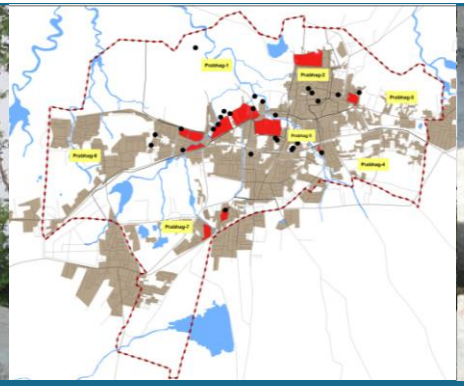


CITY SANITATION PLAN

for AMBAJOGAI *Municipality*

pas performance assessment system

PAS Project, CEPT University, INDIA

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

Section IV: Ambajogai

30th May 2014

CEPT University

Contents

Ambajogai is a Class B town of ~74,000 people located in the Beed district of Maharashtra

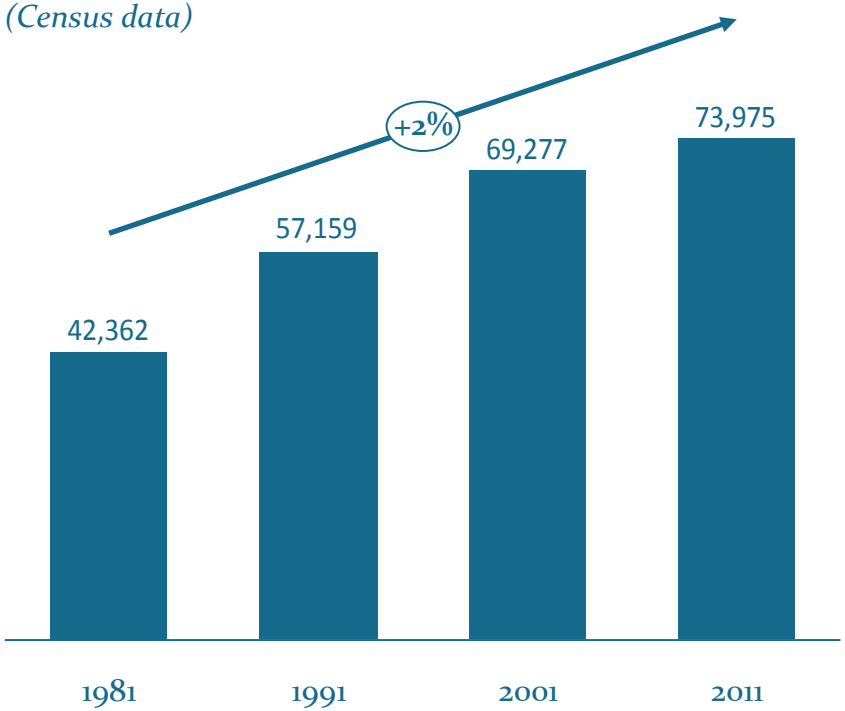
Location

- **Class 'B' city** located ~130 Km south-west of the city of Nanded in Maharashtra
- **Spread over 10.18 sq. km**., with a population density of **~7,200 inhabitants / sq. km.**
- **Cultural capital of the Marathwada region,** famous for its temples and educational institutes

Demographics

Population of Ambajogai Municipal Council

(Census data)

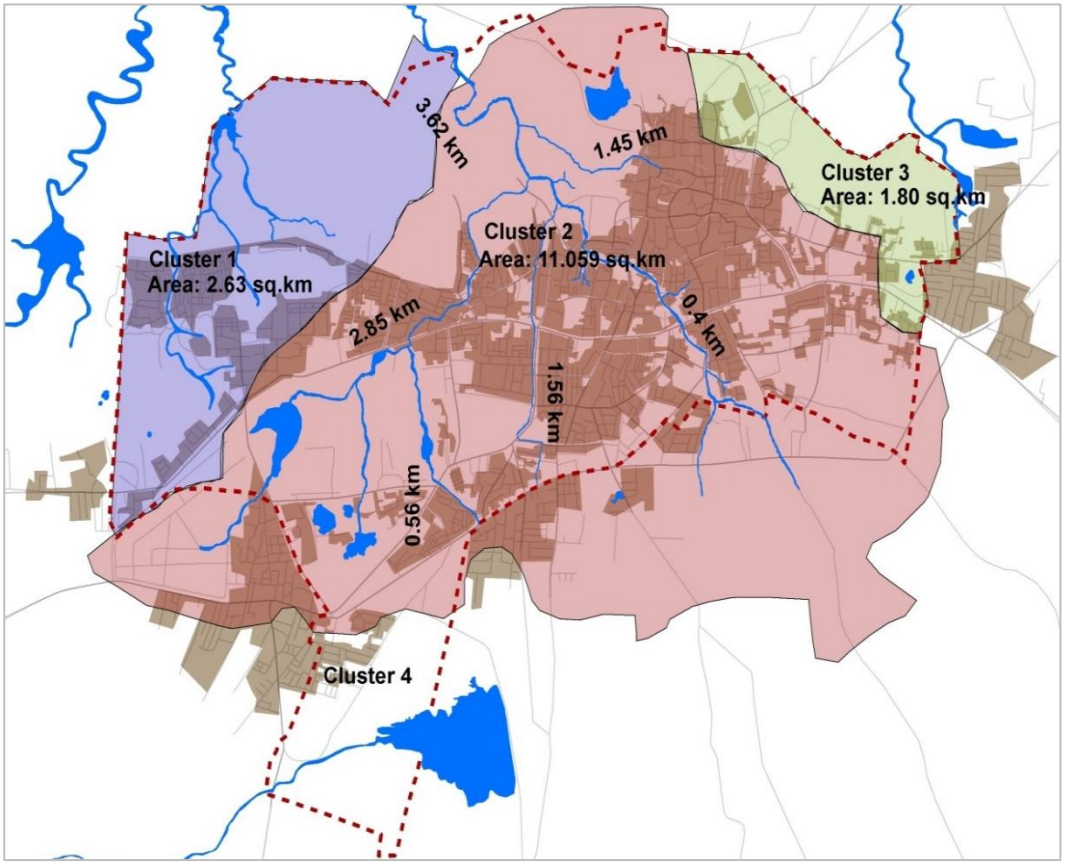


- Has **~14,000** households with an average household size of ~5.5 persons
- Population growth has been slow (~2% between 1981 and 2011)
- **26%** of the total population lives in **slum areas**

Source: Census information (link), City Sanitation Plan of Ambajogai , PAS Project – CEPT University

The town is divided into four clusters for wastewater generation based on the natural drainage pattern

Ambajogai's wastewater clusters



Terrain and Topology

- The river **Jaywanti** flows in the south to north direction, dividing the town into two major parts – the eastern part and Western part.
- The **natural slope and topography converges towards the river** diverting wastewater to the river
- Based on natural topography and drainage system, as well human construction, the city can be divided into four clusters:
  - **Cluster 1: Semi-rural and sparsely populated,** slopes to the north
  - **Cluster 2: Covers ~95% of the city population,** slopes towards the river
  - **Cluster 3: Semi-rural and sparsely populated,** slopes away from river
  - **Cluster 4: Minimally inhabited**, slopes towards nearby lake

Source: City Sanitation Plan of Ambajogai , PAS Project – CEPT University

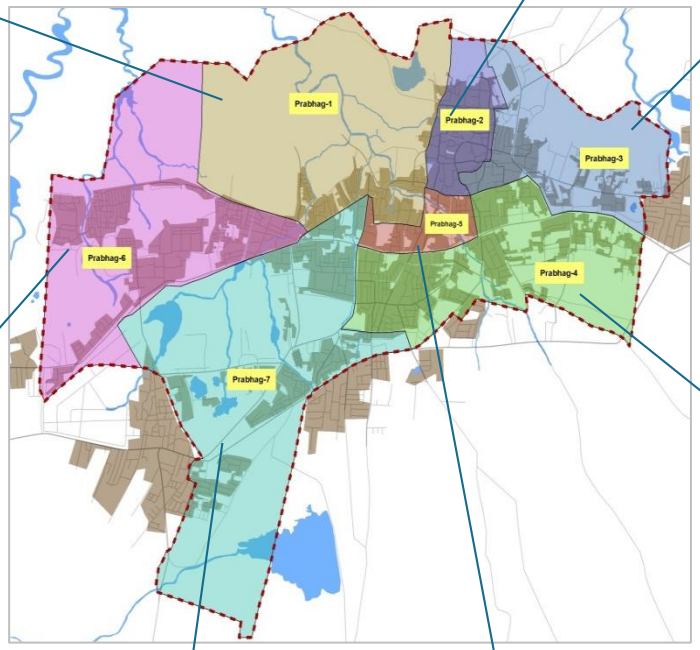
For administrative purposes, Ambajogai is divided into 7 Prabhags

Administrative Map of Ambajogai

Only ~50% of this area is inhabited, comprising mainly of residential and institutional buildings
Population: 12,160

Densely populated area dominated by commercial establishments
Population: 11,051

Mix of old and new residential areas, as well as some commercial establishments
Population: 10,540



Only ~50% of this area is inhabited, mainly by slums and low income households
Population: 15,074

Newly developing area comprising primarily of residential colonies
Population: 11,186

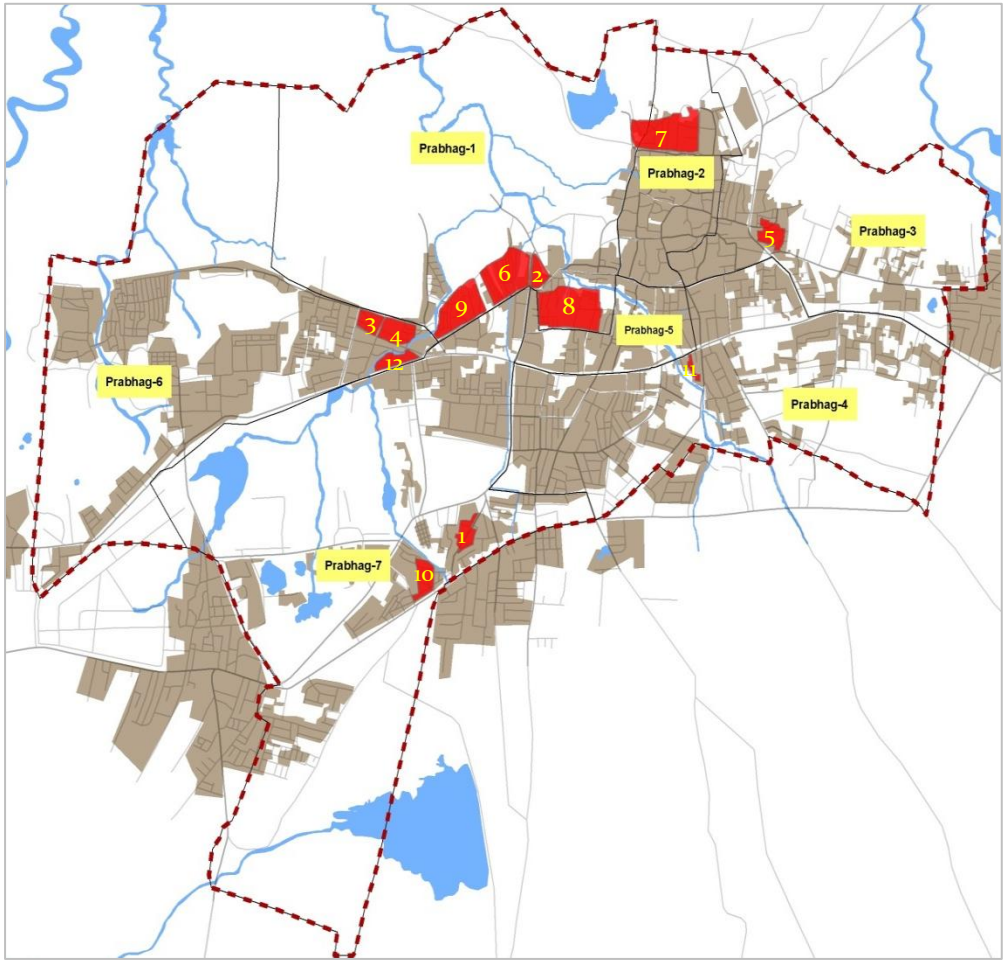
Newly developing area comprising primarily of residential colonies
Population: 10,302

Densely populated area dominated by commercial establishments
Population: 9,687

Source: City Sanitation Plan of Ambajogai , PAS Project – CEPT University

26% of the total population lives in 12 large slum areas

Map of Ambajogai city with slum pockets



Slum areas

S. No.	Name of the slum	Population
1	Wadarwada	1172
2	Dhorpura	348
3	Sadar Bazar	596
4	Panchseelnagar	2706
5	Parlives	3618
6	Ghandhinagar	1451
7	Raviwarpeth	1791
8	Siddharthanagar	1681
9	Millind nagar	2741
10	Kabirnagar Raigadnagar	2177
11	Dhobighat	502
12	Pensionpura	1475

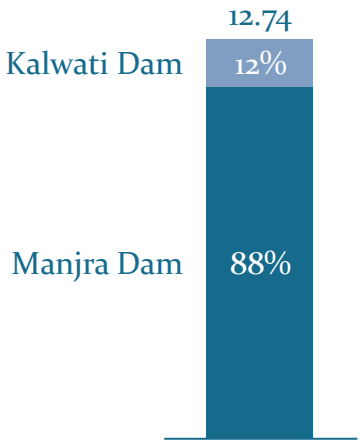
Source: City Sanitation Plan of Ambajogai , PAS Project – CEPT University

Contents

Ambajogai faces a severe shortage of water, and only ~65% of households have a water supply connection

Source of water supply

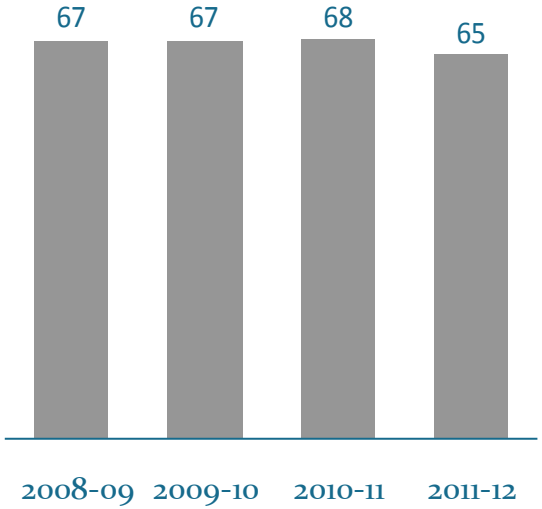
(in MLD)



- **Manjra Damn near Dhanegaon** is the main source of water for Ambajogai
- Water is treated at **two treatment plants** located at the dam sites, with a combined capacity of **25 MLD**
- Water is stored **at 4 ground storage reservoirs and 8 elevated storage reservoirs**

Coverage of water supply connections

(in % of total households)



- The percentage of households provided **water supply connections has marginally fallen** from ~68% in 2010-11 to ~65% in 2011-12

Per capita availability of water in Ambajogai

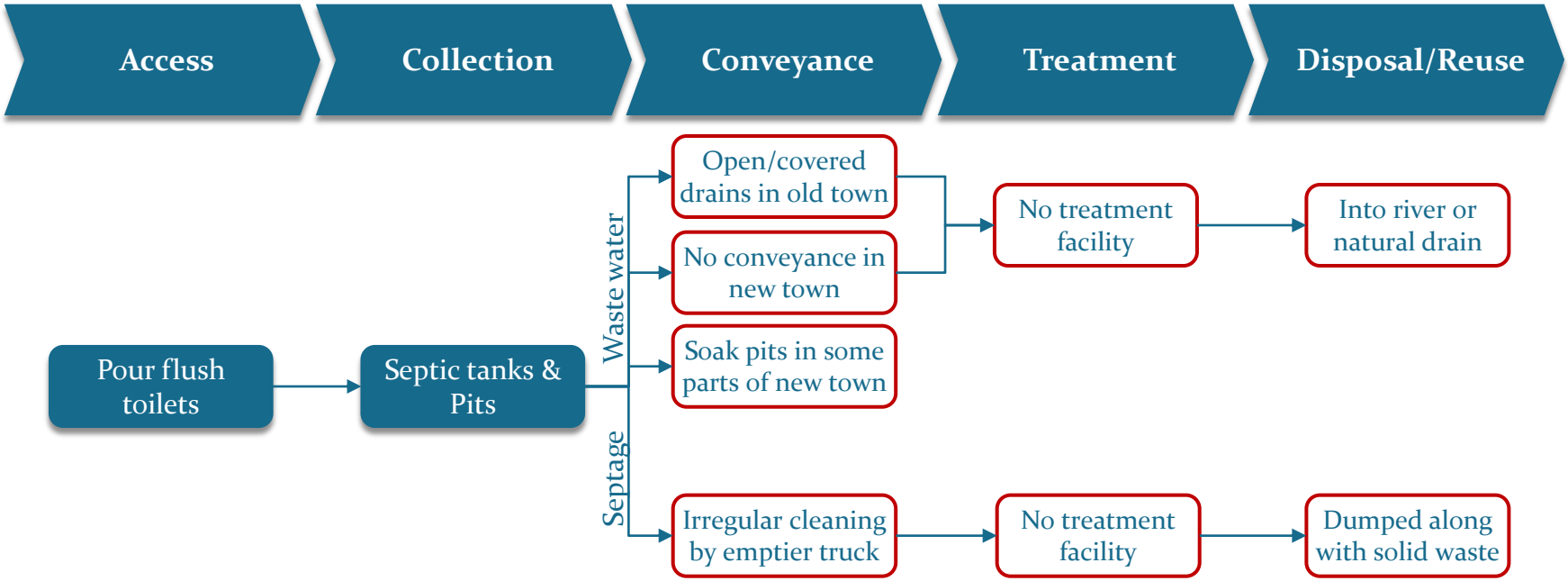
(in LPCD)

- The per capita availability of water is inadequate as per the Code of Basic Requirements of Water Supply set at 100-150 LPCD by the **Bureau of Indian Standards (BIS)** and the **service level benchmarks** set by the Govt. of India at **135 LPCD**
- Current water supply (12.74 MLD) exceeds estimated demand (10.96), however per capita availability remains low due to **loss of water through illegal connections and leakages**

Source: City Sanitation Plan of Ambajogai , PAS Project – CEPT University,

Code of basic requirements of water supply by Bureau of Indian Standards (link), Census 2011

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



Pour flush toilets

Septic tanks

Open/closed drains

No treatment

No treatment of septage or grey and black water from domestic use

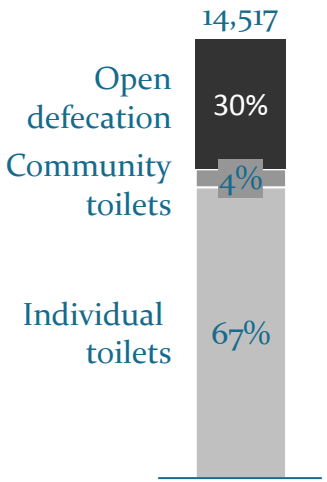
Jaywanti River

Source: City Sanitation Plan of Ambajogai , PAS Project – CEPT University

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

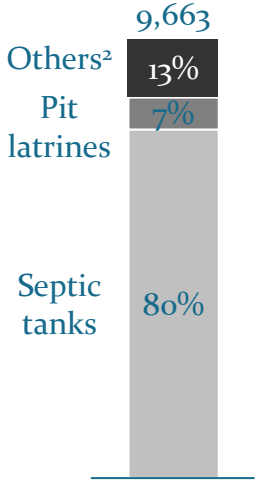
Access | Collection | Conveyance | Treatment | Disposal/Reuse

Access to type of sanitation
(Number of HH)



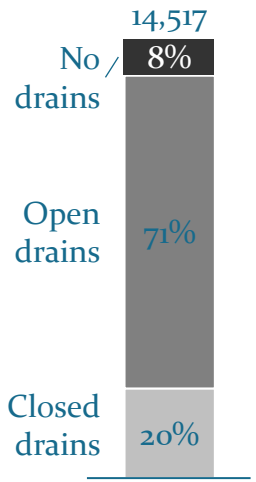
- ~ 4,300 HH practice OD in Ambajogai
- Dependence on community toilets is low, with only ~550 households dependent on it, which are mainly non-slum HHs

Method of collection of waste[1]
(Number of HH)



- ~1,290 HH with access to individual toilets depend on primitive methods of collection of waste
- Septic tanks are over sized and some lack access manhole covers

Methods of conveyance of waste
(Number of HH)

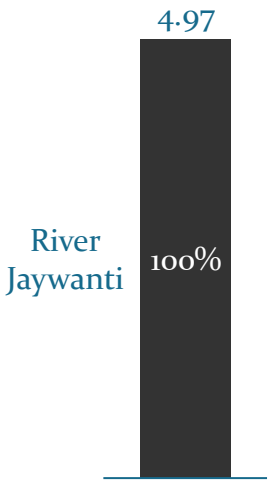


- ~1,200 HH have no drains for conveyance of wastewater
- Only ~1% of septic tanks are cleaned per year

Treatment of wastewater
(in MLD)

- ~4.97 MLD of waste water is untreated
- No treatment facility for fecal sludge

Disposal of waste
(in MLD)



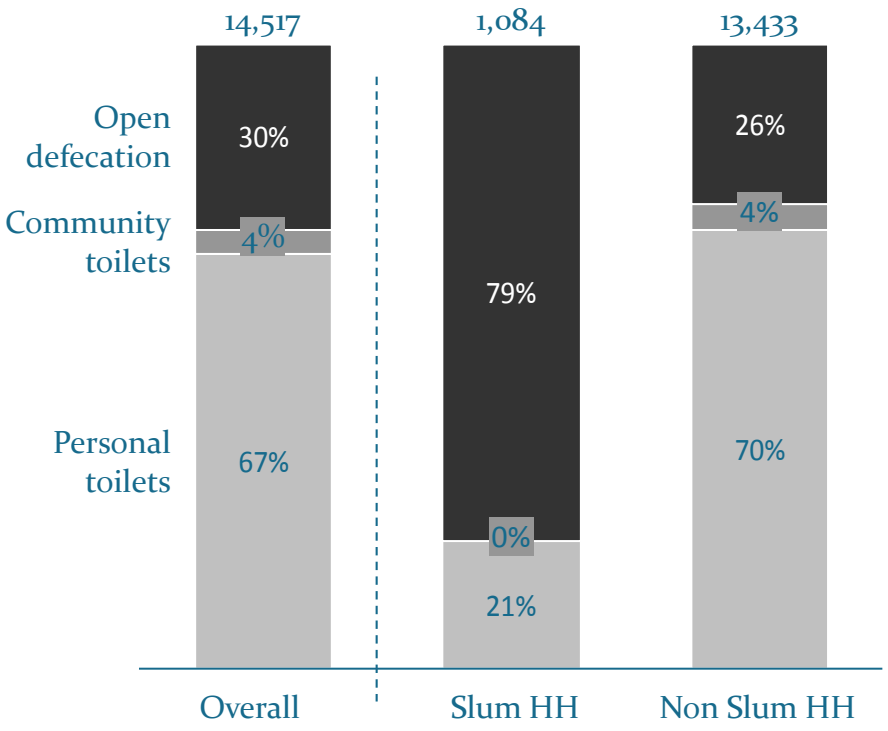
- ~4.97 MLD of wastewater is dumped into river Jaywanti
- Fecal waste is dumped into the open

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

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

Access: Open defecation rates are extremely high, particularly in slums where ~80% of households practice open defecation

Access to types of sanitation facility in Ambajogai
(As a % of total HH)



- **4,303 households** practice **open defecation** in Ambajogai
- **9,663 households** have access to **individual toilets**
- **Only 551 households** are dependent on **community toilets,** and slum HHs mainly resort to open defecation due to lack of functional community toilets

Current status of access to toilets in Ambajogai

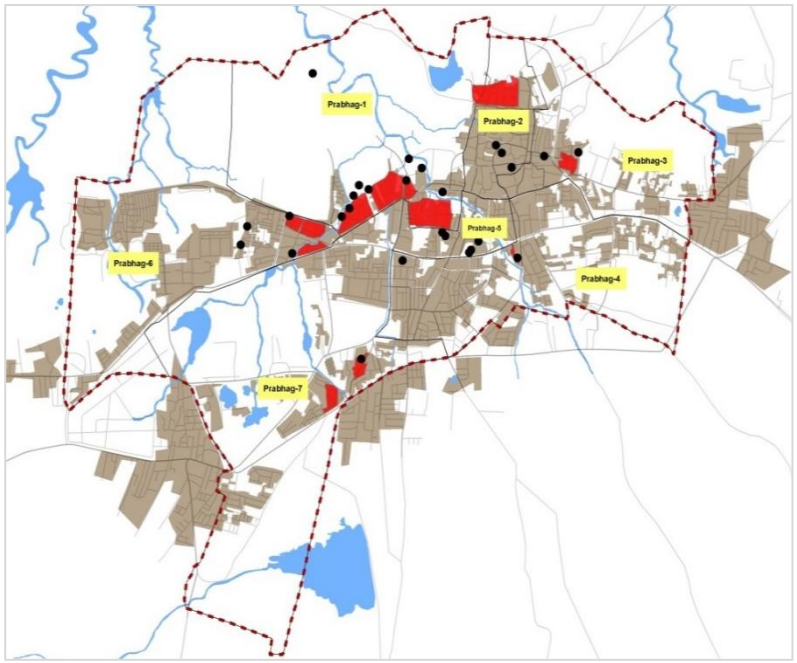
Prabhag	Toilet dependence
Prabhag 1	• 60% of HH have access to personal toilets • 35% of HH practice open defecation
Prabhag 2	• Almost all HH have access to personal toilets • Rare instances of open defecation
Prabhag 3	• 70% of HH have access to personal toilets • 20% of HH practice open defecation
Prabhag 4	• 90% of HH have access to personal toilets • 10% of HH practice open defecation
Prabhag 5	• 80% of HH have access to personal toilets • 8% of HH practice open defecation
Prabhag 6	• Only 30% of HH have access to personal toilets • 60% of HH practice open defecation
Prabhag 7	• 90% of HH have access to personal toilets • 10% of HH practice open defecation

- **Lack of availability of finance, space constraints and legal clearances** are cited as the main barriers to adoption of individual toilets

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

Access: There are 39 community toilet blocks in Ambajogai and 2 public toilets

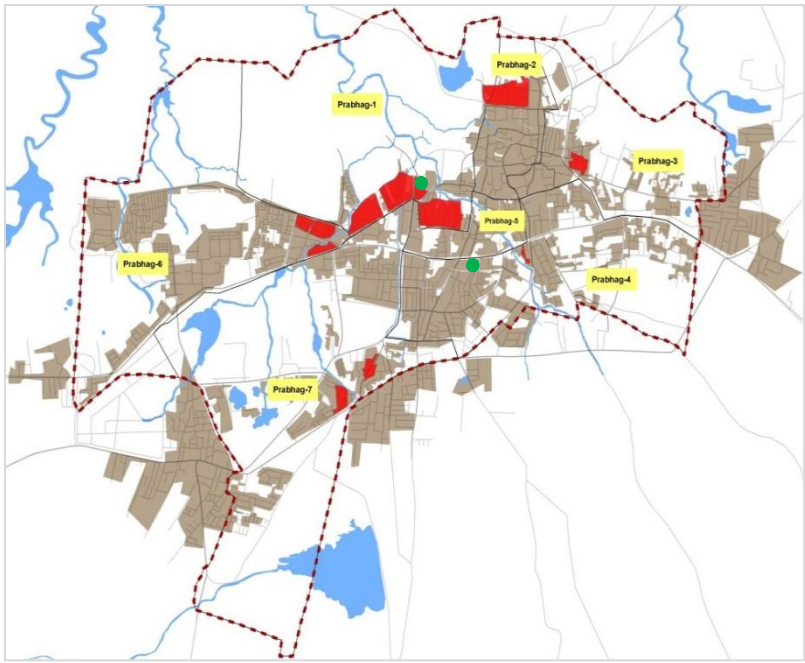
Location of community toilet blocks in Ambajogai



Community toilets

Slum areas

Location of Public toilet blocks in Ambajogai



Public toilets

Slum areas

Source: City Sanitation Plan of Ambajogai , PAS Project – CEPT University

Access: Community and public toilet blocks are in very poor condition and need refurbishment

Community toilets

- There are **39 community toilet blocks in Ambajogai which are located in slum and non-slum areas**
- A study in 2012 found that **community toilets are in very poor condition** with only 141/249 functional seats
- Most toilet blocks are in **dilapidated condition**
- **Lack of availability of regular water supply** limits use
- **Unavailability of electricity** makes them unsafe for use at night
- All Community toilet facilities are free to use and mainly managed by the ULB

Public toilets

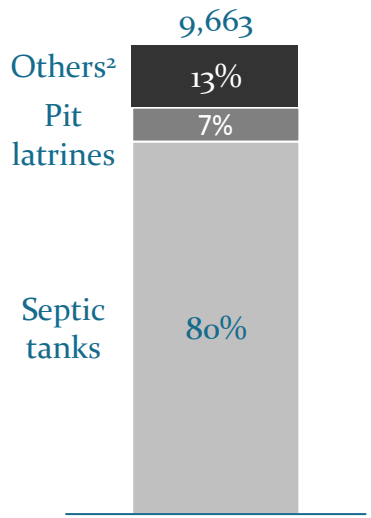
- There are **2 public toilets** blocks in Ambajogai
- One public toilet is located at the bus stand and the other at the Dasopant Samadhi area
- The public toilet at the **bus stand** is operated by a **private contractor** and runs on a **pay-per-use model**
- **Lack of maintenance of toilet blocks, broken infrastructure, and unavailability of water** limit their use
- There is a need for a **public toilet near Yogeshwari temple**

Source: City Sanitation Plan of Ambajogai , PAS Project – CEPT University

Septage collection: 80% of individual toilets depend on septic tanks, which are often over-sized and difficult to access

Method of collection of waste for households with personal toilets

(As a % of total HH)



Assessment of household septic tanks

- Most personal toilets are **connected to septic tanks for collection**
- Septic tanks are usually designed to have **2-3 baffled chambers**

- **Septic tanks are often sealed at the top,** making access difficult
- Septic tanks in old town areas are often of **non-standard size** due to space constraints
- Practice of constructing septic tanks with **outlets connecting to local open drains** or channels is widely prevalent *(see photo above)*

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

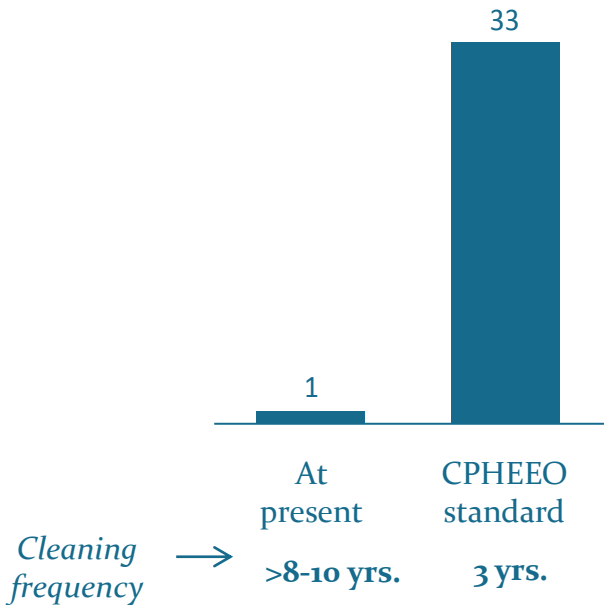
Conveyance of septage: Only 1% household septic tanks are cleaned annually as compared to the service standards of 33%

Existing septage conveyance mechanism in Ambajogai

- The Ambajogai ULB has **one suction emptier truck of only 200 L capacity** which is responsible for cleaning all septic tanks in the town
- The truck is used to clean all **community and public toilets once a week and** households pay ~INR 3,000 /septic tank to the ULB to get their septic tanks cleaned
- **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 Ambajogai ULB

(As a % of total septic tanks)



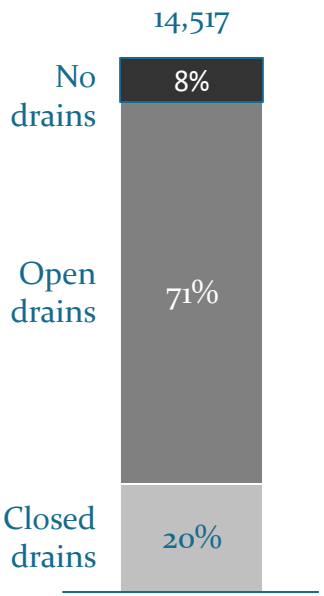
- Only **1% of tanks are cleaned annually, far below the service standards of 33%** recommended by the CPHEEO manual[1] and the MoUD advisory on septage management
- Due to **infrequent cleaning, septage begins to solidify** in tanks
- As the septic tank fills up, **fecal matter along with effluent is released** into the drains, leading to widespread pollution

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

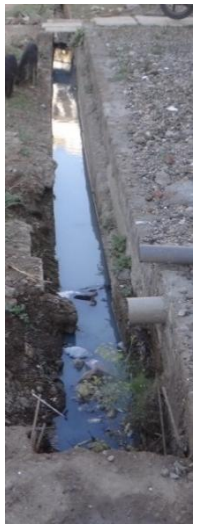
Source: City Sanitation Plan of Ambajogai , PAS Project – CEPT University

Wastewater collection and conveyance: ~70% of households rely on open drains for the conveyance of waste water

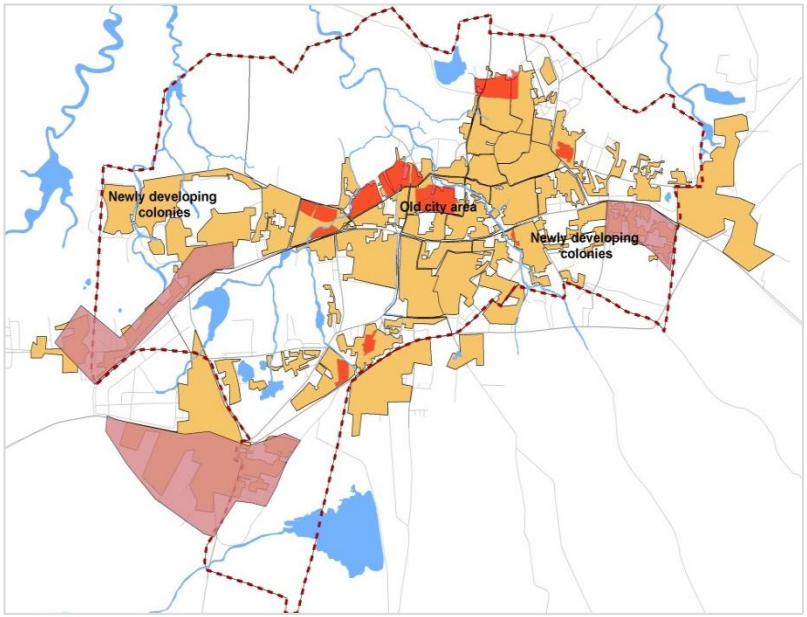
Method of collection and conveyance of wastewater
(As a percentage of total HH)



Road side drains



Map of Ambajogai with conveyance mechanisms



Area not covered by drain network

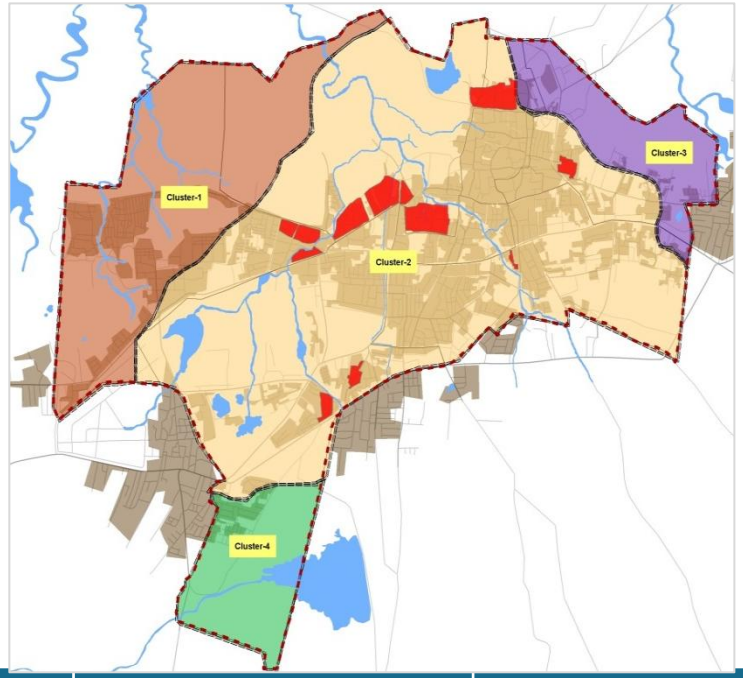
Area covered by drain network

- **~1,200 households** in Ambajogai have no drainage system for the conveyance of wastewater
- There is **no appropriate mechanism for conveyance of grey and black water** and all wastewater is disposed into drain channels flowing along the streets
- In old town area, a large amount of **solid waste is dumped into drains,** blocking the *nallahs*
- **The drainage system in new areas is limited in coverage** and wastewater is discharged into soak pits or into the open

Source: City Sanitation Plan of Ambajogai , PAS Project – CEPT University

Wastewater treatment and disposal: All wastewater is dumped without treatment into river Jaywanti

Quantity of Wastewater generation in Ambajogai by clusters



Cluster	Prabhag	Wastewater generated (MLD)
1	Part of 6	0.4
2	1,2,4,5,7 and part of 3 and 6	4.2
3	Part of 3	0.1
4	Part of 7	0.2

Source: City Sanitation Plan of Ambajogai , PAS Project – CEPT University

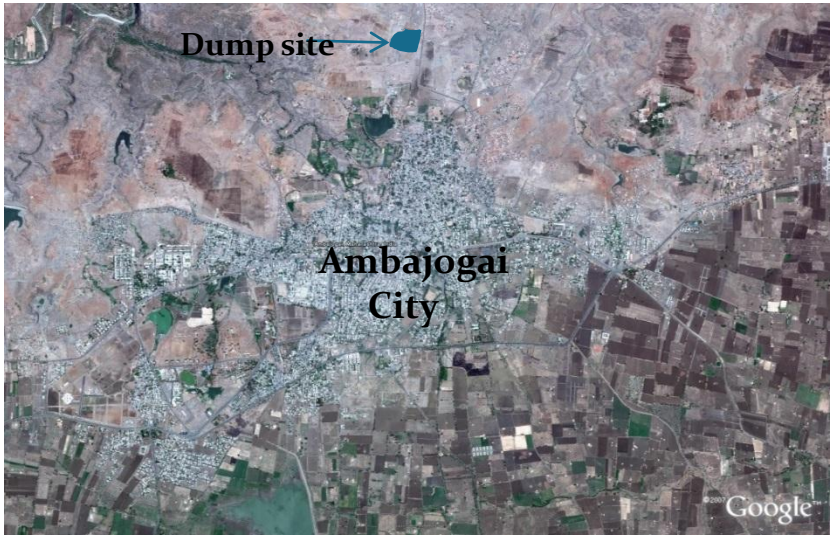
There is no treatment facility for septage or wastewater

Wastewater treatment

- **~4.97 MLD of wastewater is generated in Ambajogai and goes untreated** due to lack of any centralized or decentralized treatment facility
- Due to lack of soak-pits and treatment facilities **all the wastewater drains into the river or into natural drains**

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

Location of the dump site



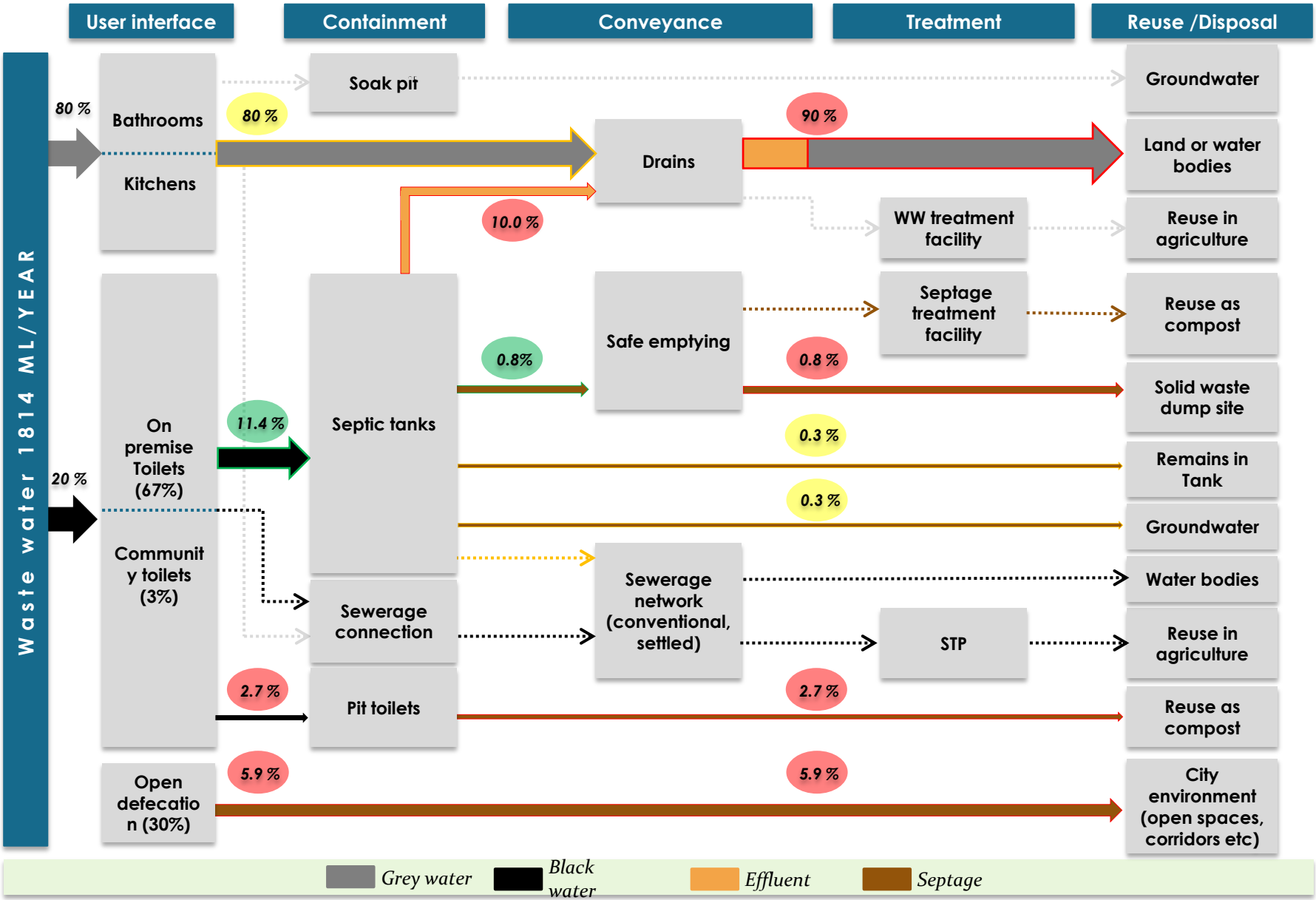
Dump site located next the existing solid waste treatment facility

Crude disposal of septage

Solid waste treatment facility

Source: City Sanitation Plan of Ambajogai , PAS Project – CEPT University

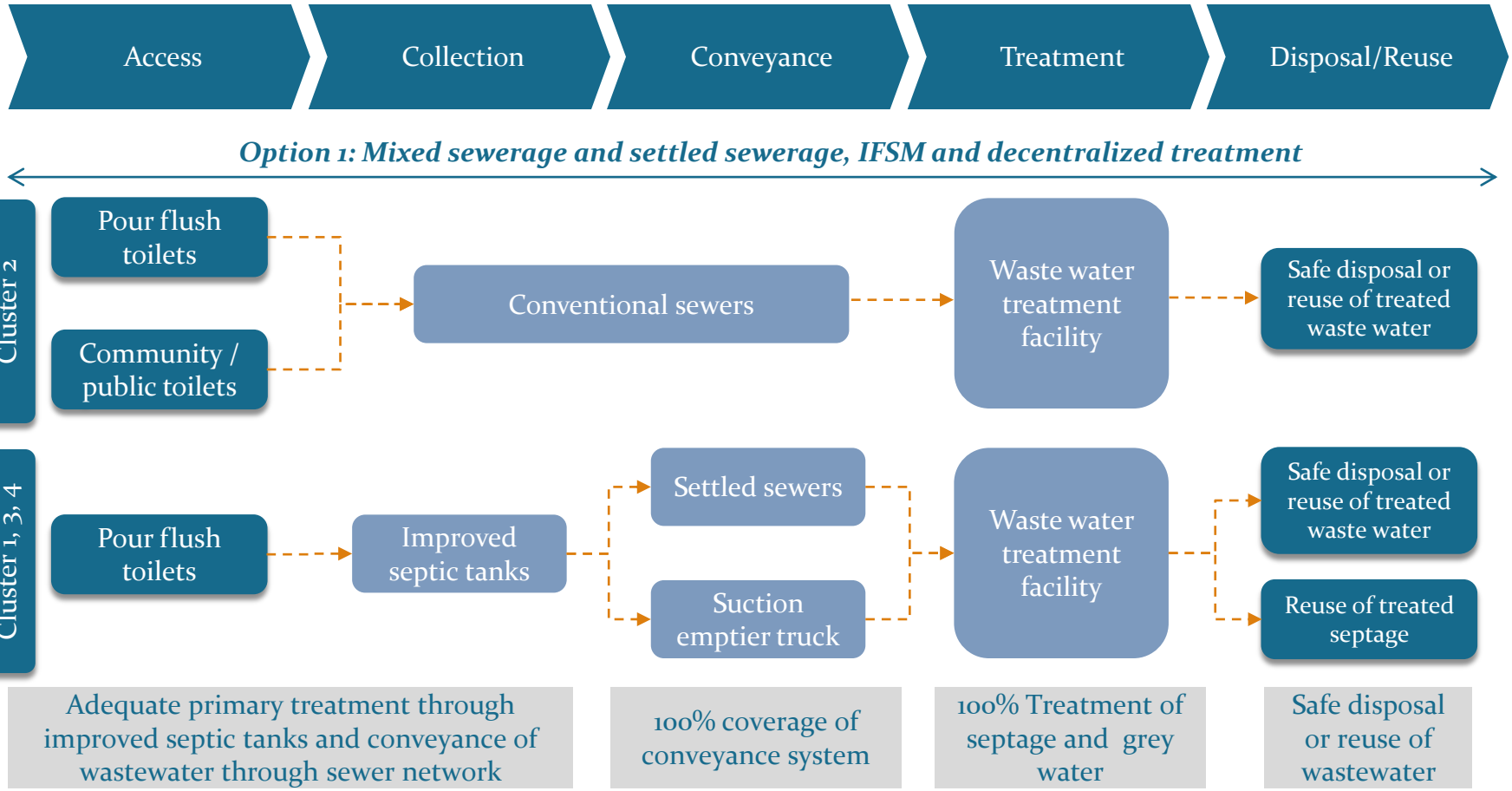
Existing Wastewater water flows in Ambajogai



Source: City Sanitation Plan of Ambajogai , PAS Project – CEPT University

Contents

CEPT has supported Ambajogai with developing comprehensive City Sanitation Plan for universal sanitation services (1/2)



Source: City Sanitation Plan of Ambajogai , PAS Project – CEPT University

CEPT has supported Ambajogai with developing comprehensive City Sanitation Plan for universal sanitation services (2/2)

Access	Collection	Conveyance	Treatment	Disposal/Reuse
Provision of individual toilets in slum areas (INR 11 Million)		**Rehabilitation of drains in Cluster 2[A]** (INR 92.4 Million)	**Cluster 2[A]- Conventional wastewater treatment facility[B]** (INR 53.4 Million)	**Reuse for agriculture and irrigation purposes**
Refurbishment of 39 community toilet blocks (INR 5.7 Million)		**Cluster 2[A] - conventional sewer[B]** (INR 567.8 Million)		
Refurbishment of community toilet block in Sardarbazar slum (INR 0.3 Million)		**Cluster 1,3,4[A] – Settled sewers** (INR 43 Million)	**Cluster 1,3,4[A]- Decentralized wastewater treatment facility** (INR 30 Million)	
Refurbishment of existing public toilets and urinals (0.92 Million)		**Cluster 1,3,4[A]- Suction emptier truck** (INR 0.8 Million)	**Cluster 1,3,4[A]- Fecal sludge treatment facility** (INR 1 Million)	**Reuse as compost in agriculture**

Investment required

INR 17.9 Million	**INR 704 Million**	**INR 84.4 Million**

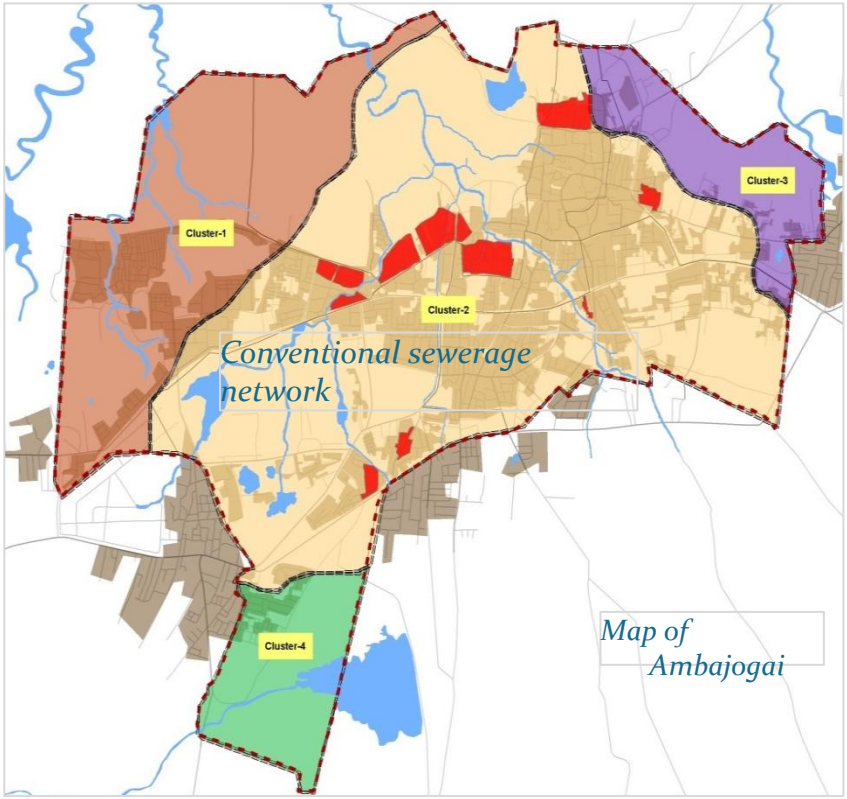
- This proposal provides each household in Ambajogai **access to individual and community toilets**
- The city has already proposed a **conventional sewer network for Cluster 1**
- In the remaining cluster, the city is exploring the construction of a **settled sewer network with DEWATs along with regular septic tank cleaning**
- The total investment required for this proposal is ~**INR 806.3 Million**

Note: (A) Cluster 2 refers to Ambajogai's central town area, while Clusters 1, 3, 4 are newly developed clusters where ~14% of Ambajogai's households live (B) The plan for a conventional sewerage system attached to a conventional treatment plant had already been undertaken by the city under UIDSSMT

Source: City Sanitation Plan of Ambajogai , PAS Project – CEPT University

The ULB has decided to construct a conventional sewerage system in the central part of the city

Location of conventional sewerage network



Details of the project

- **Cluster 2** will be served by **two conventional trunk main sewers** for the east and west sides
- The trunks will connect to a sump from where wastewater will be pumped to **conventional sewage treatment plant** near the river
- The construction is due to begin in **2014 and will cost the ULB ~INR 600 – 700 Million**
- The **sewer network** and pumping stations will cost ~ **INR 550 – 630 Million**, and **the treatment plant** will cost ~ **INR 50 - 70 Million**
- However, the sewerage network will **not cover the 3 remaining three clusters**

Source: City Sanitation Plan of Ambajogai , PAS Project – CEPT University;

Detailed Project Report for underground drainage system prepared by Solid Core Consultants Pvt. Ltd.

For the remaining 3 clusters, the city plans to develop decentralized sanitation solutions for the safe conveyance and treatment of waste

Areas for intervention

1

Integrated fecal sludge management *(short run)*

Regular (in a 3-year cycle) collection and disposal of fecal waste from septic tanks, along with necessary refurbishment of septic tanks ,construction of a treatment facility for septage and reuse of treated septage

2

Settled sewer + DEWATS *(long run)*

Conveyance of wastewater through settled sewers to a decentralized wastewater treatment facility for the newly developing clusters and reuse of treated wastewater

In the short run, the city plans to develop an end-to-end integrated fecal sludge management solution in these three clusters

	Access	Collection	Conveyance	Treatment	Disposal / Reuse
Current value chain	Pour flush toilets	Septic tanks	Suction emptier trucks	No treatment facility	Disposed off on dumping site
		• Septic tanks **lack manhole covers** • Septic tanks are **not of standard size** • **No HHs level database on** septic tanks	• Only **1% of septic tanks cleaned** annually, about once in more than 8-10 years	• **No facility** for fecal sludge treatment	• Septage disposed off on dumping site **without treatment**
Proposed value chain	Pour flush toilets	Septic tanks	Suction emptier trucks	Sludge drying beds	Revenue from compost
		• Providing **access manhole covers** to allow regular cleaning • Data base /MIS on properties with septic tanks	• Preparing a schedule for **regular** cleaning of septic tanks, to ensure tanks are **cleaned every 3 years**, or **33% of septic tanks are cleaned** annually	• **Installing fecal sludge drying beds,** for the treatment of fecal sludge	• **Use or sale** of treated **sale of septage** at a fixed rate to nearby farms or agro-businesses

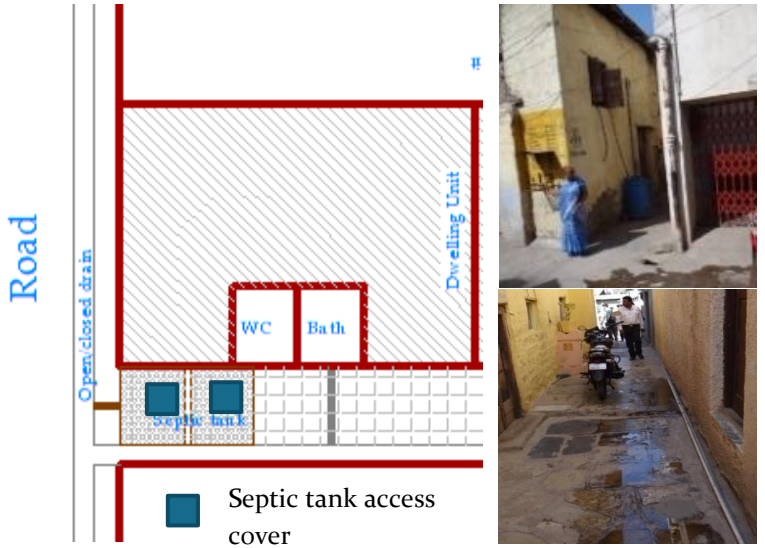
Source: Presentation on septage management plan of Ambajogai , CEPT University

As in the other cities, septic tanks will first need to be provided with access manhole covers to enable ready access for cleaning

Details of proposal

- Based on an assessment done during the preparation of the city sanitation plans, it was noticed that many **septic tanks in Ambajogai 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 will need to be repaired, this implies a cost of ~**INR 0.5 million**

Location of manhole of cover



RCC access manhole cover

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

To maintain a 3 year emptying cycle, 898 personal septic tanks will need to be cleaned annually in these three clusters

Current septage management practice

~1% 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. Ambajogai has only 1 truck of 200 L capacity, owned and operated by the ULB
5. Houses pay ~INR 3000 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. Ambajogai will get an additional 5 kL truck to meet service standards, that will clean 3 tanks per day, 300 days per year , which can be operated by a private. The existing truck will serve in areas which are inaccessible in the 3 clusters
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[1]

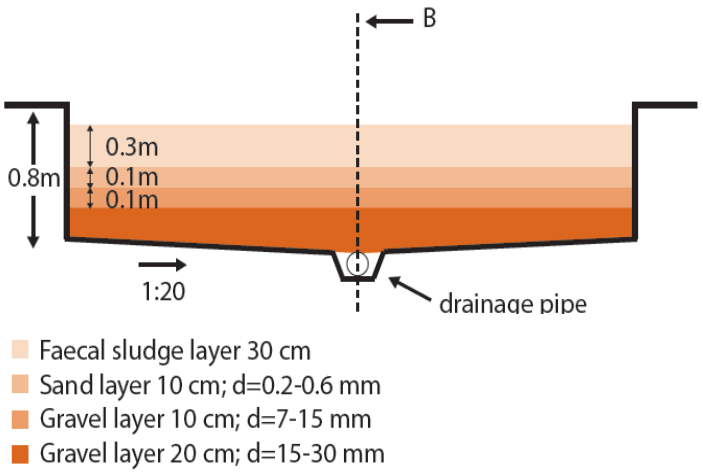
Source: Presentation on septage management plan of Ambajogai , CEPT University ,

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

For the treatment of collected septage, 4 sludge drying beds will be needed

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

Description of proposal

- For these three clusters, it is estimated that the daily load on the septage treatment facility will be **10.5 cum/day**
- This SDBs can either be constructed either at the wastewater treatment facility, or at the solid waste dump site or along with the DEWATs plant
- The city requires **4 sludge drying beds, covering a cumulative area of 684 sq. m.**
- The total investment required is **INR ~0.8 - 1 Million**[1]

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

Source: Presentation on septage management plan of Ambajogai , 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 need 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

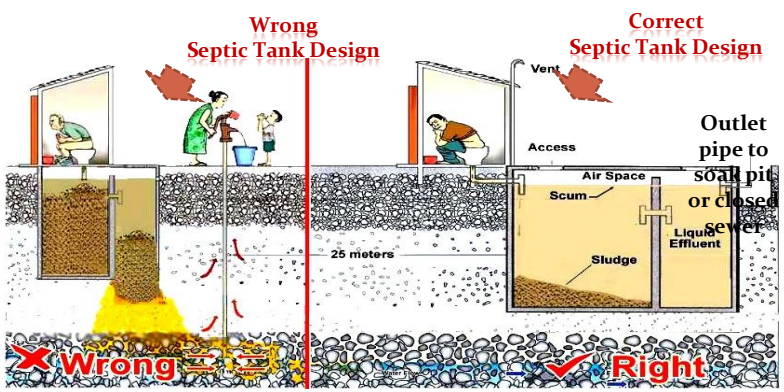
Source: Presentation on septage management plan of Ambajogai , CEPT University

These activities also need to be supported by campaigns for awareness generation

- 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 :
  1. Print and electronic media
  2. Civil Society organizations such as NGOs and RWAs
  3. Academic institutions such as schools and colleges
  4. 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 the pollute ground
- Whenever the septic tank get cleaned, please check that 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 source
- Provide proper access manhole to ease the process of emptying

Service provided by Ambajogai Nagar Parishad

De-sludge Your Septic Tank every 3 Year

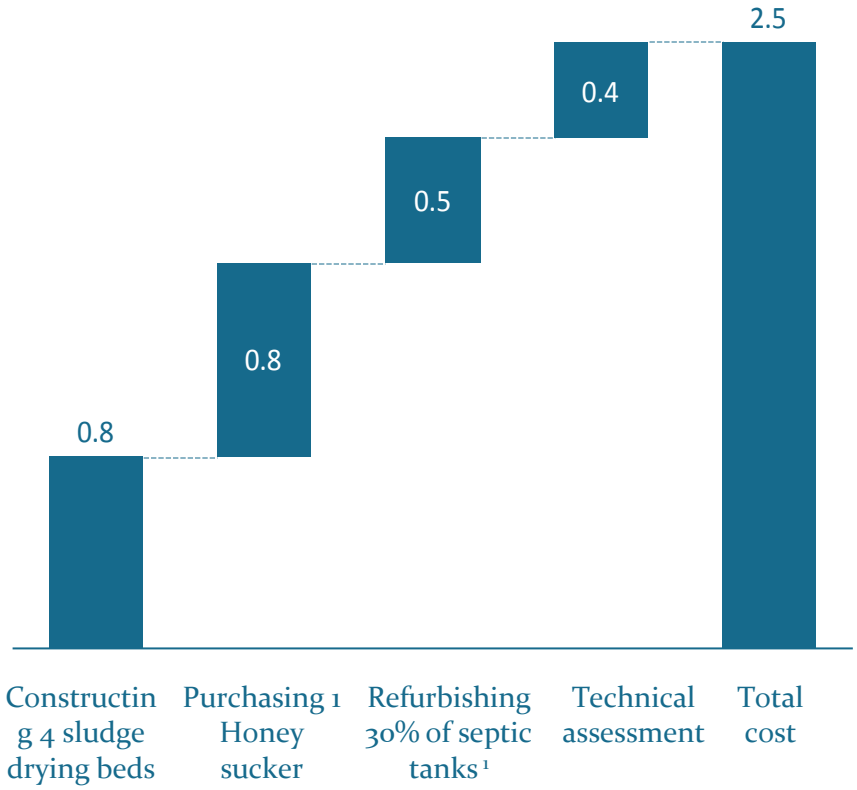
- As you clean you toilets daily , so that it does not affect your health, similarly clean your septic tanks every 3 years so that it does not affect the environment
- Ambajogai Nagar Parishad will provide you services for cleaning of Septic tank free of cost once every 3 years.
- The ULB officials will inform you in advance before they clean your septic tanks
- ULB will leave 1inch of solids inside septic tank, as it will act as seeding material for new incoming waste

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

The integrated fecal sludge management plan will entail capital investment of INR ~2.5 million and annual operating costs of INR ~1.2 million

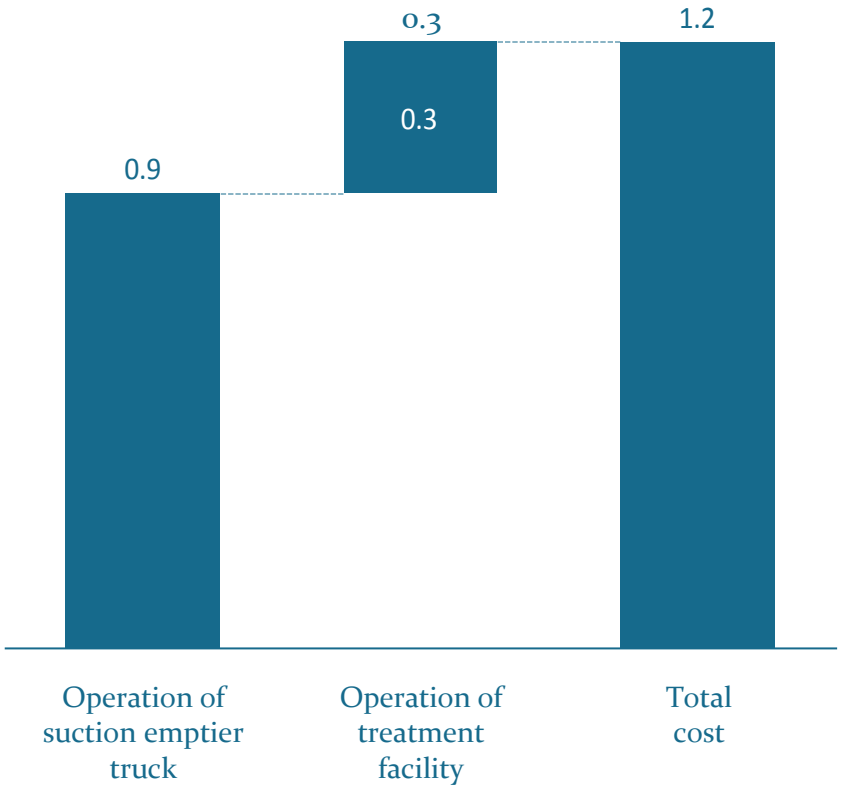
Capital expenditure

Investment required on capital assets for septage management in Ambajogai
(INR in Million)



Operating expenditure per year

Investment required per year on O&M for septage management in Ambajogai
(INR in Million)



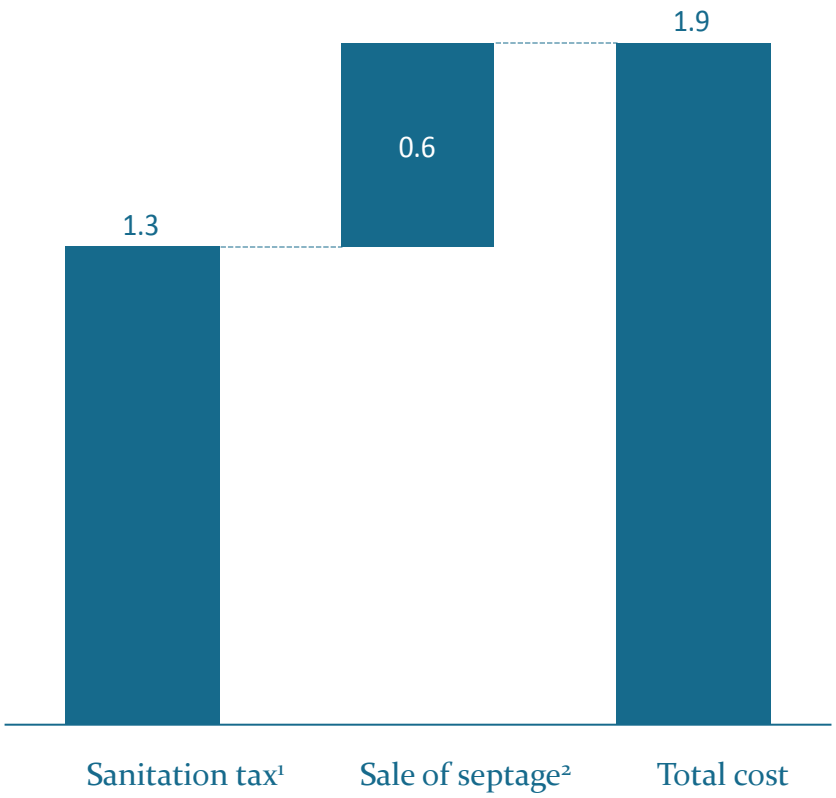
Note: (1) As per discussions with the ULB, this cost can also be borne by private households

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

Levying a special sanitary tax along with the sale of septage can make the septage management model profitable

Estimated annual revenue from septage management in Ambajogai[1]

(INR in Million)



Details of revenue model

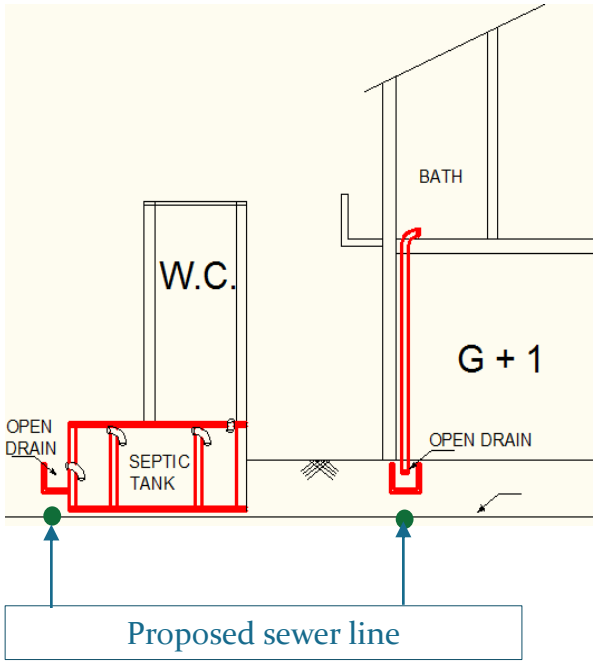
- The city can levy a **special sanitary tax of INR 500 per household per year** i.e. roughly equivalent to half the current one-time charge of Rs. 3000
- The ULB can also recover **costs through** the sale of compost after treatment
- Assuming ~30% of the compost is sold at INR 0.50/kg, **the pay back period for the ULB will be ~3-4 years**

Assumptions: (1) Annual sanitation tax collected by the ULB is assumed to be ~INR 500 per household per year for 2694 households (2) 30% collected septage sold at INR 0.50/kg

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

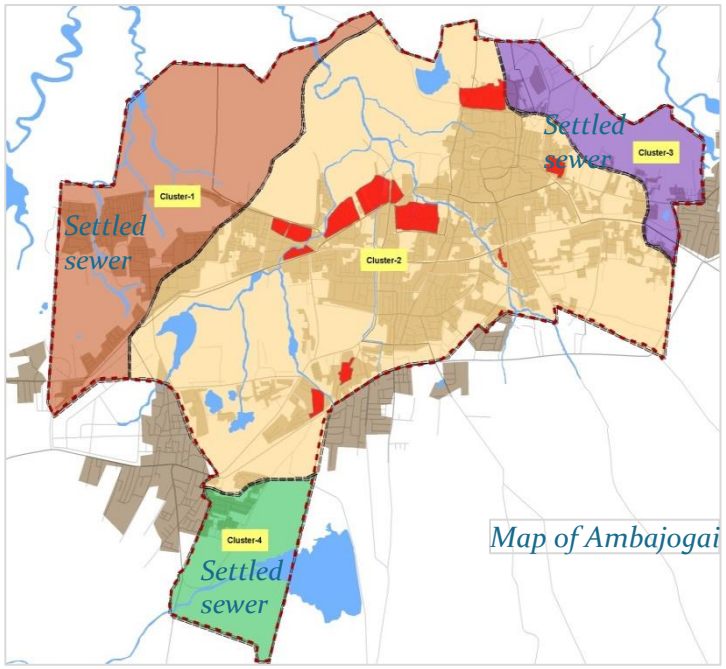
The city is also exploring the construction of settled sewers to serve these three clusters in the long run

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 excavation depth** is proposed to be **0.6 meters**

Proposed Location of settled sewers

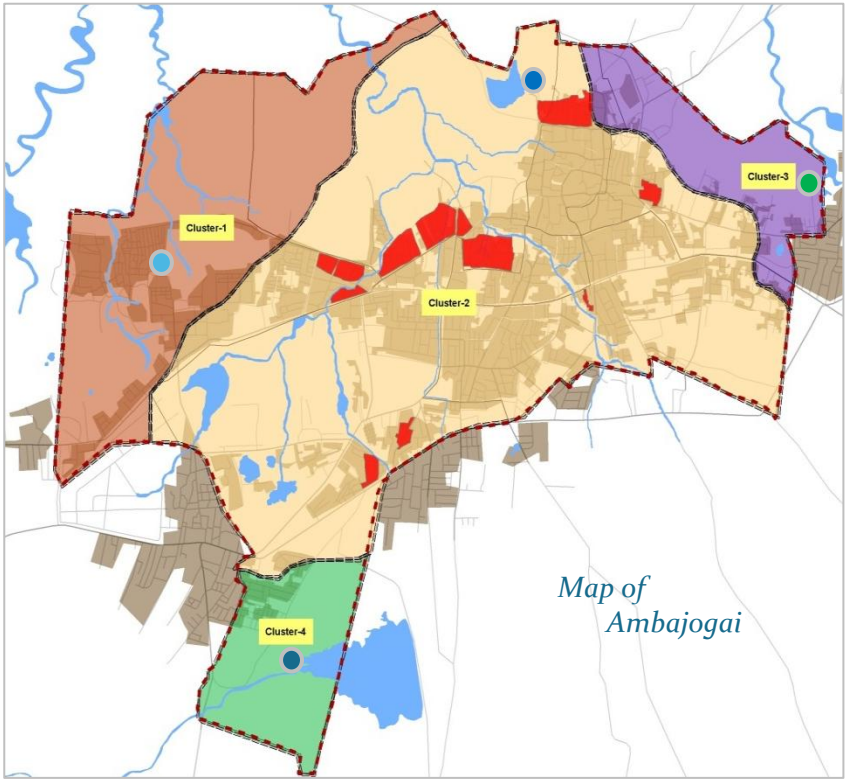


- The city is exploring the **construction of settled sewers in Cluster 1, 3 and 4** which will not be covered under the conventional sewerage network proposed by the ULB
- These three clusters account for ~14% of the total households and **~14% of the total wastewater generated** (0.7 MLD / 4.97 MLD) in Ambajogai

Source: Presentation on Wastewater management plan for Ambajogai , CEPT University

The settled sewer system will be attached to DEWATS facility at 4 locations for the treatment of wastewater

Proposed location of DEWATS



- DEWATS 1
- DEWATS 2
- DEWATS 3
- DEWATS 4

Details of DEWATS

DEWATS No.	Area	Population (2045)	Wastewater generated (Cu. M.)
1 A	Backside of Yogeshwari temple	2,350	255
1 B	Backside of Yogeshwari temple	2,150	183
2	Barula Talab	3,000	255
3 A	Kranti Nagar	4,700	400
3 B	Kranti Nagar	3,500	300
4 A	Mauli Nagar	6,000	510
4B	Mauli Nagar	6,000	510

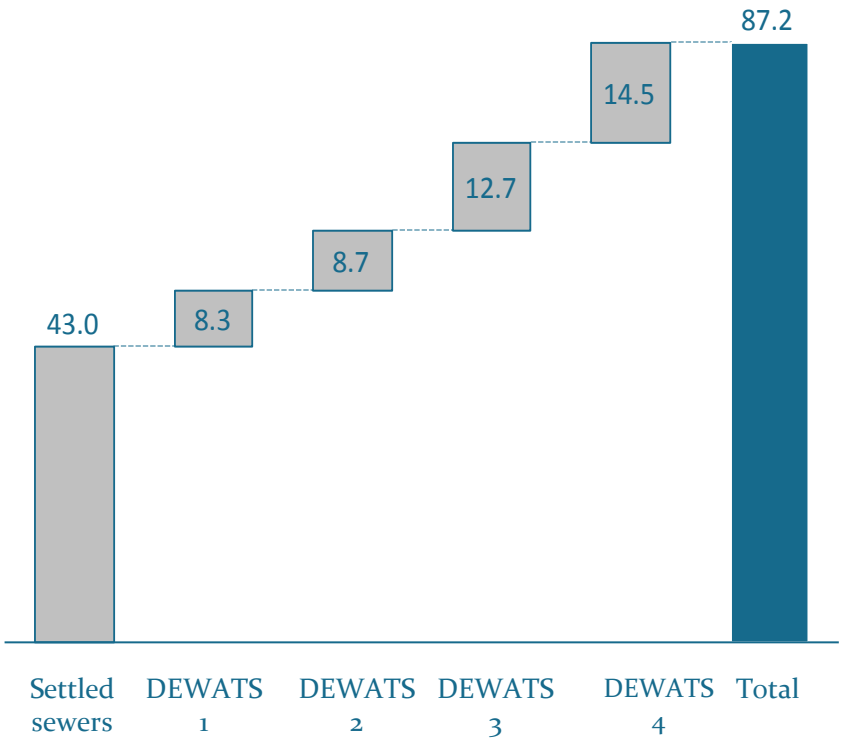
- Our initial assessment provides for **7 DEWATS plants located at 4 locations**
- All the **DEWATS facilities will provide at least up to secondary treatment**, after which the wastewater will be **safe for disposal in the river or for reuse**

Source : Presentation on Wastewater management plan for Ambajogai , CEPT University, DEWATs prefeasibility report for Ambajogai by CDD

The overall proposal will require an investment of INR ~87 Million on capital expenditure and an annual O&M cost of INR ~2.6 Million

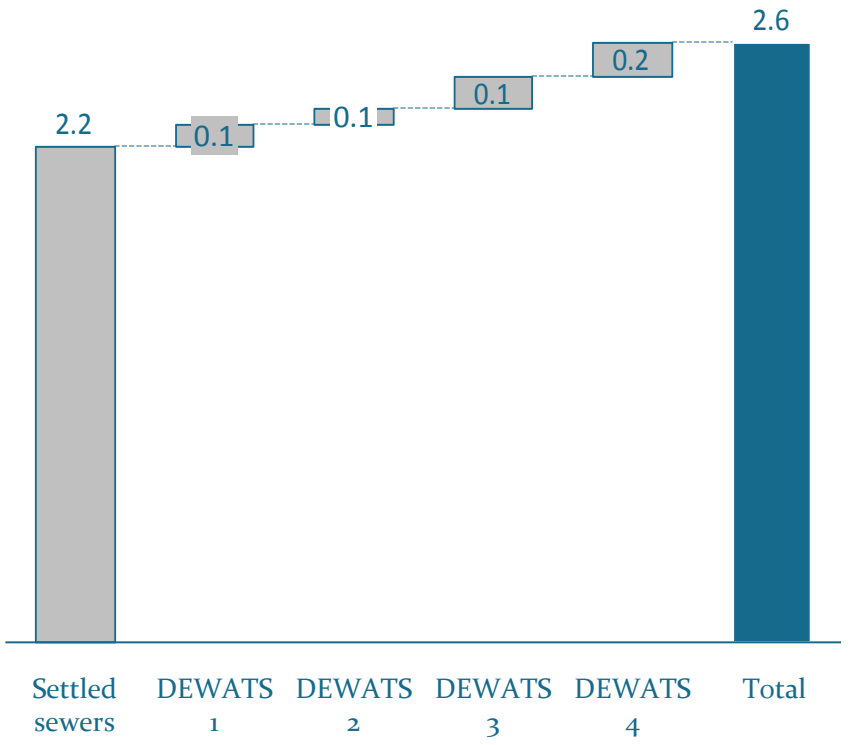
Investments required on capital assets for settled sewers + DEWATS

(INR in Million)



Annual O&M costs of settled sewers + DEWATS

(INR in Million)



Note: 1) Cost of each DEWATS facility is the average of the costs proposed by the Center for DEWATS Dissemination (CDD) (2) O&M cost for 100 to 200 m^3 of DEWATS is INR 100000/- every 2 years, for 200 to 350 m^3 of DEWATS the cost is INR 130000/- every 2 years & for 350 to 500 m^3 of DEWATS the cost is INR 150000/-

Source: DEWATS Prefeasibility report by CDD for Ambajogai, City Sanitation Plan of Ambajogai , PAS Project – CEPT University

Contents

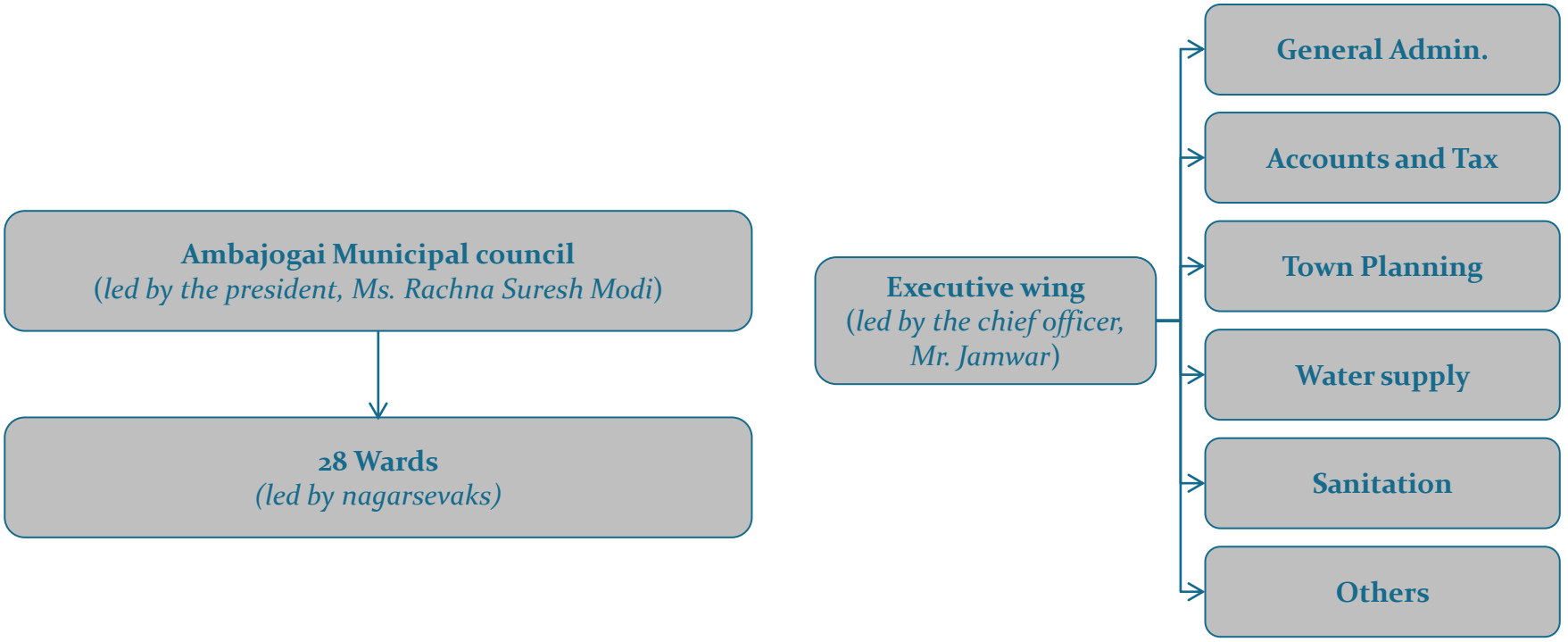
Ambajogai is governed by the elected municipal council which is aided in its day-to-day operations by the executive wing

Legislative wing

- **Consists of elected officials** called nagarsevaks, led by the Council President who is directly elected by the people
- **Nagarsevaks are organized into committees**, such as the standing committee and water and sanitation committee– with the authority to plan and approve proposals
- **Legislative and financial approvals** are discussed and passed in the general body meeting (GBM)

Executive wing

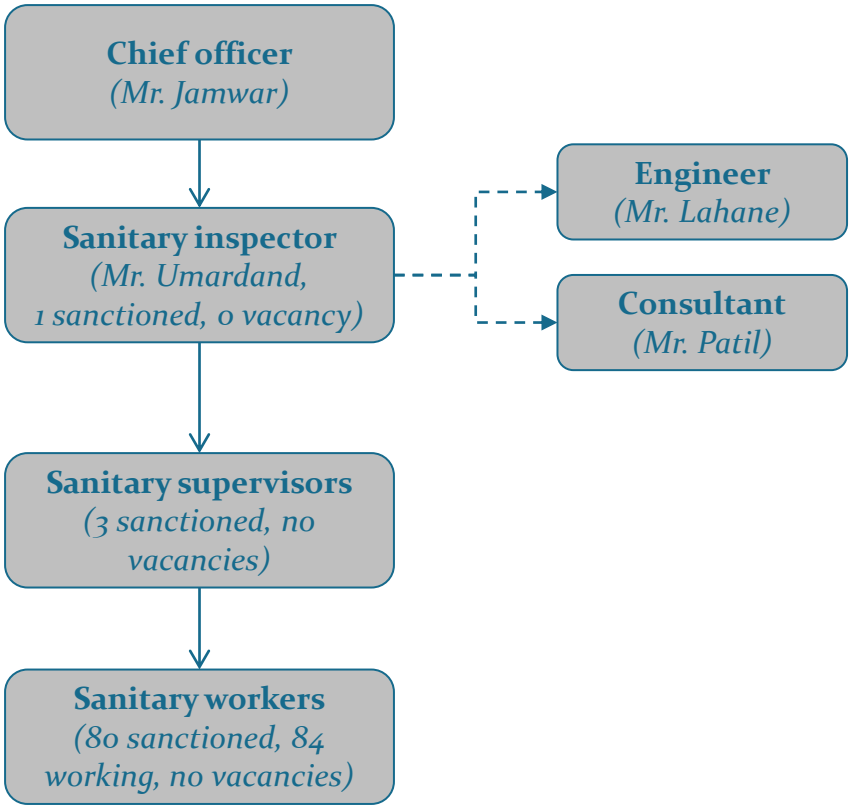
- **The executive wing** is the bureaucratic arm, led by Chief Officer (CO)
- The CO is supported by officers **heading various departments** of the executive wing
- Ambajogai has **7 Prabhags divided into 28 wards** for administrative purposes
- The executive wing is responsible for implementing **policies and schemes**



Source: City Sanitation Plan of Ambajogai , PAS Project – CEPT University , Interviews with Ambajogai city officials

The sanitation department is headed by the sanitary inspector, who supervises a staff of ~80

Structure of the sanitation department



Key issues

- **Shortage of staff:** Like other cities, Ambajogai faces a staff crunch due to inflexible government resolutions on the number of sanctioned staff
- **Lack of dedicated personnel:** Even though all sanitary worker positions are filled, in practice not all workers focus on sanitation work
- **Vacancies and Absences:** Only one of the sanitary inspector positions is filled, and officials report that daily absences are common. As in other cities, the state retains authority over hiring, and important senior positions remain vacant
- **Lack of formal monitoring:** There is no formal monitoring or reporting structure for staff
- **Lack of training:** There is no formal training, and learning is on-the-job hampering productivity

Source: Interviews with Ambajogai city officials

Ambajogai has entered into four management contracts with private players, only two of which are currently active

	Sector	Name of the contract	ULB responsibilities	Contractor responsibilities
Active contracts		• Management contract for cleaning small drains and transportation and disposal of collected waste • Awarded to a local non-profit	• Monthly payment to the contractor at fixed charges per tractor per trip	• Cleaning drains and transportation and disposal of waste • Provision of labor, tractors, trailers and cleaning materials
		• Management contract for pre-monsoon cleaning of large drains • Awarded to a local contractor	• One-time payment to the contractor at fixed charges per tractor/truck per unit time	• Cleaning of main drains before monsoons • Provision of labor, JCB, tractors, trailers and cleaning materials
Inactive contracts		• O&M of vermi- compost treatment plant • Awarded initially to an Ahmednagar based contractor, now up for re-bidding	• Fixed monthly payment to contractor for O&M	• Provision on labor for operating the mechanical separator • Sale of compost, 100% of the proceeds of which paid to the ULB
		• Contract for door-to-door waste collection • Awarded to two local self-help groups, now discontinued	• Fixed monthly payment	• Provision on labor, trucks (*ghantagadi*) and cleaning materials

Source: Artwork from the Noun project, City contract documents, Interviews with Ambajogai city officials

City officials acknowledge the utility of private sector engagements, but have faced certain challenges

All officials believed that the private sector provides a higher quality of service than ULB workers

"Nobody wants to work in the sanitation department anymore – they all want office jobs. Our staff kept requesting transfers and we found it extremely difficult to incentivize them. Hence we decided to privatize and are quite happy. We can place penalties on the private contractor and make sure that the work is done."
- Sanitary Inspector, Ambajogai

"Private sector engagement became necessary because of a severe staff crunch. The number of permanent staff we can hire is fixed by the state government. On top of that, our sanitary staff is constantly pulled into other work, and then there are a few each day who are absent."
- Engineer, Ambajogai

"I am not completely satisfied with our current private sector players, but they are performing better than the permanent ULB staff, who lack the incentives to work."
- President, Ambajogai

However, the ULB's inability to make monthly payments has thrown up difficulties in finding willing private partners

"The first vendor we hired for the operation of the vermin-compost plant quit because we were unable to make the monthly payments."
- Engineer, Ambajogai

"We had to discontinue the contract made to SHGs for door-to-door cleaning because of poor performance and payment issues."
- Sanitary Inspector, Ambajogai

"We had to release a tender three times for the vermi-composting plant. We need three minimum bids to move forward. We got no bids the first time, two bids the second time, and have finally received three bids this time."
- Sanitary Inspector, Ambajogai

Source: Interviews with Ambajogai city officials

The engagements are structured as simple annual management contracts which are renewed annually

Contract structure for existing engagements

Features	Cleaning of small drains and waste collection	Pre-monsoon drain cleaning	O&M of vermi-composting plant	Door-to-door waste collection
Contract length	Annual	Annual	Annual	Annual
Automatic Renewal	✗	✗	✗	✗
Tender type	Open bid	Open bid	Open bid	Open bid
Payment duration	Monthly	Monthly	Monthly	Monthly
Item rate or Lump sum/fixed fee[1]	Item rate	Item rate	Fixed fee	Fixed fee
Rate per unit	~ INR 650-750 per tractor trolley per trip	~750 per hour per JCB machine; ~INR 1,750 per day per tractor	~INR 93,000 per month	~INR 42,000 per month
Penalty clause for non-performance	✓	✓	✓	✓
Number of bids received last year	3-4	3	3	Unknown

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
- **Active contracts are item-rate, and payment is linked to inputs (man-days), instead of outputs or outcomes**
  - ✓ There are no performance incentives tied directly 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 parameters

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 Ambajogai city officials, City contract documents

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

Priority contract clauses for effective engagements

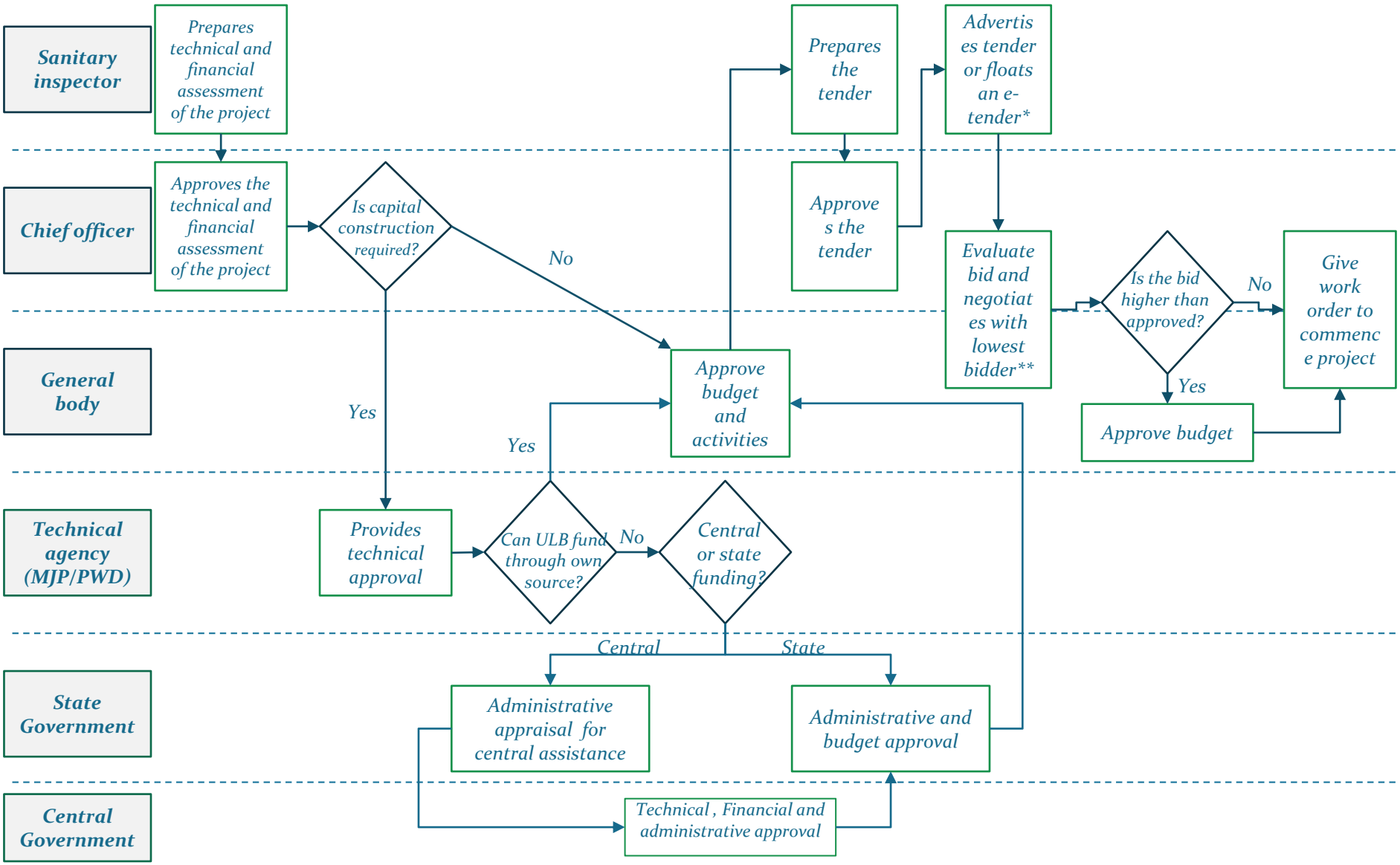
Features	Cleaning of small drains and waste collection	Pre-monsoon drain cleaning	O&M of vermi-composting plant	Door-to-door waste collection
User complaint redress	✗	✗	✗	✗
Dispute resolution mechanism	✗	✗	✗	✗
Mitigating payment risk	✗	✗	✗	✗
Mitigating Termination risk	✗	✗	✗	✗

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).
- **Contracts lack termination clauses.** There is no notice period for either the private player or the municipality.

Source: Interviews with Ambajogai city officials, City contract documents

The process for implementing private engagements involves multiple stakeholders



Note: Functions highlighted over the dotted line are done by both the stakeholders. *If tender value is over INR 1 Million, tenders need to be e-tenders

Source: Interviews with Ambajogai 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
- **Limited technical knowledge of proposed solutions:** The settled sewer and DEWATS plans are relatively new to the ULB

"We would like to get help with preparing a detailed project report (DPR) to capture the technical and financial details for the settled sewer and DEWATS plan. On our end we can help assess sources for funding."

- Ambajogai engineer

"We also need to assess how to structure the public private partnership for the sewerage and DEWATS plan. What are the profit expectations from the private player? What sanitation tax will we collect? What revenue can be expected from the sale of wastewater? These are all questions we have."

- Ambajogai engineer

Source: Interviews with Ambajogai city officials

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

Procurement process

Draft contract and place a request for proposals

- Chief office (CO) approves tender drafted by the Sanitary Inspector (SI)
- Bids are then solicited local newspaper[1]

Receive bids from private players

- Private players submit their bids including:
  - ✓ Business license and registration
  - ✓ Pan card
  - ✓ Pricing quote
  - ✓ Tax records
  - ✓ Previous work experience

Evaluate bids and sanction work order

- Received bids are evaluated by the General body and negotiated by the SI and CO
- Contractors meeting the minimum specified criteria and offering the lowest bid are issued a work order

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
- **Difficulty in finding bidders:** The vermi-compost contract was sent for three rounds of bidding before the minimum three contracts were received – indicating that the ULB was not meeting player expectations

"Other than cost, all the other criteria are satisfied by all the players. Hence generally we just select the lowest bidder. If the cost is too high then the ULB successfully negotiates to bring it down."

- Ambajogai engineer

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

Source: Interviews with Ambajogai city officials

Monitoring of contracts is not systematic and focused more in inputs rather than outputs or service levels

Cleaning of small drains and waste disposal

Pre-monsoon drain cleaning

ULB monitored

- The department has created a *prabhag* wise daily schedule for the private contractor
- Supervisor accompanies the contractor on his schedule
- Supervisor collects the signatures of each household where drain cleaning was done and submits them to the sanitary inspector on daily basis

- No systematic schedule for monitoring, supervisor checks the progress of the work on an ad-hoc basis over the duration of the work (~ 1 month)

Key Gaps

- **Monitoring forms do not measure key output metrics:** For drain cleaning, the only monitoring form lists user signature testifying that a truck arrived in their locality. It does not measure key output metrics such as level of satisfaction or quality with cleaning etc.
- **There are no systematic monitoring tools for other contracts:** the pre-monsoon drain cleaning and O&M of the vermi-compost plant are inspected on a ad-hoc basis, and the findings are not recorded
- **Limited resources to meet established monitoring standards:** The burden of supervision for all activities falls entirely on the 3 supervisors. As per ULB monitoring practices, user signatures are expected from each household in the service areas yet the forms we collected seem have only ~10 – 15 signatures, suggesting that supervisors were unable to meet monitoring standards

"We have an extensive monitoring system in which we take signatures from each household in the area where work is done."

- Sanitary Inspector

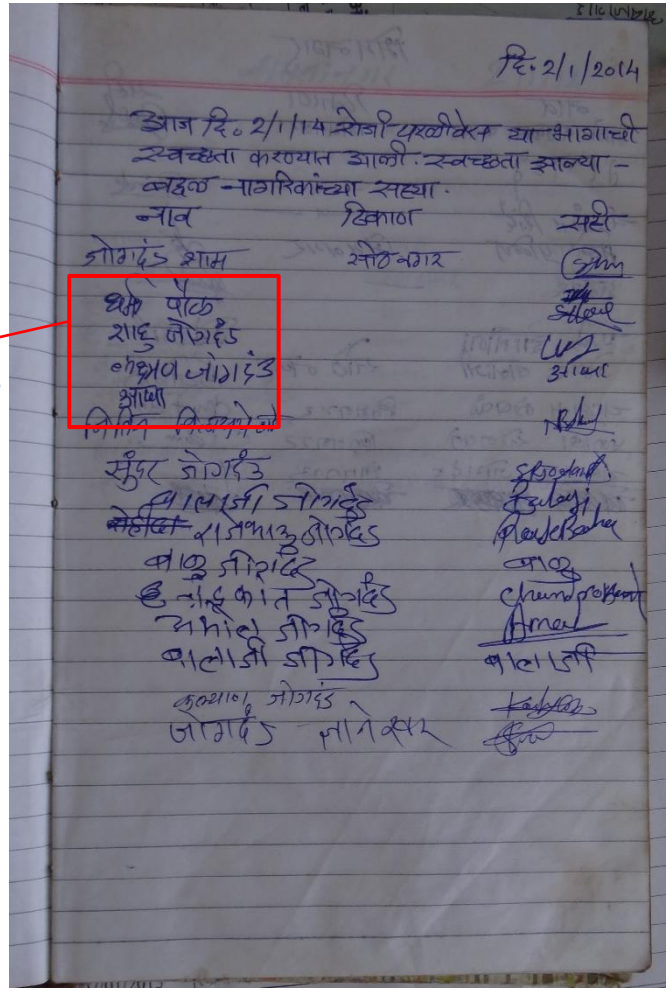
"The ULB can manage monitoring itself. It is one of our routine activities."

- Chief Officer

Source: Interviews with Ambajogai city officials

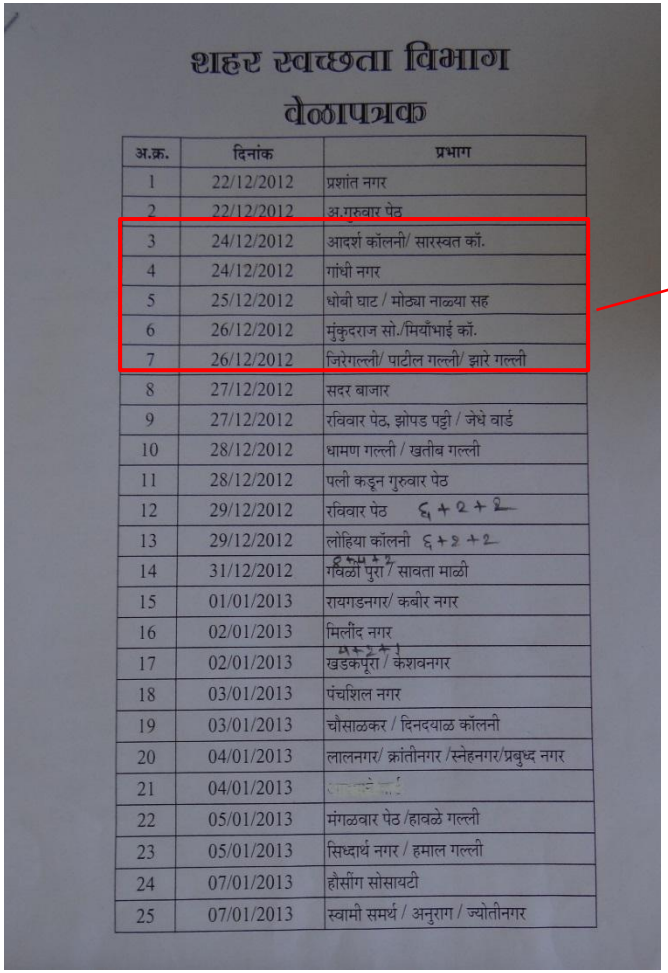
Current monitoring forms are rudimentary, and do not measure service levels or outcomes

Form for user signatures for monitoring drain cleaning



User signatures

Daily schedule for drain cleaning



शहर स्वच्छता विभाग

वेळापत्रक

अ.क्र.	दिनांक	प्रभाग
1	22/12/2012	प्रशांत नगर
2	22/12/2012	अ.गुरुवार पेठ
3	24/12/2012	आदर्श कॉलनी/ सारस्वत कॉ.
4	24/12/2012	गांधी नगर
5	25/12/2012	धोबी घाट / मोठ्या नाळ्या सह
6	26/12/2012	मुकुंदराज सो./मियाँभाई कॉ.
7	26/12/2012	जिरेगल्ली/ पाटील गल्ली/ झारे गल्ली
8	27/12/2012	सदर बाजार
9	27/12/2012	रविवार पेठ, झोपड पट्टी / जेधे वाडं
10	28/12/2012	धामण गल्ली / खतीब गल्ली
11	28/12/2012	पली कडून गुरुवार पेठ
12	29/12/2012	रविवार पेठ
13	29/12/2012	लोहिया कॉलनी
14	31/12/2012	गवळी पुरा / सावता माळी
15	01/01/2013	रायगडनगर/ कबीर नगर
16	02/01/2013	मिलींद नगर
17	02/01/2013	खडकपूरा / केशवनगर
18	03/01/2013	पंचशिल नगर
19	03/01/2013	चौसाळकर / दिनदयाळ कॉलनी
20	04/01/2013	लालनगर/ क्रांतीनगर /स्नेहनगर/प्रबुध्द नगर
21	04/01/2013	
22	05/01/2013	मंगळवार पेठ /हावळे गल्ली
23	05/01/2013	सिध्दार्थ नगर / हमाल गल्ली
24	07/01/2013	हौसींग सोसायटी
25	07/01/2013	स्वामी समर्थ / अनुराग / ज्योतीनगर

Date and area to be cleaned

Source: Interviews with Ambajogai city officials, City documents

The ULB needs support in undertaking assessments, developing contracts and monitoring mechanisms

	Technical and Financial assessment	Contract development	Procurement process	Monitoring
Current status and key gaps	• Undertaken by sanitary inspector and ULB staff	• Annual management contracts prepared by the ULB with a monthly payment based on billed inputs	• Lowest bid meeting minimum criteria is chosen	• Self reported forms and form filled by ULB supervisors is tallied daily • Monitoring forms focus on inputs
Capacity building needed	• Prepare technical and financial assessments for proposed solutions	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	• Strengthen current framework for bid evaluation to include metrics for quality and level of service delivery	Draft a systematic monitoring framework that ✓ Clearly measures outputs or outcomes ✓ Is clearly tied to payment incentives ✓ Can be effectively implemented by ULB staff
Need for capacity building				

Source: Interviews with Ambajogai city officials, City documents

Contents

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 (RE)	2012 (BE)
Revenue account							
Revenue Receipts	55.2	66.8	69.1	69.5	84	104.1	130.5
Revenue Expenditure	42.1	51.3	51.5	55.4	67.4	111.7	159.8
Capital account							
Capital Receipts	54.4	50.1	38	30.3	64.3	150.7	201
Capital Expenditure	56.6	52.2	63.7	35.7	95.2	148.8	214.1
Extraordinary account							
Extraordinary Receipts	2.4	5.4	2.9	4.6	15.6	6.3	6.7
Extraordinary Expenditure	2.6	5.7	5.1	4	6.2	9.5	12.7
Summary							
Total Receipts	112	122.2	109.9	104.3	163.9	261.1	338.2
Total Expenditure	101.4	109.2	120.4	95.1	168.8	270	386.6
Closing Balance	33.7	46.8	36.3	45.6	40.6	31.8	-3.7
Operating ratio[1]	0.76	0.77	0.75	0.80	0.80	1.07	1.22
Revenue account surplus (INR in million)	13.1	15.6	17.6	14.1	16.6	-7.5	-29.3

Revenue Accounts

- Revenue receipts and expenditures are those related to **day-to-day operations** of the ULB
- Traditionally **Ambajogai has maintained a revenue deficit,** 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**

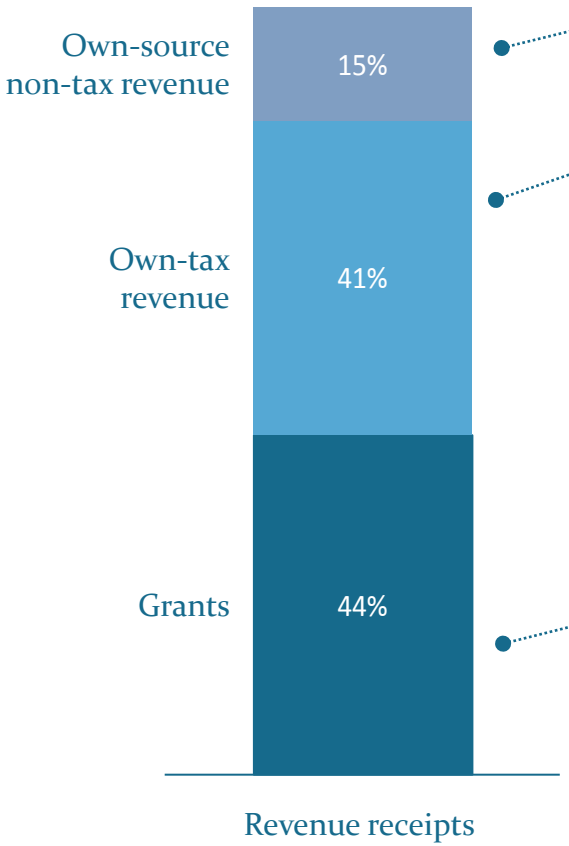
Note: (1) Ratio of revenue expenditures to revenue receipts, core measure of financial health for a ULB

Source: Financing plan for Ambajogai, CEPT University

Ambajogai ULB is dependent on grants to fund its operational expenditures, however own-tax revenues form a considerable proportion

Ambajogai ULB Revenue receipts

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



- Non-tax revenues like **rent from properties, service charges, licence fees** etc. make up a small portion of revenue receipts

- Average municipal tax revenue accounted for ~**40% of revenue receipts,** and averaged to about ~INR 510 per capita in 2010-11[1]
- The two main sources of tax revenues are:
  - *Property tax* (INR ~ 449 per property per year in 2010-11[2], INR 11.4 million on an average over 2007-2011, 36%% of total tax revenue)
  - *Water tax* (INR ~ 1500 per connection per year in 2010-11[3], INR ~20 million on an average over 2007-2011, ~60% of total tax revenue)
- High proportion of revenue from taxes is due to the **high collection efficiency** (82% of property tax and 88% of water tax in 2009-10)

- Revenue grants amount to INR ~ 35 million per year on an average from 2007-2011 **constituting 44% of total revenue receipts**
- **On average (2007-11) ~INR 3.4 million in grants** was dedicated to solid waste, part of the **12th finance commission grants**

Note: (1) Total 2011 tax revenues divided by 2011 population, (2) Total consolidated tax revenue divided by number of properties, (3) Total water tax revenue divided by number of connections

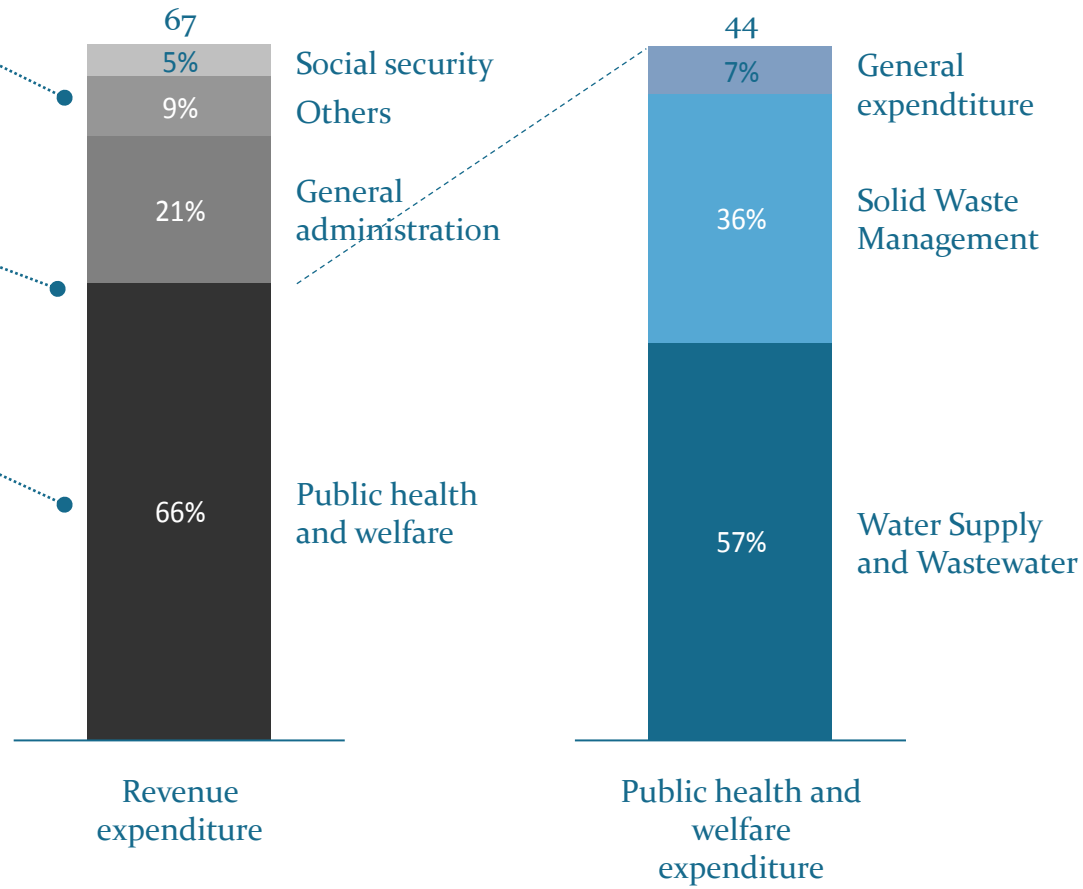
Source: City budget documents, CEPT University analysis

Water supply and wastewater constitute more than ~1/3rd of total revenue expenditure

- "Others" includes expenditure on **education, contributions as well as other miscellaneous expenses of the ULB**
- Expenditure on general administration includes salaries of **ULB employees, Pensions and gratuities**
- Expenditure on **water supply and wastewater is ~66% of total expenditure on public health and welfare**
- Per capita expenses towards on WSS was **INR ~ 574, against INR ~926 suggested by the HPEC in 2011**

Ambajogai ULB Revenue expenditure

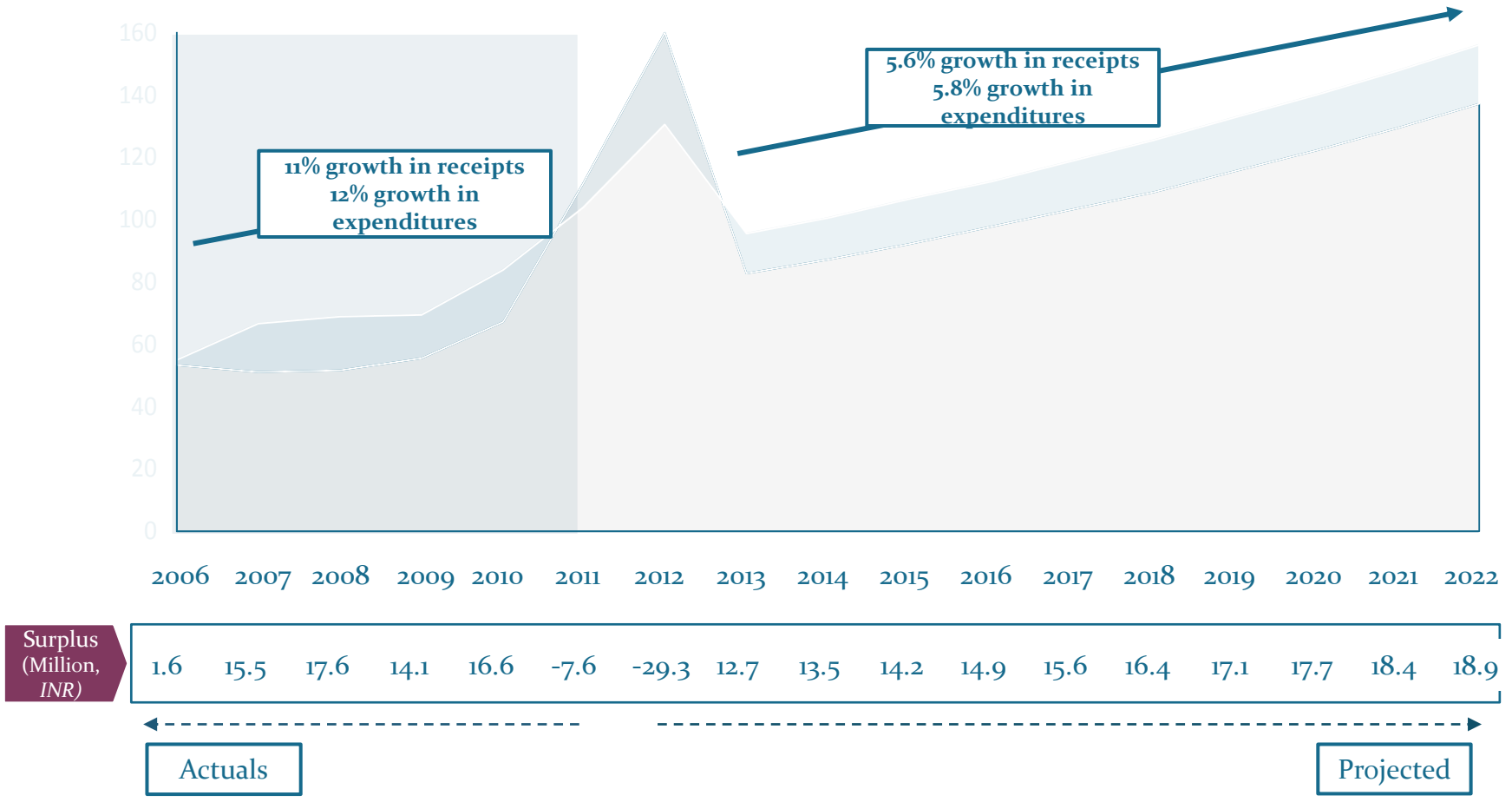
(As a % of average receipts between 2007-2011, INR in million)



Source: City budget documents, CEPT University analysis

Ambajogai is expected to have an average surplus of INR ~10-15 million per year for investment going forward

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



Note: The projected revenue and expenditure is based on an estimated average growth rate

Source: City budget documents, CEPT University analysis

Appendix

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	808
	Cost	525,370

Total Cost = INR 525,370

+

HH survey and septic tank assessment

1	Cost of 1 HH survey	50
	# of HH surveyed	2694
	Cost	134,710
2	Cost of 1 HH survey	100
	# of HH surveyed	2694
	Cost	269,420

Total Cost = INR 404,130

1	Number of tanks to be cleaned per year	898
	Number of trips per day, for ~300 days	3
	Number of honey sucker required	1
	Cost of truck	**780,000**
2	Number of safety gear required	3
	Unit cost	5,000
	Cost	**15,000**
3	Number of uniform required	3
	Unit cost	5,000
	Cost	**15,000**

Total Cost = INR 810,000

1	Amount of septage treated per day (cu. m.)	10.5
	Total septage (15 days) (cu. m.)	**157.9**
	Area of one SDB (sq. m.)	120
	Depth of septage (m)	0.3
	Capacity per bed (cu. m.)	**36**
	Number of beds req.	**4**
	Cost per bed	**200,000**
	Cost	**800,000**

Total Cost = INR 800,000

INR ~2.5 Million

Note: All costs in INR

Source: CEPT University analysis for Septage Management plan of Ambajogai

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

Conveyance of fecal sludge + **Treatment of collected septage** = **Annual total cost**

1	Cost of diesel (INR/L)	60
	Fuel efficiency (KM/L)	10
	Total distance travelled in a year (Km)	9,429
	Cost	**56,574**
2	Legal costs	50,000
	Registration and Misc. cost	20,000
	Total business establishment cost	**70,000**
3	Number of staff (driver and operator)	3
	Monthly salary	12,000
	Total salary	**432,000**
4	**Medical expenses/insurance**	**24,000**
5	**Telephone bill (INR 3,000 per month)**	**36,000**
6	**Electricity and water bill**	**180,000**
7	**Travel**	**10,000**
8.	**Training**	**25,000**
9	Vehicle maintenance cost	32,400
	Vehicle insurance cost	12,000
	Misc. cost	24,000
	Cost	**68,400**
Annual Total Cost = INR 901,974		

1	Number of staff	3
	Monthly salary	7,000
	Cost	**252,000**
2	**Maintenance cost (5% of capital cost)**	**43,856**
Total Cost = INR 295,856		

INR ~1.2 Million

Note: All costs in INR; Source: CEPT University analysis for Septage Management plan of Ambajogai

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	Ambajogai (No. of HH)
1	Tap water from treated source	13,153
2	Tap water from untreated Sources	238
3	Covered and uncovered well	104
4	Tubewell/Borehole	543
5	Handpump	177
6	Others	302
Total		**14517**

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	Ambajogai (No. of HH)
1	Within the premises	10,611
2	Near the premises	1,856
3	Away	686
Total		**13153**

Source: Census of India 2011

Thank You