CITY SANITATION PLAN

for WAI *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 II: Wai

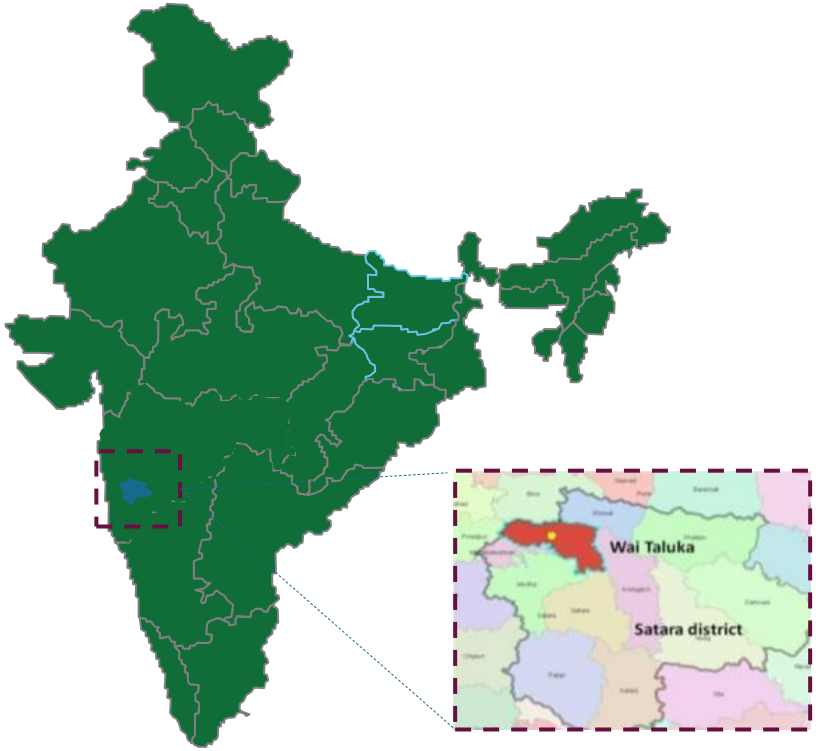
30th May 2014

CEPT University

Contents

Wai is a Class C town of 36,000 people located in the Satara district of Maharashtra

Location

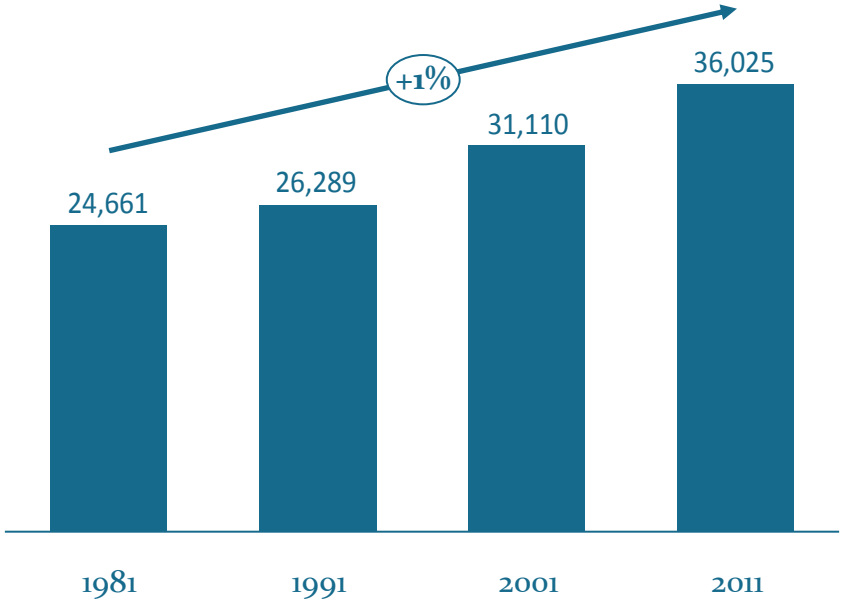


- **Class 'C' Nagar Parishad** located 95 Km south of the city of Pune in Maharashtra
- **Spread over 3.6 sq. km.,** with a population density of **9,924 inhabitants / sq. km.**
- Known as **Dakshin Kashi,** it is a **holy pilgrimage town and an old Buddhist settlement**

Demographics

Population of Wai Municipal Council

(Census data)

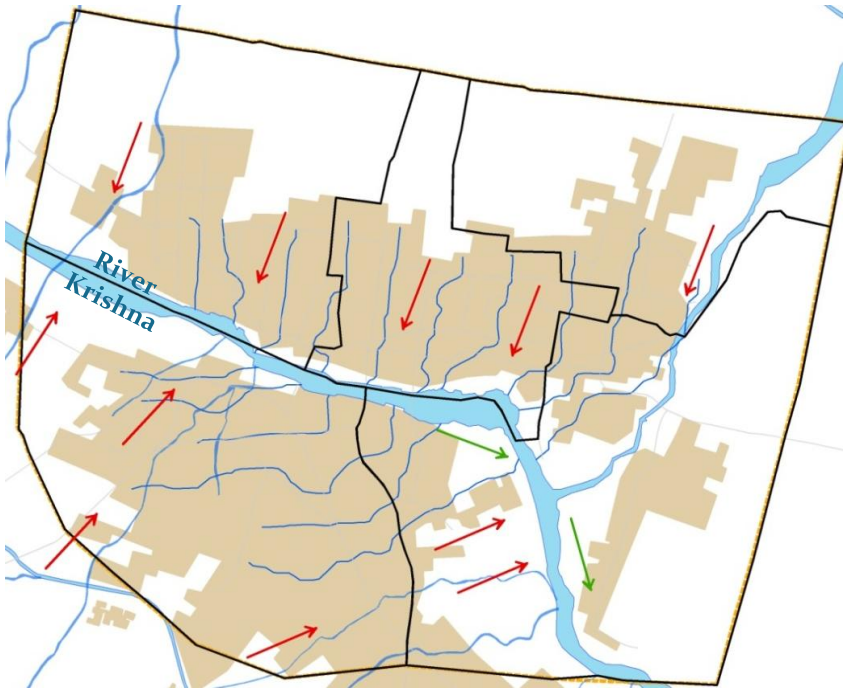


- Has ~**7,500 households** with an average household size of 4.4 persons
- Population growth has been slow (~1% between 1981 and 2011)
- **6%** of the total population lives in **slum areas**
- Literacy rate is high at ~80%

Source: Maharashtra district profiles by MIDC (Link), Census information, 1981-2011 (link), City Sanitation Plan of Wai , PAS Project – CEPT University

The town slopes towards the river Krishna which runs through its center

Map of Wai municipal Council



Direction of flow

Water bodies

Terrain and Topology

- **River Krishna flows through the middle of the city**, dividing it into two halves
- Due to heavy rainfall and release of water from Dhom Dam, the **river experiences frequent flooding**
- The **terrain converges uniformly towards the river,** which complements the natural drainage system of the town
- The city experiences **considerable variations in altitude**, ranging between 677 and 1,092 meters above sea level
- The **older settlements in the town are to the north** of the river, and are characterized by densely packed dwelling units
- The **new development has predominantly happened on the south**

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

Wai is divided into 5 Prabhags and has two large slums areas

Administrative Map of Wai

Relatively underdeveloped area compared to other parts **Population: 7,805**

Prabhag 3

Includes main market area and temple precinct, with densely populated residential area
Population: 6,607

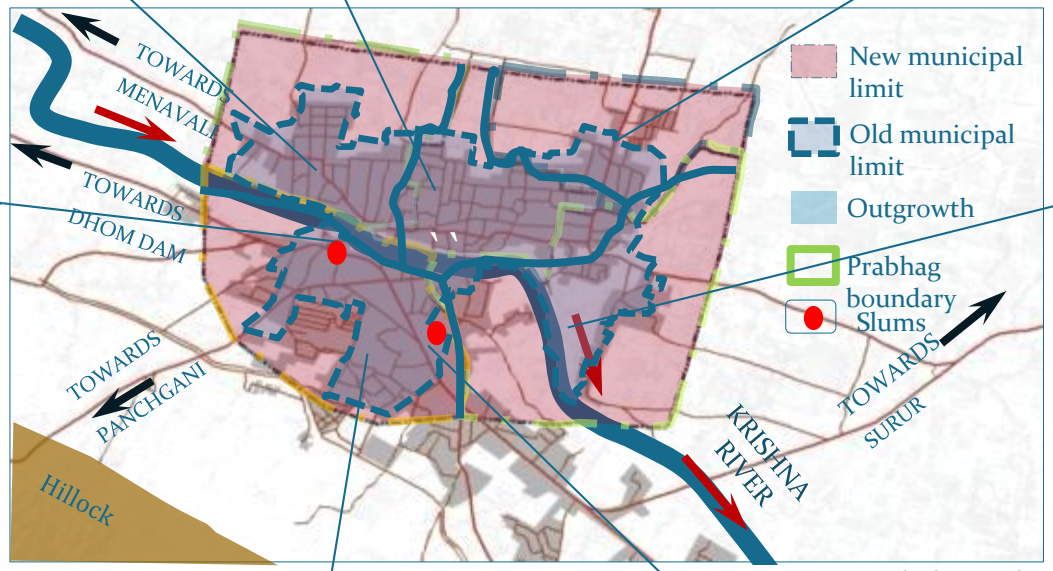
Prabhag 1

Densely populated area, with households facing significant space constraints
Population: 6,916

Prabhag 2

Gurebazar slum

30 year old slum in Wai, also the largest
Population: 1,328



Prabhag 5

Lower density due to topographical constraints and lack of space
Population: 6,702

Prabhag 4

Newly developing area, consisting of reconstructed dwelling units and government buildings
Population: 8,023

Kashikapadi slum

50 year old densely populated slum
Population: 812

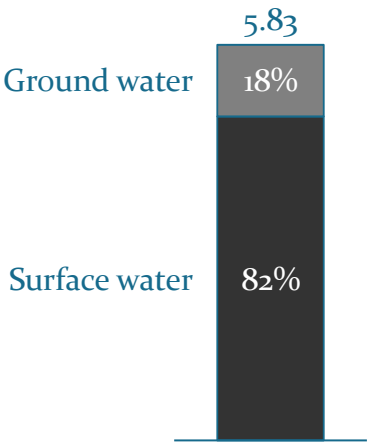
Source: City Sanitation Plan of Wai , PAS Project – CEPT University, Dalberg Analysis

Contents

Wai has an adequate per capita availability of water but ~25% of households do not have a water supply connection

Source of water supply

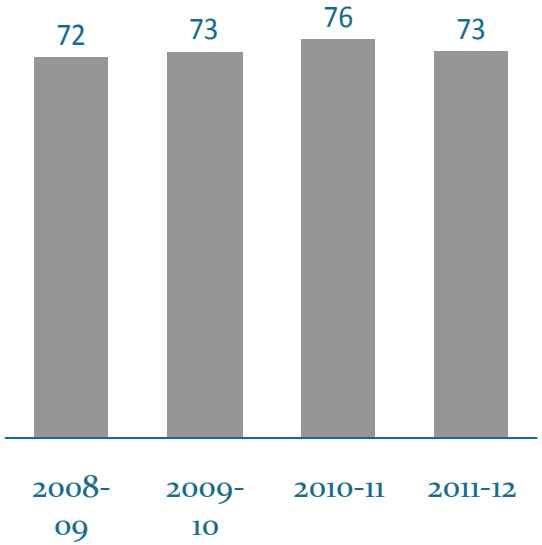
(in MLD)



- Surface water is treated at a **water treatment plant of 4.8 MLD** capacity
- The main source of ground water are the **7 private wells** and **1 bore well**
- There is a **ground storage reservoir of 20,000 Liter** capacity

Coverage of water supply connections

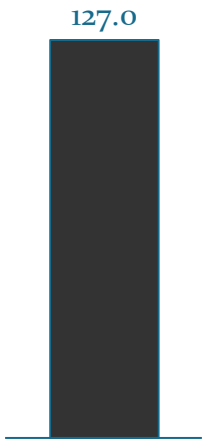
(in % of total households)



- **The percentage of households provided water supply connections has come down** from 75.7% in 2010-11 to 73.3 % in 2011-12

Per capita availability of water in Wai

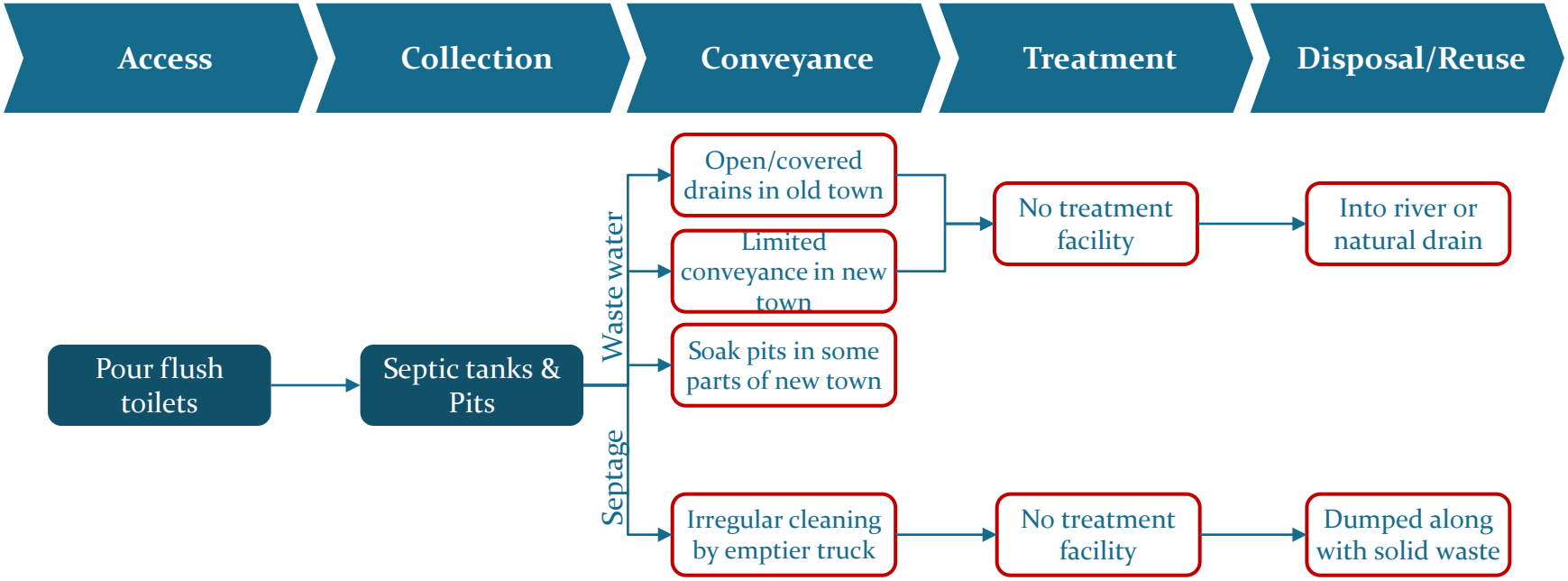
(in LPCD)



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

Source: City Sanitation Plan of Wai , PAS Project – CEPT University , Code of basic requirements of water supply by Bureau of Indian Standards (link)

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



Pour flush toilets

Septic tanks

Open/closed drains

No treatment

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

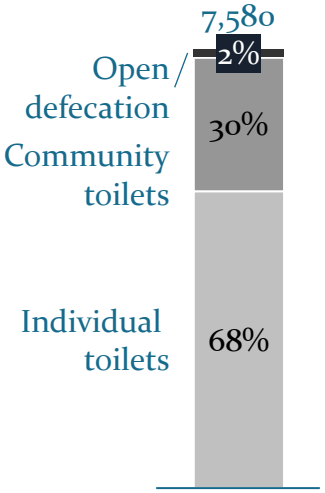
River Krishna

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

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

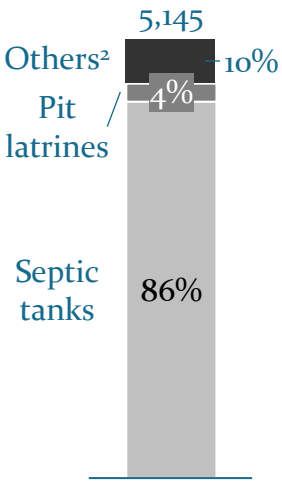
Access → Collection → Conveyance → Treatment → Disposal/Reuse

Access to type of sanitation
(Number of HH)



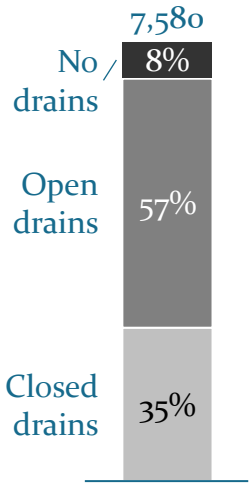
- ~ 135 HH practice OD in Wai
- ~2,300 HH are dependent on community toilets
- 29% of non-slum HHs are also dependent on community toilets

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



- ~500 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)



- ~600 HH have no drains for conveyance of wastewater
- Only ~2% of septic tanks are cleaned per year

Treatment of wastewater
(in MLD)

- ~3.9 MLD of waste water is untreated
- No treatment facility for fecal sludge

Disposal of waste
(in MLD)

- ~3.9 MLD of wastewater is dumped into river Krishna
- Fecal waste is dumped into the open

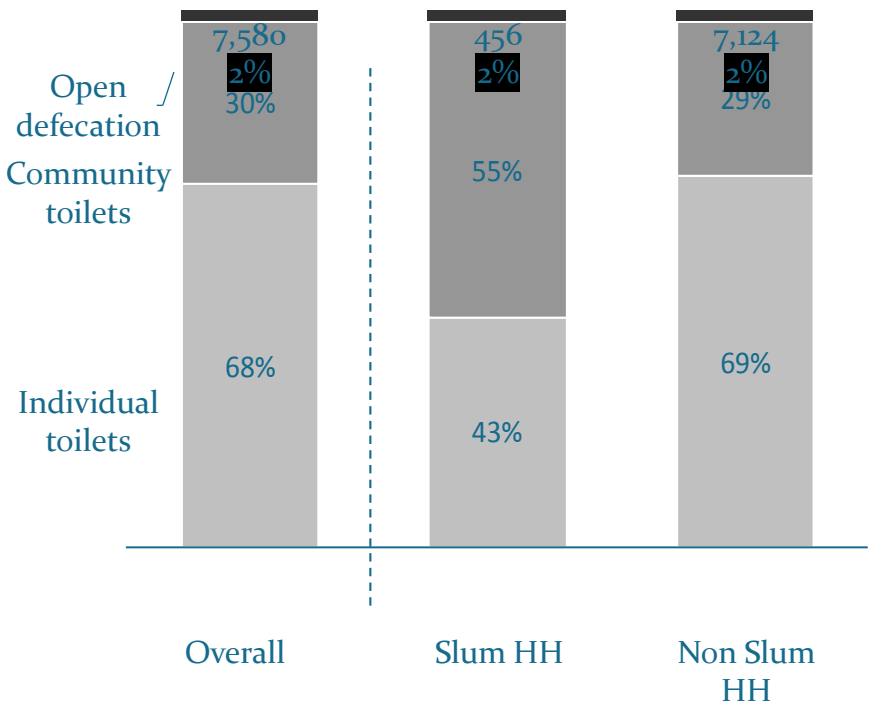
Note: (1) Collection only for HH with individual toilets, (2) Includes low quality sewerage network and primitive methods such as latrines serviced by animals

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

Access: Only 68% of households in Wai have access to individual toilets

Access to types of sanitation facility in Wai

(Number of HH)



- **135 households** practice **open defecation** in Wai
- **5,145 households** have access to **individual toilets**
- **2,300 households** are dependent on **community toilets, ~250 of them in slum areas**

Current status of access to toilets in Wai

Prabhag	Toilet dependence
Prabhag 1	• Majority of HH have individual toilets • Low dependence on community toilets
Prabhag 2	• Only 10% HH have individual toilets • High dependence on community toilets
Prabhag 3	• Southern part of prabhag has new constructions with individual toilets • Northern part depends on community toilets due to space and legal constraints
Prabhag 4	• South side of main road has individual toilets • Northern side depends on community toilets due to space constraints
Prabhag 5	• Lack of individual toilet facilities with majority of HH dependent on community toilets

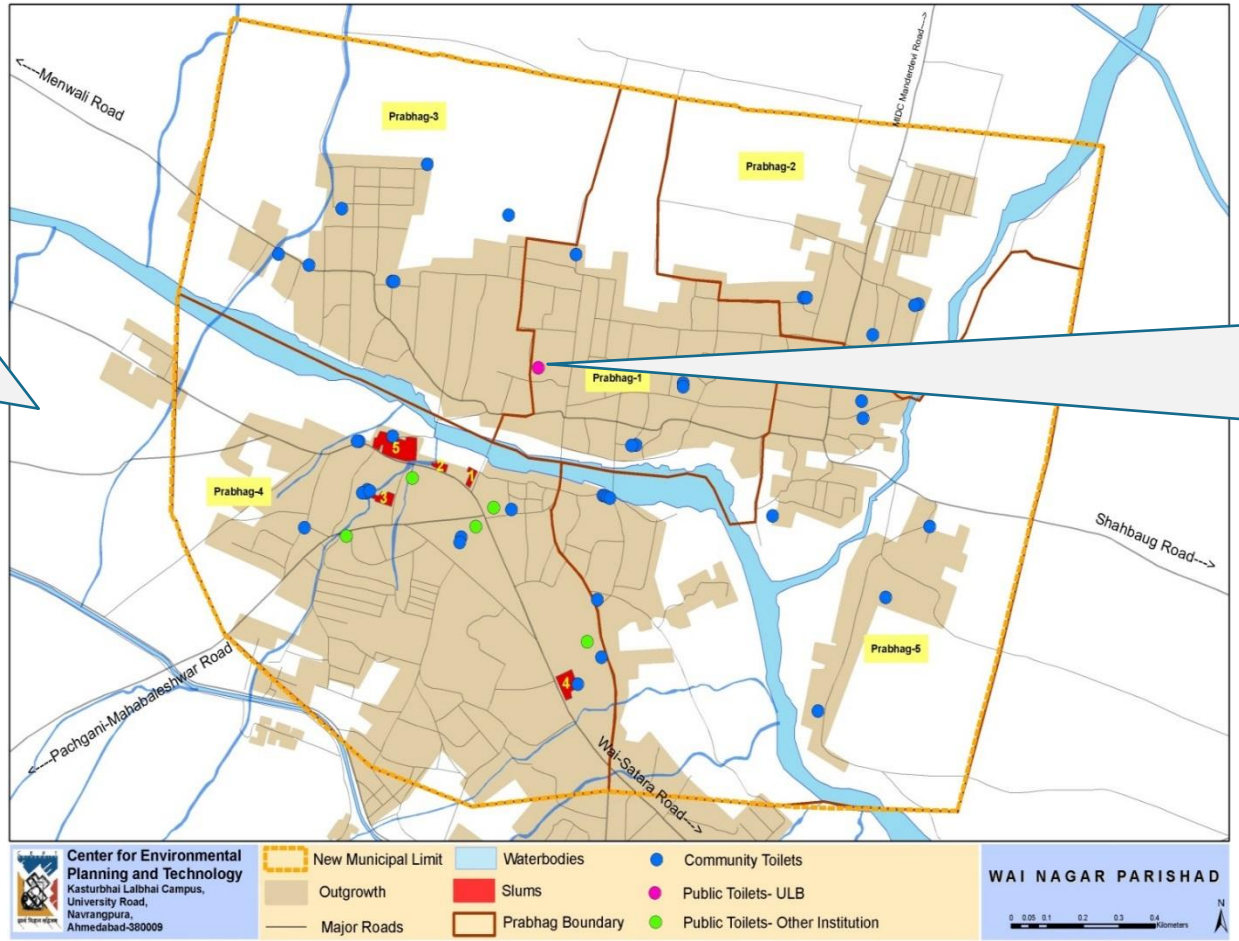
- **Lack of availability of finance, space constraints and legal clearances** are cited as the main barriers to adoption of individual toilets
- As a result, even non-slum households rely on **community toilets**

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

Access: ~30% of the households rely on the 45 community toilet blocks

Location of community toilets and public toilet in Wai

Three of the old community toilet blocks are being demolished



The ULB is responsible for the operation and maintenance of only one public toilet

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

Access: Community toilets are spatially distributed throughout the city but there are only few public toilets

Community toilets

New CTs

Old CTs

- There are **45 community toilet (CT) blocks (out of which 3 have been demolished, 30 are old CTs & 12 are new CT blocks)** with 35 persons per seat
- **A large proportion of community toilets are located in non-slum areas**, where households face space constraints due to densely packed dwelling units
- An audit in 2013 found that older CT blocks do require some amount of refurbishment and 264/283 CT seats are functional All Community toilet facilities are free to use and maintained by private contractors

Public toilets

- There are **6 public toilets currently however only one PT in market area is under ULB purview**
- The toilet, operated by a private player on a pay-per-use model, is functional 24x7 and is in **good condition**
- There is a **need for four more public toilets** in the market area, bus stand, Forest Dept./Tehsil/PWD office and temple precincts

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

Access: Old community toilet blocks lack basic amenities however newly constructed toilet blocks are adequately equipped

Old community toilet blocks

Have 4-5 seats, built side by side with no electricity supply

Lack water supply within the toilet and water is supplied outside the toilet

Septic tanks are located behind the toilet block, making access difficult

New community toilet blocks

Have modern design with electricity supply inside and outside the block

Toilets are provided with wash basins inside the block

3 chambered septic tanks of sufficient size with access covers

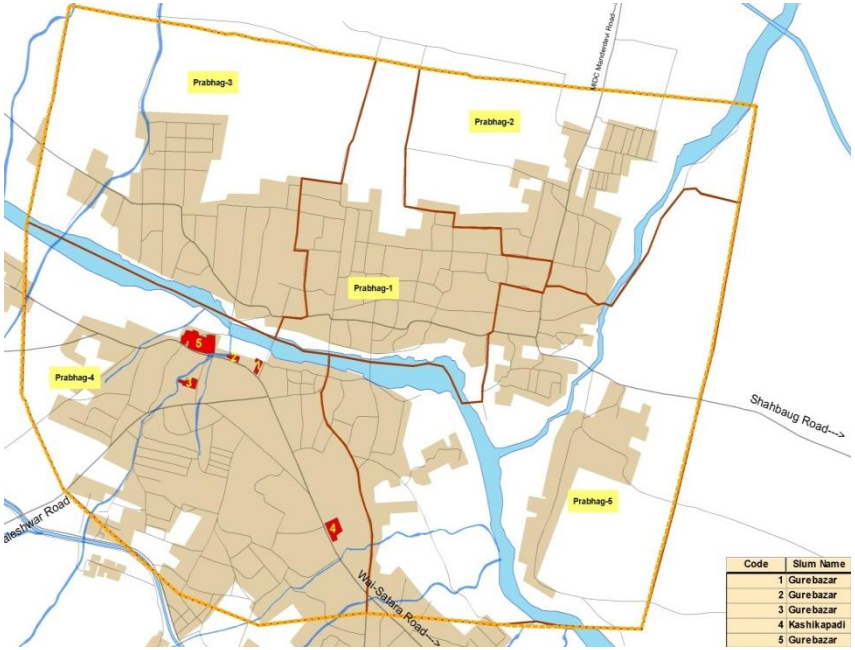
Source: City Sanitation Plan of Wai , PAS Project – CEPT University

Access: Under the IHSDP scheme launched by the Government of India, 342 slum households in Wai will get housing facilities

Program details

- The **Integrated Housing & Slum Development Programme (IHSDP)** was launched in 2005 with a view to improve the conditions of the urban slum dwellers
- The IHSDP program is being implemented by the **Ministry of Housing & Urban Poverty Alleviation (MoHUPA)**
- Under the IHSDP scheme in Wai, the government of India has constructed **housing facilities for 342 slum households**
- The houses come with **attached individual toilets and water supply connections**, thus providing improved access to toilets to all slum households
- **The construction of the establishments is complete**, and all slum dwellers will be provided permanent houses in 2014

Location of the slums



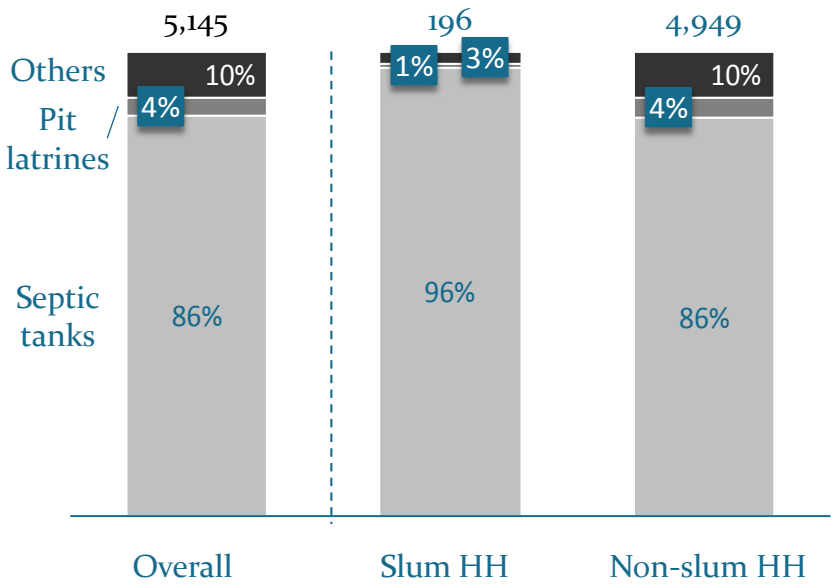
Slums

Source: City Sanitation Plan of Wai , PAS Project – CEPT University, Ministry of Housing & Urban Poverty Alleviation

Collection of septage: 86% of individual toilets depend on septic tanks which are largely oversized

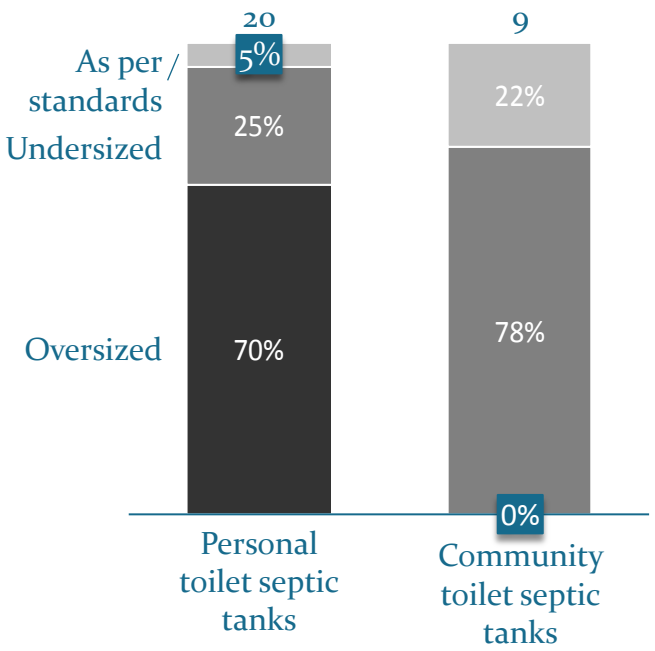
Method of collection of waste for all households

(in HH)



Sample assessment of size of septic tanks

(Numbers)



- Most personal toilets are **connected to septic tanks for collection**
- Septic tanks usually have **2-3 chambers and are placed under the toilets,** making access difficult
- For **old community toilets**, the septic tanks are located behind the toilets and impede access. This has been corrected in new toilets

- A sample survey found that septic tanks connected to individual toilets are **largely oversized** and do not meet the standards prescribed in IS codes and CPHEEO[1] manual
- As a result, they are **infrequently cleaned**
- Septic tanks connected to **community toilets are largely undersized** and get filled frequently due to flushing of water into the tanks

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

Source: Census of India 2011 , City Sanitation Plan of Wai , PAS Project – CEPT University, Dalberg Analysis

Collection of septage: Household septic tanks are constructed underneath the toilet making access difficult for regular cleaning and emptying

Household septic tanks

Septic tanks are below the toilets and don't have access

Inaccessible septic tanks with sealed tops

Septic tanks located near drains

Community toilet septic tanks

In old community toilets, septic tanks are behind the block making them difficult to access

In new community toilet, septic tanks are on the side of the toilet block

3 chambered septic tanks of sufficient size with access covers

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

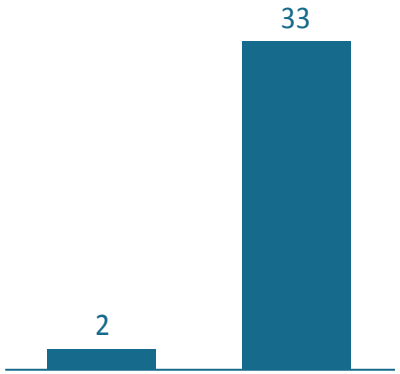
Conveyance of septage: Only 2% of the septic tanks that are connected to personal toilets are cleaned annually

Existing septage conveyance mechanism in Wai

- Wai has **1 suction emptier truck** of 5kL capacity for the cleaning of all septic tanks in the town
- The truck is **owned and operated the ULB** which charges **INR 1,000 /trip for cleaning one septic tank**
- The truck is also responsible for cleaning **septic tanks connected to community and public toilets**, which are **cleaned once a week**
- There is **no regulated schedule for cleaning tanks**, and households call the ULB when the septic tanks are filled up

Number of septic tanks cleaned annually by the Wai ULB

(As a % of total septic tanks)



	At present	CPHEEO standard
Cleaning frequency →	**>8-10 yrs.**	**3 yrs.**

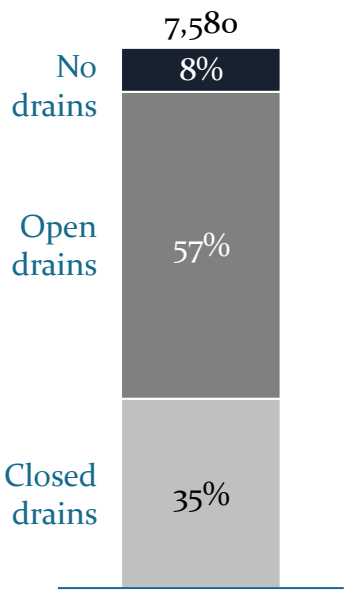
- Only **2% of tanks are cleaned annually, far below the service standards of 33%** recommended by the CPHEEO manual[1] and the MoUD Advisory on Septage Management
- Due to **infrequent cleaning, septage begins to solidify** in tanks
- As the septic tank fills up, **fecal matter along with effluents 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 matters related to urban water supply and sanitation

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

Wastewater collection and conveyance: ~92% of households rely on 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 Wai with conveyance mechanisms

Area with no network of conveyance system

Area with network of open and covered drain channels along roads

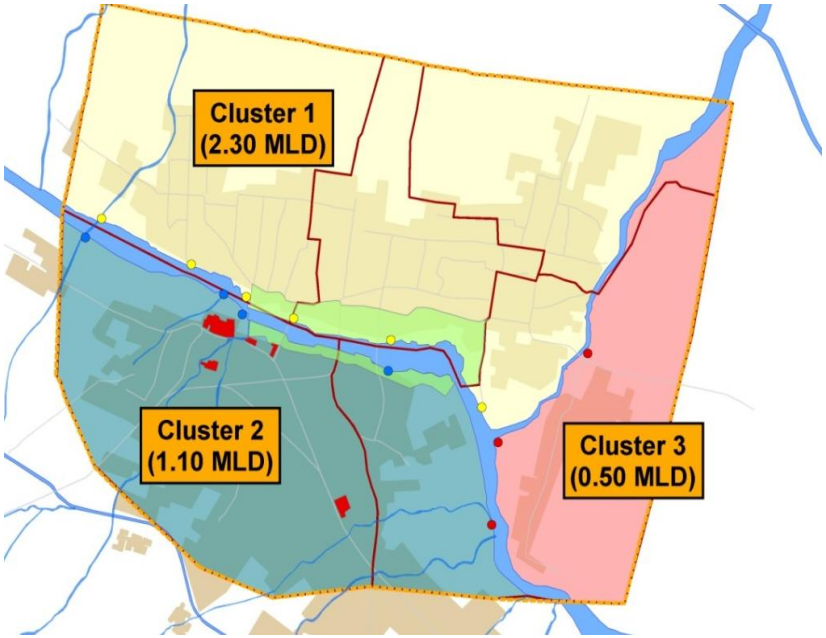
- **~3,100 people or ~600 households** in Wai have no drainage system for the conveyance of wastewater
- There is **no appropriate mechanism for conveyance of grey and black water** and all wastewater is disposed into drain channels flowing along the streets

- Wai **has a good system of drainage** through well-connected drains running parallel to the road
- However, in areas near the river, **solid waste** blocking the drains
- **Some new areas lack drainage** and wastewater is discharged into soak pits

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

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

Quantity of Wastewater generation in Wai by clusters



Points of disposal into river Krishna

Cluster	Wastewater generated (MLD)
1	2.3
2	1.1
3	0.5

There is no treatment facility for septage or wastewater

Wastewater treatment

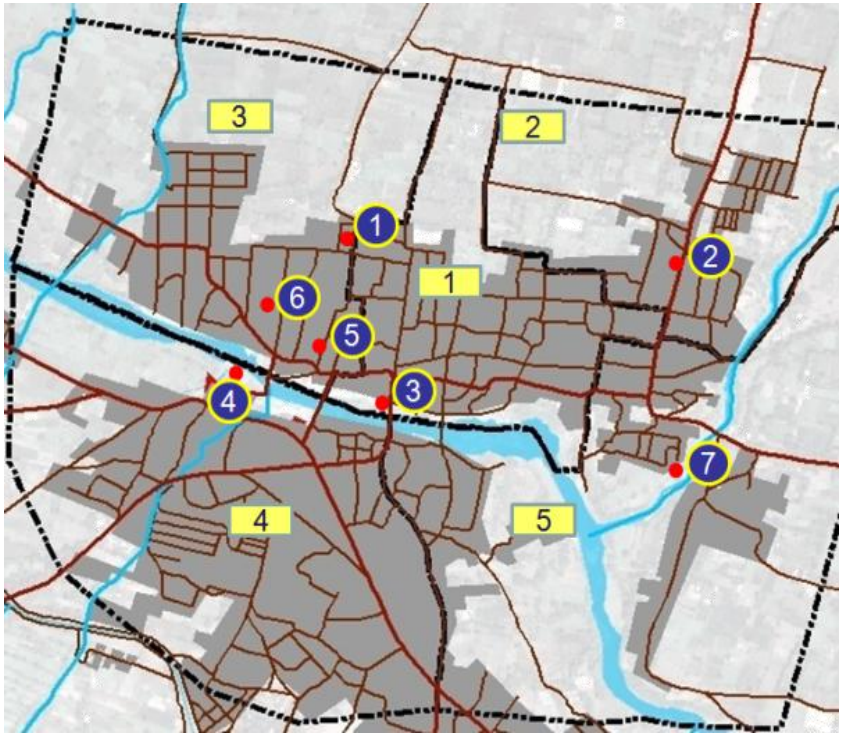
- **~3.9 MLD of wastewater is generated in Wai and goes untreated** due to lack of any centralized or decentralized treatment facility
- The town slopes towards the river Krishna, and due to lack of soak-pits and treatment facilities **all the wastewater drains into the river**
- Based on a **sampling of wastewater done** in Wai, the level of BOD in wastewater was found to be **higher** than the CPCB standards in **5 out of the 7 locations** sampled

Crude disposal of wastewater

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

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

Location of sample collection for wastewater testing



Location of sample collection

Prabhag number

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

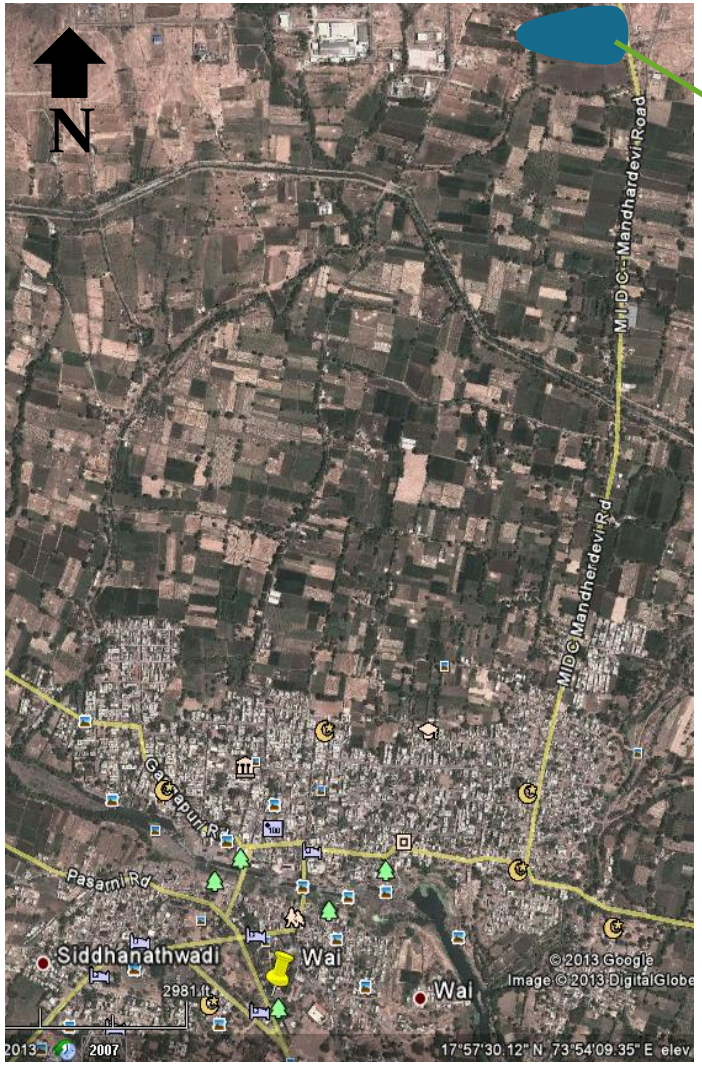
Test results

- **Samples of wastewater from 7 locations** in Wai 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** was higher than the prescribed limits of the CPCB at **5/7 locations**
- The **COD levels** were higher than the limit at **2/7 locations**

Location		BOD (Mg/l)	COD (Mg/l)	TSS (Mg/l)	pH count
1	Ganpati Ali (river)	96	150	92	7.5
2	Kalwaat Ali	147	230	119	7.6
3	Behind police station (old bridge)	201	380	332	6
4	Siddhanthwadi (Nala)	36	59	51.6	7.4
5	Ganpati temple (river Krishna)	9.3	28	17.6	7.3
6	Vishwakosh Ghat (river)	4.2	13	7.8	7.5
7	Ravivar peth (open drain)	153	260	201	5.7
	Permissible Limits	30	250	600	6.5-8.5

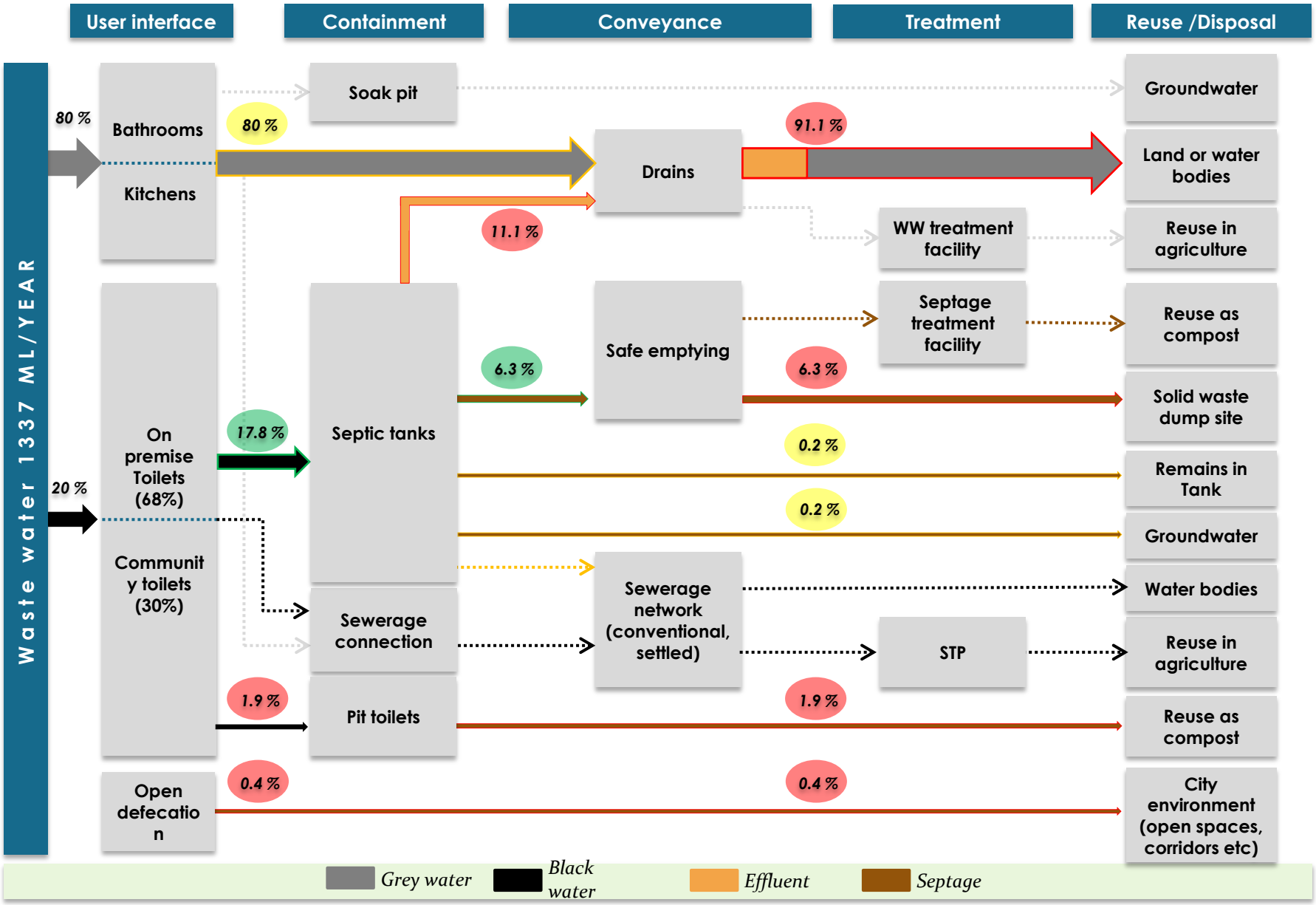
Septage treatment and disposal: Septage is disposed off at the solid waste dump site without treatment

Location of the dumping ground



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

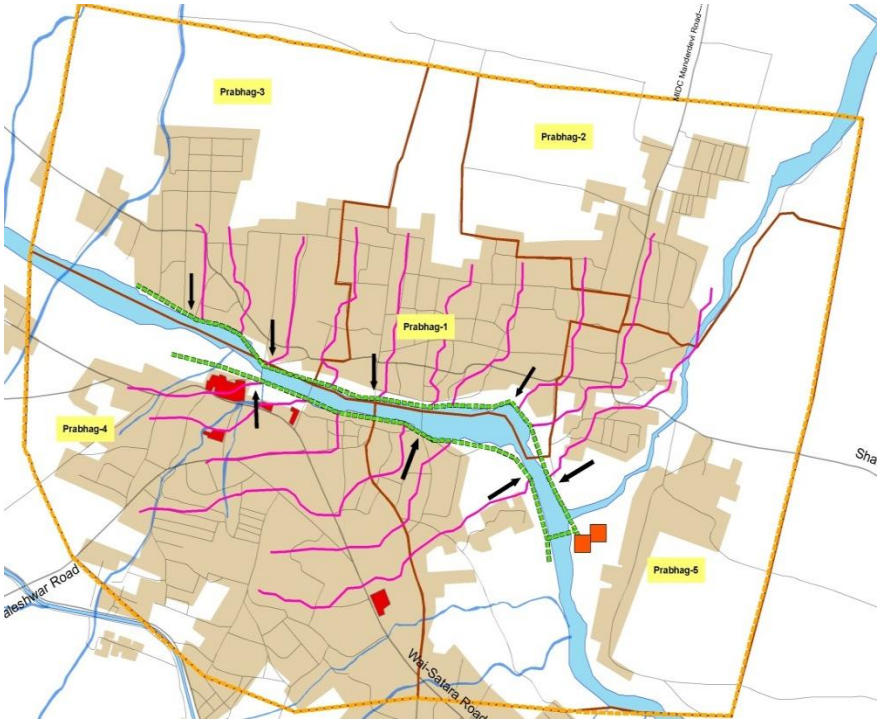
Existing Wastewater water flows in Wai



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

Wastewater conveyance and treatment: Under the NRAP program, an interceptor sewer connected to a treatment plant will be constructed in Wai

Location of interceptor sewer and sewerage treatment plant



Sewerage treatment plant

Interceptor sewerage network

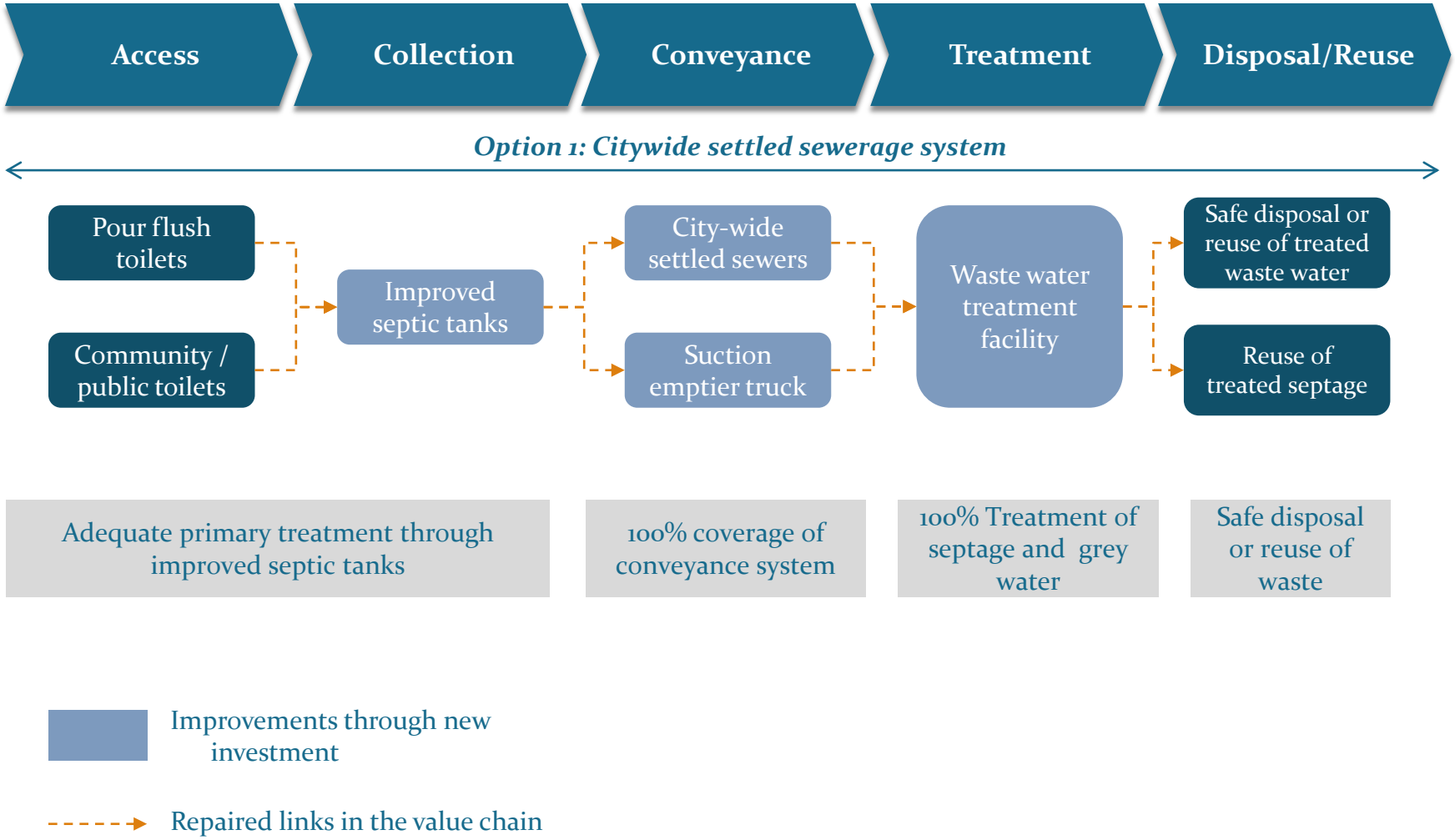
Program details

- **The National River Action Plan (NRAP)** is a program launched by the Government of India that aims to prevent pollution of major rivers in India
- Under the NRAP scheme in Wai, the government plans to construct:
  1. **Interceptor sewer** for the diversion of sewerage on the north and south sides of the river
  2. **Sewerage treatment plant** for the collected waste
- The northern interceptor sewer will be **6,500 m long**, whereas the southern interceptor sewer will be **1,700 m long**
- The 5 MLD treatment plant will adopt the **Moving Media Bio reactor Technology (MMBRT)** and will be constructed across an area of 10,000 sq. m.
- The treated sewerage can be discharged into the river or used for irrigation
- The scheme will entail an **investment of INR ~200 million,** with a per capita investment of INR ~3k
- The construction of this project is **expected to take 3 years**

Source: NRAP detailed project report

Contents

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



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

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

Option 1: Citywide settled sewerage system

Access	Collection	Conveyance	Treatment	Disposal/Reuse
Ensuring demand led access to toilets with septic tanks for 2,093 HH[2] (INR 31.4 million)		**Rehabilitation and closing of drains** (INR 16.5 million)	**Construction of wastewater treatment facility[1]** (INR 120 million)	**Reuse for agriculture and irrigation**
Refurbishment of selected old **community toilets** (INR 9.3 million)		**Construction of settled sewer network** (INR 46.4 million)		
Construction public toilets (INR 1.7 million)	**Refurbishment of septic tanks[2]** (INR 16.7 million)	**Construction of interceptor sewer[1]** (INR 40 million)		
		Procure new suction trucks (INR 2 million)		

Investment required

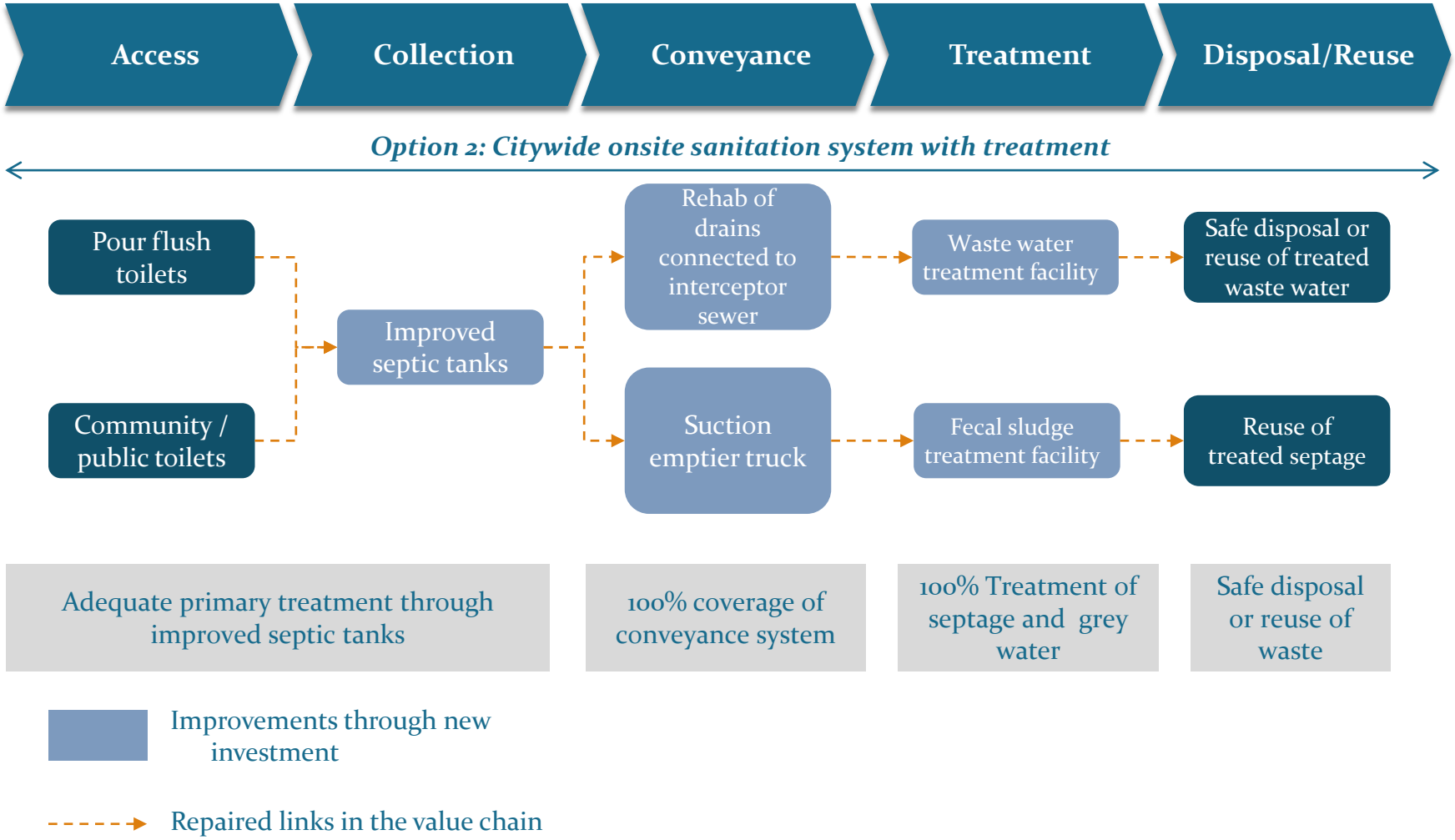
INR 59.1 million	**INR 104.9 million**	**INR 120 million**

- This proposal provides each household in Wai access to individual toilets and includes construction of settled sewer network connected to a centralized treatment facility
- The total investment required for this proposal is ~INR 284 million

Note: (1) Have already been adopted under Wai's National River Action Plan (2) A large proportion of these costs will be borne by households

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

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



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

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

Option 2: Citywide onsite sanitation system with treatment

Access	Collection	Conveyance	Treatment	Disposal/Reuse
Ensuring demand led access to toilets with septic tanks for 2,093 HH[2] (INR 31.4 million)		**Rehabilitation and closing of drains** (INR 16.5 million)	**Construction of treatment facility** (INR 10.5 million)	**Reuse for agriculture and irrigation**
Refurbishment of selected old **community toilets** (INR 9.3 million)		**Construction of interceptor sewer[1]** (INR 40 million)		
Construction public toilets (INR 1.7 million)	**Refurbishment of septic tanks[2]** (INR 16.7 million)	**Procure new suction trucks** (INR 2 million)	**Fecal sludge treatment facility** (INR 1 million)	

Investment required

INR 59.1 million	**INR 58.5 million**	**INR 11.5 million**

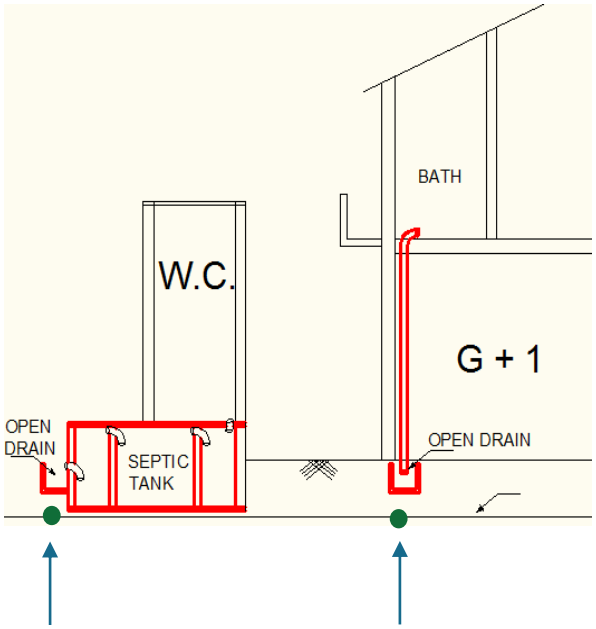
- This proposal provides each household in Wai access to individual toilets and includes rehabilitation of existing conveyance mechanism along with regular septage management and treatment of waste
- The total investment required for this proposal is INR ~ 129.1 million

Note: (1) Have already been adopted under Wai's National River Action Plan (2) A large proportion of these costs will be borne by households

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

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

Settled sewer technology



Proposed sewer line

- 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

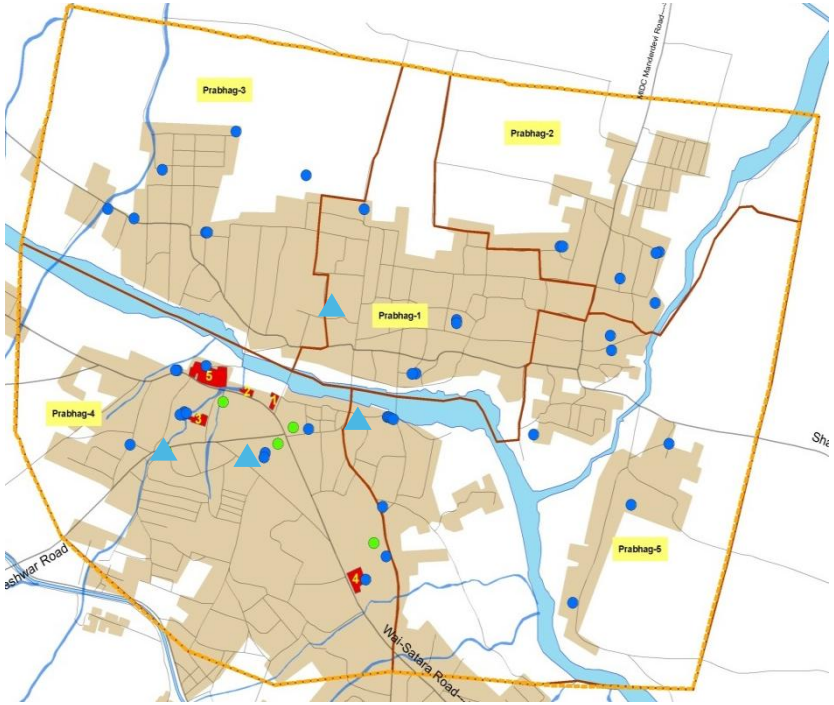
Location of settled sewer lines

Sewer lines 0.6 meters below road level under drains

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

The city is also considering the construction of 4 public toilets to serve the floating population

Proposed location of public toilet blocks



Proposed public toilets

Details of public toilet blocks

Location	Toilet details	Estimated number of users (per day)	Estimated Cost (INR)
Market area	6 seats and 3 urinals	300-500	50,000
Bus stand	3 seats	500	150,000
Central office building	8 seats and 6 urinals	350-375	400,000
Temple precincts	14 seats and 6 urinals	700	600,000

- The **total investment required** to construct 4 toilet blocks will be **INR ~1.2 million**
- The city could also explore a user fee of INR 1 per use to generate ~ **INR 65k per month**

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

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

Areas for intervention

Access → Collection → Conveyance → Treatment → Disposal/Reuse

1

Own Toilets + Septic Tanks
Construction of own toilets, individual or shared by 2-4 households, along with attached septic tanks

2

Integrated fecal sludge management
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 the reuse of treated septage

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 Programme (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'.

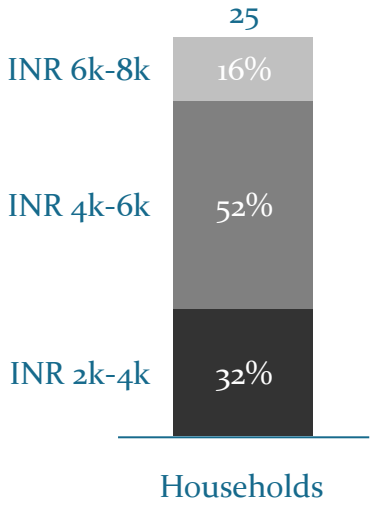
Preliminary demand assessment of households was done to assess the response towards group toilets and estimate household willingness to pay

Methodology and key observations

- CEPT **interviewed 25 households** with no access to personal toilets in different areas of the city and **detailed out 10 first potential cases** willing to implement the group toilets.
- The **databases of the surveys** conducted **by WMC in the past** were used to **identify areas** with poor access to personal toilets. **HHs dependant on community toilets** in these areas **were interviewed** to assess their willingness towards group toilets.
- In all 10 cases, households **greatly appreciated** the idea of group toilets, primarily due to the difficulties faced in accessing 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.

Household willingness to pay

(n=25)



- **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 ~4,500**

Source: Presentation on Innovative scheme for moving towards own toilets in Wai , CEPT University, Household surveys in Wai

The Wai 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 5,000 for individual toilets or toilets shared by up to four households
- In our surveys, households expressed a willingness to contribute between INR 4000 – 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			
	Households (Subsidy - INR 5,000/HH)			
	1	2	3	4
Cost per toilet (in INR)[1]	~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 4,000 – 6,000[2] 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 10 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 ~25 households in Wai

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

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

	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 **2% of septic tanks cleaned** annually	• **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 that all septic tank are cleaned at least **once in 3 years**	• **Installing fecal sludge drying beds,** for the treatment of fecal sludge	• **Use or sale** of treated **septage** at a fixed rate to nearby farms or agro-businesses

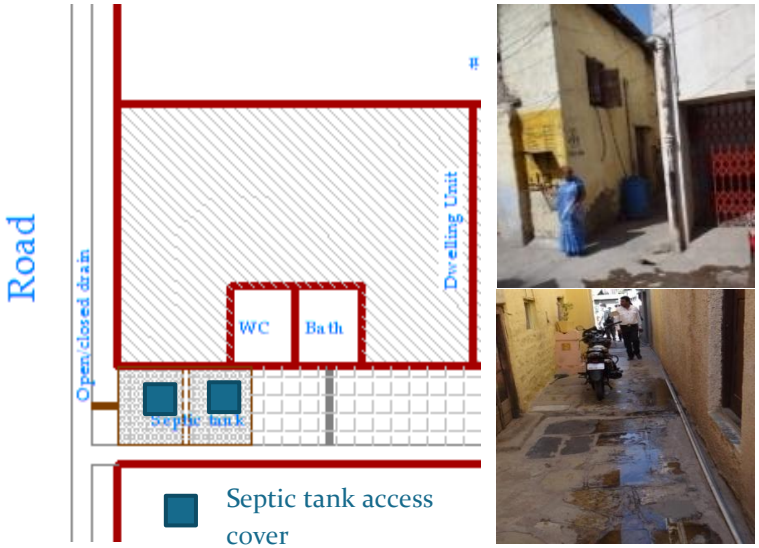
Source: Presentation on septage management plan of Wai , CEPT University

To facilitate regular cleaning, septic tanks need to provided manhole covers making access easier

Details of proposal

- Based on a technical assessment done in 2013, it was noticed that many **septic tanks in Wai had sealed covers or a *farsi* (tile) placed over it**
- 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 million**

Location of manhole of cover



RCC access manhole cover

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

To maintain the recommended three year emptying cycles, ~1700 tanks will need to cleaned in Wai

Current septage management practice

~2% 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. Wai has only 1 truck of 5kL capacity, owned and operated by the ULB
5. Houses pay ~INR 1000 to the ULB to get tanks cleaned, once in more than 8-10 years

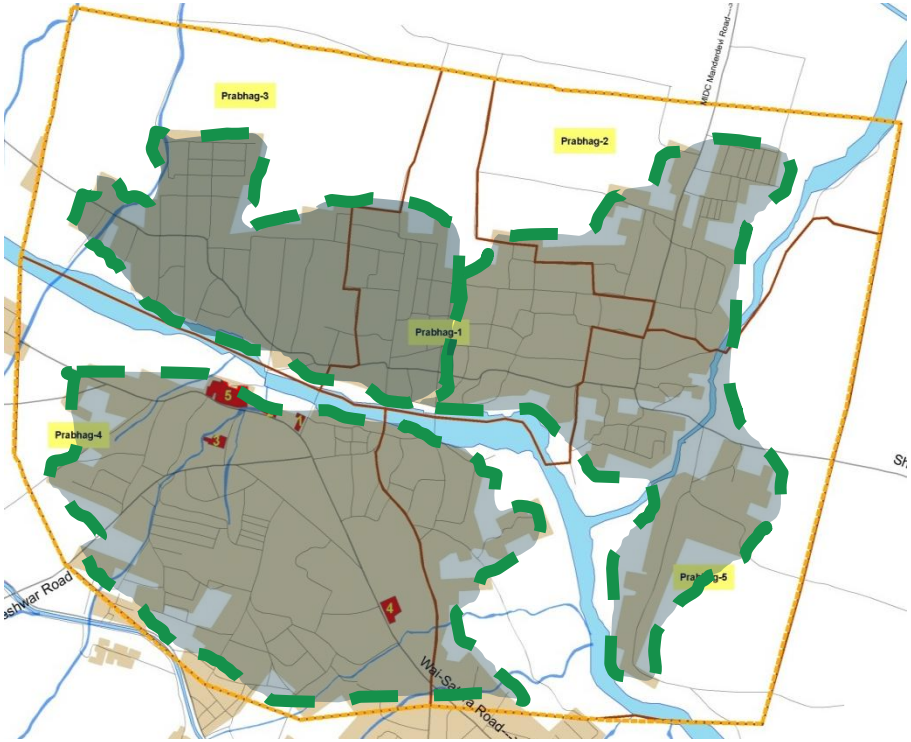
Proposed solutions

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. Wai will get an additional 5 kL truck to clean ~6 septic tanks a day, 300 days a year, which can be operated by a private . The existing truck 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[1]

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

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

The regulated septic emptying plan will be rolled out in three phases, beginning with a pilot for ~40 households



Phase/Year	Prabhag to be covered
1	Prabhag 3 and part of Prabhag 1
2	Part of Prabhag 1 and Prabhag 2 and 5
3	Prabhag 4

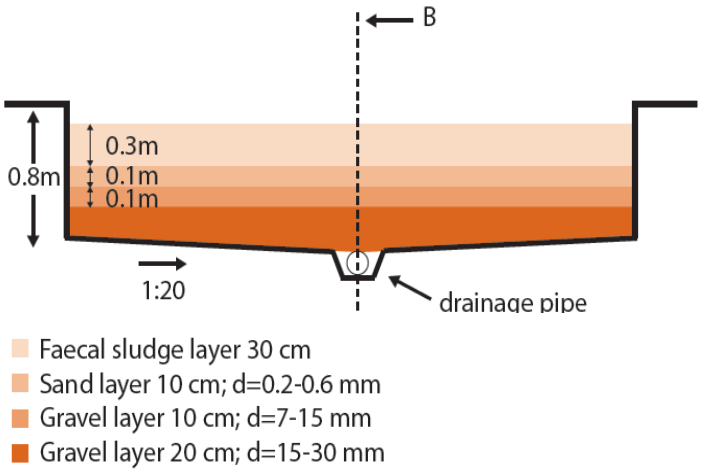
- The effectiveness of the regulated emptying plan will be tested in a pilot for 40 households
- The goal will be to identify barriers that arise in promoting behavioral change among households

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

For the treatment of collected septage, 11 sludge drying beds will be needed

Technical details of sludge drying bed

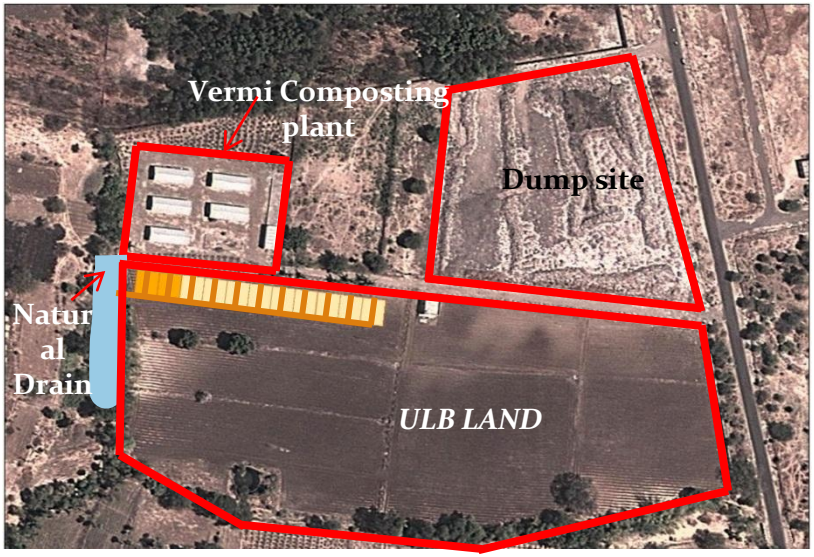
Technical illustration of a sludge drying bed



- 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 or reused as compost after mixing it with organic solid waste

Description of proposal

Possible location of the sludge drying beds



- In Wai, it is estimated that the daily load on the septage treatment facility will be **26.3 cum/day**[1]
- ULB officials has identified **ULB land** near the current solid waste dumping site for the construction of **11 sludge drying beds, covering an area of ~1,700 sq. m.**
- The total investment required would be **INR ~2.2 – 2.8 million**[1]

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

Source: Presentation on septage management plan of Wai , 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

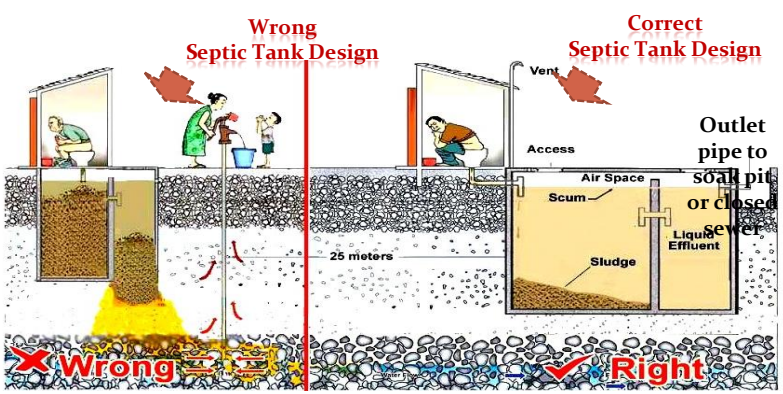
Source: Presentation on septage management plan of Wai , CEPT University

These activities need to be supported by 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:
  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

Home | Nagar Palika | Pumping Truck

Service provided by Wai Nagar Parishad

De-sludge Your Septic Tank every 3 Year

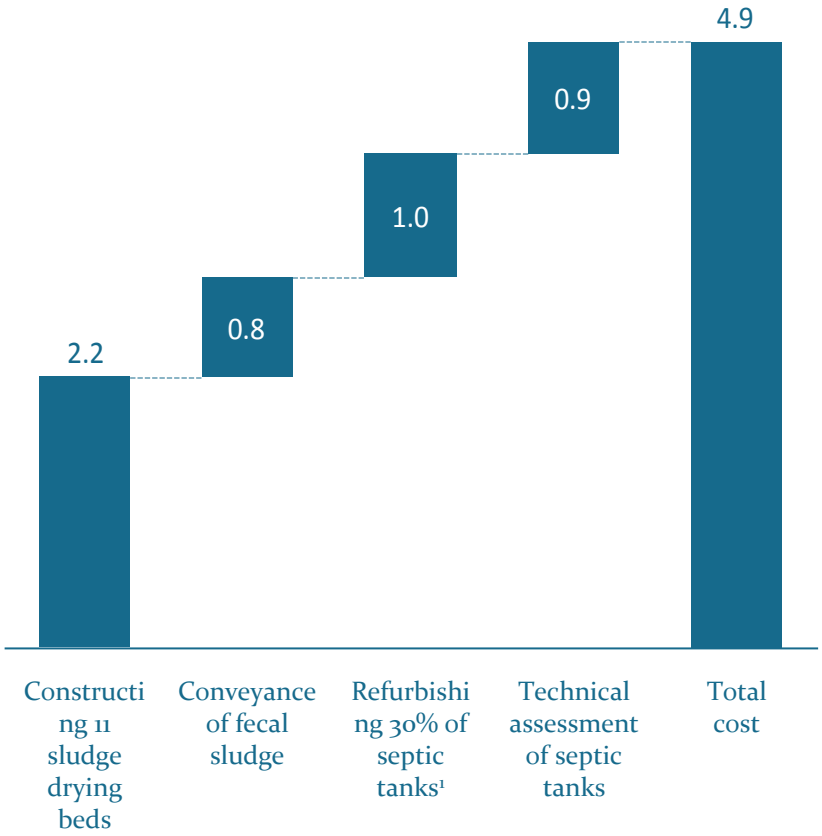
- As you clean you toilets daily , so that it does not affect your health, similarly clean your septic tanks every 3 years so that it does not affect the environment
- Wai Nagar Parishad will provide you services for cleaning of Septic tank free of cost once every 3 years.
- The ULB officials will inform 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 Wai , CEPT University

The integrated fecal sludge management plan will entail capital investment of INR ~4.9 million and annual operating costs of ~1.3 million

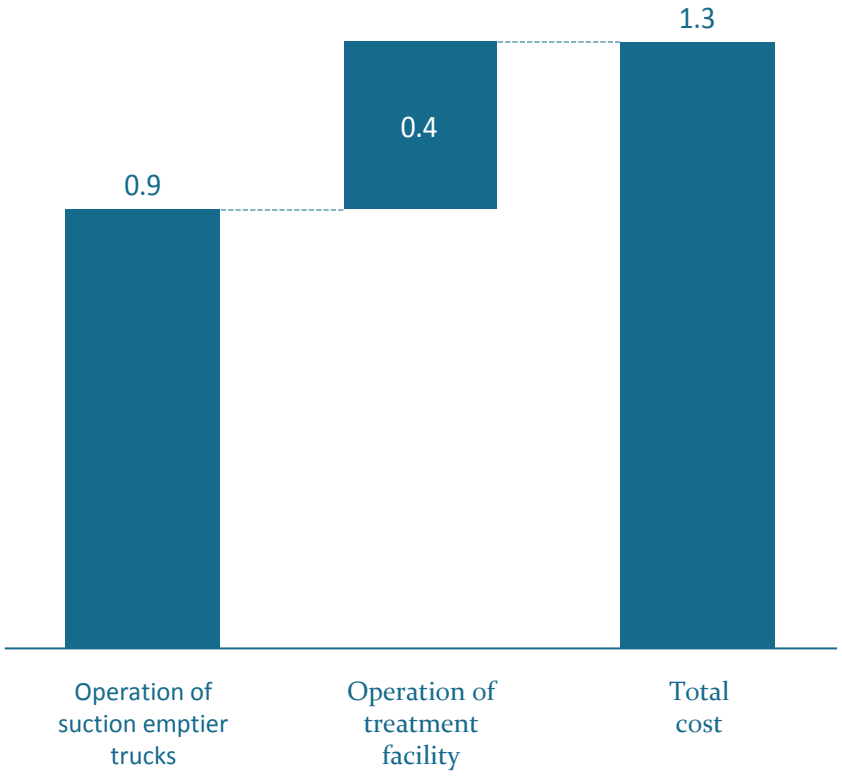
Capital expenditure

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



Operating expenditure per year

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



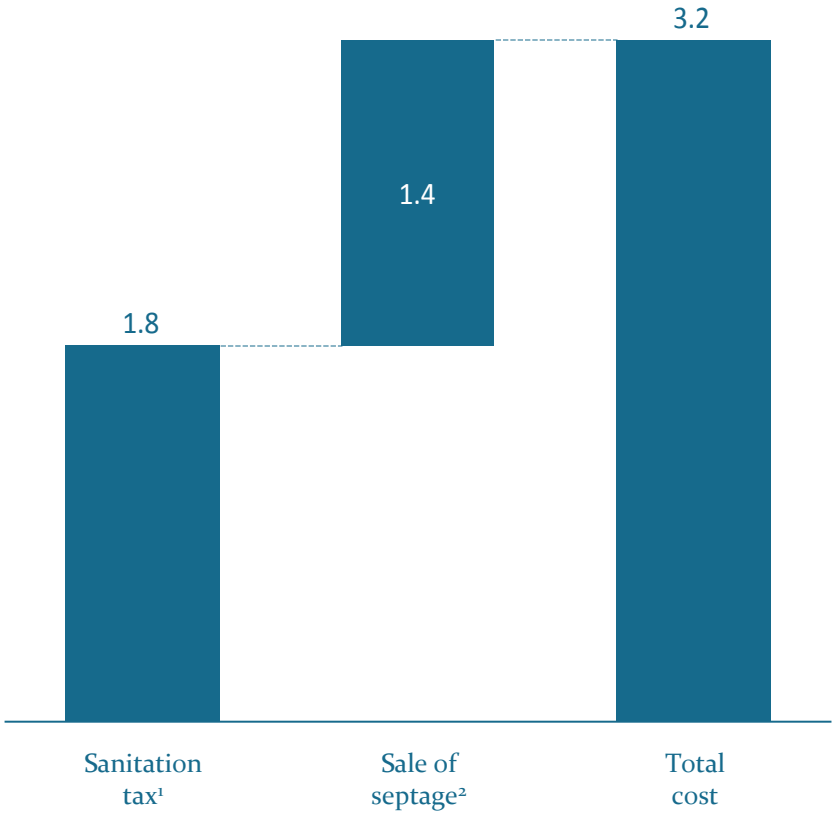
Note: (1) As per discussions with the ULB, this cost can also be borne by private households

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

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

Estimated annual revenue from septage management in Wai

(INR in million)



Details of revenue model

- The city can levy a **special sanitary tax of INR 333 per household per year** i.e. roughly equivalent to the current one-time charge of Rs. 1000
- 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 ~2-3 years**

Assumptions: (1) Here we account for the annual sanitation tax of Rs. 333 collected by the ULB for the ~5280 households with personal toilets only, in practice the sanitation tax will be collected for all 7580 households (2) 30% collected septage sold at INR 0.50/kg

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

Contents

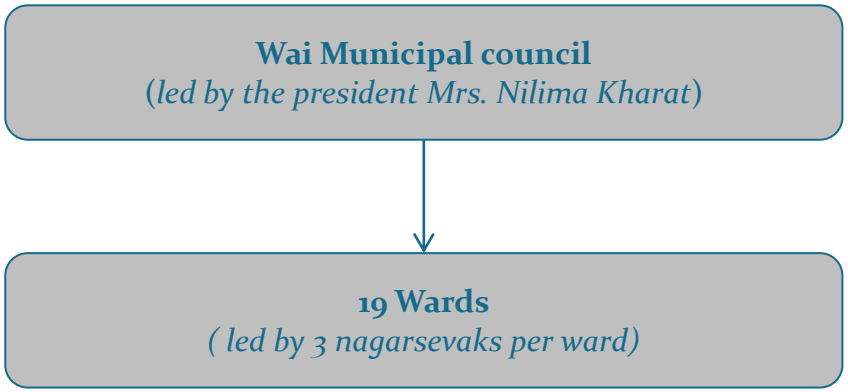
Wai is governed by the elected municipal council which is aided in its day-to-day operations by the executive wing

Municipal Council

- **Consists of elected officials** called nagarsevaks, led by the Council President . Each ward elects 3 municipal councillors or nagarsevaks.
- 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) is responsible for **legislation and financial approvals**

Executive wing

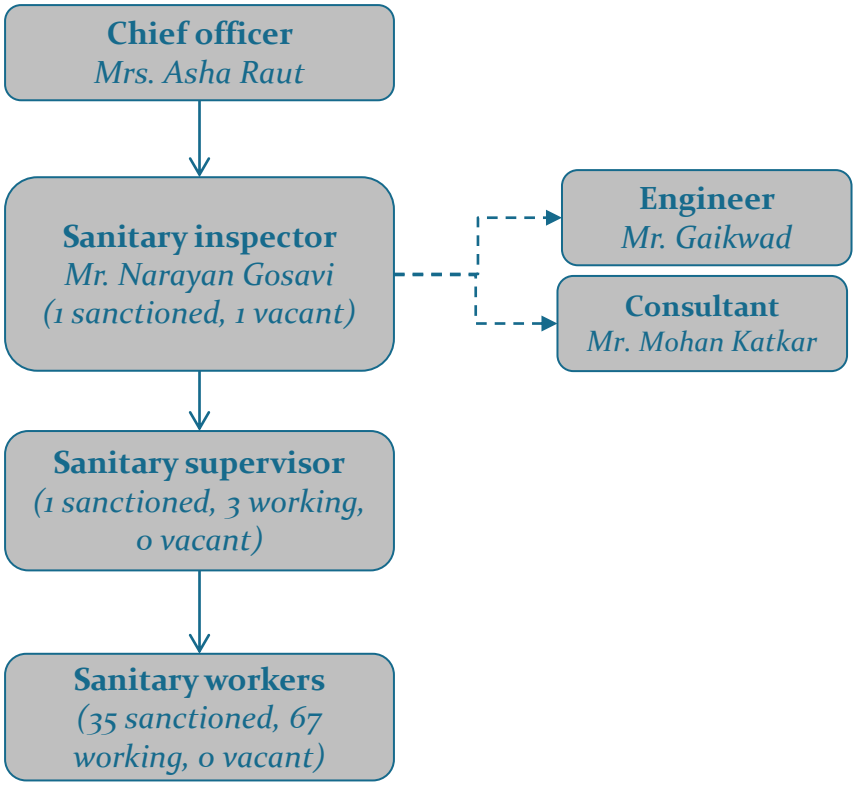
- **The executive wing** is the bureaucratic arm, led by Chief Officer (CO)
- The CO is supported by officers **heading various departments** of the executive wing
- Wai is divided into 5 **prabhags which are further divided into 19 wards** for administrative purposes
- **The sanitation department**, headed by the sanitary inspector, manages sanitation and solid waste management



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

The sanitation department is headed by the sanitary inspector who oversees a staff strength of ~70 people

Structure of the sanitation department



Key issues

- **Shortage of staff:** Like other cities, the Wai Nagar Parishad faces a staff crunch due to inflexible government resolutions on the number of sanctioned staff. ~50% of sanitation workers are hired temporarily, 2 of the three supervisor positions are filled by substitute sanitary workers
- **Vacancies:** The post of sanitary inspector is currently vacant with the tax inspector filling in
- **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

Source: Interviews with Wai city officials

Wai has entered into four management contracts with private players for solid waste management and O&M of community toilets

Sector	Name of the contract	ULB responsibilities	Contractor responsibilities
	• Management contract for door collection of waste and cleaning of drains • Awarded to a Wai based contractor	• Fixed monthly payment made to the contractor	• Door to door collection of waste and cleaning to drains • Provision of labor required • Provision, Operation and maintenance of trucks
	• Management contract for the O&M of vermi-compost treatment plant • Awarded to the same contractor as above under different contract	• Monthly payment made to contractor for operation and maintenance of compost plant constructed by the ULB	• Provision of labor, equipment and utilities for the plant • Sale of compost, 50% of the proceeds of which, need to paid to the ULB
	• Management contract for the O&M of community toilets • Awarded to a Pune based non profit, the Nirmal Bharat Foundation	• Monthly payment made to contractor • Payment for utilities	• O&M of community toilets along with regular cleaning and repairs
	• Management contract for cleaning of pre-monsoon drain cleaning • Awarded to a Wai based contractor	• Fixed monthly payment made to the contractor	• Undertaking cleaning of drains • Provision of labor required • Provision of equipment required to undertake cleaning

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

Overall, officials are satisfied with the private provision of services

"Our experience with these contracts has been quite good. The ULB has not received any complaints so far. It is a relief for our staff."

- Wai Engineer

"We are paying more than we did when we did these activities ourselves. However, the service levels have improved and we have shifted a lot of our burden on to the private player. For example, we constantly faced issues with theft and vandalism in community toilets. That is now the responsibility of the private player to keep this toilets operational."

- Wai Sanitary Inspector

Source: Interviews with Wai city officials

The engagements are relatively well structured as fixed fee, medium term management contracts, but place significant risk on the private player

Contract structure for existing engagements

Features	Door-to-door waste collection	O&M of vermi-compost plant	Cleaning of community + public toilets	Pre-monsoon drain cleaning
Contract length	3 years	3 years	3 years	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]	Fixed fee	Fixed fee	Fixed fee	Item rate
Rate per unit (INR)	1,90,000 per month	221,000 per month	1,55,000 per month	~1600-2000 per truck trip, ~350/manday
Penalty clause for non-performance	✓	✓	✓	✓
Number of bids received last year	5	3	3	4

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 Wai city officials

Key features

- **The council prefers medium term** 3 years contracts to allow for stability in services
- **In addition, the council prefers lump sum contracts** because they are not tied to inputs and avoid incentives for private players to inflate bills. In addition, they are easier to monitor with fewer disputes.
  - ✓ However, private players complain that the lump sum payments do not account for repair costs they face
- **Payment is not linked clearly to monitoring**
  - ✓ Penalty clauses are open-ended and not tied to monitored outputs or service levels
  - ✓ There is no mention of monitoring or reporting requirements
  - ✓ There are no positive performance incentives tied directly to outputs or

"If any complaint is received by this office that the collection vehicle has not visited the designated area, an appropriate amount shall be deducted from my monthly bill and I will have no objection to such deductions."

– Performance penalty in contract for door-to-door collection of waste

Current contracts contain clauses for dispute resolution and termination risk, but do not mitigate key risks faced by the private player

Priority contract clauses for effective engagements

Features	Door-to-door waste collection	O&M of vermi-compost plant	Cleaning of community + public toilets	Pre-monsoon drain cleaning
Redress of user complaints	✓	NA	✓	✗
Dispute resolution mechanism	✓	✓	✓	✓
Mitigating payment risk	✗	✗	✗	✗
Mitigating Termination risk	✗	✓	✓	✓

Key features

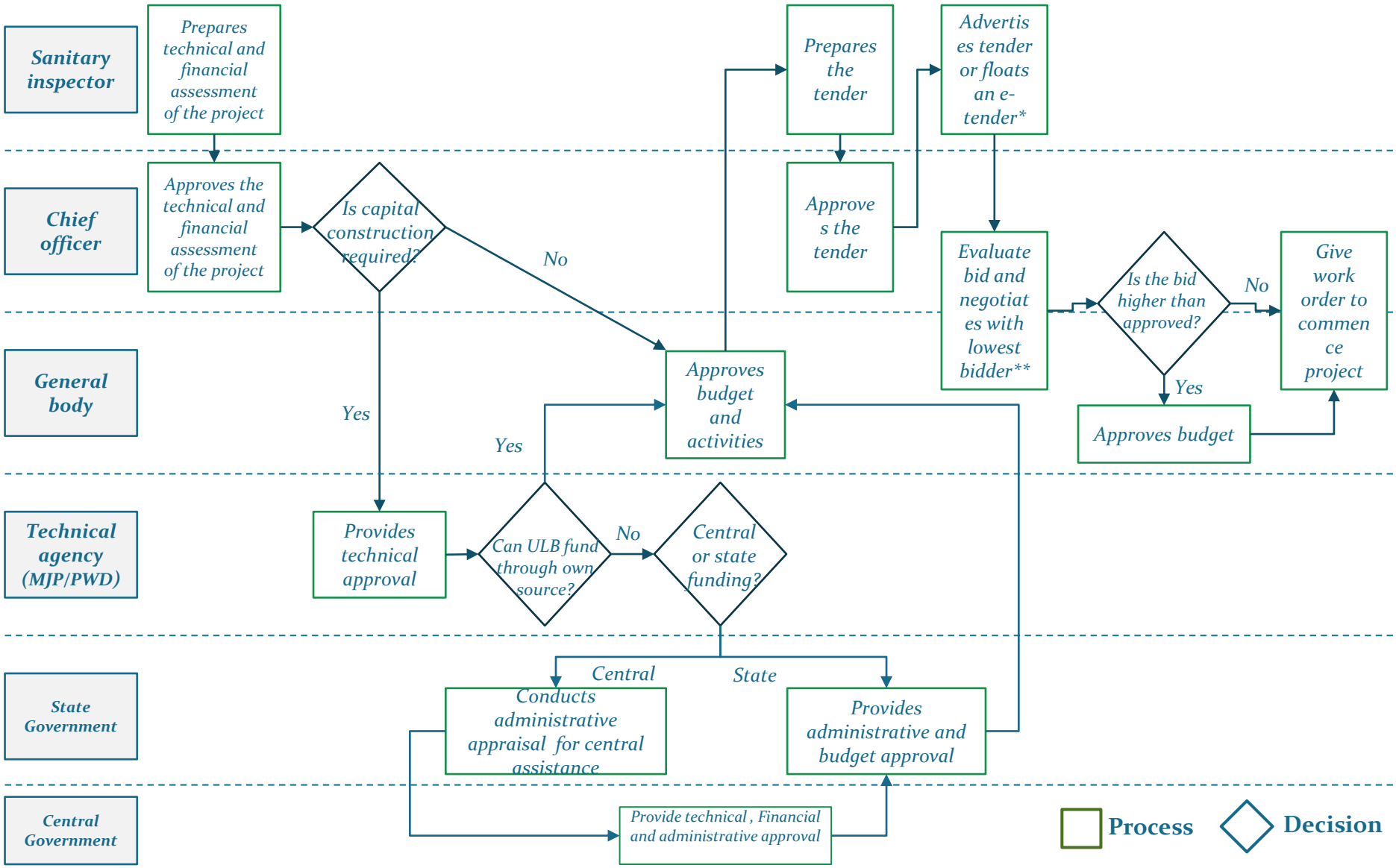
- **All contracts include a dispute resolution clause** that *"Any dispute regarding the bills will be settled at Wai and in the jurisdiction of Wai court."*
- **All contracts except the door-to-door collection contract, have a termination clause** in case of public and private termination.
- **Current contracts put the responsibility for complaint redress entirely on the private sector,** but do not mention processes or expected service standards for complaint registration and redress
- There is no clause to **manage delays in payments** (e.g. interest paid to the private sector)

"In case of any complaint or a conflict regarding the public lavatory, it would be my responsibility to solve the complaint and I will not involve the municipal council in the matter."
– Complaint redress clause in contract for community toilet cleaning

"I agree that the Town Council has reserved the right to cancel this contract if the work is not satisfactory and the work is not improved after due notice and instructions.
– Termination clause in contract for vermi-compost plant

Source: Interviews with Wai city officials

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, e-tendering is required

Source: Interviews with Wai city officials, City contract documents

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 • Plan the operation schedule for 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 shortages and lack of qualification:** The ULB has only one engineer and a tax inspector who is filling in as a sanitary inspector. Lack of dedicated trained staff affects the ULB's capability to undertake meaningful assessments
- **Limited technical knowledge of proposed solutions:** The proposal for integrated fecal sludge management are relatively new to the ULB officials

"The final outlay to ULB after contracting has been slightly higher than when we provided services but the service levels have improved."
– Sanitary inspector

"Since the new proposals are made by CEPT, we will need their help in technical assessments as these projects are new to us."
– Engineer

Source: Interviews with Wai city officials

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

Procurement process

Draft contract and place a request for proposals → **Receive bids from private players** → **Evaluate bids and sanction work order**

- CO and SI hold initial discussions with potential private players to understand their requirements[1]
- Chief office (CO) approves tender drafted by the Sanitary Inspector (SI)
- Bids are then solicited in local newspaper[2]

- Private players submit their bids including:
  - ✓ Business license and registration
  - ✓ Employee Provide fund details
  - ✓ Tax records
  - ✓ Previous work experience
  - ✓ Pricing quote

- 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 the main 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 lack of focus on service levels. Even when service levels are found to be higher, bids must be negotiated down to the lowest level offered by other players.

"Our old vermi-compost operator quit because of labor issues. We have learned from that experience and now assess feasibility by holding informal talks with the private sector contractors to make sure we are understanding their requirements as well."

- Engineer

Note: (1) Not part of the official process, but an additional activity conducted in Wai (2) Bids over INR 1 million require e-tendering

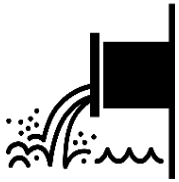
Source: Interviews with Wai city officials

Monitoring of contracts is not focused on outputs or service levels, and relies completely on three supervisors

Collection of waste

O&M of vermi-composting plant

Cleaning of toilets



Cleaning of drains

ULB monitored

- There are 3 supervisors who are responsible for monitoring the daily performance of private contractors
- The town area is divided into 3 parts, each of which, is assigned to a supervisor. The supervisor inspects his area daily to ascertain the work done by private contractor
- Daily report is filed by all the supervisors. These are compiled to form monthly reports which are inspected by the SI before finalizing the contractor payments
- Supervisor's areas are changed every 10 days to ensure efficiency and prevent instances of corruption

Key Gaps

- **Focus on monitoring inputs:** Staff is currently monitoring 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
- **Staff shortages:** The burden of supervision for all activities falls entirely on the 3 supervisors.

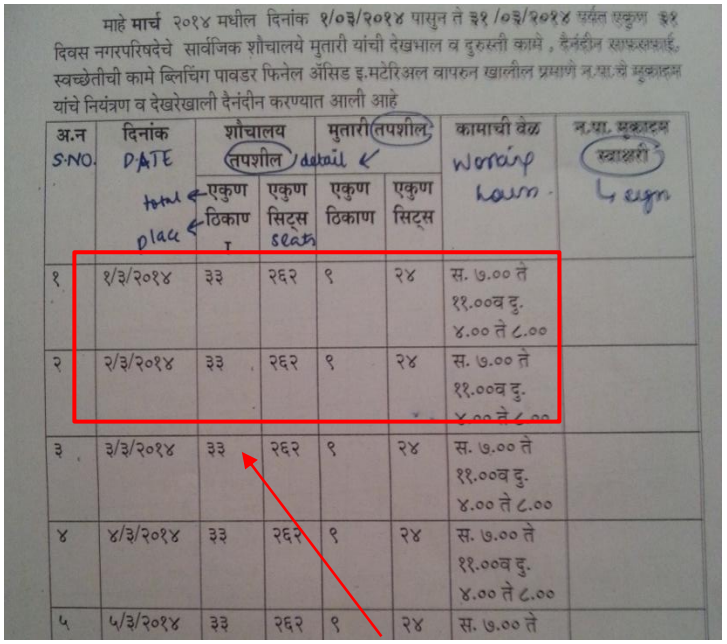
"For the new contracts, ULB staff will need training for monitoring those initially as those are new arrangements. However, after that, ULB staff will learn to do things on their own."

– Chief Officer

Source: Interviews with Wai city officials

Current monitoring forms do not measure service levels or outcomes

Monitoring form for community toilets cleaning

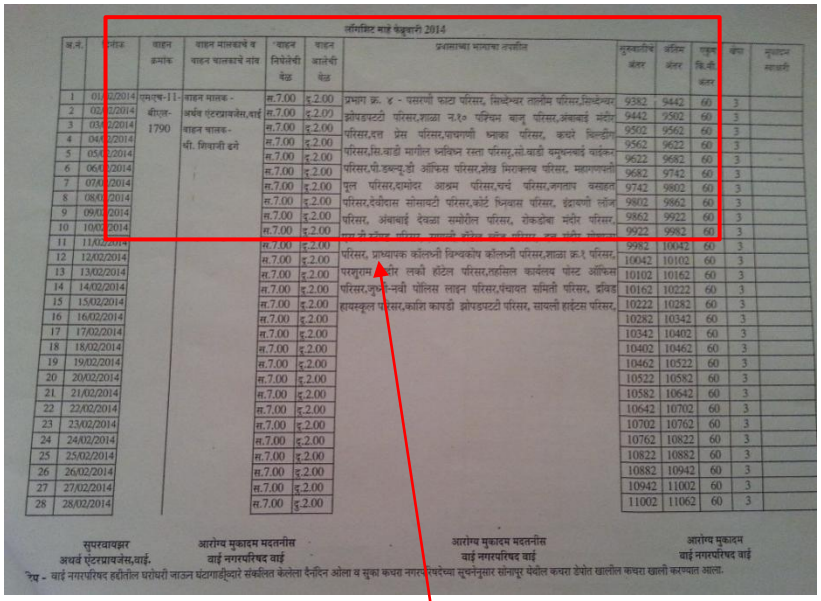


माहे मार्च २०१४ मधील दिनांक १/०३/२०१४ पासुन ते ३१ /०३/२०१४ सर्वसह एकुण ३१ दिवस नगरपरिषदेचे सार्वजिक शौचालये मुतारी यांची देखभाल व दुरुस्ती कामे , दैनंदीन साफसफाई, स्वच्छेतीची कामे ब्लिचिंग पावडर फिनेल ॲसिड इ.मटेरिअल वापरुन खालील प्रमाणे न.पा.चे मुकादम यांचे नियंत्रण व देखरेखाली दैनंदीन करण्यात आली आहे

अ.न S.NO.	दिनांक DATE	शौचालय तपशील detail		मुतारी तपशील		कामाची वेळ Working hours	न.पा. मुकादम स्वाक्षरी Sign
		एकुण ठिकाण Total place	एकुण सिट्स seats	एकुण ठिकाण	एकुण सिट्स		
१	१/३/२०१४	३३	२६२	९	२४	स. ७.०० ते ११.००व दु. ४.०० ते ८.००	
२	२/३/२०१४	३३	२६२	९	२४	स. ७.०० ते ११.००व दु. ४.०० ते ८.००	
३	३/३/२०१४	३३	२६२	९	२४	स. ७.०० ते ११.००व दु. ४.०० ते ८.००	
४	४/३/२०१४	३३	२६२	९	२४	स. ७.०० ते ११.००व दु. ४.०० ते ८.००	
५	५/३/२०१४	३३	२६२	९	२४	स. ७.०० ते	

For community and public toilet cleaning, the sanitary supervisor notes the location and number of seats cleaned on a daily basis

Monitoring form for door-to-door waste collection



वॉर्डनिहाय वाई कंत्राटदारी 2014

अ.नं.	दिनांक	वाहन क्रमांक	वाहन मालकाचे व वाहन चालकाचे नाव	वाहन निघेलेली वेळ	वाहन आलेली वेळ	प्रभागाच्या मार्गाचा तपशील	सुरुवातीचे अंतर	अंतिम अंतर	एकुण कि.मी. अंतर	फेरी	मुकादम स्वाक्षरी
1	01/02/2014	एमएच-11-बीएल-1790	वाहन मालक - अर्थव एंटरप्रायजेस,वाई वाहन चालक - पी. शिवारी दने	स.7.00	इ.2.00	प्रभाग क्र. ४ - पसरणी फाटा परिसर, सिध्देश्वर तालीम परिसर,सिध्देश्वर	9382	9442	60	3	
2	02/02/2014			स.7.00	इ.2.00	झोपडपट्टी परिसर,शाळा न.१० पश्चिम बाजू परिसर,अंबाबाई मंदीर	9442	9502	60	3	
3	03/02/2014			स.7.00	इ.2.00	परिसर,दत्त प्रेस परिसर,पाचगणी रुग्णालय परिसर, कदमे चिल्ड्रीन	9502	9562	60	3	
4	04/02/2014			स.7.00	इ.2.00	परिसर,सि.वाडी मागील भगिनिच्या रस्ता परिसर,सो.वाडी बमणेनवाडी वाडेकर	9562	9622	60	3	
5	05/02/2014			स.7.00	इ.2.00	परिसर,पी.डब्ल्यू-डी ऑफिस परिसर,शेंडे मिरासदार परिसर, महागणपती	9622	9682	60	3	
6	06/02/2014			स.7.00	इ.2.00	पूल परिसर,रामोदर आश्रम परिसर,चर्च परिसर,जगताप वस्ताहत	9682	9742	60	3	
7	07/02/2014			स.7.00	इ.2.00	परिसर,देवीदास सोसायटी परिसर,कोर्ट भिनयास परिसर, इंद्रायणी लॉज	9742	9802	60	3	
8	08/02/2014			स.7.00	इ.2.00	परिसर, अंबाबाई देवळा समोरील परिसर, शेकटोबा मंदीर परिसर,	9802	9862	60	3	
9	09/02/2014			स.7.00	इ.2.00	[illegible]	9862	9922	60	3	
10	10/02/2014			स.7.00	इ.2.00	[illegible]	9922	9982	60	3	
11	11/02/2014			स.7.00	इ.2.00	परिसर, प्राथमिक कॉलनी विश्वकोष कॉलनी परिसर,शाळा क्र.१ परिसर,	9982	10042	60	3	
12	12/02/2014			स.7.00	इ.2.00	परशुराम मंदिर लकी हॉटेल परिसर,तहसिल कार्यालय पोस्ट ऑफिस	10042	10102	60	3	
13	13/02/2014			स.7.00	इ.2.00	परिसर,जुनी-नवी पोलिस लाइन परिसर,पंचायत समिती परिसर, द्रविड	10102	10162	60	3	
14	14/02/2014			स.7.00	इ.2.00	हायस्कूल परिसर,काशि कापडी झोपडपट्टी परिसर, सायली हाईटस परिसर,	10162	10222	60	3	
15	15/02/2014			स.7.00	इ.2.00		10222	10282	60	3	
16	16/02/2014			स.7.00	इ.2.00		10282	10342	60	3	
17	17/02/2014			स.7.00	इ.2.00		10342	10402	60	3	
18	18/02/2014			स.7.00	इ.2.00		10402	10462	60	3	
19	19/02/2014			स.7.00	इ.2.00		10462	10522	60	3	
20	20/02/2014			स.7.00	इ.2.00		10522	10582	60	3	
21	21/02/2014			स.7.00	इ.2.00		10582	10642	60	3	
22	22/02/2014			स.7.00	इ.2.00		10642	10702	60	3	
23	23/02/2014			स.7.00	इ.2.00		10702	10762	60	3	
24	24/02/2014			स.7.00	इ.2.00		10762	10822	60	3	
25	25/02/2014			स.7.00	इ.2.00		10822	10882	60	3	
26	26/02/2014			स.7.00	इ.2.00		10882	10942	60	3	
27	27/02/2014			स.7.00	इ.2.00		10942	11002	60	3	
28	28/02/2014			स.7.00	इ.2.00		11002	11062	60	3	

सुपरवायझर अथर्व एंटरप्रायजेस,वाई. — आरोग्य मुकादम मदतनीस वाई नगरपरिषद वाई — आरोग्य मुकादम मदतनीस वाई नगरपरिषद वाई — आरोग्य मुकादम वाई नगरपरिषद वाई

टिप - वाई नगरपरिषद हद्दीतील घरोघरी जाऊन घंटागाडीद्वारे संकलित केलेला दैनंदिन ओला व सुका कचरा नगरपरिषदेच्या सूचनेनुसार सोनापूर येथील कचरा डेपोत खालील कचरा खाली करण्यात आला.

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 that day

Source: City documents

The Wai 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, engineer and ULB staff	• Three year management contracts prepared by the ULB staff with a fixed fee payable monthly • Have key dispute resolution, termination and complaint redress clauses	• Lowest bid meeting minimum criteria is chosen	• 3 supervisors oversee work done by a contractor in their assigned area. Daily reports are compiled which are inspected by the SI
Capacity building needed	• Prepare technical and financial assessments for proposed solutions	Develop a systematic contracting framework which: ✓ Links payment to explicitly monitored service levels or outputs ✓ Addresses risks affecting the public and private players such as termination, payment delay and cost escalation	• 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 Wai city officials, CEPT and Dalberg analysis

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	49.2	45.9	58	59.3	72.6	108.1	111.2
Revenue Expenditure	36.5	44.5	49.4	54.7	79.8	103.5	78.8
Capital account							
Capital Receipts	37	15.8	15.1	46.3	9.9	88.5	31.3
Capital Expenditure	18.6	16.2	38.8	36.5	5.6	106	45.7
Extraordinary account							
Extraordinary Receipts	7.3	8	14.2	15.3	50.6	15.5	17.8
Extraordinary Expenditure	9.8	14.1	28.1	15.4	27.5	43	24.9
Summary							
Total Receipts	93.5	69.7	87.3	121	133.1	212.1	160.2
Total Expenditure	64.9	74.8	116.3	106.6	112.9	252.5	149.4
Closing Balance	36.5	31.4	2.4	16.7	36.9	3.9	18.6
Operating ratio[1]	***0.74***	***0.97***	***0.85***	***0.92***	***1.10***	***0.96***	***0.71***
Revenue account surplus (INR in million)	*12.7*	*1.4*	*8.6*	*4.6*	*-7.2*	*4.6*	*32.4*

Revenue Accounts

- Revenue receipts and expenditures are those related to day-to-day operations of the ULB
- Traditionally Wai 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 predictable and is not used for planning of future projects

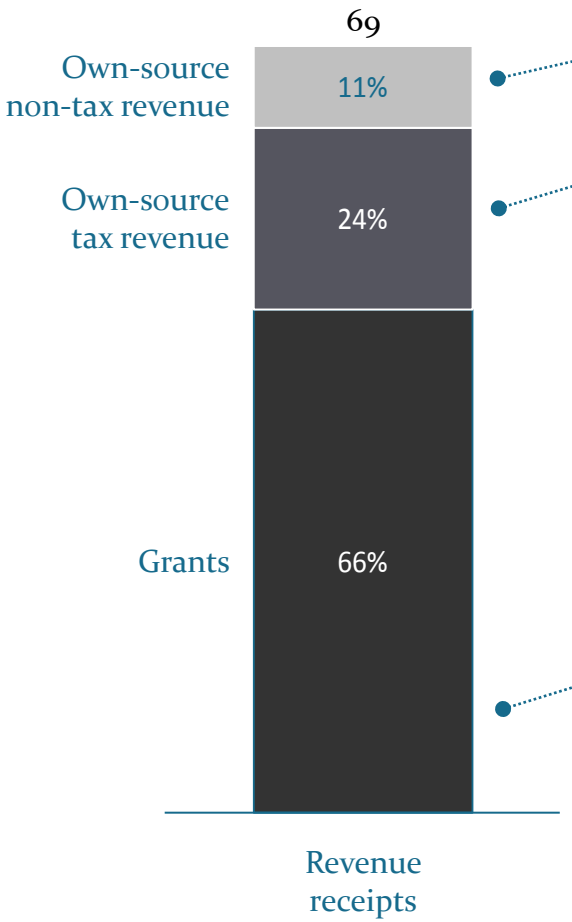
Note: (1) Ratio of revenue expenditures to revenue receipts, core measure of financial health for a ULB

Source: Financing plan for Wai, CEPT University

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

Wai ULB Revenue receipts (Average between 2007-2011)

(INR in million)



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

- In 2011,. the **per capita municipal tax revenue was INR ~700** , accounting on average for only **24% of revenue receipts from 2007-2011**
- The two main sources of tax revenues are:
  - *Property tax* (INR 1,083 per annum per property in 2011, ~57% of average tax revenue from 2007-2011)
  - *Water tax* (INR 1,100 per connection per annum in 2011, ~37% of average tax revenue from 2007-2011)
- **Collection efficiency for property tax was 84% in 2009-10 and 63% for water tax**

- The average revenue grants amounted to **INR ~45.1 million constituting ~66% of total revenue receipts**
- From 2007-2011 on average, only INR 2.1 million of these grants **were ear-marked for solid waste management in the form of 12th Finance commission grants,** and none were ear-marked for sanitation

Note: (1) Average tax revenues divided by population in 2011

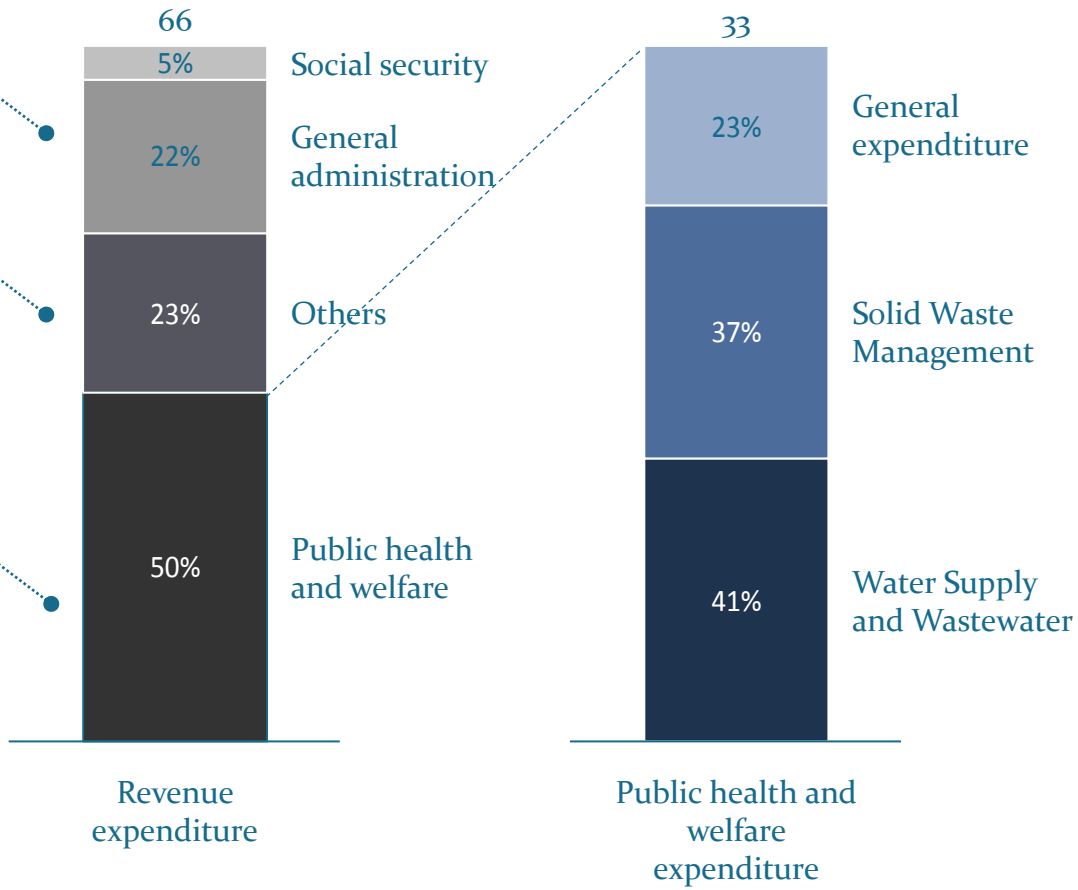
Source: City budget documents, CEPT University analysis

Water supply and wastewater constitute ~1/5th of total revenue expenditure

- Expenditure on general administration includes **salaries of ULB employees, Pensions and gratuities etc.**
- "Others" **includes expenditure on public works** such as permanent establishments, maintenance of roads etc.
- Expenditure on sanitation is ~18% of total expenditure on public health and welfare
- **Per capita spending on Water and sanitation is INR ~875**, which is 21% higher than that suggested by HPEC (INR 730) in 2011

Wai ULB Revenue expenditure, (Average between 2007-2011)

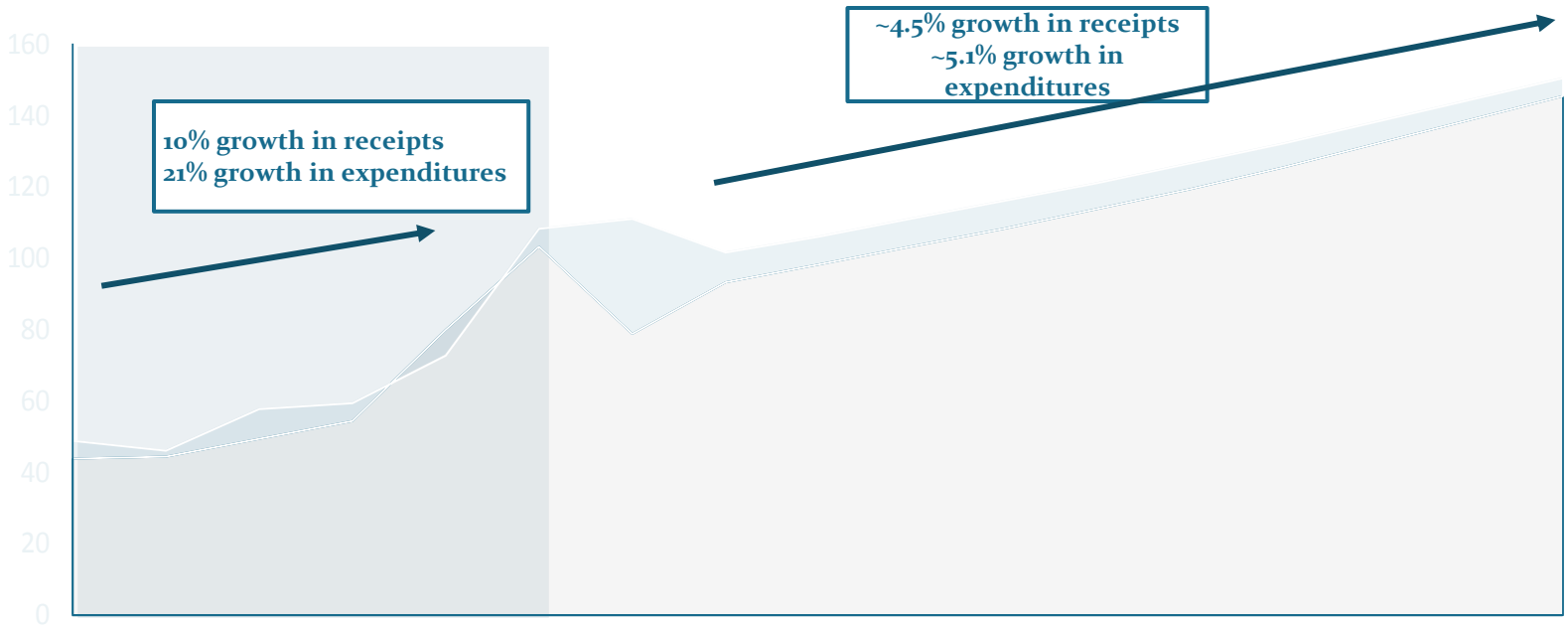
(As a % of total, INR in million)



Source: City budget documents, CEPT University analysis

Wai is expected to continue to have a surplus of ~INR 5-8 million per year available for investment

Forecast of Wai ULB's Revenue receipt and expenditure
(INR in million)



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Surplus *(million, INR)*	5	1.5	8.5	4.7	-7.2	4.6	37.4	8.2	8	7.8	7.6	7.3	6.9	6.5	6.1	5.6	5.1

Actuals

Projected

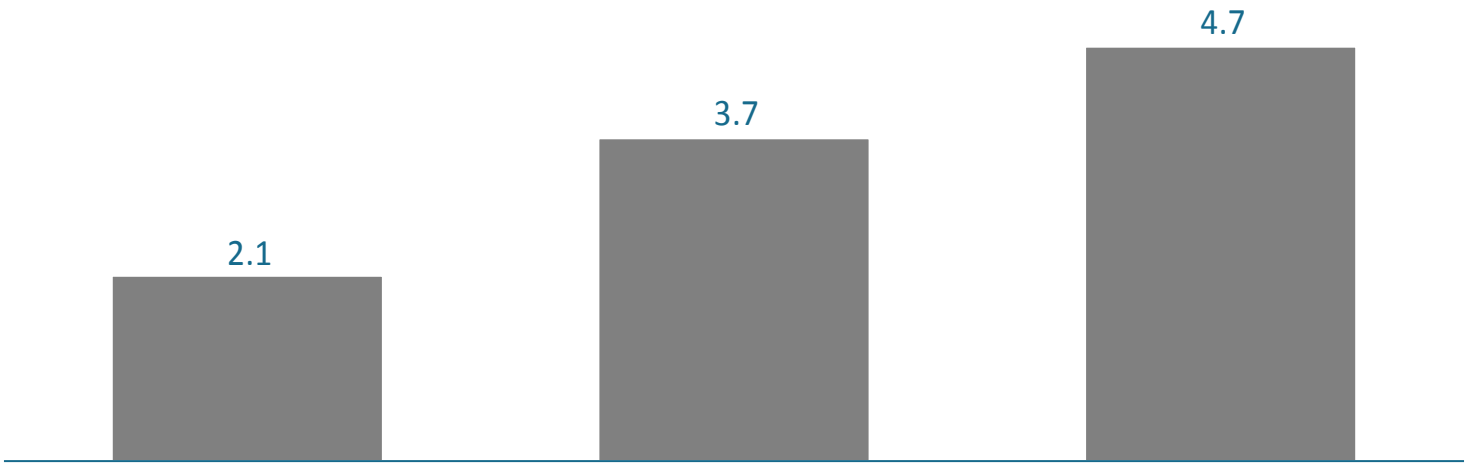
Revenue expenditure Revenue receipts

Source: City budget documents, CEPT University analysis

Appendix

Given Wai's financial status, the group toilets scheme will cost ~45% of its projected annual surplus for three years

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



	2014	2015	2016
# of households provided with toilet	419	733	941
% of annual surplus	26%	47%	62%

The toilet scheme will take up ~45% of the Wai ULB surplus between 2014 to 2022

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

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	1,558
	Cost	1,012,700

Total Cost = INR 1,012,700

+

HH survey and septic tank assessment

1	Cost of 1 HH survey	50
	# of HH surveyed	7580
	Cost	379,000
2	Cost of 1 HH survey	100
	# of HH surveyed	5193
	Cost	519,300

Total Cost = INR 898,000

1	Number of tanks to be cleaned per year	1760
	Number of trips per day, for ~300 days	6
	Number of suction emptier truck required	1
	Cost of truck	**780,340**
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 810,340

1	Amount of septage treated per day (cu. m.)	26.3
	Total septage (15 days) (cu. m.)	**394.5**
	Area of one SDB (sq. m.)	120
	Depth of septage (m)	0.3
	Capacity per bed (cu. m.)	**36**
	Number of beds req.	**11**
	Cost per bed	**2,00,000**
	Cost	**2,200,000**

Total Cost = INR 2,200,000

INR ~4.9 million

Source: CEPT University analysis for Septage Management plan of Wai

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)	16016
	Cost	**96,096**
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 941,496		

Treatment of collected septage =

1	Number of staff	3
	Monthly salary	7,000
	Cost	**252,000**
2	**Maintenance cost (5% of capital cost)**	**109,544**
Total Cost = INR 361,544		

Annual total cost

INR ~1.3 million

Note: All costs in INR,

Source: CEPT University analysis for Septage Management plan of Wai

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	Wai (No. of HH)
1	Tap water from treated source	6,831
2	Tap water from untreated Sources	174
3	Covered and uncovered well	192
4	Tubewell/Borehole	253
5	Handpump	7
6	Others	123
Total		**7580**

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	Wai (No. of HH)
1	Within the premises	5,901
2	Near the premises	503
3	Away	427
Total		**6831**

Source: Census of India 2011

Thank You