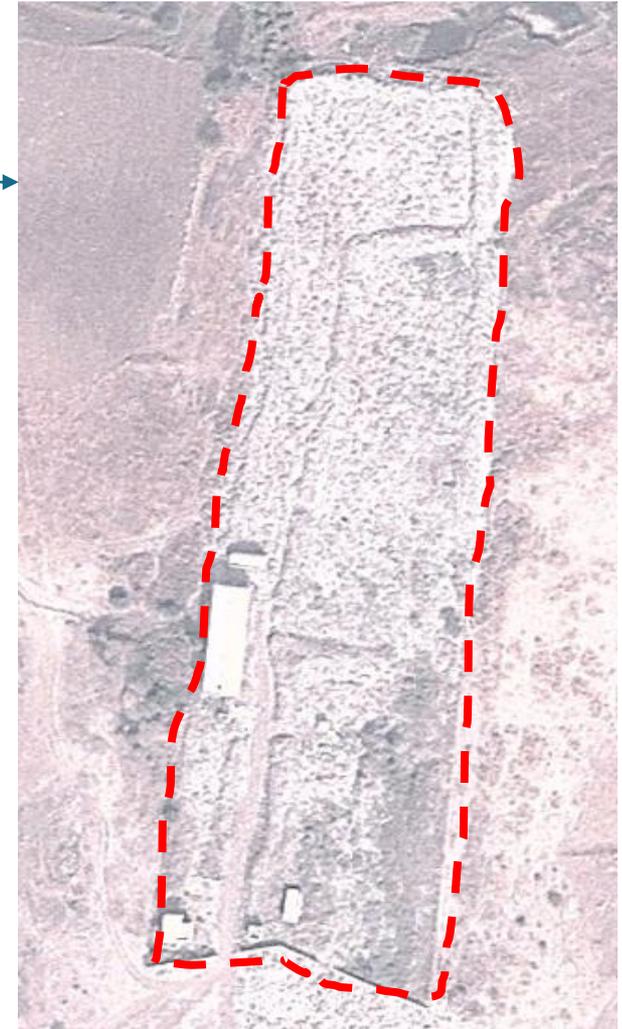
	Location	BOD (Mg/l )	COD (Mg/l )	TSS (Mg/l )	pH count
1	Khasdar Pool (drainage outlet)	222	360	186	6.9
2	Bazar Pool (river water)	198	310	263	7
3	Indira Nagar (open drain)	375	610	274	6.8
4	Talwadi (septic tank)	360	540	249	7.4
5	Vanjar Galli (open drain)	228	340	194	6.9
	<b>Permissible Limits</b>	<b>30</b>	<b>250</b>	<b>600</b>	<b>6.5-8.5</b>

# Septage treatment and disposal: Septage is dumped off at the solid waste dump site without treatment

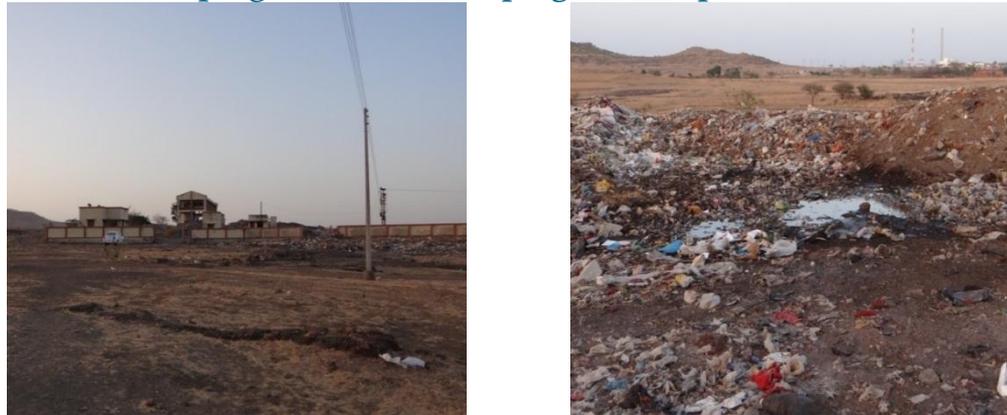
Location of dump site



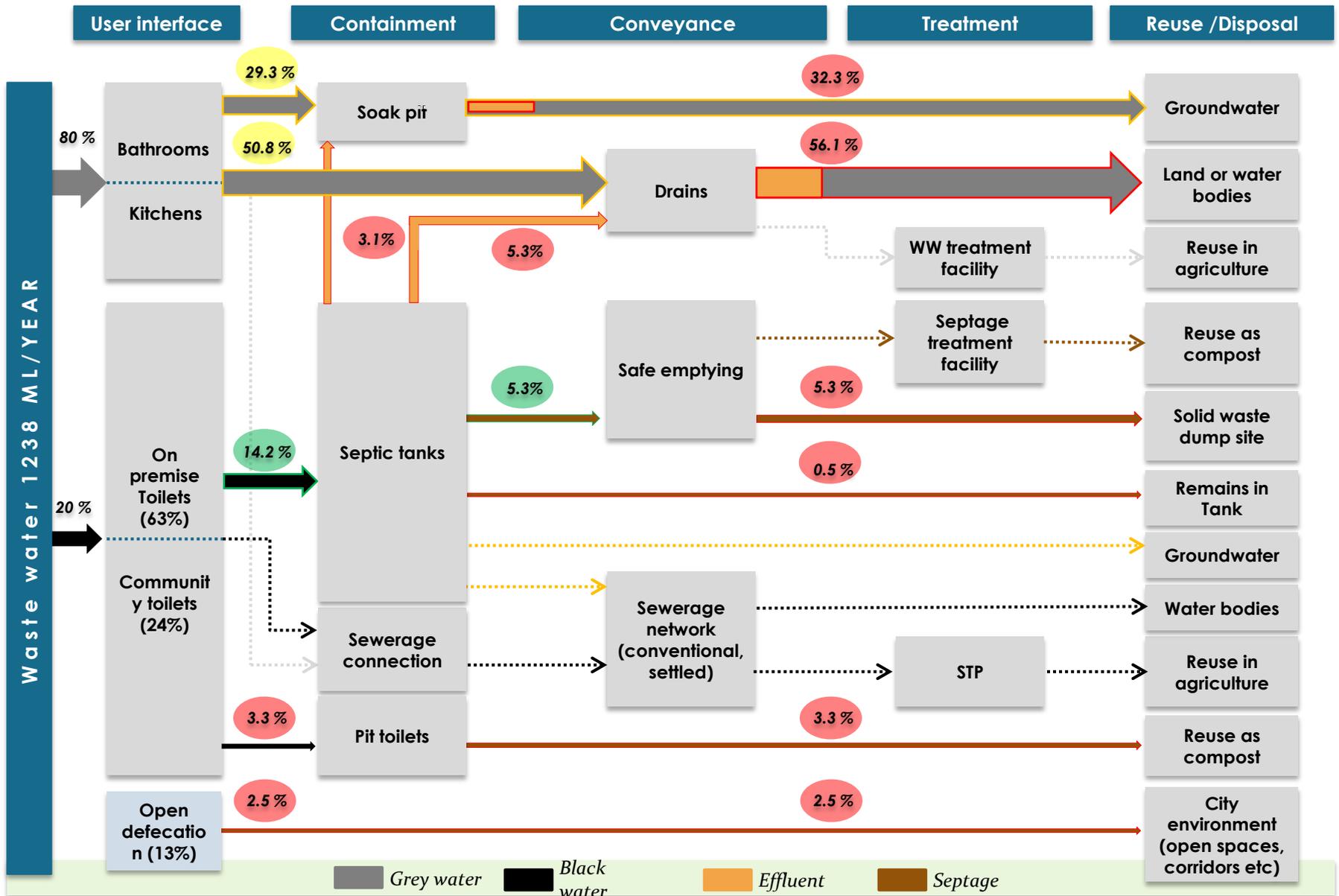
SWM and septage dump site



Dumping of untreated septage at dump site



# Existing Wastewater water flows in Sinnar



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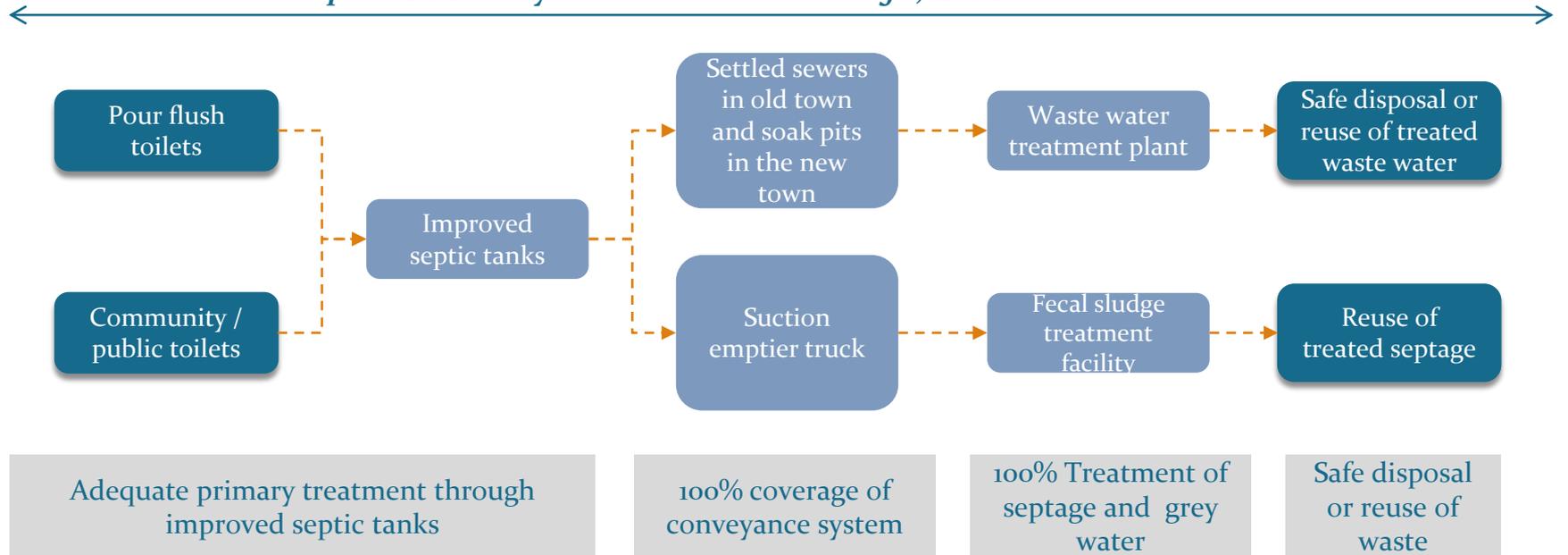
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# CEPT has supported Sinnar with developing comprehensive City Sanitation Plan for universal sanitation services: Option 1 (1/2)



*Option 1: Mixed system with settled sewerage , IFSM and onsite sanitation*

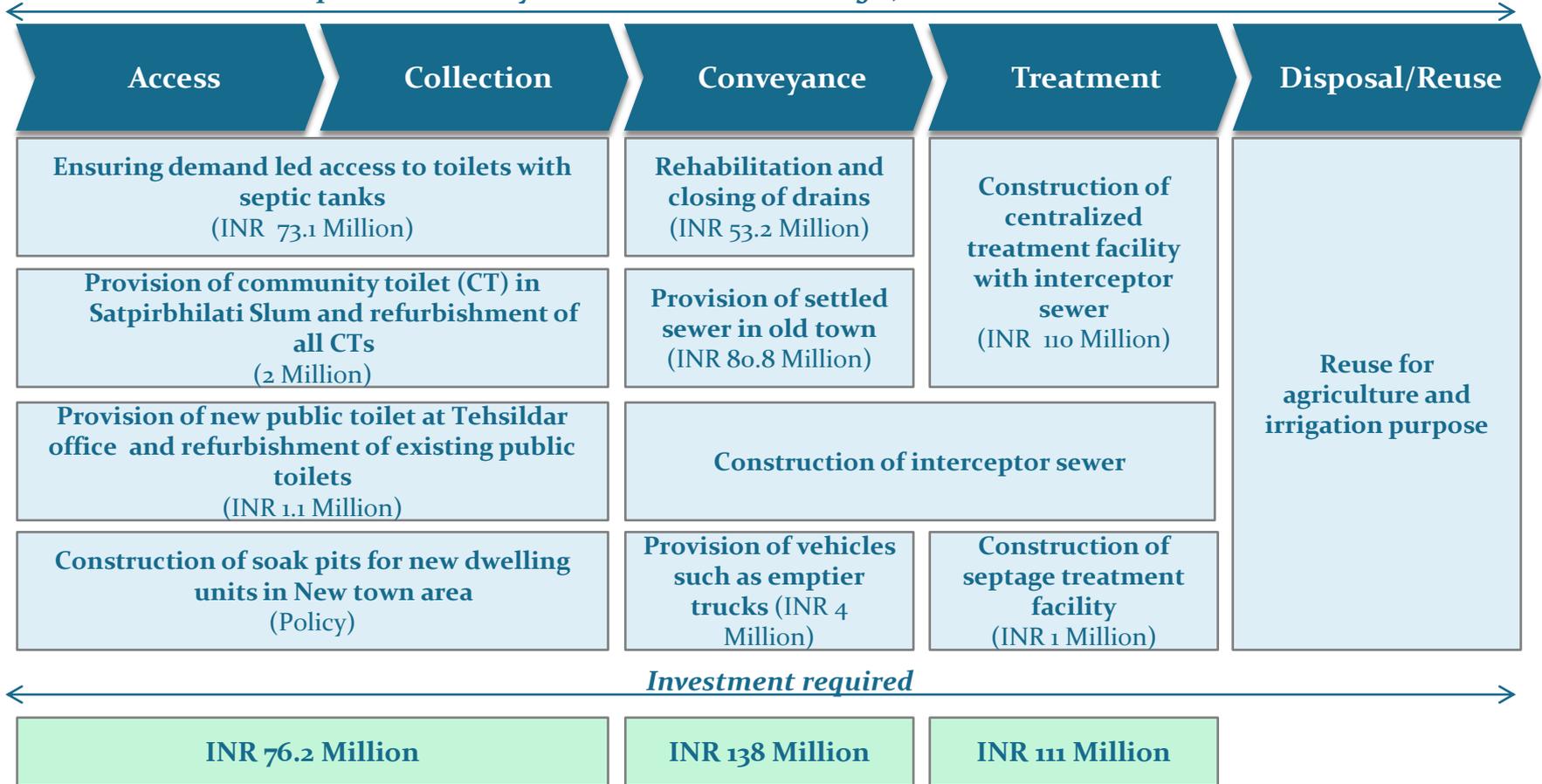


 Improvements through new investment

 Repaired links in the value chain

# CEPT has supported Sinnar with developing comprehensive City Sanitation Plan for universal sanitation services: Option 1 (1/2)

## Option 1: Mixed system with settled sewerage , IFSM and onsite sanitation

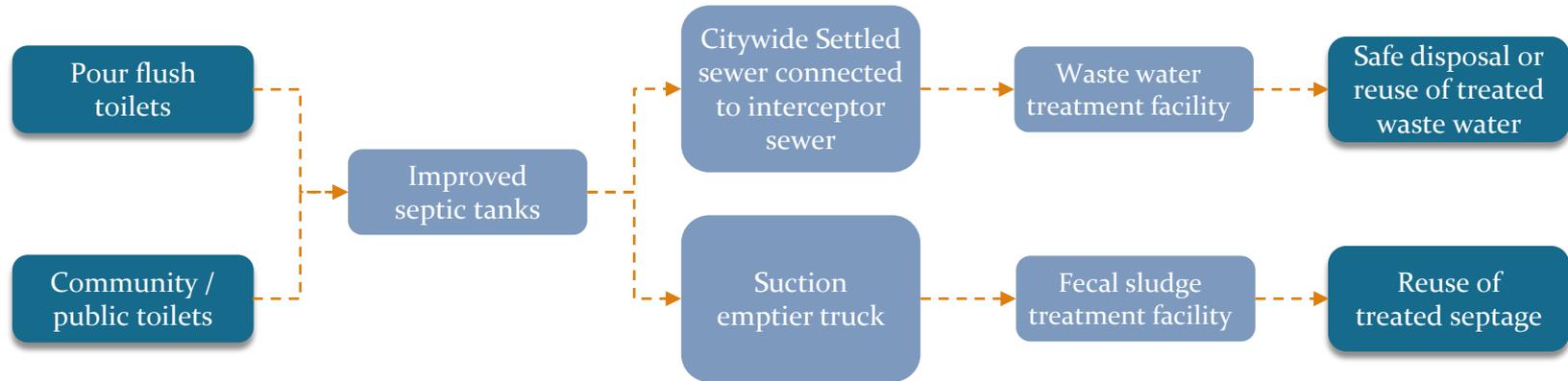


- This proposal provides each household in Sinnar access to personal toilets in the long term and includes the construction of an settled sewerage system in old town area which is connected to treatment facility and in newly developing areas HHs septic tanks and grey water outlets will be connected to Soak pit
- The total investment required for this proposal is INR ~ **325.2 Million**

# CEPT has supported Sinnar with developing comprehensive City Sanitation Plan for universal sanitation services: Option 2 (1/2)

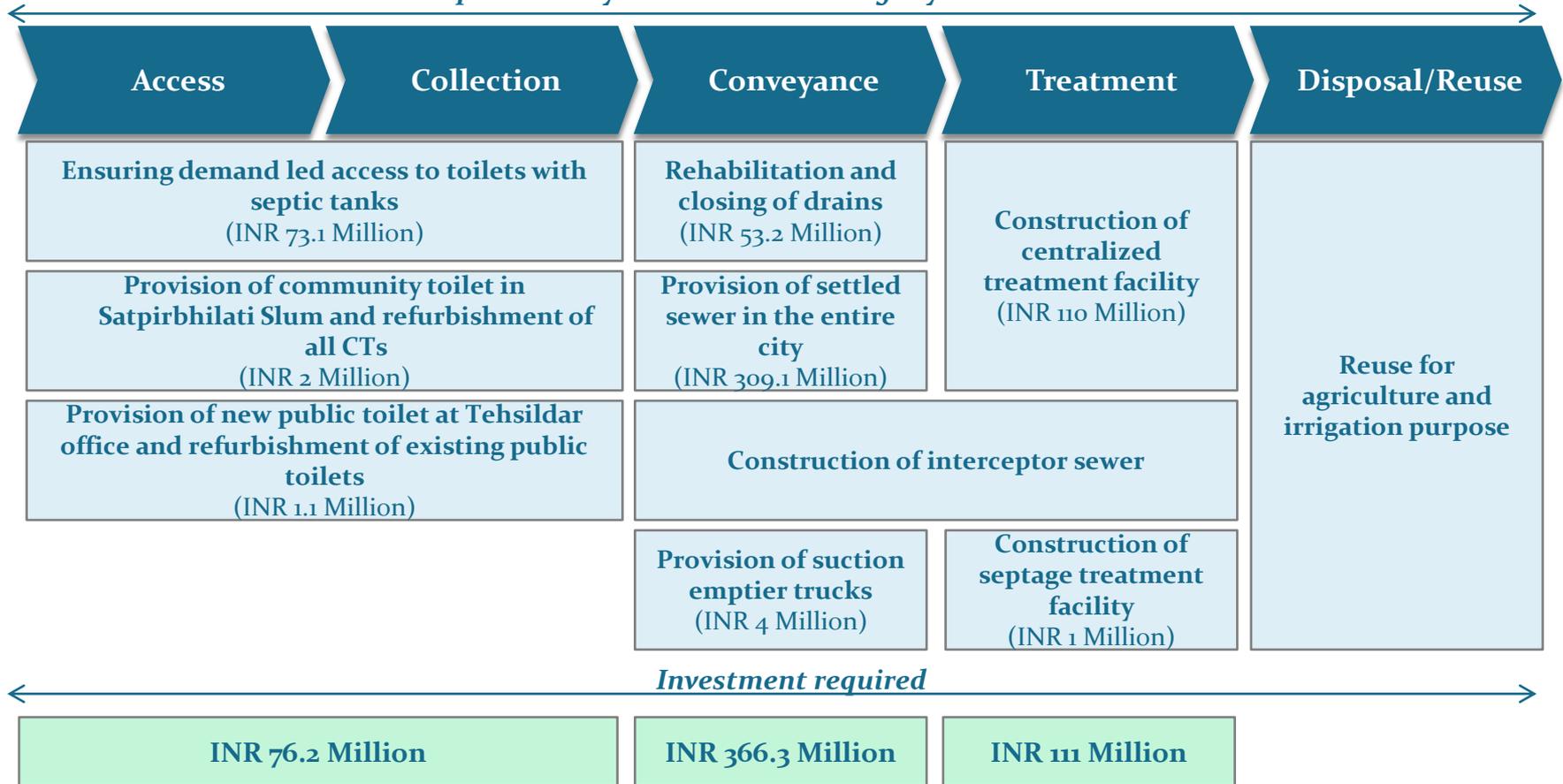


*Option 2: Citywide settled sewerage system with IFSM*



# CEPT has supported Sinnar with developing comprehensive City Sanitation Plan for universal sanitation services: Option 2 (2/2)

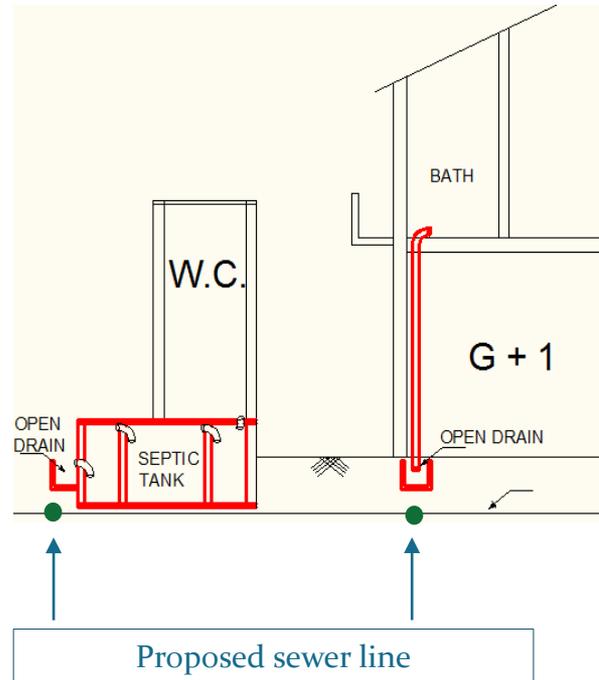
## Option 2: Citywide settled sewerage system with IFSM



- This proposal provides each household in Sinnar access to personal toilets in the long term and includes the construction of a settled sewerage system connected to a treatment facility
- The total investment required for this proposal is INR ~ **553.5 Million**

# In the long term, the ULB is interested in constructing settled sewers as a low cost option to provide safe conveyance of waste water

## Settled sewer technology



- Small bore sewers with a minimum diameter of 100 mm are proposed to be constructed over a period of 5 years
- Minimum evacuation depth is proposed to be 0.6 meters

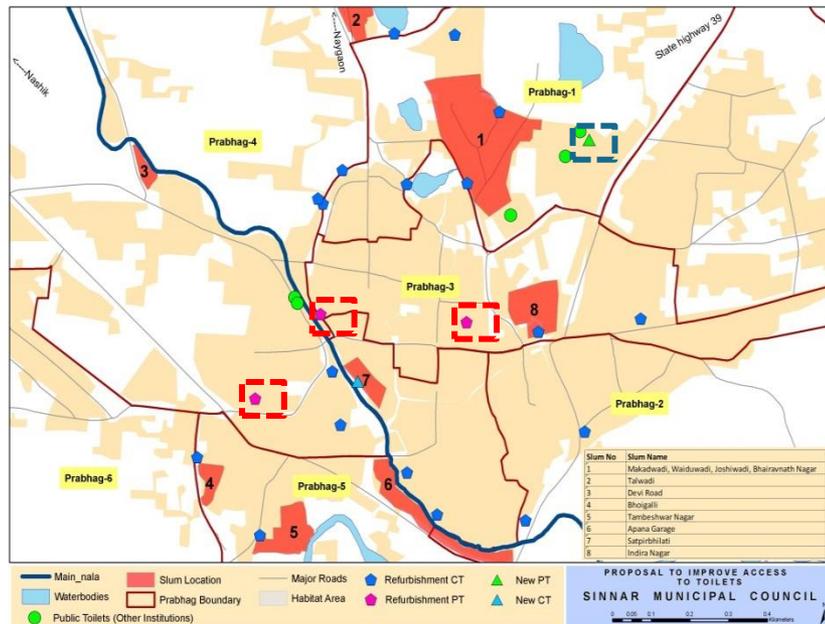
## Location of settled sewer lines



Sewer lines 0.6 meters below road level under drains

# The city is also considering the construction of a public toilet block and the refurbishment of existing public toilets to serve the floating population

## Proposed location of public toilet blocks



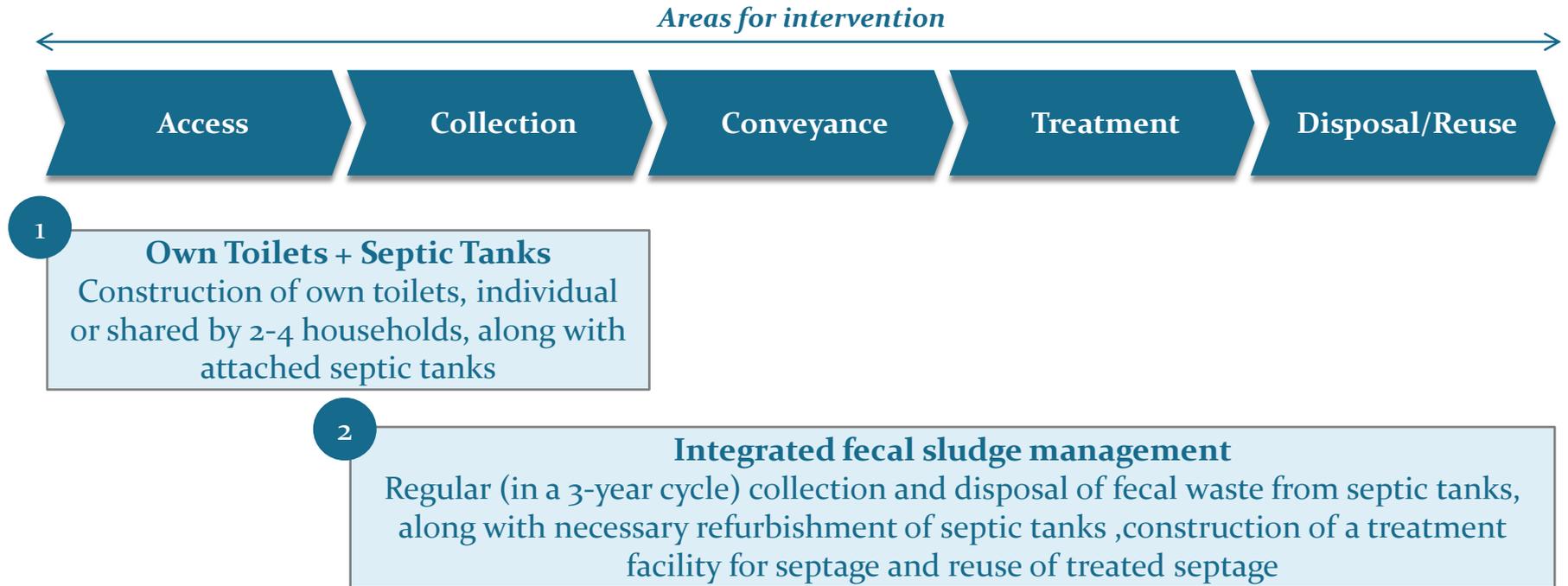
 New public toilet block

 Refurbishment of existing public toilets

## Details of public toilet blocks

- Due to the degrading infrastructure of existing public toilets, the city is interested in the **refurbishment of existing public toilets**
- This will require an investment of **INR 0.6 Million**
- To meet the demand for a toilet at the Tehsildar office, city has proposed the construction of **1 new public toilet block which will be operated by the Tehsil office**
- This public toilet will have **8 seats (4 each for men and women) and 5 urinals**
- The construction of a new public toilet will require an investment of **INR 0.5 Million**
- Once 100% household level sanitation is achieved in Sinnar, the **existing community toilets can be converted to public toilets**

# However, based on local priorities, the city is focused on two high potential solutions in the near-term



# Group toilets are privately owned toilets shared by 2-4 households who are generally related to each other

## Types of toilet facilities

	Individual toilets	Group toilets	Community toilets
			
Description	Personally owned toilets, usually constructed inside the household premises	Toilets owned and shared by few households which are related to each other or know each other well, constructed in common spaces between households	ULB owned toilets built in community spaces catering to households in the vicinity
# of HH per seat	1	2-4	10
JMP* category	Improved	Improved	Unimproved

Note: \*According to the WHO/UNICEF Joint Monitoring Program (JMP) for Water Supply and Sanitation, an improved sanitation facility is defined as one that hygienically separates human excreta from human contact. In the Post 2015 targets, a group toilet shared by less than 5 families who know each other is also treated as 'improved sanitation'.

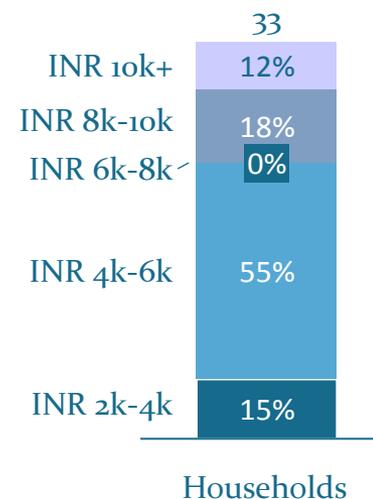
# Preliminary demand assessment of households was done to assess the response towards group toilets and estimate household willingness to pay

## Methodology and key observations

- CEPT interviewed **33 households** in slum as well as non-slum areas and **detailed out 15 first potential cases** willing to implement the group toilets.
- **HHs dependant on community toilets** in the areas with **low access to personal toilets** were **interviewed** to assess their willingness towards group toilets.
- In all cases, households **greatly appreciated** the idea of group toilets primarily due to **very poor conditions of community toilets** and convenient arrangement of sharing the costs and lands in case of group toilets.
- **Common concern** raised by households was about **less affordability** even in case of group toilets and possible arrangements for **maintenance of group toilets** in future.
- Another constraint faced by the households was **land ownership** since all the **slums were non-notified**

## Household willingness to pay

(n=33)



- **More than half** of the households interviewed, were willing to spend between **INR 4,000 and 6,000**
- The **average household willingness to pay** was **INR ~6,300**

# The city wants to provide own toilets to ~4,900 households over five years to provide universal access to improved toilets in Sinnar

- The city is exploring the provision of individual/group toilets for 4,869 households, who currently practice open defecation or are dependent on community toilets
- CEPT has supported the city to formulate a demand based scheme through which each household will be provided improved toilets in 5 years

**Access to type of sanitation facility under proposal**  
(Number of households)



Note: The scheme is only for existing households, assuming all new households will have access to improved toilets

Source: Census 2011, Presentation on Innovative scheme for moving towards own toilets in Sinnar , CEPT University

# The Sinnar ULB is considering a scheme to incentivize households to pool resources for the construction of own toilets

- Each household to be provided with a subsidy of INR 5000 for individual toilets or toilets shared by up to four households
- In our surveys, households expressed a willingness to contribute between INR 5000 – 6000 upfront for a toilet
- Given this willingness to pay, households will be able to afford a toilet if 3-4 of them share a toilet

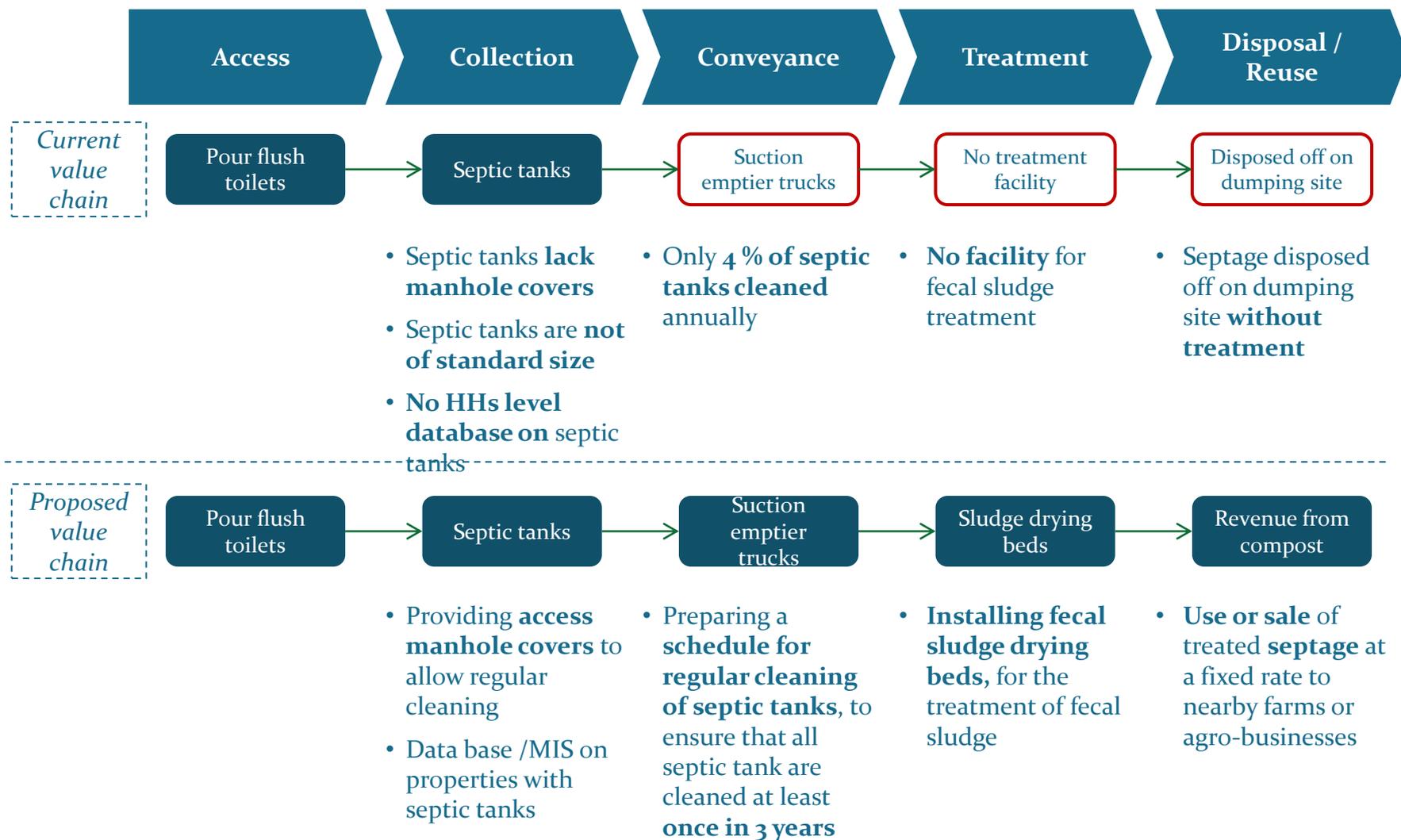
Scheme details	Number of households sharing a toilet			
		Other households (Subsidy - INR 5,000/HH)		
	1	2	3	4
Cost per toilet (in INR) <sup>1</sup>	~30,000	~30,000	~30,000	~30,000
Subsidy per toilet provided by the ULB	~ 5000	~10,000	~15,000	~20,000
Effective cost per HH	~25,000	~10,000	~5,000	~2,500

1. Estimated willingness to pay upfront per household is ~INR 5000 – 6000<sup>2</sup> implying that 3-4 households can come together to afford a toilet directly
2. An assessment is being made of potential for consumer financing through micro-finance institutions, commercial banks and self-help groups
3. The estimated investment required will be ~ INR 24 Million

Note: (1) Based on Schedule of Rates published by the Maharashtra government and interviews with local contractors, estimate includes cost of superstructure and septic tank(2) Based on 2013 focus group discussions with ~33 households each in Sinnar

Source: Presentation on Innovative scheme for moving towards own toilets in Sinnar, CEPT University

# The city plans to develop an end-to-end integrated fecal sludge management solution

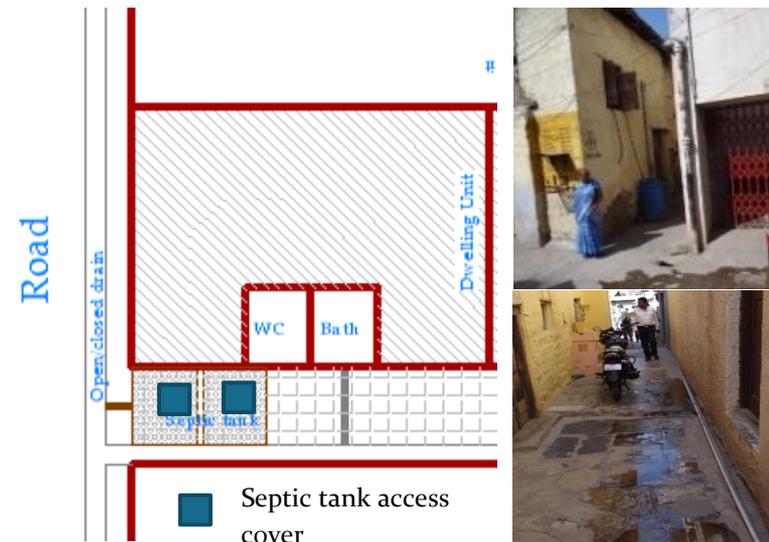


# To facilitate regular cleaning, septic tanks need to be provided access manhole covers to allow easy access

## Details of proposal

- Based on a technical assessment done in 2013, it was noticed that many **septic tanks in Sinnar had sealed covers**
- This **prevented regular cleaning**, as the seal had to be broken each time to access the septic tanks
- ULB proposes the provision of **RCC access manhole covers** (60 cm X 45 cm) to allow easy access during the emptying process
- The cost of installing one such cover is **INR 500-800**
- Assuming ~30% of septic tanks need refurbishment, the total investment is estimated to be **INR ~1.6 Million**

## Location of manhole of cover



## RCC access manhole cover



# To maintain the recommended three year emptying cycles, ~2800 tanks will need to be cleaned in Sinnar

## Current septage management practice

~4% of tanks cleaned per year  
(once in >8-10 years)



## Recommended septage management practice

~33% of tanks cleaned per year  
(once in 3 years)

### Current barriers

- 1 Lack of detailed information on household level sanitation situation
- 2 Many septic tanks are sealed and difficult to access
- 3 Cleaning is done on-call by the household, who do not see the need for regular cleaning
- 4 Sinnar has only 1 truck of 3kL capacity, owned and operated by the ULB
- 5 Houses pay ~INR 400 – 800 to the ULB to get tanks cleaned, but only once in more than 8-10 years

### Proposed solutions

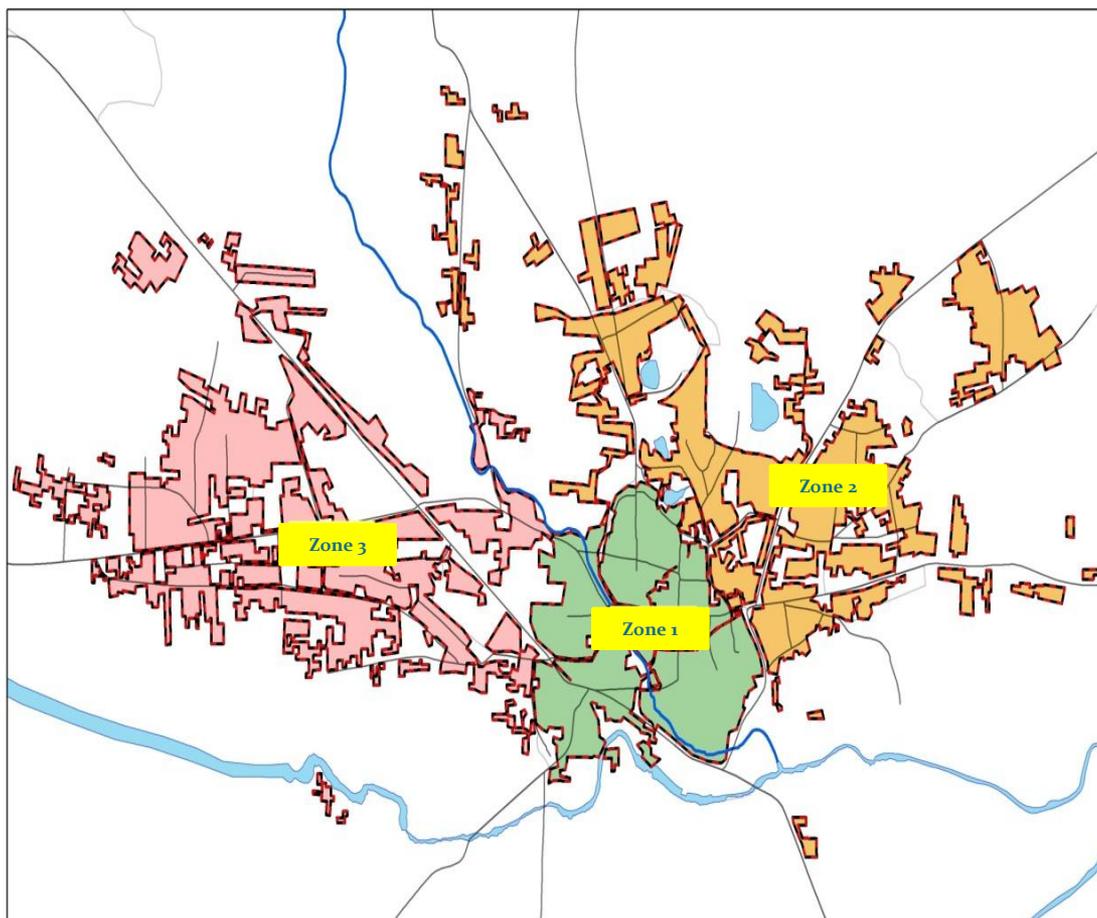
- 1 MIS /database on household level sanitation
- 2 Septic tanks will be refurbished with access covers
- 3 Septic tanks will be cleaned on a **pre-determined schedule**. **Regulations and penalties** will be set in place to ensure periodic cleaning  
**Awareness generation** activities will educate households about the need for regular cleaning
- 4 Sinnar will get 3 additional 5 kL trucks to clean ~4 septic tanks a day, 300 days a year , which can be operated by a private. The existing trucks will continue to clean public and community toilets
- 5 All property owners (residential and non-residential) will pay a 'special sanitary tax' to be levied by the ULB as per the municipal legislation<sup>1</sup>

Source: Presentation on septage management plan of Sinnar , CEPT University ,

(1) Maharashtra Municipal Councils, Nagar Panchayats and Industrial Townships Act, 1965, Chapter IX : Municipal taxation, Section 108

# The regulated septic tank emptying plan will be rolled out in three phases

## Desludging plan for Sinnar



Year 1		
Zone	Number of tanks to be cleaned	Number of days required
1	1889	201
2	947	101
<b>Total</b>	<b>2836</b>	<b>302</b>

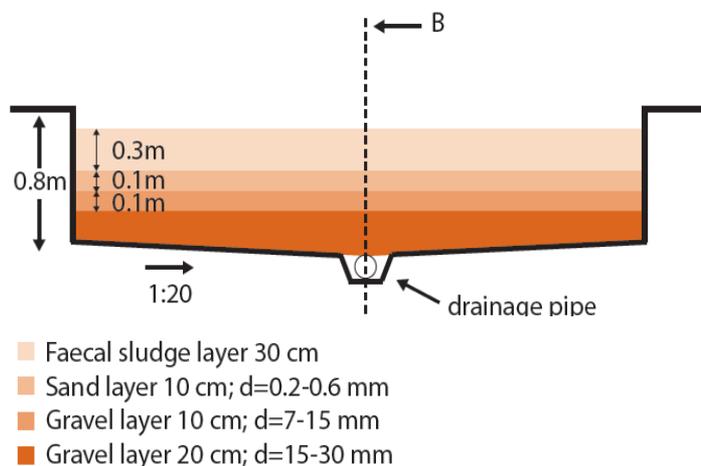
Year 2		
Zone	Number of tanks to be cleaned	Number of days required
2	1262	135
3	1582	169
<b>Total</b>	<b>2844</b>	<b>303</b>

Year 3		
Zone	Number of tanks to be cleaned	Number of days required
3	2762	294
<b>Total</b>	<b>2762</b>	<b>294</b>

# For the treatment of collected septage, 18 sludge drying beds will be constructed

## Technical details of sludge drying bed

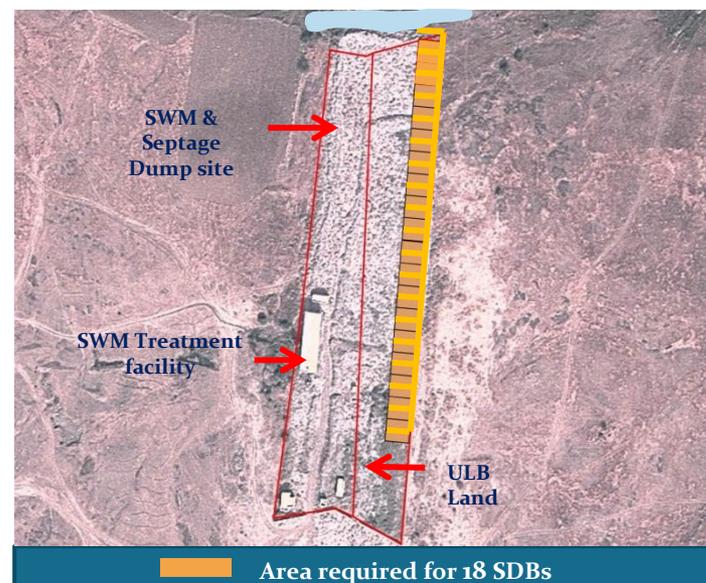
### Technical illustration of a sludge drying bed



- The MoUD advisory recommends the use of unplanted **Sludge drying beds (SDB)** for the treatment of collected septage
- The sludge will be allowed to dry for **15 days to form sludge cakes**, which can be disposed safely in the open or reused as compost after mixing it with organic solid waste

## Description of proposal

### Possible location of the sludge drying beds



- ULB officials have identified ULB land near the current solid waste dumping site for the construction of 18 **sludge drying beds, covering an area of ~2800 sq. m.**
- The total investment required would be **INR ~3.6-4.5 Million<sup>1</sup>**
- In Sinnar, it is estimated that the daily load on the septage treatment facility will be **42 cum/day**

Note: (1) Excluding the cost of land, which will be provided by the ULB

Source: Presentation on septage management plan of Sinnar, CEPT University

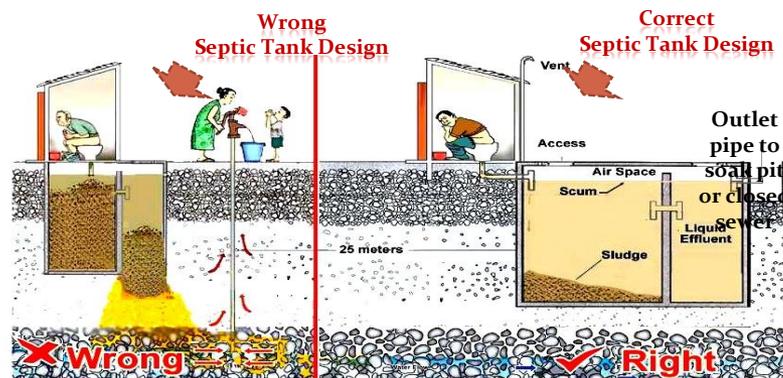
# To ensure adoption of the integrated fecal sludge management plan, the ULB has to make regulatory changes

- The key issue in ensuring regular and safe septage management is **lack of implementation of government regulations and advisories**
- This will require the **formulation of ULB bye-laws** and rules to ensure implementation of each aspect of the IFSM plan
- The rules should address:
  1. **Septic tank design:** to ensure septic tanks of standard size are installed in new constructions
  2. **Periodicity of de-sludging:** to ensure septic tanks are cleaned every 3 years as per the MoUD's advisory
  3. **De-sludging procedures:** to ensure safe handling of fecal sludge
  4. **Sanitation tax:** to persuade households to clean septic tanks regularly
  5. **Penalties:** to deter irregular cleaning and use of substandard septic tanks
- There is also a need for **regular monitoring and inspection** of septic tanks and de-sludging procedures to facilitate the implementation of bye-laws

# These activities need to be supported by IEC campaigns to generate awareness

- To ensure **adoption of government regulations and ULB bye-laws**, there is a need to **generate awareness** about regular septic tanks emptying
- To **educate people about IFSM**, we can involve:
  - Print and electronic media
  - Civil Society organizations such as NGOs and RWAs
  - Academic institutions such as schools and colleges
  - Opinion influencers such as doctors and religious leaders

## Illustrative posters to generate awareness



Proper Design

- Preservation of the Environment is our Joint responsibility.
- Septic tank base should always be sealed, so that it does not pollute the ground
- Whenever the septic tank gets cleaned, please check that there are no cracks in the side walls or base of septic tanks
- Have proper vent pipes for your septic tanks
- Septic tanks should be located away from groundwater sources
- Provide proper access manhole to ease the process of emptying



Service provided by Sinnar Nagar Parishad

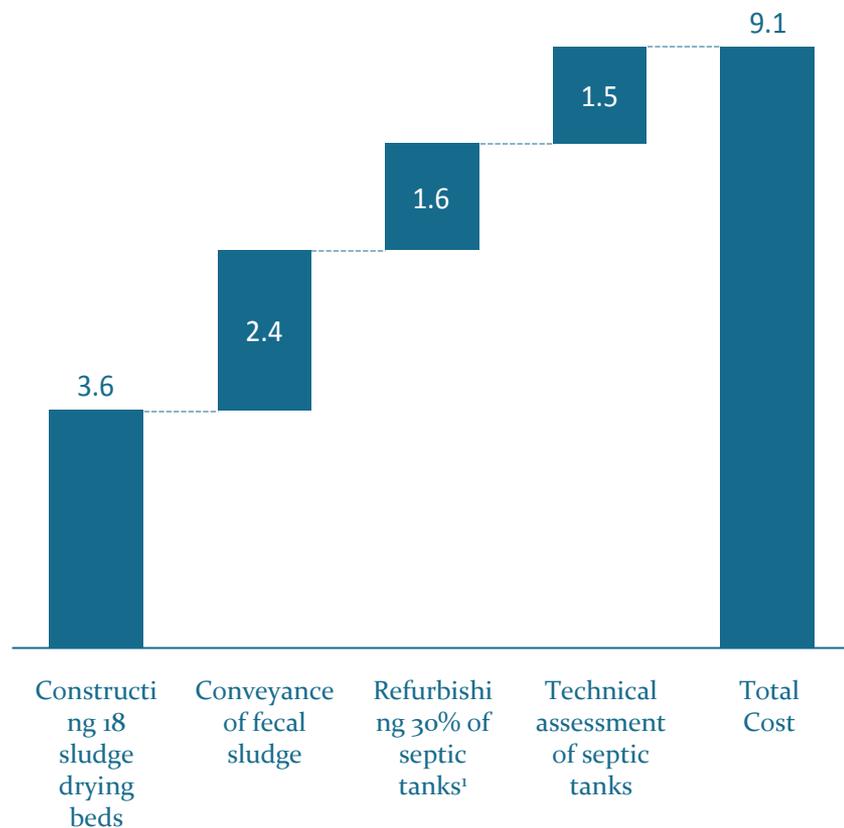
De-sludge Your Septic Tank every 3 Year

- As you clean your toilets daily, so that it does not affect your health, similarly clean your septic tanks every 3 years so that it does not affect the environment
- Sinnar Nagar Parishad will provide you services for cleaning of septic tanks free of cost once every 3 years.
- The ULB officials will inform you in advance before they clean your septic tanks
- ULB will leave an inch of solids inside the septic tank, as it will act as seeding material for new incoming waste

# The integrated fecal sludge management plan will entail an investment of INR ~9 million on capital construction

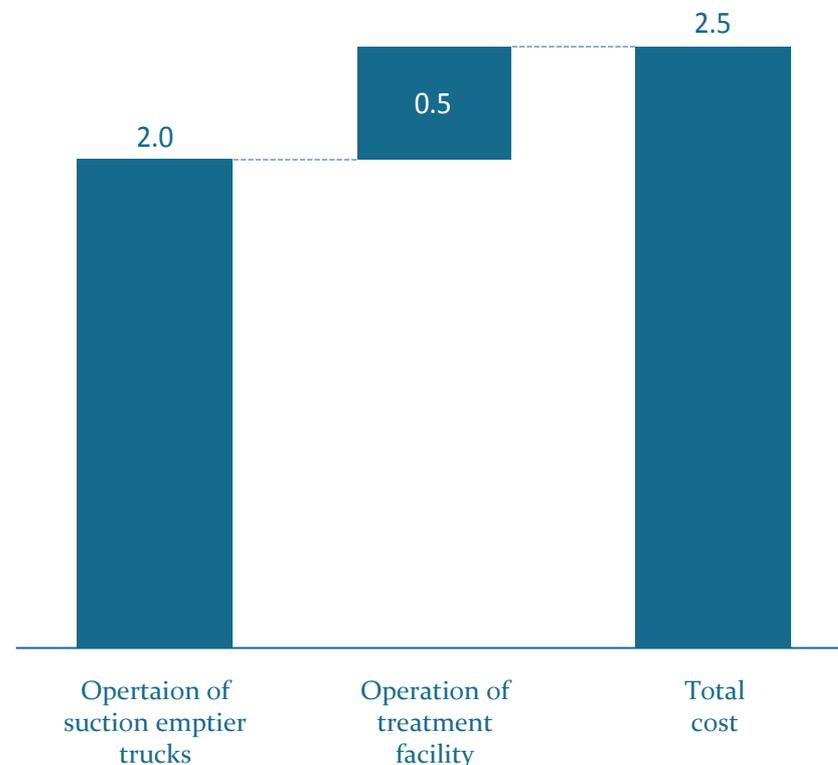
## Capital expenditure

Investment required on capital assets for septage management in Sinnar  
(INR in million)



## Operating expenditure per year

Investment required per year on O&M for septage management in Sinnar  
(INR in million)



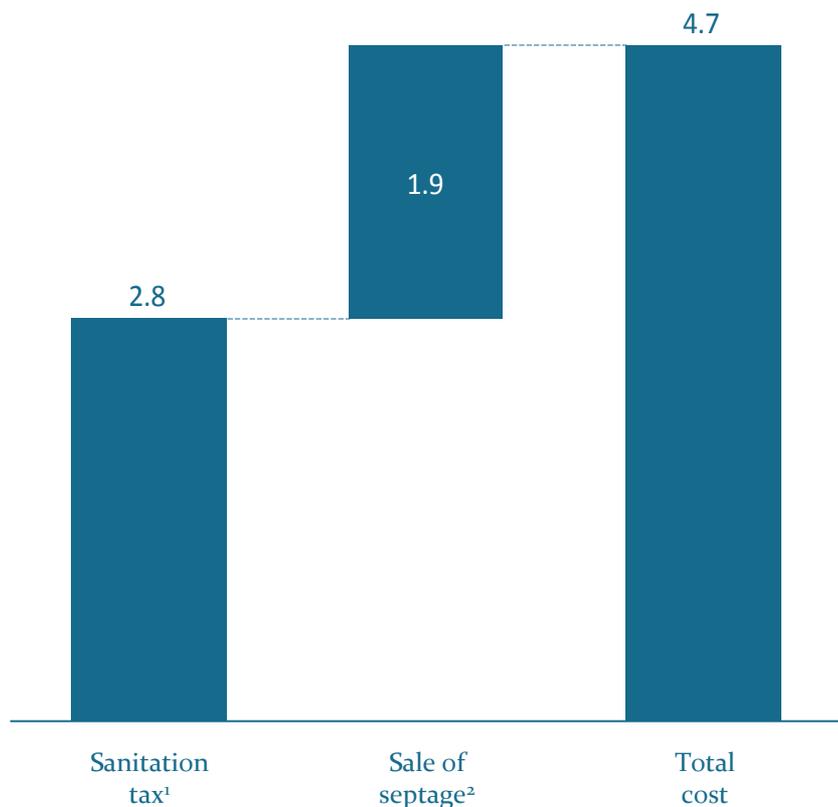
Note: (1) As per discussions with the ULB, this cost can also be borne by private households

Source: Presentation on septage management plan of Sinnar, CEPT University

# Levying a special sanitary tax can make the septage management model profitable for the Sinnar ULB

Estimated annual revenue from septage management in Sinnar<sup>1</sup>

(INR in million)



## Details of revenue model

- The city can levy a **special sanitary tax of INR 333 per household per year** and also recover costs through the sale of compost after treatment
- Assuming ~30% of the compost is sold at INR 0.50/kg, the **pay back period for the ULB will be ~4 years**

Assumptions: (1) Here we account for the annual sanitation tax of Rs. 333 collected by the ULB for the ~8250 households with personal toilets only, in practice the sanitation tax will be collected for all 13,112 households (2) 30% collected septage sold at INR 0.50/kg

Source: Presentation on septage management plan of Sinnar, CEPT University

# Contents

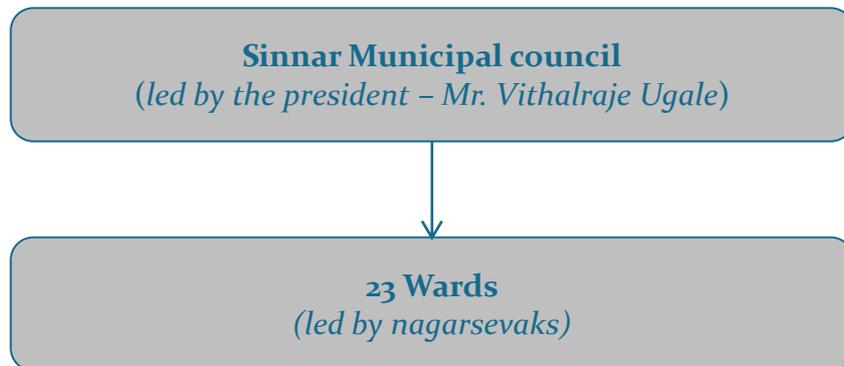
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- ① City profile
- ② Current status of sanitation
- ③ Recommendation solutions
- ④ ULB institutional assessment and areas for capacity building**
- ⑤ Financial capacity assessment

# Sinnar is governed by the elected municipal council which is aided in its day-to-day operations by the executive wing

## Legislative wing

- **Consists of elected officials** called nagarsevaks, led by the Council President
- **Nagarsevaks are organized into committees**, such as the standing committee and water and sanitation committee— with the authority to plan and approve proposals
- The general body meeting (GBM) together is responsible for **legislation and financial approvals**



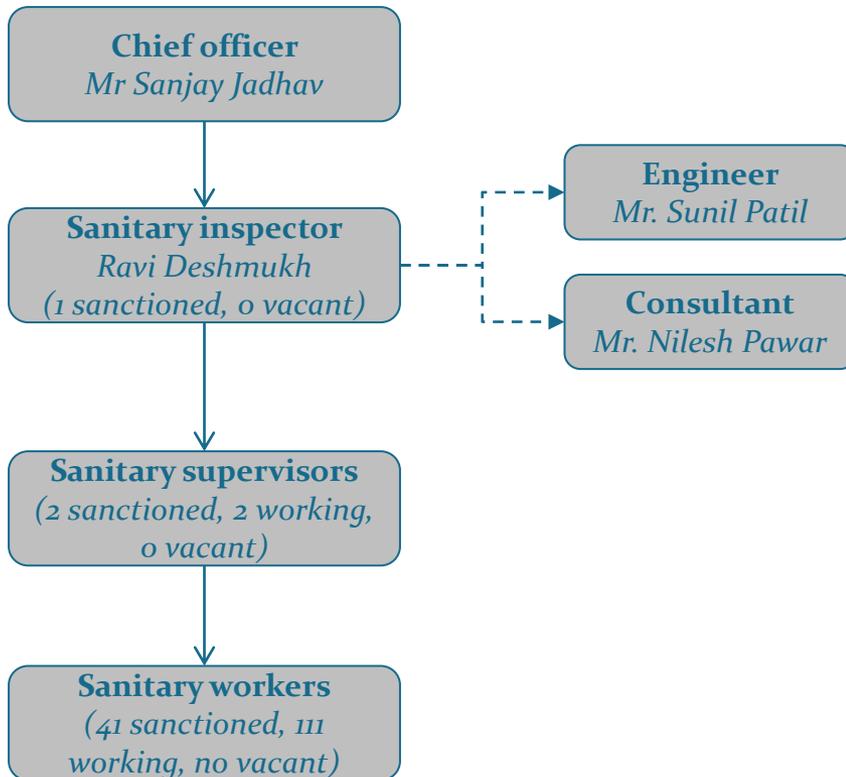
## Executive wing

- **The executive wing** is the bureaucratic arm, led by Chief Officer (CO)
- The CO is supported by officers **heading various departments** of the executive wing
- Sinnar has **6 Prabhags divided into 23 wards** for administrative purposes
- The executive wing is responsible for implementing **policies and schemes**



# The sanitation department is headed by the sanitary inspector who is sanctioned to oversee a staff strength of ~40 people

## Structure of the sanitation department



## Key issues

- **Shortage of staff:** The administrative area of the municipal council increased from 5 sq. km. to 51 sq. km. in 2011 but the staff strength has remained the same due to a inflexible government resolution on the number of sanctioned staff by city type. This has resulted in severe staff shortages and a reliance on temporary/contract staff
- **Vacancies:** Both the supervisor positions are currently filled by temporary staff. The state retains authority over hiring, and as a result important senior positions remain vacant
- **Lack of formal monitoring:** There is no formal monitoring or reporting structure for staff e.g. sanitation workers fulfill the role of a sanitary supervisor
- **Lack of training:** There is no formal training, and learning is on-the-job hampering productivity

# Sinnar has engaged private sector players in a limited fashion through management contracts

Sector	Name of the contract	ULB responsibilities	Contractor responsibilities
	<ul style="list-style-type: none"> <li>• Management contract for labor for cleaning drains and solid waste collection</li> <li>• Awarded to a Nashik based contractor</li> </ul>	<ul style="list-style-type: none"> <li>• Monthly payment to the contractor at fixed charges per man-day of labor</li> </ul>	<ul style="list-style-type: none"> <li>• Cleaning of drains and transportation of waste</li> <li>• Provision of labor and cleaning materials</li> </ul>
	<ul style="list-style-type: none"> <li>• Management contract for provision of tractor trolleys with drivers</li> <li>• Awarded to a Sinnar based contractor</li> </ul>	<ul style="list-style-type: none"> <li>• Monthly payment to the contractor based on number of days equipment is used</li> </ul>	<ul style="list-style-type: none"> <li>• Collection and transportation of waste to the compost center</li> <li>• Provision of vehicles and labor</li> <li>• O&amp;M of vehicles</li> </ul>
	<ul style="list-style-type: none"> <li>• Management contract for the operation of community and public toilets</li> <li>• Awarded to a Sinnar based contractor</li> </ul>	<ul style="list-style-type: none"> <li>• Monthly payment to contractor based on number of seats cleaned</li> <li>• Provision for electricity and water</li> <li>• Responsible for toilet repairs</li> </ul>	<ul style="list-style-type: none"> <li>• Cleaning all community and public toilet two times a day</li> <li>• Provide all cleaning supplies needed</li> </ul>

# Overall, officials are satisfied with the private provision of services

*“Sinnar’s city area has grown from 5 sq. km. to 51 sq. km. but the ULB’s manpower has remained the same. We are very short of staff, so we had to outsource these activities.”*

*- Sinnar Sanitary Inspector*

*“The private sector performs better than the ULB. They have an incentive to perform since there is yearly bidding. Also people know each other and there is pressure to perform due to ‘good faith’. We have never cancelled a contract mid-year.”*

*- Sinnar Chief Officer*

*“Private sector has been working well. Sometimes there is a problem with toilet cleaning but that is because the toilets themselves are in such poor condition that the private sector cannot be faulted. We need to build new seats and that is the ULB’s responsibility.”*

*- Sinnar Sanitary Inspector*

*“Our experience with the private sector has been good. We don’t have the staff to sustain our functions. At the same time, it is far easier to monitor and ensure performance with private contractors, especially if they are not local.”*

*- Sinnar Council President*

# The engagements are structured as simple annual management contracts and payment is not linked clearly to service levels

## Contract structure for existing engagements

Features	O&M of toilets	Labor for drain cleaning and solid waste	Provision of tractor trolleys
Contract length	Annual	Annual	Annual
Automatic Renewal	✗	✗	✗
Tender type	Open bid	Open bid	Open bid
Payment duration	Monthly	Monthly	Monthly
Item rate or Lump sum/fixed fee <sup>1</sup>	Item rate	Item rate	Item rate
Rate per unit	INR 5.50 per seat cleaned	INR 245 per person per day	INR 641 per day per tractor
Penalty clause for non-performance	✓	✓	✓
Number of bids received last year	2	3	4

## Key issues

- **The council prefers annual contracts that are put up for re-bidding each year to increase competition**
  - ✓ Likely to increase transaction costs
  - ✓ Lapses in service are likely during contract re-negotiation
- **All contracts are item-rate, and payment is linked to inputs (man-days), instead of outputs or outcomes**
  - ✓ There are no payment tied to outputs or service levels
  - ✓ Item-rate contracts tied to number of man-days are also more difficult to monitor effectively
- **Payment is not tied to monitoring**
  - ✓ There is no mention of monitoring or reporting requirements in the contractor
  - ✓ The penalty clause is open-ended and not tied to specific monitored

*“If there is an irregularity in the work of cleaning toilet or if the users or municipal supervisors complain about toilet cleaning, then the decision taken by Municipal council will be binding on the contractor.”*

– Penalty clause in contract for community toilet cleaning

Note: (1) Item rate contracts are those billed based on a bill of quantities or inputs, while a lump sum contract is a fixed fee paid irrespective of level of inputs

Source: Interviews with Sinnar city officials

# The current contracts lack important risk allocation clauses affecting both the ULB as well as the private contractor

## Priority contract clauses for effective engagements

Features	Contract for O&M of toilets	Contract for cleaning drains and solid waste	Contract for provision of tractor trolleys
User complaint redress	✗	✗	✗
Dispute resolution mechanism	✗	✗	✗
Mitigating payment risk	✗	✗	✗
Mitigating Termination risk	✗	✗	✗

*“We simply write down the activities we have been doing as a point in the contract. Whatever issues come up each year, we add that as an additional clause the following year, so that each year the contract clause increases by a point or two.”*

– Sanitary inspector

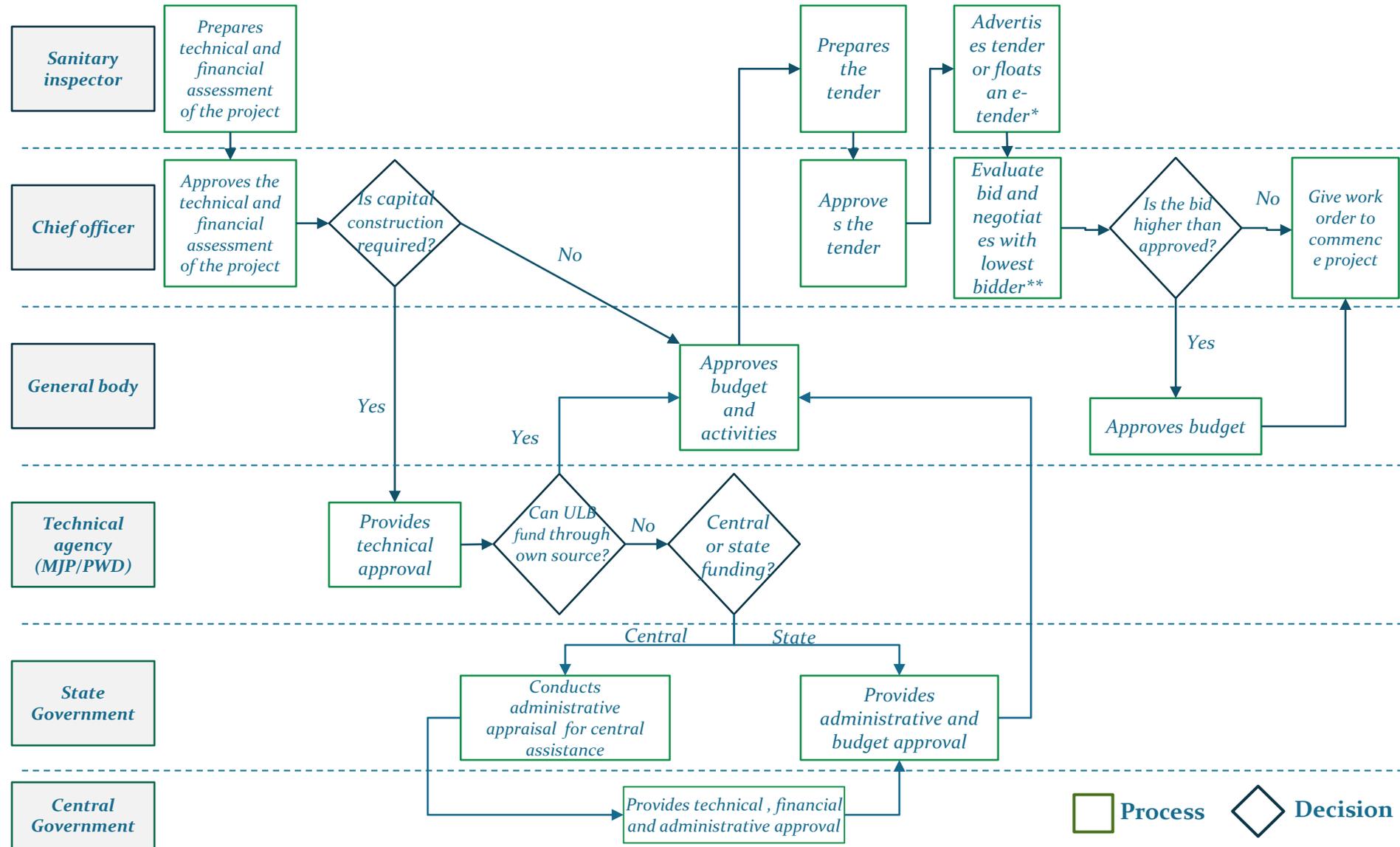
## Key gaps

- There is no mechanism to **handle complaints from users.**
- There is **no established dispute resolution mechanism** between the municipality and the private player.
- There is no clause to **manage delays in payments** (e.g. interest paid to the private sector).
- **The contract for toilet cleaning lacks a termination clause.** In the other contracts, the contract can be terminated by the ULB without notice at a ULB’s discretion. There is no notice period for either the private player or the municipality.

*“If at any point of time, the Sinnar Town Council has its own vehicles available it may stop hiring contractor’s vehicles.”*

– Clause in the contract for tractor trolleys

# The process for implementing private engagements involves multiple stakeholders over 1-2 months



Note: Functions highlighted over the dotted line are done by both the stakeholders. \*If tender value is over INR 1 million, e-tendering is required

Source: Interviews with Sinnar city officials

# For existing contracts, the ULB manages the needs assessment as well as the technical and financial feasibility studies internally

## Technical assessment

## Financial assessment

### Purpose

- Assess the existing level of infrastructure
- Determine the services required from the private contractor

- Set a financial benchmark for negotiations with the private contractor (often by estimating ULB's expenditure on the same task)

### Person responsible

- Engineer
- Sanitary inspector

- Engineer
- Sanitary inspector

### Key gaps

- **Staff shortage:** The ULB has only one engineer and sanitary inspector, who are responsible for all technical and financial evaluations
- **Lack of qualified staff:** The sanitary inspector lacks a technical background in sanitation, leading to disproportionate burden on the engineer and reliance on external consultants

*"We are facing severe staff shortages and there is only one engineer for technical and financial assessment."*

– Chief Officer

*"The integrated fecal management plan is new to us and we will require help to undertake assessment for these."*

– Sanitary Inspector

# The procurement process is a simple open bid conducted annually where the contract is awarded to the lowest bidder

## Procurement process



## Key Gaps

- **Focus on lowest cost:** Service quality or level is not an award criteria. Current requirements include the most basic legal requirements, which are met by most bidders. As a result, contracts are awarded to the lowest bidder resulting in poor levels of service.

*“The qualifying criteria are not focused on the service levels these players can provide. This leads to poor service.”*

– Consultant to ULB

Note: (1) Bids over INR 1 million require e-tendering

Source: Interviews with Sinnar city officials

# Monitoring of contracts is not focused on outputs or service levels, and is limited by staff shortages



## O&M of toilets

Self reported  
by private  
entity

- Daily report of number of toilet seats cleaned



## Cleaning of drains and solid waste

- Daily report of number of laborers used to clean drain and solid waste



## Provision of tractor trolleys

- Daily report of the route taken by the tractor and the waste picked up

ULB  
monitored

- Sanitary supervisor checks attendance of the all private contractors at 7am each morning
- Supervisors make rounds to ensure that the respective contractor has carried out the required work
- Supervisors then file reports on the work done which is tallied with the contractor's self reported forms. Any discrepancy is sorted out and payment is made on the final report approved by Sanitary inspector

## Key Gaps

- **Focus on monitoring inputs:** Staff is currently monitoring the number of inputs provided by the private player, instead of the quality of outputs (e.g. cleanliness of streets or toilets). This not only creates incentives for the private player to inflate input estimates, but is also more difficult for the staff to monitor directly
- **Inability to meet monitoring level:** The staff shortage at the ULB has made it difficult to maintain monitoring responsibilities

*"There needs to be 1 sanitary inspector for 20,000 people. There are 60,000 people and I am the only one here. There is a capacity crunch to monitor well."*

– Sanitary inspector

*"Monitoring needs to be systematic and coordinated. This is beyond our current capacity at the moment"*

– Consultant to ULB

# Current monitoring forms are rudimentary, and do not measure service levels or outcomes

## Monitoring form for door-to-door waste collection completed by sanitary supervisor

Saturday: 01/03/2014

प्रति,  
 मा. मुख्याधिकारी सो.  
 सिन्नर नगर परिषद,  
 वरुणे किंती रिपोर्ट करतो की, आज दि. 01/03/2014 रोजी सिन्नर नगर परिषद हद्दीतील साफसफाई कामी खालील प्रमाणे कामगार प्रत्येकीने आले.

लॉक नं.	आमो क. (१)	कामगार	आज
MH15 9386		अर्जुन पवार	वेदवडी, पाणव्याची
		गिनेश पवार	राखी सोमवारवाडी
		शिवेश मळगे	रुतोजा लार्डिन
		केमरी लालने	बाळमपरा
MH15 98		वाळू पावल	सुंभेक, ताळेवाडी
		भैरो पावल	अंबावेस, ताणव्या
		शंजु पावलाप	बोटे, वाणार
		सुकुदेव पवार	अंबावेस, ताणव्या
MH15 986		सुधाभाष बाई	रुतोजा लार्डिन

1) ताणव्याची खोरे वेदवडी, पाणव्याची राखी, सोमवारवाडी बाळ

2) अंबावेस बाळगे

3) राम, खोरे

4) शंभू पावल अंबावेस- उजोर, पाणव्याकडून आले. शिंदे

आमो क. (२)

MH15 131		शिवेश मळगे	लाविनेस, शिन्नरवाडी
		शंभू पावल	शिंरी बोटे, किणार
		शंजु पावल	अंबावेस, ताणव्या
		वाळू पावल	बाळमपरा
		पवन सोळे	

For door to door waste collection, the supervisor makes a simple note of the name of the worker and the vehicle number, along with the area they served

The note also mentions the length of time the truck or person worked

## Daily schedule for drain cleaning

विषय :- ट्रॅक्टर व ट्रॉली ड्रायव्हरसह पुरवठेचे वाहतूक विगोद.

कारणे किती रिपोर्ट करतो की, आज दि. 10/4 /2013 रोजी ट्रॅक्टर व ट्रॉली ड्रायव्हरसह पुरवठेचे आला त्याची तपशीलवार माहिती खालील प्रमाणे आहे.

क्र.	विनांक	ट्रॅक्टर नं.	वेळ
1	74192698	MH15B 478	साकाळी 6 ते 3
2		MH30B 5476	6 ते 3
3		MH15BW 2900	6 ते 3
4		MH15BW 9386	6 ते 3

एकूण ट्रॅक्टर 4

वेळेदाराची सही

श्री. बापूराव रामभाऊ गोवंडर

For door to door waste collection, the private player submits the vehicle number and the time for which the vehicle worked

## Monitoring form for community toilet cleaning

प्रति,  
 मा. मुख्याधिकारी सो.  
 सिन्नर नगरपरिषद

मुस्ताक नादुसा काद्री रिपोर्ट करितो की, आज दि. 10/4 /2013 रोजी सिन्नर नगरपरिषदेचे मालकीचे खालील प्रमाणे शौचालय व मुतांगी पाणी व केमीकलने साफसफाई करणेत आली हा रिपोर्ट दिला असे.

अ.क्र.	शौचालयाचे ठिकाण एकूण शिट	एकूण शिट
1	चौदा चौक वाडा	96
2	वावी वेस मिलाटी	30
3	समाजमंदिर	96
4	शेरताटी	20
5	कुरणेगल्ली	20
6	काजीपुरा	92
7	यशवंत ऑईल मिल	99

For community and public toilet cleaning, both the private player as well as the sanitary supervisor note the location and number of seats cleaned

# The ULB needs capacity building mainly in technical and financial assessment, contract development and monitoring



## Current status and key gaps

- Technical and Financial assessment**
  - Undertaken by sanitary inspector and ULB staff
- Contract development**
  - Annual management contracts prepared by the ULB, with monthly payments based on billed inputs
- Procurement process**
  - Lowest bid meeting minimum criteria is chosen
- Monitoring**
  - Self reported forms and form filled by ULB supervisors is tallied daily
  - Monitoring forms do not measure outputs or service levels

## Capacity building needed

- Technical and Financial assessment**
  - Prepare technical and financial assessments for proposed solutions
- Contract development**
  - Develop a systematic contracting framework with which:
    - ✓ Links payment to explicitly monitored service levels or outputs
    - ✓ Clearly addresses risks affecting both the private and the public sector
- Procurement process**
  - Strengthen current framework for bid evaluation to include metrics for quality and level of service delivery
- Monitoring**
  - Draft a systematic monitoring framework that
    - ✓ Monitors outputs or outcomes
    - ✓ Is clearly tied to payment incentives
    - ✓ Can be effectively implemented by ULB staff

## Need for capacity building



# Contents

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- ① City profile
- ② Current status of sanitation
- ③ Recommendation solutions
- ④ ULB institutional assessment and areas for capacity building
- ⑤ **Financial capacity assessment**

# There are three accounts in the ULB budget, namely Revenue, Capital and Extraordinary

(INR in million)

Category	2006 (Actual)	2007 (Actual)	2008 (Actual)	2009 (Actual)	2010 (Actual)	2011 (Actual)	2012 (RE)	2013 (BE)
<b>Revenue account</b>								
Revenue Receipts	41.2	45.1	42.9	46.2	46.5	84.4	120.2	143.2
Revenue Expenditure	34.2	40.8	37.5	40.0	59.7	68.4	115.9	147.0
<b>Capital account</b>								
Capital Receipts	11.0	16.5	21.9	6.2	18.3	27.5	171.7	455.6
Capital Expenditure	25.1	19.3	19.9	19.5	23.8	26.9	130.9	293.1
<b>Extraordinary account</b>								
Extraordinary Receipts	10.2	7.1	7.5	5.0	6.8	13.8	34.0	38.6
Extraordinary Expenditure	9.1	7.3	6.2	3.7	5.0	9.7	31.6	37.0
<b>Summary</b>								
Total Receipts	62.4	68.7	72.3	57.4	71.6	125.7	325.9	637.3
Total Expenditure	68.5	67.5	63.6	63.2	88.5	105.0	278.4	477.0
<b>Operating ratio<sup>1</sup></b>	0.83	0.90	0.87	0.87	1.28	0.81	0.96	1.03
<i>Revenue account surplus (INR in million)</i>	7.0	4.3	5.4	6.2	(13.2)	16.0	4.3	(3.8)

## Revenue Accounts

- Revenue receipts and expenditures are those related to day-to-day operations of the ULB
- Traditionally Sinnar has maintained a revenue surplus, indicating good financial health

## Capital Accounts

- Capital receipts includes grants received from state or central governments for the creation of capital assets
- Capital grants received from the state and central governments are usually tied to specific capital creation projects

## Extraordinary Accounts

- This account includes receipts and expenditure which are temporary in nature and vary from year to year
- Revenue from these receipts is not predicted or used for the planning of future projects

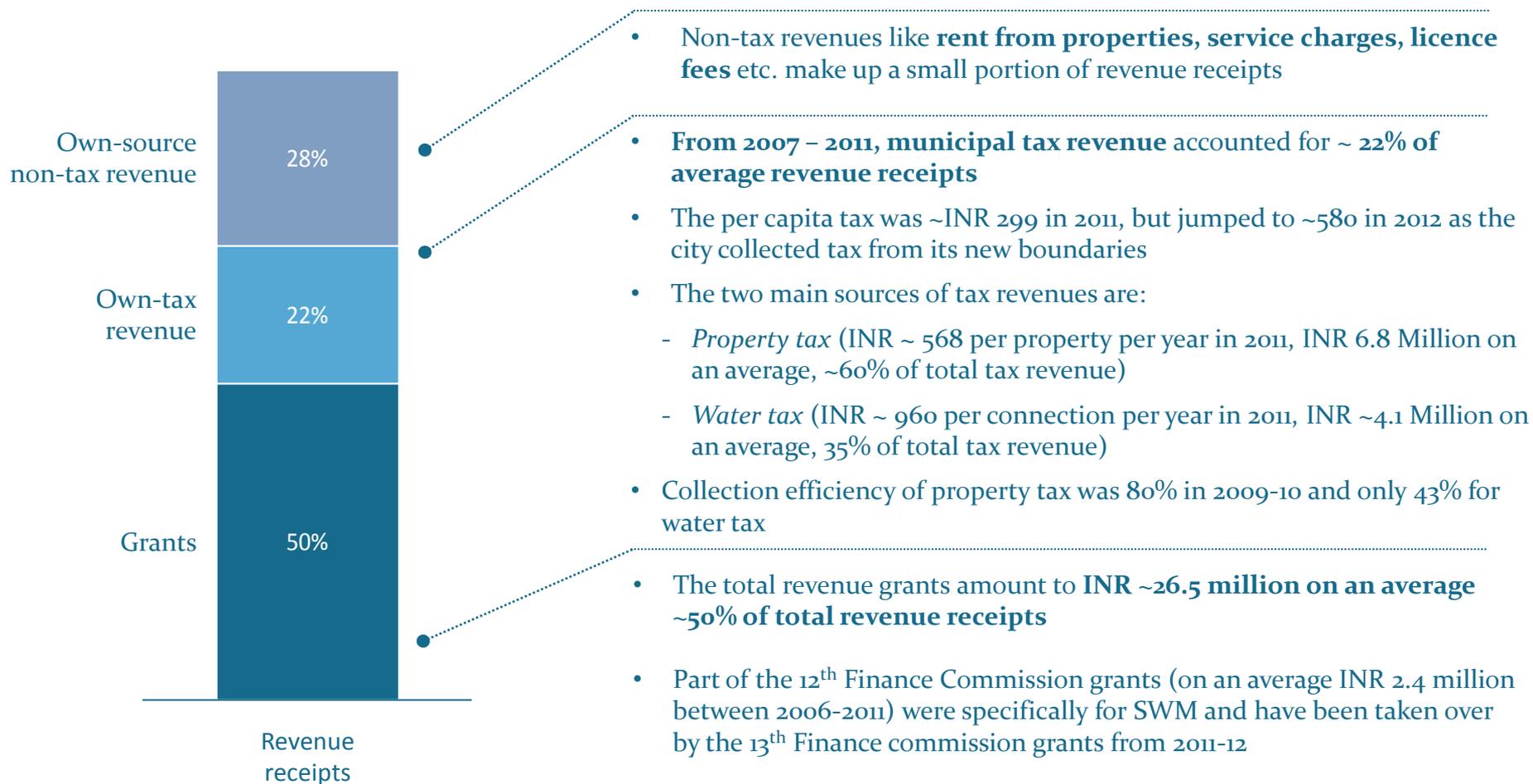
Note: (1) Ratio of revenue expenditures to revenue receipts, core measure of financial health for a ULB

Source: Financing plan for Sinnar, CEPT University

# Sinnar ULB is highly dependent on grants to fund its operational expenditures, limiting its financial autonomy

## Sinnar ULB Revenue receipts

(As a % of average receipts between 2007-2011)

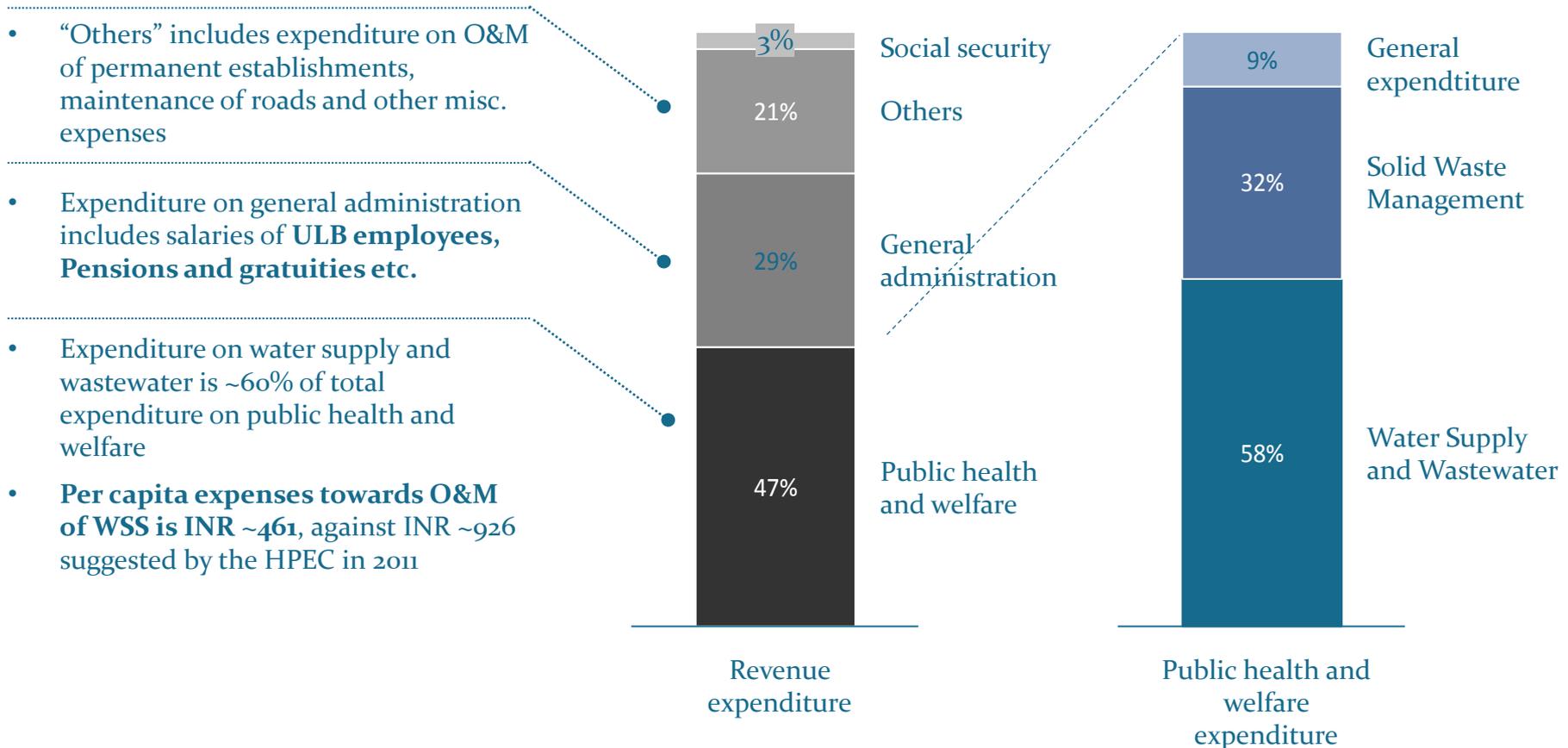


Note: (1) Total consolidated tax revenue divided by population

Source: City budget documents, CEPT University analysis

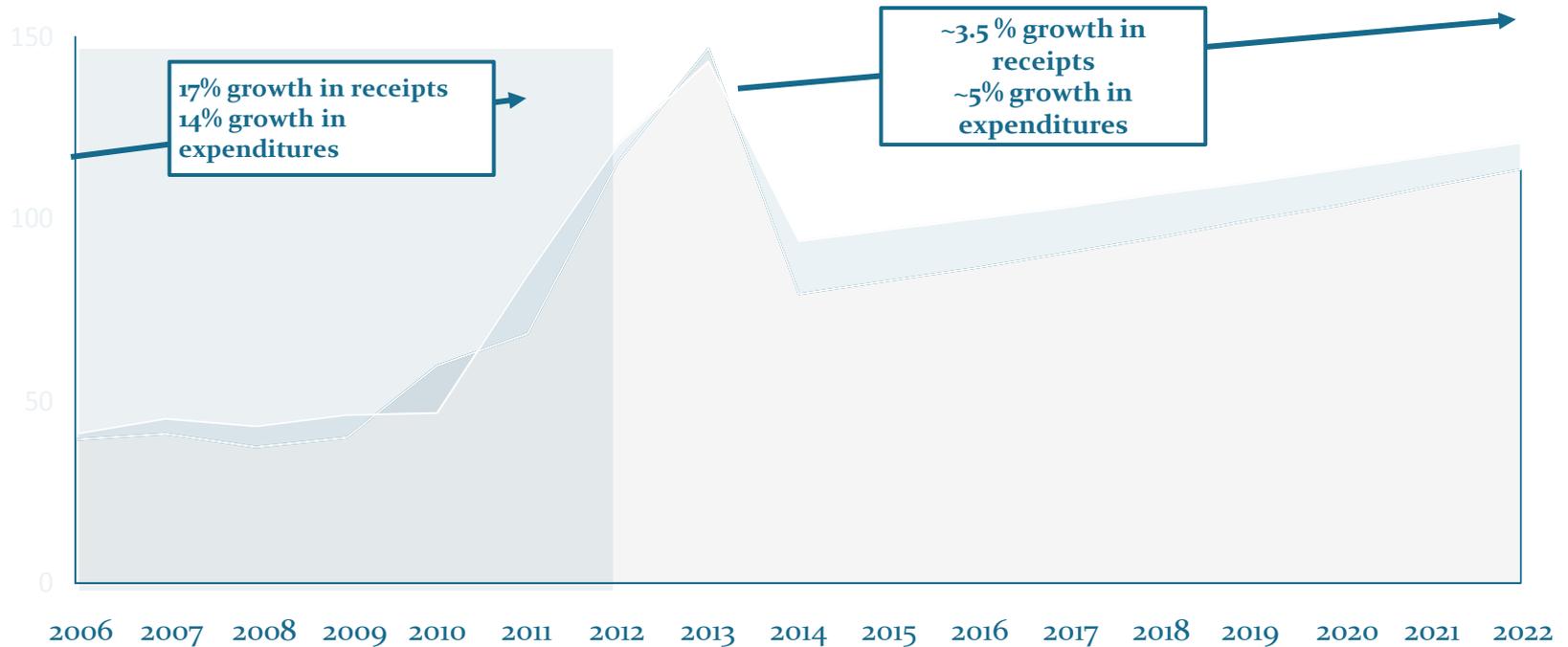
# Water supply and wastewater constitutes ~1/4<sup>th</sup> of total revenue expenditure

Sinnar ULB Revenue expenditure (Average between 2007-2011)  
(As a % of average expenditures between 2007-2011)



# Sinnar has historically maintained a surplus and is expected to continue to have a surplus of ~10-15 million per year available for investment

Forecast of Sinnar ULB's Revenue receipt and expenditure  
(In million)



Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Surplus (million, INR)	2	4.3	5.4	6.2	-13.2	16	4.3	-3.8	14.7	14.2	13.4	12.6	11.7	10.6	9.5	8.3	7

←----- Actuals ----->----- Projected ----->

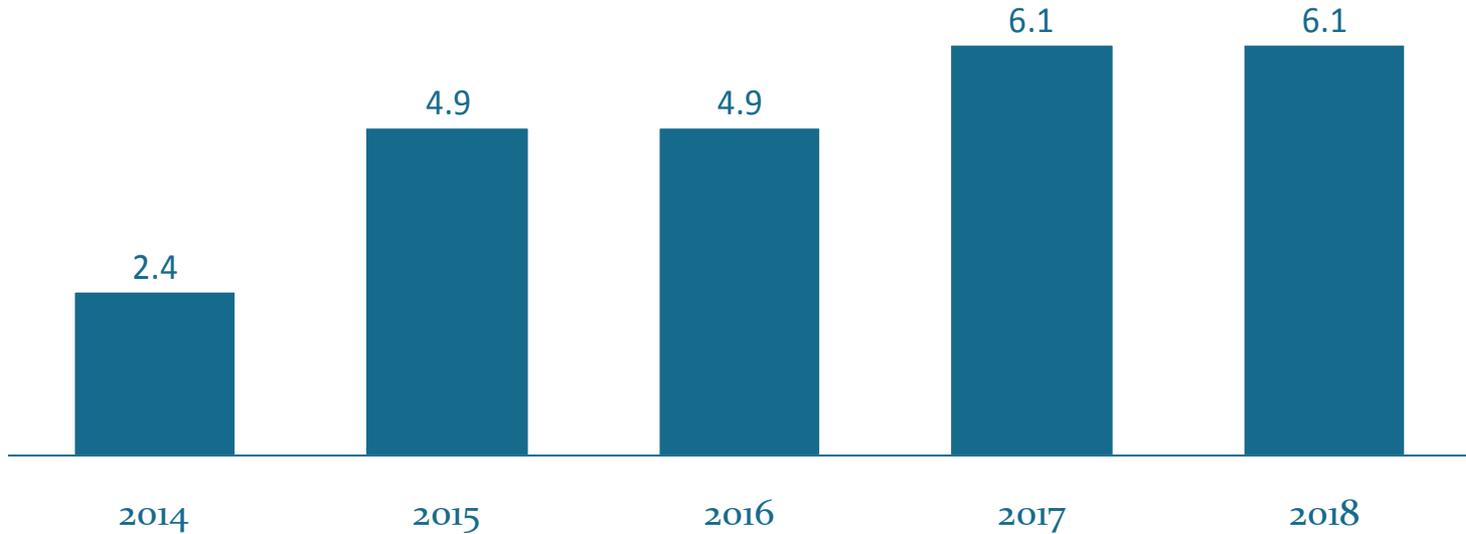
Revenue expenditure  
 Revenue receipts

Source: City budget documents, CEPT University analysis

# Appendix

# Given Sinnar's financial status, the group toilets scheme is likely to require ~40% of the projected revenue surplus over five years

Cost of subsidy for group toilets to Sinnar ULB (*INR million, 2014-2022*)



	2014	2015	2016	2017	2018
<i># of households provided with toilet</i>	487	974	974	1,217	1,217
<i>% of annual surplus</i>	17%	34%	36%	48%	52%

**The toilet scheme will take up ~40% of the Sinnar ULB surplus between 2014 to 2022**

# Capital cost incurred in Integrated Fecal Sludge Management (IFSM) plan

Refurbishment of septic tanks



Conveyance of fecal sludge



Treatment of collected septage



Total cost

1	Cost of refurbishing 1 septic tank	650
	Total number of septic tanks refurbished	2,473
	<b>Cost</b>	<b>1,607,450</b>

**Total Cost = INR 1,607,450**

HH survey and septic tank assessment

1	Cost of 1 HH survey	50
	# of HH surveyed	13112
	<b>Cost</b>	<b>655,600</b>
2	Cost of 1 HH survey	100
	# of HH surveyed	8262
	<b>Cost</b>	<b>826,200</b>

**Total Cost = INR 1,481,800**

1	Number of tanks to be cleaned per year	2,800
	Number of trips per day, for ~300 days	4
	Number of honey sucker required	3
	<b>Cost of truck</b>	<b>2,340,000</b>
	Number of safety gear required	9
2	Unit cost	5,000
	<b>Cost</b>	<b>45,000</b>
3	Number of uniform required	9
	Unit cost	5,000
	<b>Cost</b>	<b>45,000</b>

**Total Cost = INR 2,430,000**

1	Amount of septage treated per day (cu. m.)	42
	<b>Total septage (15 days) (cu. m.)</b>	<b>630</b>
	Area of one SDB (sq. m.)	120
	Depth of septage (m)	0.3
	<b>Capacity per bed (cu. m.)</b>	<b>36</b>
	<b>Number of beds req.</b>	<b>18</b>
	Cost per bed	2,00,000
	<b>Cost</b>	<b>3,600,000</b>

**Total Cost = INR 3,600,000**

**INR  
~9.1  
million**

Note: All costs in INR

Source: CEPT University analysis for Septage Management plan of Sinnar

# Annual operational cost incurred in Integrated Fecal Sludge Management (IFSM) plan

## Conveyance of fecal sludge

1	Cost of diesel (INR/L)	60
	Fuel efficiency (KM/L)	10
	Total distance travelled in a year (Km)	34,320
	<b>Cost</b>	<b>205,920</b>
2	Legal costs	50,000
	Registration and Misc. cost	20,000
	<b>Total business establishment cost</b>	<b>70,000</b>
3	Number of staff (driver and operator)	9
	Monthly salary	12,000
	<b>Total salary</b>	<b>1,296,000</b>
4	<b>Medical expenses/insurance</b>	<b>24,000</b>
5	<b>Telephone bill (INR 3,000 per month)</b>	<b>36,000</b>
6	<b>Electricity and water bill</b>	<b>180,000</b>
7	<b>Travel</b>	<b>10,000</b>
8.	<b>Training</b>	<b>25,000</b>
9	Vehicle maintenance cost	97,200
	Vehicle insurance cost	36,000
	Misc. cost	24,000
	<b>Cost</b>	<b>157,200</b>
<b>Annual Total Cost = INR 2,004,120</b>		



## Treatment of collected septage

	Number of staff	3
1	Monthly salary	7,000
	<b>Cost</b>	<b>252,000</b>
2	<b>Maintenance cost (5% of capital cost)</b>	<b>203,766</b>
<b>Total Cost = INR 455,766</b>		



## Annual total cost

INR  
~2.5  
million

# Water supply Census information

## Main Source of Drinking Water

Households by Main Source of Drinking Water Maharashtra, Census 2011 (Excluding Institutional Households)		
S. No.	Source of drinking water	Sinnar ( No. of HH)
1	Tap water from treated source	11,030
2	Tap water from untreated Sources	545
3	Covered and uncovered well	1195
4	Tubewell/Borehole	162
5	Handpump	59
6	Others	121
<b>Total</b>		<b>13,112</b>

## Availability of tap water from treated source

Households by Availability of Tap water from Treated Source, Maharashtra, Census 2011 (Excluding Institutional Households)		
Sr. No.	Tap water from treated source	Sinnar ( No. of HH)
1	Within the premises	9,441
2	Near the premises	1,179
3	Away	410
<b>Total</b>		<b>11030</b>

Thank You