

# Training Module on Septage Management Plan

MEETRA, Nashik

22<sup>nd</sup> January , 2016

# Onsite sanitation and septage management – emerging questions

**37%** URBAN HHs TOILETS HAVE **SEPTIC TANKS**



Are septic tanks linked to soak pits

Are they built as per Codes / Specifications ?

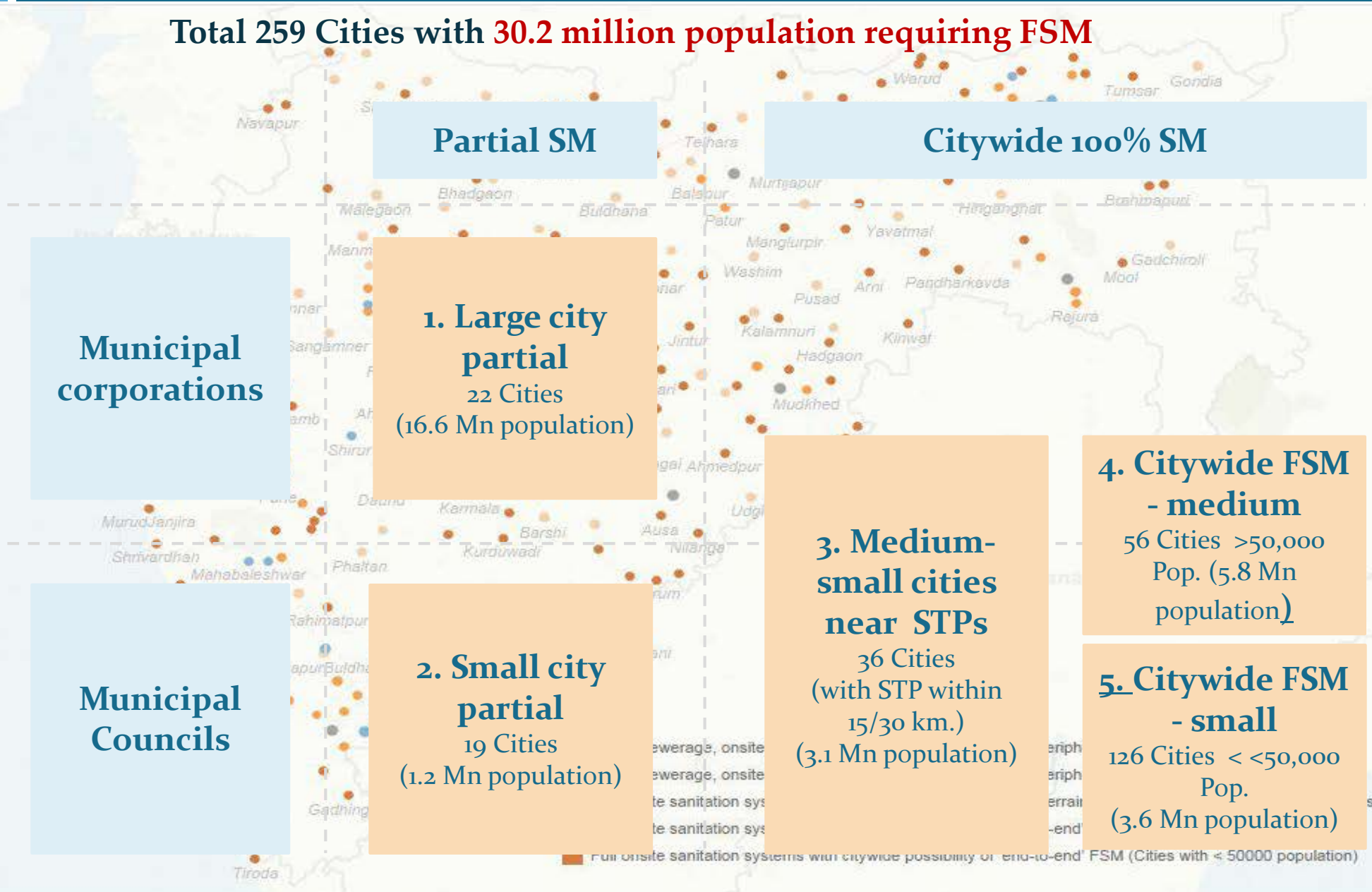
How often are they cleaned ?

Where does the effluent flow ?

What happens to the SLUDGE?

# Extent of septage management (SM) required in Maharashtra (1/2)

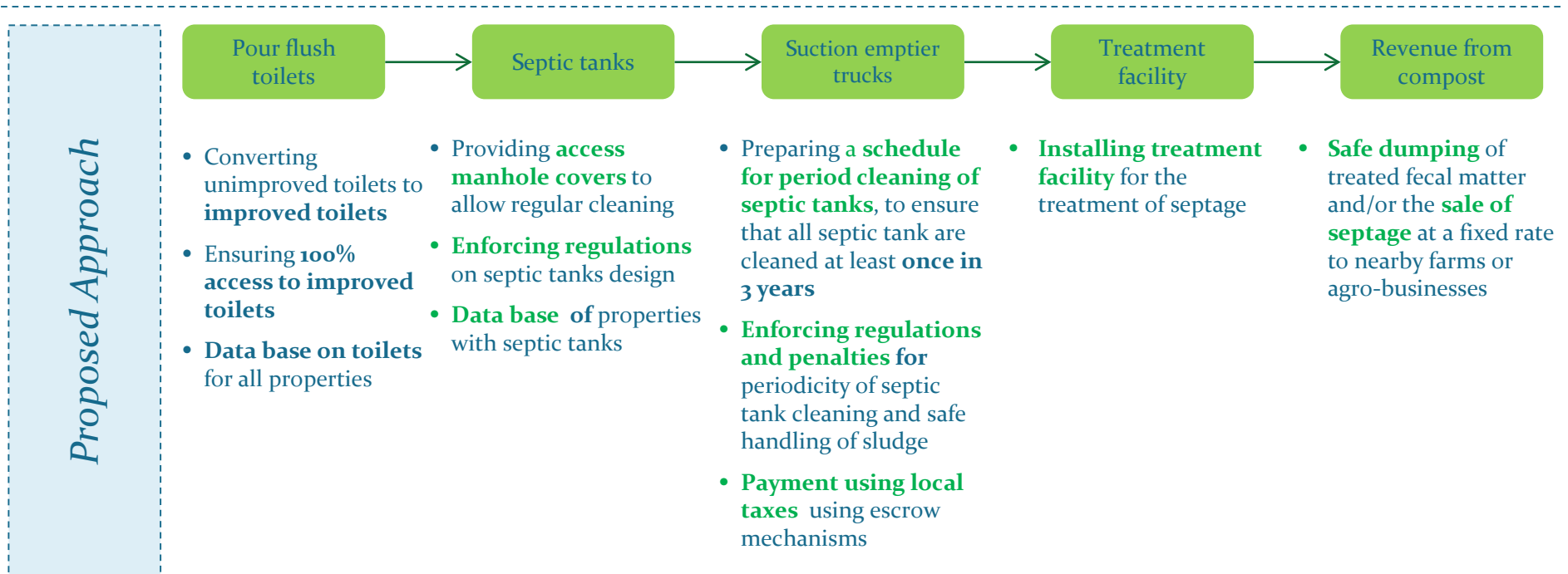
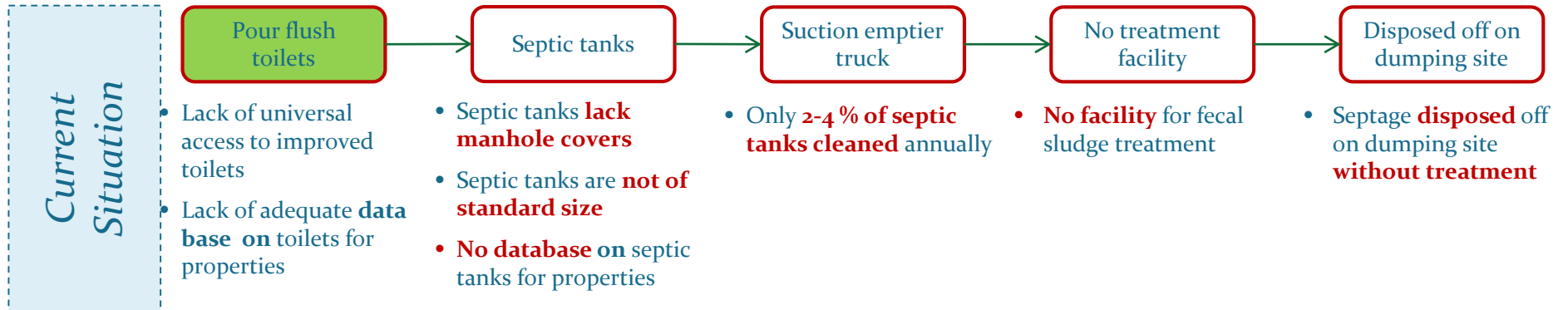
Total 259 Cities with 30.2 million population requiring FSM



# Concept of ODF , ODF +, ODF ++

	Elimination of OD practices	Access to toilets	Conveyance and treatment of faecal waste
<b>ODF City</b>	<b>No spots with regular OD practice</b> by more than 2 persons are found in the city at any time of the day.	All households, public/community/ institutions and other <b>properties have access to toilets</b> (Own or community) as per norms	All <b>toilets are connected to safe technology options</b> for disposal of faecal waste.
<b>ODF+ City</b>	<ol style="list-style-type: none"> <li>1. Not a single person found defecating in the open</li> <li>2. <b>No traces of faeces are visible</b> in the city at any time of the day.</li> </ol>	<ol style="list-style-type: none"> <li>1. All households, public/community institutions and other properties <b>have access to toilets built as per norms.</b></li> <li>2. At least <b>80%</b> of households have access to own toilets</li> <li>3. Remaining households have access to functional community toilets (with <b>≤6 HHs / seat of a community toilet</b>)</li> </ol>	<p><i>(Point 1 same as in ODF cities)</i></p> <ol style="list-style-type: none"> <li>2. <b>Regular and safe conveyance and treatment of all collected septage.</b> (in case of sewerage network, through a functional sewage treatment plant or in case of septic tanks through a septage treatment facility as per norms)</li> </ol>
<b>ODF++ City</b>	<i>(Points 1 and 2 same as in “ODF+ city”)</i>	<p><i>(Points 1 and 3, same as in “ODF+ city”)</i></p> <ol style="list-style-type: none"> <li>2. At least <b>95%</b> of households have access to own toilets</li> </ol>	<p><i>(Points 1 and 2, same as in “ODF+ city”)</i></p> <ol style="list-style-type: none"> <li>1. <b>Safe conveyance and treatment of all waste water</b> (including septic tank effluent and grey water).</li> </ol>

# End-to-end IFSM solution – From red to green



The background features abstract, overlapping geometric shapes in various shades of green, ranging from light lime to dark forest green. The shapes are primarily triangles and polygons, creating a dynamic, layered effect. The text is centered in the white space between these shapes.

# SEPTAGE Management need of hour

# Swachh Bharat Mission



## Mission objectives

- Elimination of open defecation
- Eradication of Manual Scavenging
- Modern and Scientific Municipal Solid Waste Management
- To effect behavioral change regarding healthy sanitation practices
- Generate awareness about sanitation and its linkage with public health
- Capacity Augmentation for ULB's
- To create an enabling environment for private sector participation in Capex (capital expenditure) and Opex (operation and maintenance)

# National Urban Sanitation Policy and City Sanitation Plans

- ❖ India's National Urban Sanitation Policy (NUSP, 2008) defines sanitation as "safe management of human excreta, including its safe confinement treatment, disposal and associated hygiene-related practices." The NUSP envisages preparation of State Sanitation Strategies by States, and City Sanitation Plans (CSPs) by cities. The overall goal of the NUSP is "to transform Urban India into community-driven, totally sanitized, healthy and liveable cities and towns."



## The NUSP highlights

- safe and hygienic facilities with proper disposal
- Proper disposal and treatment of sludge from on-site installations (septic tanks, pit latrines, etc.)
- Proper Operations and Maintenance (O&M) of all sanitary facilities
- The awareness generation, attention to the full-cycle of sanitation from safe collection to safe disposal, comprehensive provision and operations and maintenance management of household level arrangements and treatment systems.

# The National Urban Sanitation Policy (NUSP): Policy Goals

## A Awareness Generation and Behaviour Change

- a. Generating awareness about sanitation and its linkages with public and environmental health amongst communities and institutions
- ; b. Promoting mechanisms to bring about and sustain behavioural changes aimed at adoption of healthy sanitation practices;

## B Open Defecation Free Cities

- a. Promoting access to households with safe sanitation facilities (including proper disposal arrangements);
- b. Promoting community-planned and managed toilets wherever necessary, for groups of households who have constraints of space, tenure or economic constraints in gaining access to individual facilities;
- c. Adequate availability and 100 % upkeep and management of Public Sanitation facilities in all Urban Areas, to rid them of open defecation and environmental hazards;

## C Integrated City-Wide Sanitation

- a. Mainstream thinking, planning and implementing measures related to sanitation in all sectors and departmental domains as a cross-cutting issue, especially in all urban management endeavours;
- b.b. Strengthening national, state, city and local institutions (public, private and community) to accord priority to sanitation provision, including planning, implementation and O&M management;
- c.c. Extending access to proper sanitation facilities for poor communities and other un-served settlements;

## D Sanitary and Safe Disposal:

- a. Promoting proper functioning of network-based sewerage systems and ensuring connections of households to them wherever possible;
- b.b. Promoting recycle and reuse of treated waste water for non potable applications wherever possible will be encouraged.
- c.c. Promoting proper disposal and treatment of sludge from on-site installations (septic tanks, pit latrines, etc.);
- d. Ensuring that all the human wastes are collected safely confined and disposed of after treatment so as not to cause any hazard to public health or the environment.

## Defination -

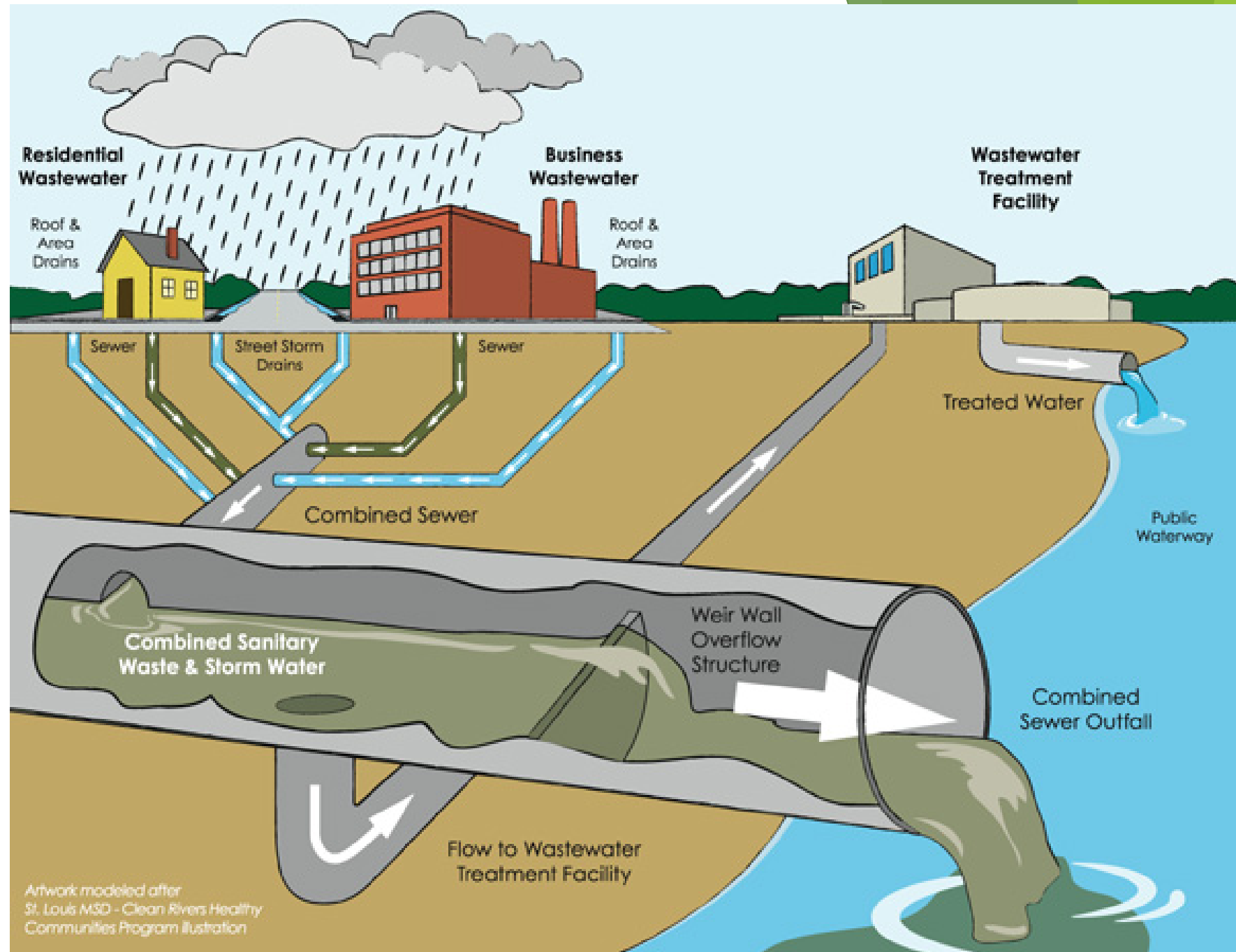
The partially treated sewage that is stored in a septic tank is commonly called as Septage. It includes the liquids, solids (sludge), as well as the fats, oils and grease (scum) that accumulate in septic tanks over time.

## Septage management -

Septage management includes the entire process of design, collection, safe treatment & disposal of septage based on generation of sewage.

A comprehensive program that regulates periodic septic tank cleaning, as well as septage transport, treatment, re-use, and disposal is important in the context of our rapidly urbanizing economies.

# Combined Sewer Scheme





# Water Requirements for Sewer scheme

Bathing	- 55 Litres
Washing of Cloths	- 20 Litres
Flushing of WC	- 30 Litres Litres
Washing the House	- 10 Litres
Washing the Utensils	- 10 Litres
Cooking	- 05 Litres
Drinking	- 05 Litres
Total	----- =135 Litres

# Benefits of septage management over the conventional sewerage systems

	CONVENTIONAL SEWERAGE	SEPTAGE MANAGEMENT
Water Requirement	High (>135lpcd) <span style="color: red;">●</span>	Low <span style="color: green;">●</span>
Capital Costs	High <span style="color: red;">●</span>	Low <span style="color: green;">●</span>
O & M Costs	High <span style="color: red;">●</span>	Low <span style="color: green;">●</span>
Technical Expertise	High-Conveyance <span style="color: red;">●</span> High - Treatment <span style="color: red;">●</span>	Low - Conveyance <span style="color: green;">●</span> Low - Treatment <span style="color: green;">●</span>
Maintenance requirement	High - on Service Provider <span style="color: red;">●</span> Low - on Households <span style="color: green;">●</span>	Low - on Service Provider <span style="color: green;">●</span> High - on Households <span style="color: red;">●</span>
Required capacity to operate	High <span style="color: red;">●</span>	Low <span style="color: green;">●</span>
Implementation challenges	High <span style="color: red;">●</span>	Low <span style="color: green;">●</span>

# Key Elements of Septage Management

- I. Design and Construction of Septic Tanks
- II. Septic Tank Pumping & De-Sludging
- III. Septage Transportation
- IV. Treatment & Septage Disposal
- V. Fees/Charges for Collection, Transportation and Treatment
- VI. Information, Education and Communication
- VII. Record-keeping and Reporting (MIS)

## Module 2 : Key components of Septage Management Plan

# **Key components** of Septage Management Plan

- 1. Assessment of existing toilets and septic tanks through surveys and creation of database**
- 2. Design and construction / refurbishment of septic tanks**
- 3. Desludging of septic tanks**
- 4. Scheduled septic tank emptying services**
- 5. Treatment of faecal sludge / septage**

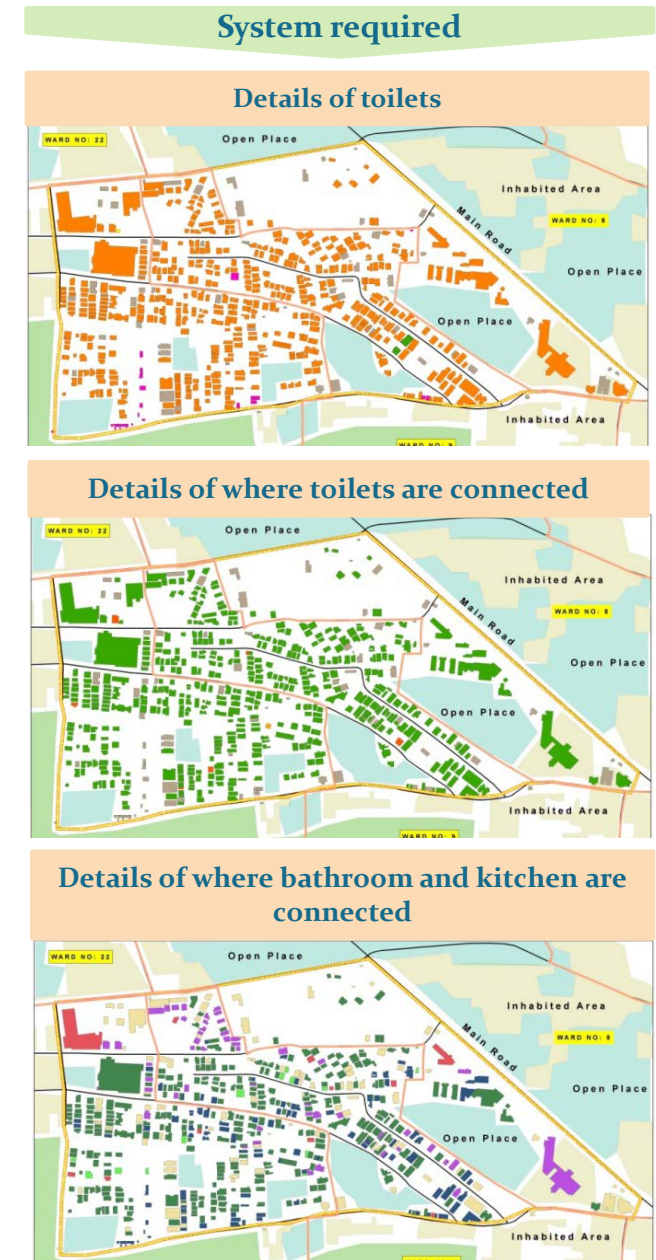
# Assessment of existing toilets and septic tanks through surveys and creation of database (1/2)

## Present system

- ❑ **No database of toilets, septic tanks** for HHs
- ❑ **No ready database** to show **how often** a **septic tank** is being **cleaned** and at which location in the city

## Creating database and improving monitoring :

- ❑ **Create GIS database** for each HHs / property depicting **details on Toilets, septic tanks**, soak pits details
- ❑ **Update of HHs / property** on server through mobile application or reporting systems **once** the **septic tank** is **cleaned**
  - ❑ Automatic reminder sent to the HHs after 3 years to clean the septic tank



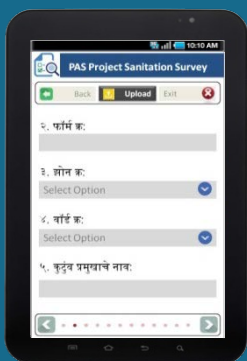
# Assessment of existing toilets and septic tanks through surveys and creation of database(2/2)

## Assessment should capture the following aspects

- ❑ Toilet availability
- ❑ Where is the toilet connected to
- ❑ Size and shape of septic tank
- ❑ Number of chambers in septic tank
- ❑ Access covers to septic tanks
- ❑ Accessibility of septic tanks
- ❑ When was the septic tank last cleaned.
- ❑ Cleaning frequency of septic tanks
- ❑ Problems encountered while cleaning of septic tanks
- ❑ Reasons for emptying septic tanks

## Sample Questionnaire

Toilet availability assessment	
19	Where do you dispose greywater from kitchen and bathroom? (1. Sewer, 2. Septic tank, 3. Soak Pit, 4. Covered drains, 5. Open drains, 6. Others, specify, 7. Don't Know)
20	Do you have your own toilet on your premises? 1. Yes 2. No.
21	If 20=1, Does any member of the household still go for defecation in the open? (1. Men. 2. Women. 3. Children. 4. No one)
Septic tank assessment	
22	What is the type of toilet facility is being used? (1. Flush/pour flush toilet connected to piped sewer system, 2. Flush/pour flush toilet connected to septic tank, 3. Flush/pour flush toilet connected to other system, 4. Single Pit toilet with slab, 5. Single pit toilet with ventilated improved pit, 6. Single pit toilet without slab / open pit, 7. Twin/Double pit toilet , 8.Night soil disposed into open drain, 9.Service toilet with night soil removed by humans, 10. Service toilet with night soil services by animals)
If Q22 is 2 (toilet connected to Septic tank) answer 23 to 46	
If Q22 is not 2 (toilet connected to Septic tank) go to B	
23	No. of septic tanks in the property (1.Number _____, 2. Don't know)
24	Distance of septic tank from the nearest well/bore (1. Distance _____ ft. to on-site system, 2.Don't know)
25	Septic tank outfall is connected to (1. Soak pit, 2. Open drain, 3. Covered drain, 4. Others (Specify) 5. Don't Know)
26	What is the average frequency of cleaning of septic tank? (1. 1 year, 2. 2 years, 3. 3 Years, 4. 4 Years 5. More than 5 years, 6. Don't Know)
27	What is the shape of your septic tank (1. Rectangular, 2. Circular, 3. Don't Know)
28	Can you provide the dimensions of the septic tank? (1. Yes 2. No.)
29	If Q. no 27= 1 and Q.no 28= 1, provide L _____ ft, B _____ ft., H _____ ft.
30	If Q. no 27= 2 and Q.no 28=1, provide Diameter _____ ft., Depth _____ ft.
31	How many chambers are there in the septic tank (1. one, 2. two , 3. three, 4. Don't Know)
32	The base of septic tank is (1. Sealed with concrete and /or plaster, 2.No base – only soil, 3.Other, please specify, 4. Don't know)
33	Are there ventilation pipes for septic tanks (1.Yes, 2. No)
34	What construction materials have been used for constructing septic tanks? (1. R.C.C, 2. Cement concrete and brick, 3. Prefabricated unit, 4. Don't Know, 5. Other, specify)
35	What is the age of septic tank? (1. No. of years _____, 2. Don't know)
Where is septic tank located? (1.Front yard. 2.Back yard (easy access). 3.Back yard (no access/through house). 4. House	



PAS has developed a Mobile App- “SaniTab” for conducting household level sanitation surveys, which can be used by the ULBs

# **Key components** of Septage Management Plan

1. **Assessment of existing toilets and septic tanks through surveys and creation of database**
2. **Design and construction / refurbishment of septic tanks**
3. **Desludging of septic tanks**
4. **Scheduled septic tank emptying services**
5. **Treatment of faecal sludge / septage**



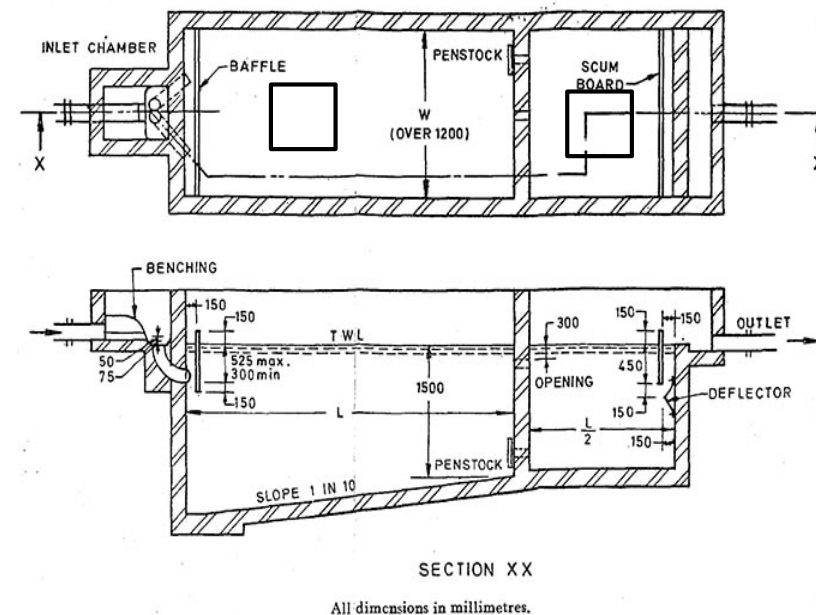
# Design and construction / refurbishment of septic tanks

- The **septic tanks** need to be **designed and constructed** as per the **norms** suggested in:
  - *Swachh Bharat Mission Guidelines, 2014*
  - *Manual on Sewerage and sewage treatment systems , CPHEEO, 2013*
  - *National Building Code of India, 2005*
  - *IS: 2470 - Code of practice for installation of septic tanks - Part 1: Design and Construction and Part 2: Secondary treatment and disposal of septic tank effluent 1985 (Reaffirmed 1996).*
- **Notices** should be issued to all **property owners** whose **septic tanks do not meet the standard septic tank design**.
- All **insanitary toilets** need to be **converted to sanitary toilets** with twin pits or septic tanks

No. of Users	Length(M)	Breadth(M)	Liquid Depth (Cleaning interval of)	
			2 Years	3 Years
Recommended size of septic tank up to 20 users				
5	1.50	0.75	1.00	1.05
10	2.00	0.90	1.00	1.40
15	2.00	0.90	1.30	2.00
20	2.30	1.10	1.30	1.80
Recommended size of septic tank for housing colony upto 300 users				
50	5.00	2.00	1.00	1.2
100	7.50	2.65	1.00	1.2
150	10.00	3.00	1.00	1.2
200	12.00	3.30	1.00	1.24
300	15.00	4.00	1.00	1.24

Note : A provision of 300 mm should be made for free board.

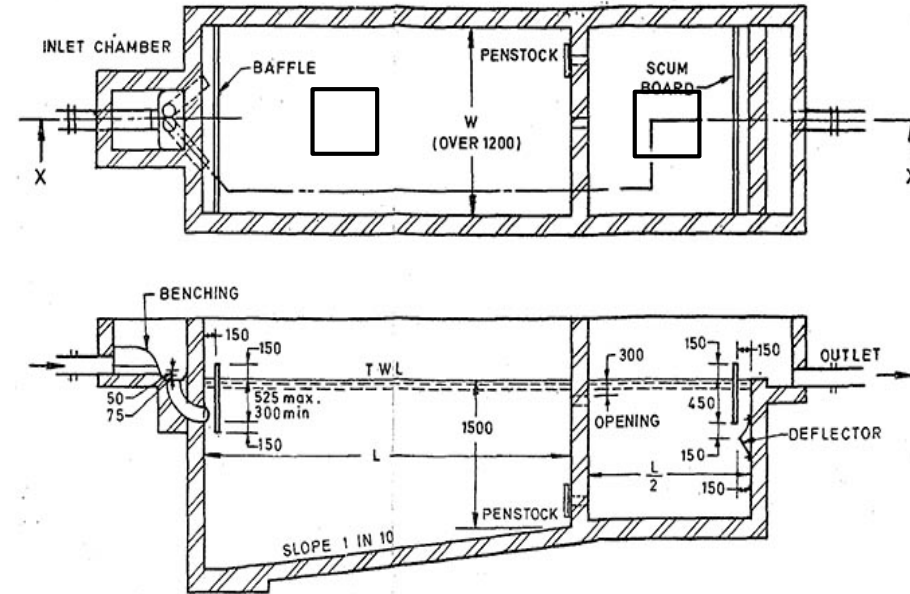
Typical sizes of septic tanks for various user sizes



Typical two compartment septic tank

# Design considerations for septic tanks . . .

- Septic tank should be designed for **1 to 2 days of retention.**
- The septic tanks are **normally rectangular** in shape and **two chambered**, with **first chamber  $2/3^{\text{rd}}$  in length of 2<sup>nd</sup> Chamber**
- The **liquid depth is 1-2 m** and the **length to breadth ratio is 2-3 to 1**
- For **circular tanks the minimum diameter shall not be less than 1.35 m** and **operating depth shall not be less than 1.0 m.**



Typical two compartment septic tank

- Each compartment of a septic tank shall be provided with a **rectangular access opening** measuring not less **455 × 610 mm** or a **circular opening 500 mm diameter**
- Ventilating Pipe—Every septic tank shall be provided with **ventilating pipe of at least 50 mm diameter.** The **top of the pipe** shall be provided with a **suitable cage of mosquito proof mesh.**

# Construction considerations for septic tanks . . .

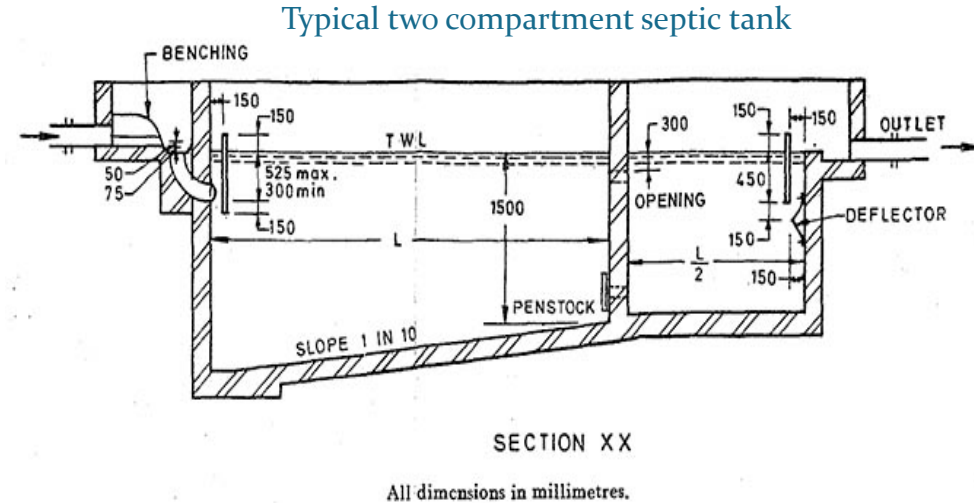
- **Baffles** are generally provided at both inlet and outlet which dip 25 cm to 30 cm into and project 15 cm above the liquid.

- For **two compartment septic tanks**, the tanks should be interconnected above the sludge storage level by means of pipes or square openings of diameter or side length respectively of not less than 75 mm

- Septic tanks may either be constructed in brick work, stone masonry or concrete cast in situ or pre-cast materials

- The floor of the tank should be of cement concrete and sloped towards the sludge outlet. Both the floor and side wall shall be plastered with cement mortar to render the surfaces smooth and to make them water tight.

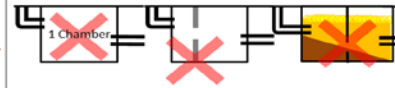
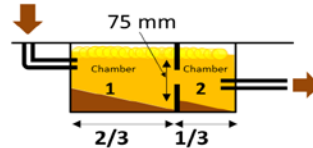
- The height of the ventilation pipe should extend at least 2 m above the top of the highest building within a radius of 20 m



# Do's and Don'ts for septic tank construction . . .

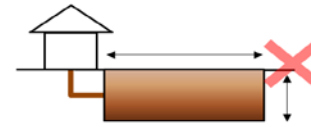
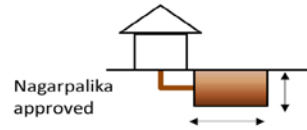
## ✓ **Dos** and ✗ **DON'Ts**

- ✓ Construct at least a two chambered septic tank
- ✓ Partition wall should be constructed at a distance of 2/3 the length from the inlet
- ✓ The 2 chambers should be interconnected above the sludge storage level by means of a pipe or square opening of diameter or side length not less than 75 mm



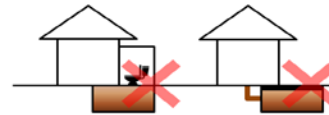
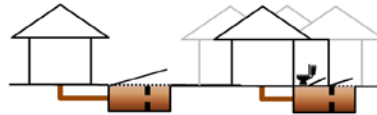
- ✗ Do not construct a one chambered septic tank
- ✗ Do not construct a partition wall at an inappropriate distance
- ✗ Do not provide the interconnection at a level where the sludge or scum is formed

- ✓ The size of the tank should be as per Nagarpalika norms



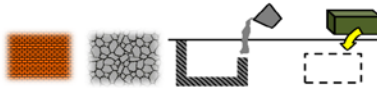
- ✗ Do not construct an oversized septic tank

- ✓ Always construct septic tank away from structure
- ✓ If space not available, construct toilet over septic tank such that all chambers are accessible
- ✓ Provide openable access covers to all chambers for inspection and desludging



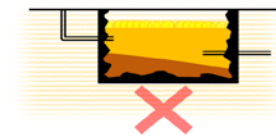
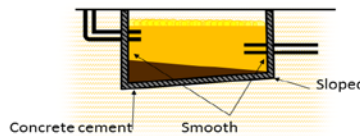
- ✗ Do not construct toilet above septic tank
- ✗ Do not completely seal the septic tank from top

- ✓ Septic tanks should be constructed in materials such as brick, stone, concrete (cast in-situ) or be of pre-cast materials



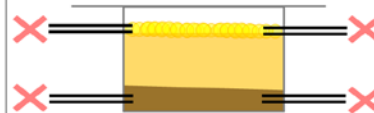
- ✗ Do not use a dug trench as septic tank
- ✗ Tank should not leak

- ✓ The base or floor should be cement concrete and sloped upwards to the outlet
- ✓ The floor and sides should be plastered with cement mortar to render the surfaces smooth



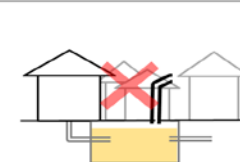
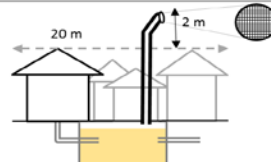
- ✗ Do not keep the base level or slope downwards to the outlet
- ✗ The inside surfaces of the septic tank should not be rough

- ✓ The inlet and outlet should be located at different levels
- ✓ The inlet and outlets should be below scum level and above sludge level
- ✓ Baffles or T junctions should be provided at inlet and outlet



- ✗ The inlet and outlet should not be located at such levels where the sludge or scum collects
- ✗ Inlet and outlet should not be at same level to prevent backflow or exit of solids

- ✓ Septic tank should be provided with ventilation pipes, the top being covered with mosquito proof wire mesh
- ✓ The height of the pipe should extend at least 2 m above the top of the highest building within a radius of 20 m



- ✗ Do not leave ventilation pipe unprotected from mosquitoes
- ✗ Do not keep the ventilation pipe too short

# **Key components** of Septage Management Plan

1. **Assessment of existing toilets and septic tanks through surveys and creation of database**
2. **Design and construction / refurbishment of septic tanks**
3. **Desludging of septic tanks**
4. **Scheduled septic tank emptying services**
5. **Treatment of faecal sludge / septage**

# Desludging of septic tanks

As per **Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013**, **desludging** / emptying of septic tanks will be **undertaken by mechanical devices** like suction emptier trucks / vacuum tankers

For septic tanks which have proper access roads, a larger vehicle maybe used



For septic tanks located in narrow lanes or those that do not have proper access roads, smaller vehicles maybe used



As per *CPHEEO Manual* on Sewerage and Sewage Treatment , 2013

IS : 2470 (Part I & II), 1985 on Code of Practice for Installation of Septic tank

*“Yearly desludging of septic tank is desirable, but if it is not feasible or economical, then septic tanks should be cleaned at least once in two - three years, provided the tank is not overloaded due to use by more than the number of persons for which it is designed”*

# Recommendations for desludging as per MoUD Advisory

## Desludging of Septic tanks

- ❑ **De-sludging** of septic tanks - using **mechanical devices**
- ❑ **De-sludging frequencies** of septic tanks once every **2 to 3 years**, or when the tank becomes one third full
- ❑ Periodical desludging will help **reduce the pollution levels in the effluent**
- ❑ **1-2 inch of sludge** should be **left in tank** to **facilitate** future **decomposition**
- ❑ **Regular desludging** activities will **require well-organized** community and **public/private service providers**
- ❑ **Tanks should not be scrub** cleaned or **washed with detergent**

## Transportation

- ❑ **Vehicles** are available in different **capacities** from **2,000 to 12,000 litres**.
- ❑ Small scale vacuum trucks called **Vacutug** are recommended for **areas inaccessible** to large vehicles
- ❑ The **no. of cleaning machines** - based on frequency of **cleaning**, **distance** of **location of treatment facility** and local conditions
- ❑ A **Transportation Plan** should be formulated which **should include**:
  - **Scheduling** and routing for **trucks**
  - **Customer service protocols**
  - **Locating** tanks and cleanouts with **proper pumping** equipment operation and worker safety
  - Transportation requirements, including rules of the road
  - **Disposal procedures** at the treatment facility
  - **Routine service** of equipment
  - **Recordkeeping** for all tanks pumped and wastes discharged at the disposal facility

# From complaint Redressal



# To regular service

## Current septage management practice

~2-4% of tanks cleaned per year  
(once in >8-10 years)

## Recommended septage management practice

~33% of tanks cleaned per year  
(once in 3 -5 years)

### Current barriers

- 1 Cleaning is done **on-call** by the household, who do not see the need for regular cleaning  
  
The **cleaning services** of the ULB are currently treated as a **complaint redressal** system for overflowing septic tanks rather than a regular cleaning and maintenance service
- 2 Each town mainly has only **1 truck, owned and operated by the ULB**
- 3 Households generally pay ~INR **400-1000** to get **tanks cleaned**, but only once in >8-10 years when the tanks overflow

### Proposed solution

- 1 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
- 2 Each town will now require an additional **1- 3 trucks to meet service standards**, which can be **operated by a private player**
- 3 **Local taxes levied** by the ULB as **per municipal act<sup>1</sup>** will be used to **recover the operating expenses** for regular cleaning

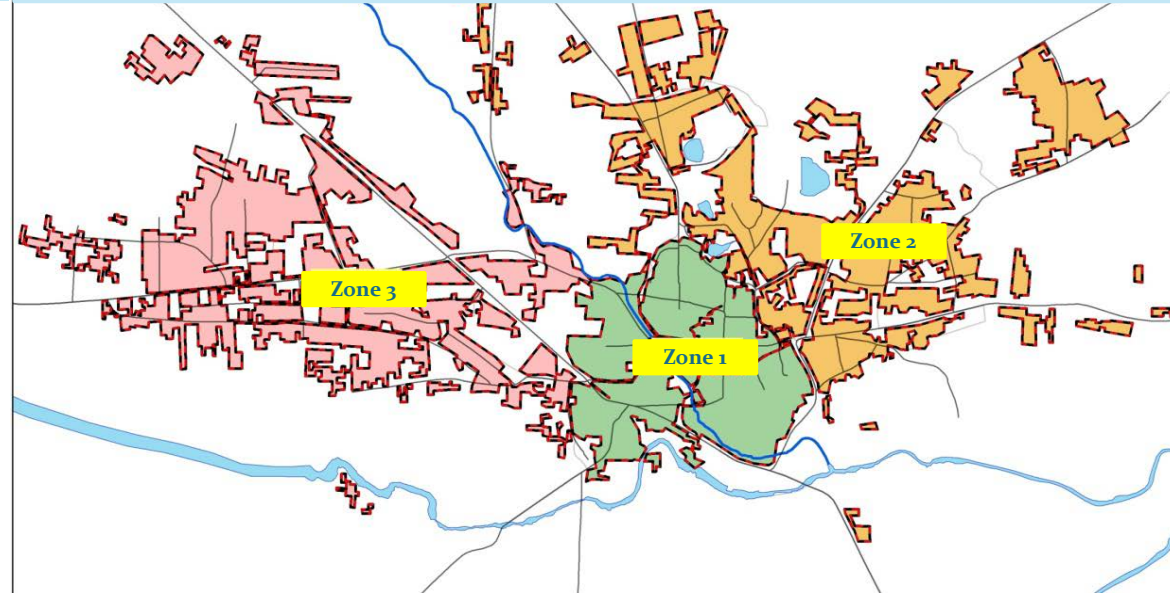


# Planning for a scheduled septic tank emptying services – Answer following questions . . .

Septic tank cleaning cycle  
of \_\_\_\_ years

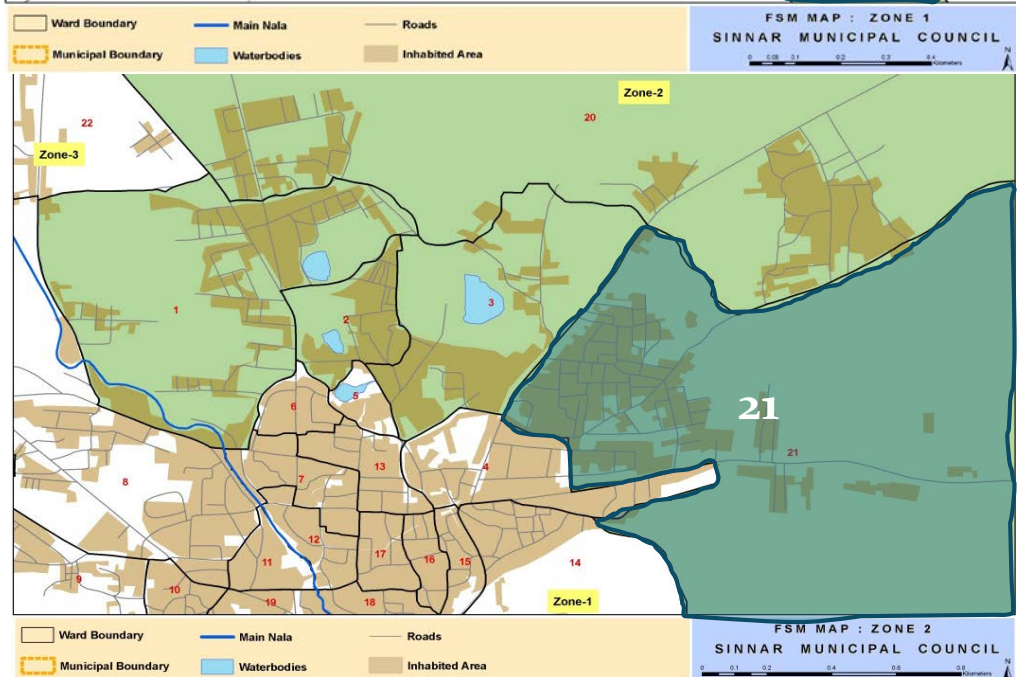
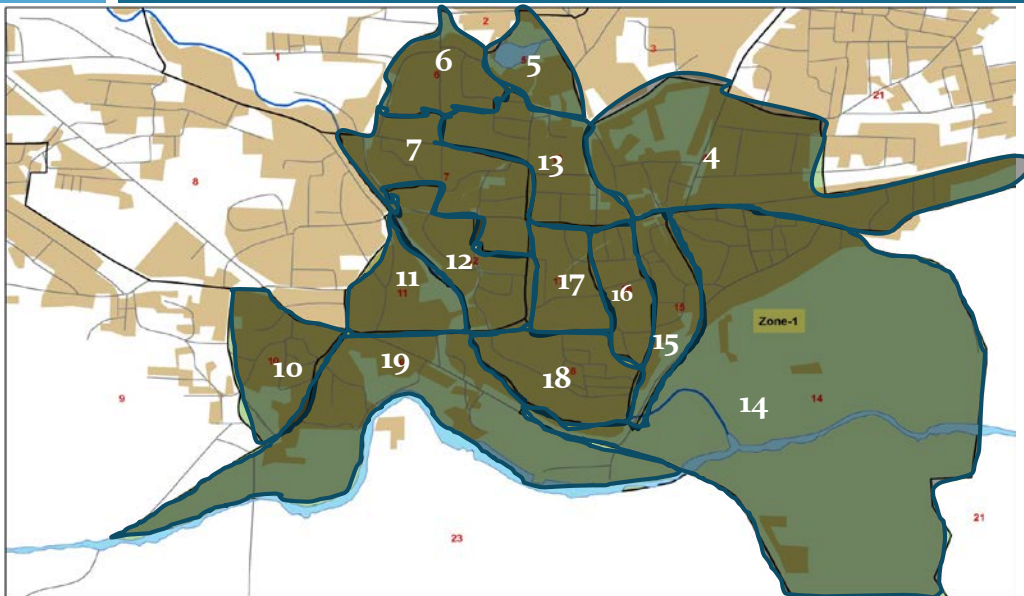
- To maintain a cycle of \_\_\_\_ years, roughly \_\_\_\_ nos of septic tanks need to be cleaned annually
  - To clean \_\_\_\_ septic tanks, \_\_\_\_ nos of suction emptier trucks of \_\_\_\_ capacity would be required
  - Each vehicle needs to make \_\_\_\_ trips daily
  - Roughly \_\_\_\_ Working Days are required
- \_\_\_\_ nos of trucks of \_\_\_\_ litre capacity are required for cleaning HHs and non-residential septic tanks

Divide the city into zones and prepare a yearly plan



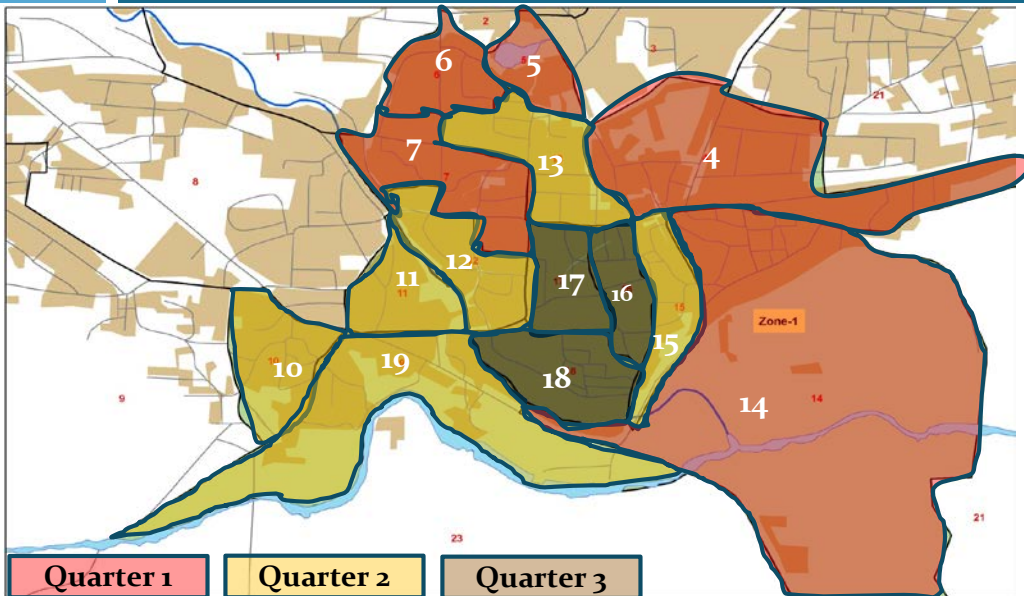
Year	Zones	No. of septic tanks to be cleaned annually (no)	No. of Days required
Year 1	Zone 1	1889	201
	Zone 2	947	101
	Total	2836	302
Year 2	Zone 2	1262	135
	Zone 3	1582	169
	Total	2844	303
Year 3	Zone 3	2762	294
	Total	2762	294

# Prepare a **scheduled desludging service plan for each year.** . .

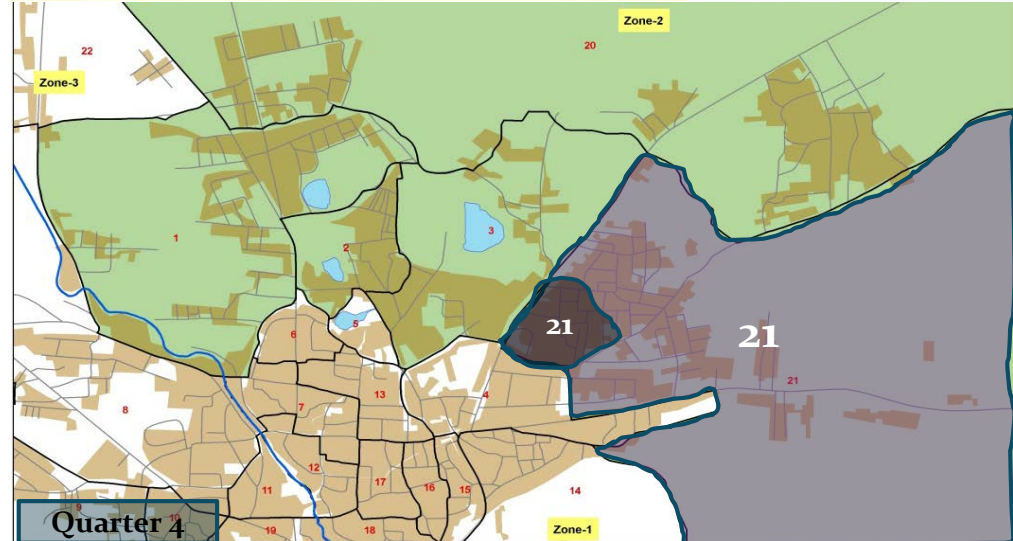


		Year 1	
Zone	Ward	No. of septic tanks to be emptied	No. of days required
Zone 1	4	62	7
	5	25	3
	6	183	20
	7	357	38
	10	71	8
	11	101	11
	12	195	21
	13	226	24
	14	53	6
	15	68	7
	16	127	14
	17	199	21
	18	146	16
	19	76	8
Zone 2	21	947	101
<b>Total</b>		<b>2836</b>	<b>302</b>

# Then develop a **quarterly desludging** service plan for a given **year** . . .



FSM MAP : ZONE 1  
SINNAR MUNICIPAL COUNCIL



FSM MAP : ZONE 2  
SINNAR MUNICIPAL COUNCIL

Year 1				
Zone	Quarter Plan	Ward	No. of septic tanks to be emptied	No. of days required
Zone 1	Q 1	4	62	7
		5	25	3
		6	183	20
		7	357	38
		14	53	6
		Sub Tot	680	74
	Q 2	10	71	8
		11	101	11
		12	195	21
		13	226	24
		15	68	7
		19	76	8
	Sub Tot	737	79	
	Q 3	16	127	14
		17	199	21
18		146	16	
21		235	25	
Sub Tot		707	75	
Zone 2	Q 4	21	713	76
		Sub Tot	713	76
Total			2836	302

# Licensing of septage transporters for providing scheduled services

- **ULBs should either provide the emptying services themselves or enter into appropriate management contracts with private agencies.**
- **In case of private sector contract, ULBs should certify and license private septage transporters to de-sludge and transport waste to the designated treatment facility.**

## Septage Transporter Permit for \_\_\_\_\_ Municipality

In accordance with all the terms and conditions of the current \_\_\_\_\_ Municipality's Rates, Rules and Regulations, the special permit conditions accompanying this permit, and all applicable rules, laws or regulations of Government of Maharashtra, permission is hereby granted to:

NAME OF PERMITTEE: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

For the disposal of septage from domestic septic tank or commercial holding tank at the \_\_\_\_\_ treatment facility.

This Permit is based on information provided in the Septage Transporter Permit application which constitutes the Septage Management Hauled Permit.

This Permit is effective for the period set forth below, may be suspended or revoked for Permit Condition Non Compliance and is not transferable. The original permit shall be kept on file in the Permittee's office. A copy of this Permit shall be carried in every registered vehicle used by the permittee.

EFFECTIVE DATE:

EXPIRATION DATE:

\_\_\_\_ CHECK IF RENEWED PERMIT

Permit is liable to be cancelled in case of violations of any Acts, Rules and Regulations relating to the operation of Septage System or in cases of safety protocols not being adhered to or in case of non-permitted disposals.

**Sample licensing format<sup>1</sup>**

# **Key components** of Septage Management Plan

1. **Assessment of existing toilets and septic tanks through surveys and creation of database**
2. **Design and construction / refurbishment of septic tanks**
3. **Desludging of septic tanks**
4. **Scheduled septic tank emptying services**
5. **Treatment of faecal sludge / septage**

# Dumping site वर मैलाची साधारण विल्हेवाट



# Treatment of faecal sludge / septage as per MoUD advisory

## Treatment / Reuse / Disposal

### ❑ Treatment at existing sewage treatment plants

- Septage addition at the **nearest sewer manhole**
- Septage addition **at the STP**
- Septage addition to **sludge digesters/sludge drying beds**

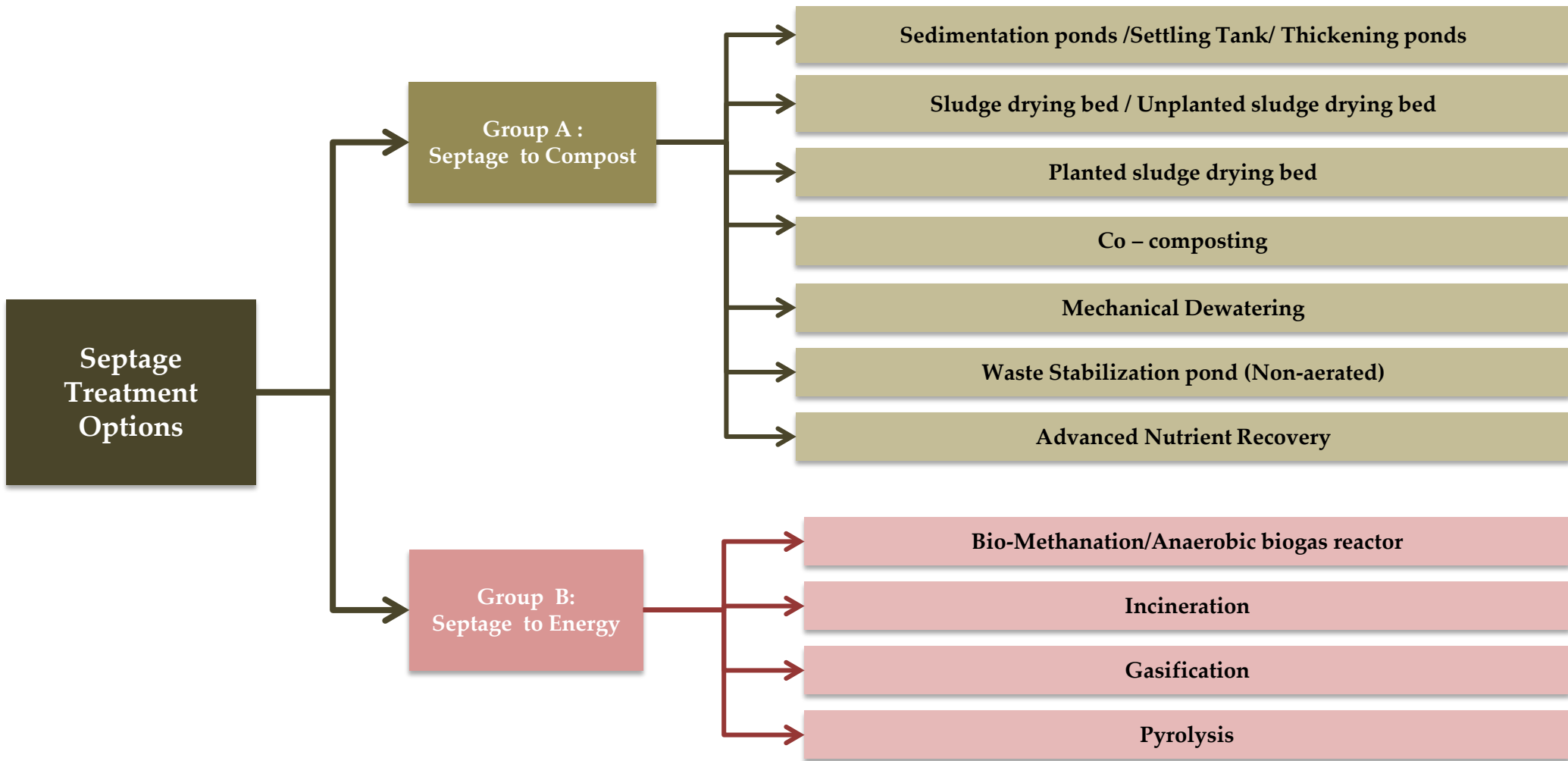
### ❑ Treatment at independent septage treatment plants

- **Space is not a constraint** : Lime treatment, Sludge drying beds, Anaerobic baffled reactor, stabilization pond, Constructed wetland, co-composting with solid waste
- **Space is a constraint** : Mechanical Dewatering system

### ❑ Properly treated sludge can be reused to reclaim parched land by application as **soil conditioner**, and/or as a **fertilizer**



# Septage treatment options based on outputs. . .





# Comparison across various aspects for treatment options that convert SEPTAGE to ENERGY

Sr No	Technologies / Parameters	Bio-Methanation/ Anaerobic biogas reactor	Incineration	Gasification	Pyrolysis
1	Operational Energy Demand	Limited (Except for advanced sludge pre-processing methods)	High	Very High	High
2	Energy Recovery Efficiency	50-70%	50-60%	70-80%	70-80%
3	Energy Product and its applications	Methane as a fuel for heat, electricity and transport Compost-Soil fertilizer	Electricity or heat from hot steam/air	Syngas - As fuel for heat and electricity	Pyrolytic oil as industrial fuel in boilers. Char as solid fuel for heat production in furnaces and medium for soil amendment
5	Capital cost	Medium-High	Medium-High	High	High
6	O&M Cost	Medium-High	Medium-High	High	High
7	Land Requirement	Low (Underground Construction)	Low	Low	Low

# Comparison across various aspects for treatment options that convert SEPTAGE to COMPOST

Sr No	Technologies / Parameters	Sedimentation ponds /Settling Tank/ Thickening ponds	Sludge drying bed / Unplanted sludge drying bed	Planted sludge drying bed	Co - Composting	Deep row entrenchment	Mechanical Dewatering	Waste stabilization pond ( Non - aerated)	Advanced nutrient recovery
1	Expertise for design	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
2	Built with Local materials	Yes	Yes	Yes	Yes	Yes	No	Yes	No
3	Expertise for construction	No	No	No	No	No	Yes	Yes	Yes
4	Expertise for operations	No	No	Yes	No	No	Yes	Yes	Yes
5	Capital cost	Low	Moderate	Moderate	Low	Low	High	Variable	Very High
6	Land required	High	Moderate	High	High: cold climates, average : warmer climates	High	Low	High	Low
7	O & M cost	Low	Low to Medium	Low	Medium	Low	High	Low	Very High
8	Resting period (i.e No. of days / months / years )	SP : 8-12 Months; ST: 2-4 months	10-15 days	2-3 years / 5-6 Years	6-8 weeks	-	-	Anaerobic ponds - 1 to 7 days Facultative ponds - 5 to 30 days	-

# Quality Standards for Reuse of treated Septage

- **Dewatered septage/sludge use as a fertilizer in agriculture**, should satisfy criteria of **Class A Bio-solids of US EPA** :
  - Fecal coliform density < 1000 MPN/g total dry solids
  - Salmonella sp. Density < 3MPN/4g total dry solids
  - Helminth egg concentration < 1/g total dry solids (WHO, 2006)
  - E – Coli of 1000/g total solids (WHO, 2006)

- **As per MSW Rules, 2000** compost quality should not exceed the prescribed limit as below:

Parameter	Concentration not to exceed (mg/kg dry basis, except for pH and carbon to nitrogen ratio)
Arsenic	10
Cadmium	5
Chromium	50
Copper	300
Lead	100
Mercury	0.15
Nickel	50
Zinc	1000
C/N ratio	20 – 40
pH	5.5 – 8.5

Properly **treated sludge** can be **reused to reclaim parched land** by application as soil conditioner, and/or as a fertilizer.

**Deteriorated land areas**, which cannot support the plant vegetation due to lack of nutrients, soil organic matter, low pH and low water holding capacity, can be **reclaimed and improved by the application of treated septage**

**Drip irrigation** is the preferred irrigation method for **settled septage effluent** when irrigation is feasible. Crops which could be safely grown are corn, fodder, cotton, trees including fruit trees, eucalyptus and poplar.

**Aquaculture** can be practiced for **settled septage effluent** when **freshwater is available to achieve dilution to ensure dissolved oxygen is above 4 mg /l**. Fish species of tilapia and carp are preferred since they tolerate low dissolved oxygen

# Module 3 : Institutional and governance aspects in Septage Management

# **Institutional and governance aspects** in Septage Management

1. **Regulations** for Septage management systems
2. **Awareness generation and capacity building activities**
3. **Record-keeping , reporting (MIS), monitoring and feedback systems**
4. **Sources of revenues** for septage management

## Various aspects that need to be covered under the regulations for septage management

- ❑ **Design of septic tanks**, pits etc.(adapted to local conditions) and methods of approval of building plans, or retro-fitting existing installations to comply with rules
- ❑ **Periodicity of desludging**
- ❑ **Operating procedures for desludging and at treatment facilities** including safety procedures
- ❑ **Licensing and reporting**
- ❑ **Methods and locations of transport, treatment and disposal**
- ❑ **Tariffs or cess/tax** etc. for septage management in the city
- ❑ **Penalty clauses for untreated discharge** for households as well as desludging agents
- ❑ **Special provisions** for new real estate developments

# Various provisions for these regulations

Sr.No	Description of regulations required	Action to be taken
1	Design of septic tanks, pits etc.(adapted to local conditions) and methods of approval of building plans, or retro-fitting existing installations to comply with rules	<ul style="list-style-type: none"><li>• Council resolution</li><li>• Additional monitoring for newly constructed septic tanks</li></ul>
2	Periodicity of desludging	<ul style="list-style-type: none"><li>• Council Resolution</li></ul>
3	Operating procedures for desludging and at treatment facilities including safety procedures	<ul style="list-style-type: none"><li>• Contract inclusive of monitoring</li></ul>
4	Licensing and reporting	<ul style="list-style-type: none"><li>• Contract inclusive of monitoring</li></ul>
5	Methods and locations of transport, treatment and disposal	<ul style="list-style-type: none"><li>• Contract</li></ul>
6	Tariffs or cess/tax etc. for septage management in the city	<ul style="list-style-type: none"><li>• Council resolution</li></ul>
7	Penalty clauses for untreated discharge for households as well as desludging agents	<ul style="list-style-type: none"><li>• Council Resolution</li></ul>

# **Institutional** and **governance** aspects in Septage Management

1. **Regulations** for Septage management systems
2. **Awareness generation and capacity building activities**
3. **Record-keeping , reporting (MIS), monitoring and feedback systems**
4. **Sources of revenues** for septage management



# Awareness generation and capacity building activities

Awareness generation for residents



Capacity building for municipal staff



Capacity building for septage transporters / private vendors

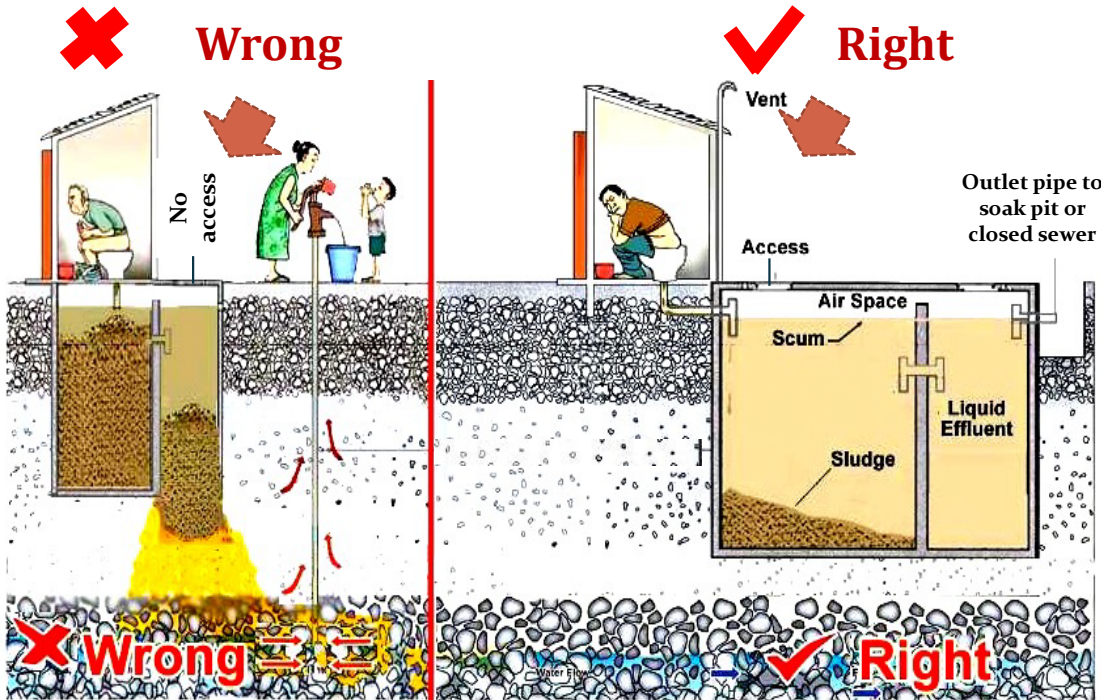


# Awareness generation for **residents**

- Members of **Resident Welfare Associations, community organizers, self-help groups** and the **general public** should be made **sensitized periodically** regarding the **need for a septage management system** including a 3-year cycle.
- **Health hazards associated with improper collection and treatment of waste**, and the ill-effects of sewage discharge into fresh water/storm water drains should be **explained to the residents**
- **Awareness generation** activities should be carried out at the **beginning** of introducing a **scheduled service** in all wards and then **repeated periodically** over the three year cycle.

# Awareness generation pamphlets

## Proper Design and Cleaning of your Septic Tank!



**Proper Design**

- Septic tank base should always be water tight and it should have proper vent pipes
- Proper access manhole should be provided for easy emptying



**Home**



**Nagar Palika**



**Pumping Truck**

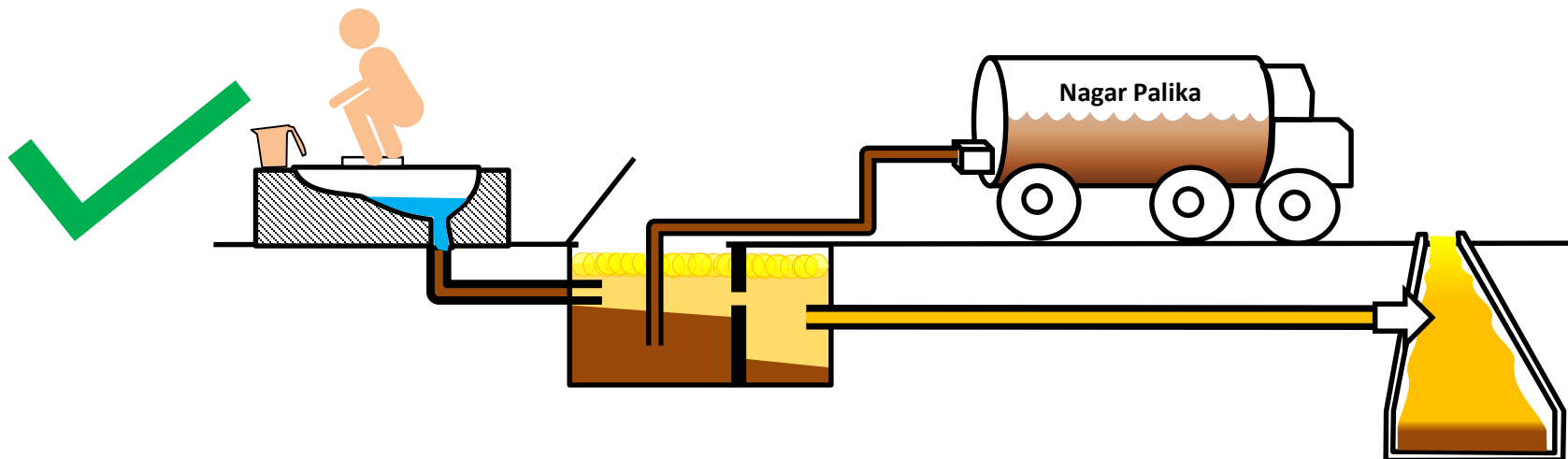


**Services provided by \_\_\_\_\_ Nagar Parishad**

**Cleaning your Septic Tank**

- Clean your septic tanks regularly once in 3 years
- Do not wait for it to overflow. This will adversely affect your health and your environment

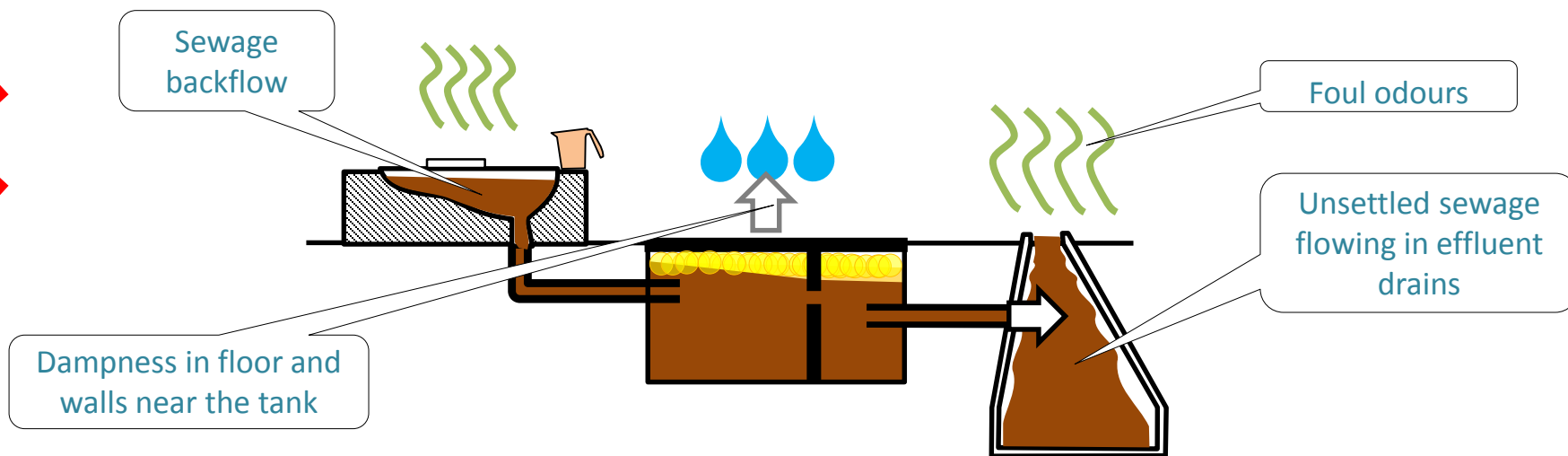
# Empty Septic tank regularly



Septic tank should be emptied every 2-3years

Avail Nagarpalika services!

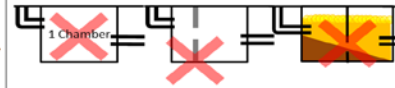
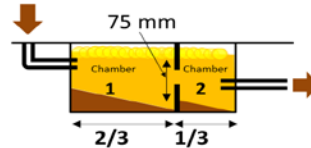
Not emptying it regularly will result in-



# Do's and Don'ts for septic tank construction . . .

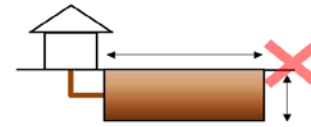
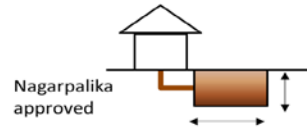
## ✓ **Dos** and ✗ **DON'Ts**

- ✓ Construct at least a two chambered septic tank
- ✓ Partition wall should be constructed at a distance of 2/3 the length from the inlet
- ✓ The 2 chambers should be interconnected above the sludge storage level by means of a pipe or square opening of diameter or side length not less than 75 mm



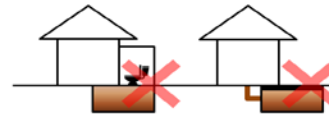
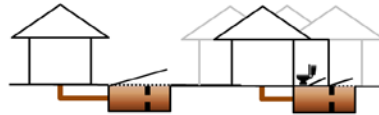
- ✗ Do not construct a one chambered septic tank
- ✗ Do not construct a partition wall at an inappropriate distance
- ✗ Do not provide the interconnection at a level where the sludge or scum is formed

- ✓ The size of the tank should be as per Nagarpalika norms



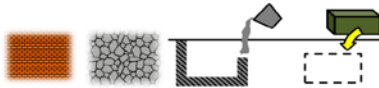
- ✗ Do not construct an oversized septic tank

- ✓ Always construct septic tank away from structure
- ✓ If space not available, construct toilet over septic tank such that all chambers are accessible
- ✓ Provide openable access covers to all chambers for inspection and desludging



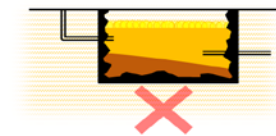
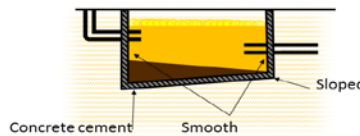
- ✗ Do not construct toilet above septic tank
- ✗ Do not completely seal the septic tank from top

- ✓ Septic tanks should be constructed in materials such as brick, stone, concrete (cast in-situ) or be of pre-cast materials



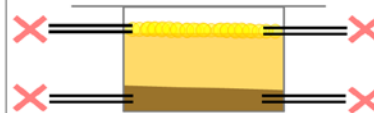
- ✗ Do not use a dug trench as septic tank
- ✗ Tank should not leak

- ✓ The base or floor should be cement concrete and sloped upwards to the outlet
- ✓ The floor and sides should be plastered with cement mortar to render the surfaces smooth



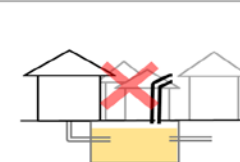
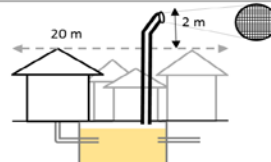
- ✗ Do not keep the base level or slope downwards to the outlet
- ✗ The inside surfaces of the septic tank should not be rough

- ✓ The inlet and outlet should be located at different levels
- ✓ The inlet and outlets should be below scum level and above sludge level
- ✓ Baffles or T junctions should be provided at inlet and outlet



- ✗ The inlet and outlet should not be located at such levels where the sludge or scum collects
- ✗ Inlet and outlet should not be at same level to prevent backflow or exit of solids

- ✓ Septic tank should be provided with ventilation pipes, the top being covered with mosquito proof wire mesh
- ✓ The height of the pipe should extend at least 2 m above the top of the highest building within a radius of 20 m



- ✗ Do not leave ventilation pipe unprotected from mosquitoes
- ✗ Do not keep the ventilation pipe too short

# Capacity building for **municipal staff**

- **Municipal Commissioners/ Chief Officers, Engineers, Sanitary Inspectors, Health Officers, and Sanitary Workers** should be **well trained** in **safe septage management** and its **best practices**
  - **Training sessions** on **safe collection, treatment and disposal** of septage should be undertaken
  - **Information** regarding **standard septic tank design, the need for periodic inspection and desludging of septage, design of a treatment facility, tender details for engaging licensed transporters, etc.** should be **disseminated**
  - **Training** should also be provided on **safety standards**
- 
- A background illustration showing a group of colorful, stylized human figures sitting around a large, round wooden table. The figures are in various colors (purple, blue, yellow, green, red, orange) and are positioned as if in a meeting or training session. The table has some papers and a laptop on it. The overall scene is set in a bright, clean environment.

# Capacity building for **septage transporters** / private vendors

- Local Bodies should ensure all **safety norms** are **clearly explained** to the septage transporters
- Private Operators and Transporters should be well **trained in safe collection and transportation** of septage including following aspects:
  - vehicle design and operation
  - process of desludging,
  - safety gears and
  - safe disposal at the nearest treatment facility.

# **Institutional and governance aspects** in Septage Management

1. **Regulations** for Septage management systems
2. **Awareness generation and capacity building activities**
3. **Record-keeping , reporting (MIS), monitoring and feedback systems**
4. **Sources of revenues** for septage management



# Record-keeping & monitoring systems

- **Recordkeeping and manifest forms** should be an **integral part** of a **comprehensive septage management program**.
- **This completed document** or documents with **signatures** of the **household/property, suction truck operator** and **treatment plant operator** should be **submitted** to the **local government** for their records
- **Payment** to the suction truck **operator** should **only be made** if there are **signatures of all the stakeholders**

## Sample Form to be filled by Operator / Transporter of Septage

### i. Identification of Waste:

- a) Volume \_\_\_\_\_
- b) b) Type: \_\_\_\_\_ Septic Tank \_\_\_\_\_ Others
- c) c) Source: \_\_\_\_\_ Residential \_\_\_\_\_ Commercial \_\_\_\_\_ Restaurant \_\_\_\_\_ Portable Toilet \_\_\_\_\_ Others

### ii. Details of Waste Generator

- a) Name:
- b) Phone Number:
- c) Address:
- d) Pin:
- e) Any kind of deficiencies, missing pipes or fittings, improper manholes or access covers, any other cracks or damage observed: \_\_\_\_\_

The undersigned being duly authorized does hereby certify to the accuracy of the source and type of wastewater collected and transported.

Date: \_\_\_\_\_ Signature: \_\_\_\_\_

### iii. Details of Transporter / Operator

- a) Company Name:
- b) Permit:
- c) Vehicle License:
- d) Pump out date:

The above described wastewater was picked up and hauled by me to the disposal facility name below and was discharged. I certify that the foregoing is true and correct:

e) Signature of authorized agent and title: \_\_\_\_\_

### iv. Acceptance by \_\_\_\_\_ Municipality's authorized STP

The above transporter delivered the described wastewater to this disposal facility and it was accepted.

Disposal date: \_\_\_\_\_ Amount Collected from Transporter (if any): \_\_\_\_\_

Signature of authorized signatory and title: \_\_\_\_\_

NOTE: SUBJECT TO THE TERMS AND CONDITIONS OF \_\_\_\_\_ MUNICIPALITY.

**Sample Recording keeping format<sup>1</sup>**

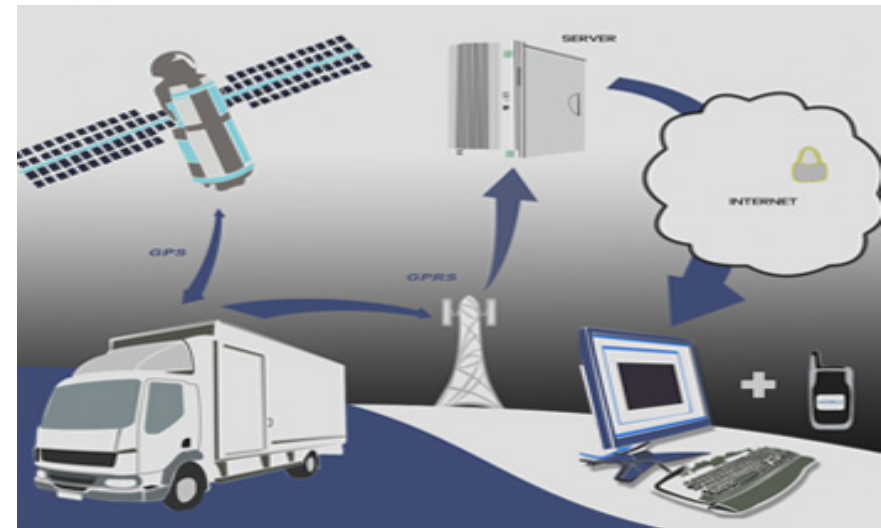
# Monitoring mechanism for septage management activities

Activities to be Monitored	Performance Metrics	Type of monitoring mechanism				
		Households reporting	Self Reporting	ULB sample HH survey	ULB random treatment site inspection	Grievance Redressal
Cleaning of septic tanks	Percentage of households cleaned as per schedule	✓	✓	✓		✓
	Number of instances where safety regulations weren't adhered to or manual scavenging took place			✓		✓
	Number of instances of spillage during cleaning		✓	✓		✓
	Number of septic tanks damaged	✓	✓	✓		✓
	Percentage septic tanks cleaned inadequately	✓	✓	✓		✓
Transportation of fecal sludge	Number of instance of spillage during transportation		✓			✓
	Number of instances of fecal matter being dumped at non-designated sites					✓
Safe disposal of fecal sludge	Time taken to construct sludge drying beds		✓		✓	
	Standard of constructed sludge drying beds		✓		✓	
	Number of instances where safety regulations weren't adhered to at treatment site				✓	
	BOD and COD level of the treated septage				✓	

**Performance metric** can be **linked to payment** in terms of **performance incentive** or **penalty** in case of **non-performance**

# MIS and GIS database

- **MIS database:** Based on the **survey** that is undertaken using the **questionnaire** create a **database of toilets and septic tanks**
  - **Update** the database **every four years** along with **property tax assessment survey**
  
- **GIS database :** **Link** the **database** to **GIS** help to **update** **property level details** regarding **availability** of **toilets and septic tanks** and help **monitor** whether the **septic tanks** have been **cleaned** as per the **planned schedule**



# Feedback systems

- **Complaint redressal system :**

To be **set up in the ULB** to **track** the **performance of private sector** in terms of whether they are **emptying the septic tanks properly or not** and to track whether they are **dumping the septage at the designated site or not**



# **Institutional and governance aspects** in Septage Management

1. **Regulations** for Septage management systems
2. **Awareness generation and capacity building activities**
3. **Record-keeping , reporting (MIS), monitoring and feedback systems**
4. **Sources of revenues for septage management**

# Sources of revenues for septage management

- **Sanitation tax** should be levied on all the properties for sustaining the septage management activities. The tax can be added either as surcharge on property tax or a new sanitation tax can be levied under the Maharashtra Municipal Councils, Nagar Panchayats and Industrial Townships Act, 1965, Chapter IX: Municipal taxation, Section 108.
- **Periodic revisions for the taxes** to be effected based on revisions in costs involved
- To the extent possible, revenues should be generated from sale of treated septage for agriculture or other purposes.
- If Private sector is involved in septage management, then an escrow account can be set up where revenues from the sanitation tax are transferred. The contractual amount for FSM services to the private party can be paid from this escrow account to avoid delays.

# Key Steps for operationalizing septage management plan

# Steps for inception stage . . .

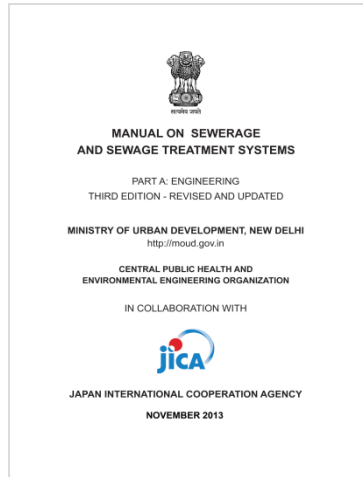
Sr. No	Key STEPs	Timeline (Months)						
		1	2	3	4	5	6	7
<b>1</b>	<b>Existing septage management situation of the city</b>							
a	<b>Assessment of On-ground Sanitation Situation</b> <i>- Secondary data : Census</i> <i>- HH Surveys</i> <i>- Property tax records</i>							
b	<b>Ground truthing of existing sanitation situation through sample surveys</b> <i>(Optional – based on information available in step-a)</i> <i>- Septic tanks</i> <i>- Pits</i> <i>- Other systems</i>							
c	<b>Availability of existing FSM infrastructure with the ULB</b> <i>- No and capacity of trucks</i> <i>- Existing septage treatment / disposal facility</i>							
d	<b>Discussions in the ULB to take up FSM</b> <i>- Executive and Elected Wing to discuss</i>							



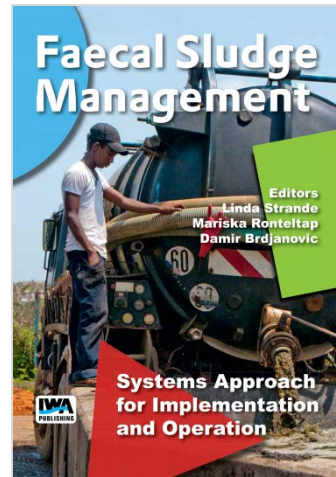
# Steps for planning and implementation stage . . .

Sr. No	Key STEPs	Timeline (Months)						
		1	2	3	4	5	6	7
<b>2</b>	<b>Planning for Citywide septage management plan</b>							
a	<b>Stakeholder identification</b> / consultation throughout the FSM planning process							
b	<b>City level plan</b> based on secondary data sources / <b>Creating database of sanitation systems through surveys</b>							
c	<b>Assessing infrastructure requirement for the FSM plan</b> - No and capacity of Trucks - Type of treatment and its capacity etc.							
d	<b>Assessing financial requirement</b> - Capex - Opex - Taxes to be levied							
e	<b>Develop and enforce regulations required for FSM</b> - Scheduled cleaning - Taxes to be levied - PSP in FSM etc.		Develop				Enforce	
f	<b>Develop and carry out awareness generation activities</b> - Scheduled cleaning - Taxes - Penalties			Develop			Carry out	
g	<b>Exploring private sector</b> within / outside the city for implementing FSM Plan							
h	<b>Develop , review and finalize contracts</b> and bid documents					Develop	Review	Finalize
<b>3</b>	<b>Implement citywide septage management plan</b>							

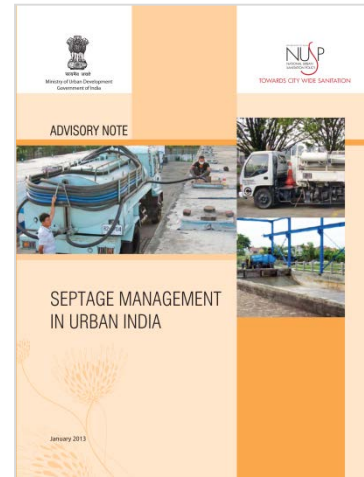
# Reference documents. . .



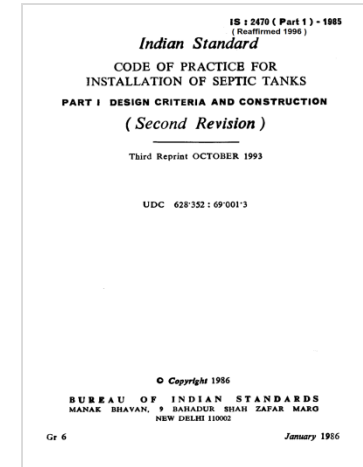
[Manual on sewerage and sewage treatment systems – CPHEEO Manual, 2013](#)



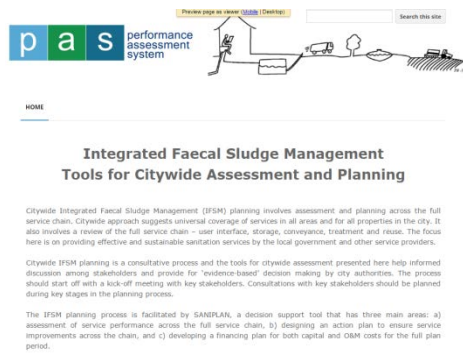
[Faecal Sludge Management – Systems Approach for implementation and operation, 2014](#)



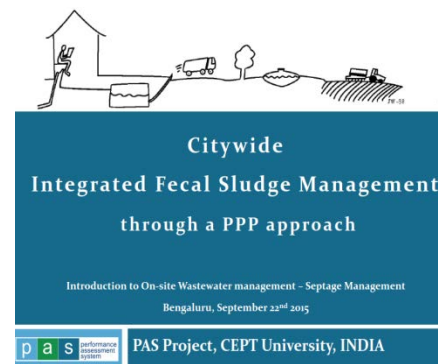
[Advisory note – Septage Management in Urban India, MoUD, 2013](#)



[IS 2470 – Code of practice for installation of septic tanks, Part I & II](#)



[FSM Assessment and Planning toolkit](#)



[Citywide Septage Management Plan – A case of Wai and Sinnar](#)

# Group Work : Preparing a septage management plan for your city

Participants will plan for the infrastructure that is required for implementing the septage plan for the following city in terms of number of septic tanks to be emptied, number of trucks required and their capacity , treatment options with size and capacity. Also explore possibility of PSP in septage management services.

SEPTAGE MANAGEMENT PLAN	
Sr.No	Description
	<b>Please provide this information for your city</b>
1	Population
2	Total households (HHs)
3	HHs having toilets with septic tanks
4	No. of community/ public toilets having septic tanks
5	Septic tank cleaning cycle for HHs (Years)
6	No. of working days in an year
7	No. of trips possible per emptying vehicle per day (trip/day/vehicle)
8	Number of trucks required and size of truck
9	No of septic tanks to be cleaned annually
10	Type of technology and capacity of septage treatment facility

## Group Work : Implementing septage management plan for your city

### Participants will discuss issues related to following aspects:

- Institutional and governance aspects of septage management plan
- Challenges
- The nature of support required from government and financial institutions
- Costing and Financing aspects
- Operational aspects etc

# ➤ **Module 4: Private Sector Participation for septage management activities**

*Training workshop for ULBs*

January 2016

..... **CEPT** University .....



# Agenda for the workshop

Agenda	Objective of the session
<b>Context setting and Introductions</b>	<b>Sharing the agenda for the day</b>
Understand IFSM	Understanding the sanitation value chain and recognizing the need for IFSM
Identify the need for PSP in IFSM	Assessing in-house ULB capacity and identifying whether private sector intervention is needed, and to deliver what services
Assess private players for partnership	Evaluating private players on the basis of their preferences, and expertise required
Plan and manage private sector engagement	Designing contracts and monitoring systems to track private sector performance

**Do you have any questions  
for us?**

## Objectives of the workshop

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This workshop is designed to assist ULBs in **understanding the role of the private sector** in providing sanitation services in small towns/ cities, and how their participation can be managed effectively by the ULB



We will take all attendees through a **toolkit** that has been designed to **assist ULBs in assessing** the need for **private sector participation** in their towns/ cities, **identifying the right players** to engage with, **and planning and managing** their performance

# Agenda for the workshop

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## Important terms for this section

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**Integrated Faecal Sludge Management (IFSM):** The connected and end to end process of accessing, collecting, treating and reusing the faecal sludge

**Manhole :** Hole in the floor of a latrine through which excreta/waste falls directly to a pit below

**Septage treatment facility:** The facility where the process of treatment is applied to the septic tank contents  
**Sludge:** The solids which collect at the bottom of the tank and where most of the bacteria live that are involved in the anaerobic degradation processes

**Sludge Drying Bed:** Platform on which sludge is dewatered by at thermal drying process to evaporate water. The process of drying sludge reduces volume of the product, making its storage, transportation, packaging and retail easier. The digested sludge slurry is spread on an open bed of sand after which drying takes place by a combination of evaporation and gravity drainage through the sand

**Suction emptier truck:** Is a type of specialized tank truck with suction gear which can suck wastewater and mud and sludge out of holes and carry it to a suitable disposal point

## Introduction to the section

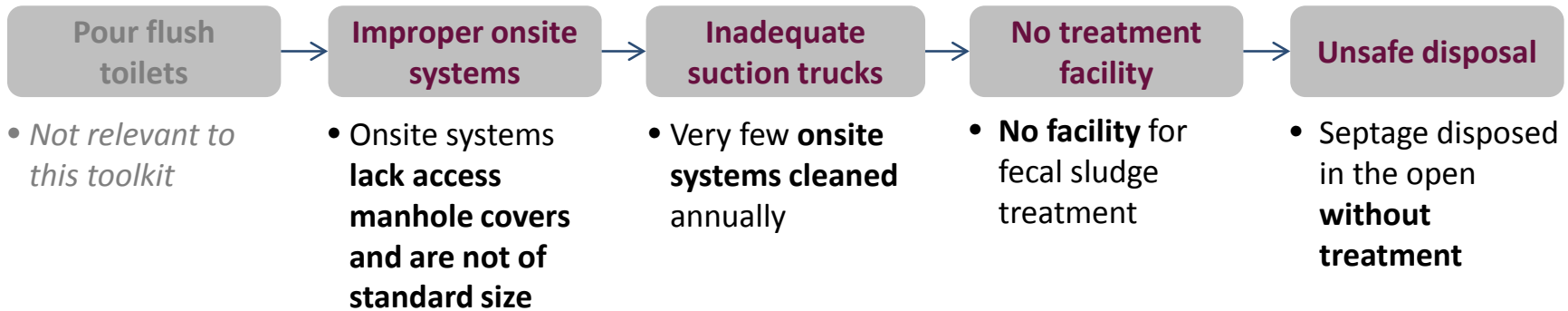
- Most small towns and cities in India use decentralized waste collection systems, and face issues in collection, treatment, and safe disposal of faecal waste. An Integrated Faecal Sludge Management (IFSM) approach offers a comprehensive solution to address these sanitation issues
- Urban Local Bodies (ULBs) typically face challenges in planning and executing projects based on the IFSM approach. Partnering with private players could offer significant benefits to the ULB in terms of access to technical expertise, and financing support
- While there are existing resources to guide Private Sector Participation (PSP) in large scale sanitation projects, there is need for support and guidance on engaging the private sector in commissioning small-scale sanitation projects based on the IFSM approach

# Challenges faced across the sanitation value chain

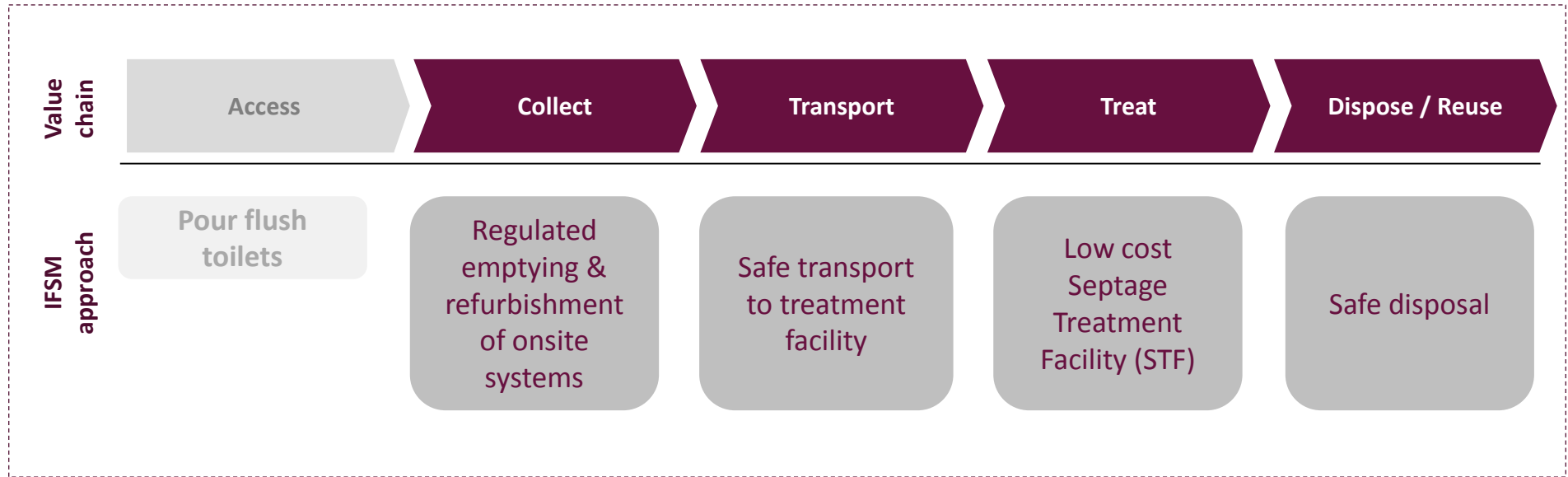
## Sanitation value chain



## Typical challenges faced



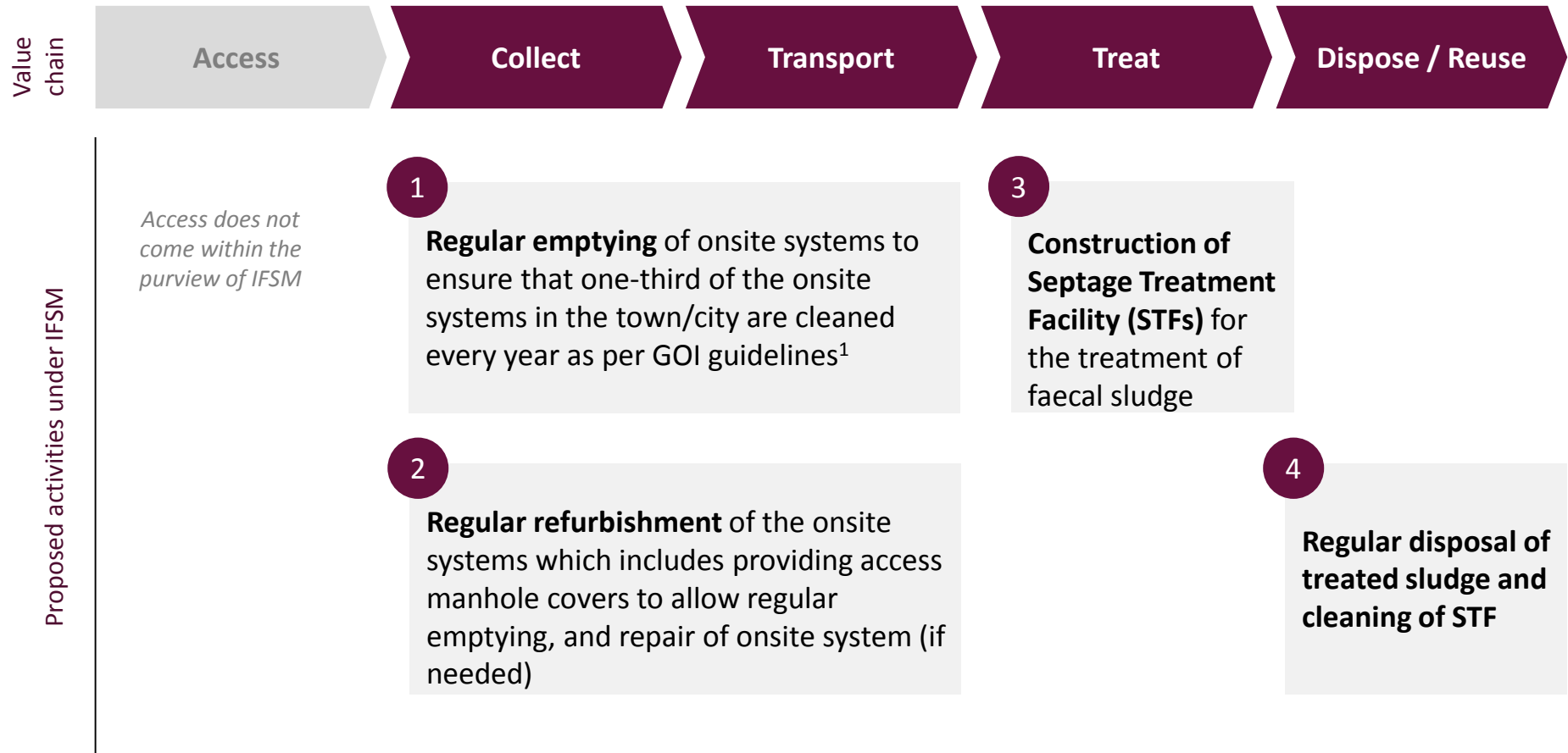
# IFSM represents an integrated approach from collection of faecal waste to its safe disposal



- IFSM provides a simple and comprehensive approach to challenges related to decentralised systems in the collection, conveyance, treatment and reuse of faecal sludge
- IFSM is a relevant approach if:
  - ✓ The majority of the population depends on a onsite system based waste collection system
  - ✓ There is a gap in sanitation services across the value chain from collection to disposal of faecal sludge
  - ✓ Majority of waste collected from onsite systems is dumped without treatment, and if there is no central treatment facility

# In this toolkit, we have considered 4 key activities under the scope of IFSM

## Scope of IFSM for this toolkit



Note: (i) As per MoUD guidelines, a household onsite system/onsite system must be emptied every 3 years hence 33% of all onsite systems/ onsite systems should be emptied annually

Source: CEPT, Dalberg research

# Agenda for the workshop

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## Important terms for this section

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**Current service level** is the present performance of the system in terms of meeting the current needs.

**Institutional Capacity** is the strengths, resources,, skills and all output oriented assets that an institution possesses

## Introduction to the section

- ULBs in **small and medium towns typically face challenges** such as low institutional capacity, limited technical know-how, and restricted access to financial resources **in planning and implementing the IFSM approach**
- **Partnering with private players could offer significant benefits** in terms of access technical knowledge, as well financial support
- However, the potential to, and the benefits from engaging the private sector could vary based on a particular ULB's context. Before a decision is taken to leverage the private sector, it is important to assess the **legal and political support for a PSP** in the town/city, as well as the **public sector capacity** to support a private sector engagement
- The objective of this section is to help the ULB:
  - **Assess current gaps** in the sanitation services related to faecal sludge management in their towns
  - **Understand if PSP is a potential solution** to address these gaps in their towns



# Key questions to consider



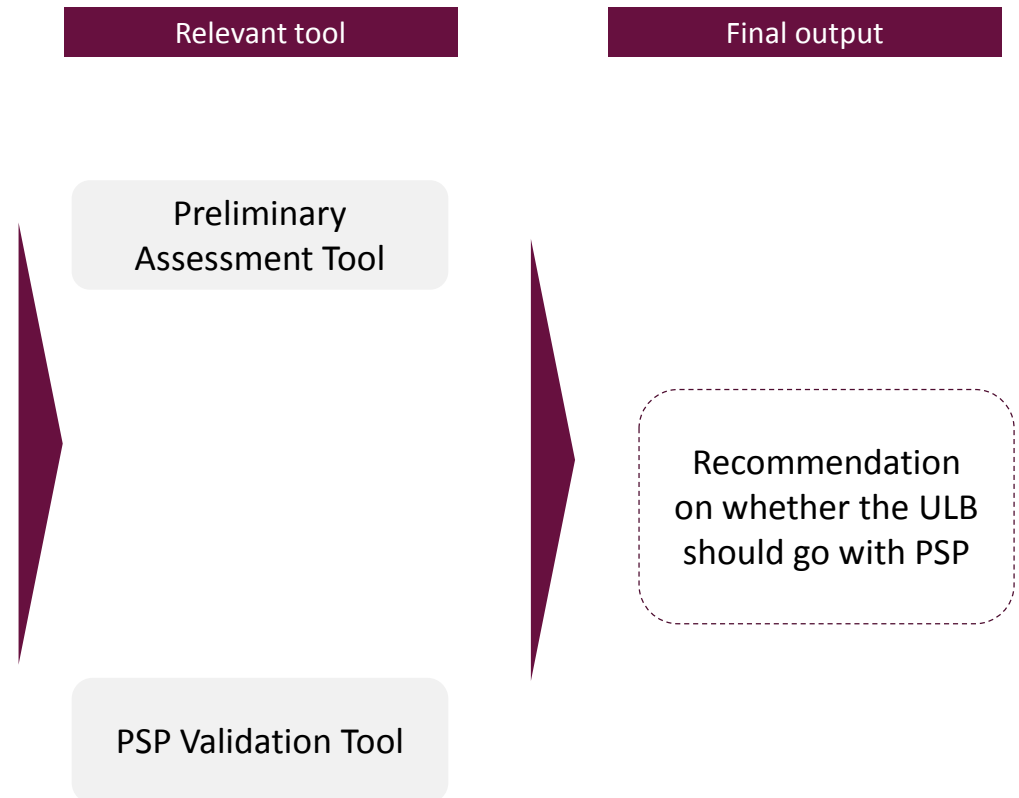
**1. Does the ULB have the capacity to deliver the IFSM approach on its own?**

- Understand **current service levels** of sanitation services in the town/ city
- **Assess ULB capacity** to deliver the required service levels



**2. Is there a supporting environment for PSP?**

- Understand **legal and political support** for PSP
- Assess **public sector capacity** to support a PSP



# Preliminary Assessment Tool

## Objective of the tool

The objective of this tool is to understand gaps in the current service levels and the ULB capacity to deliver on the required service levels

## Key inputs

### Current service levels

- Current statistics and data on the number of onsite systems
- Ongoing processes for waste management
- Observed issues/gaps and inefficiencies

### Understanding ULB capacity

- Detailed information on staff capacity
- Availability of equipment and machinery
- Financial capacity

## Outputs

### Existing gaps in:

- Current service levels of sanitation services
- Current ULB capacity to provide the desired service levels

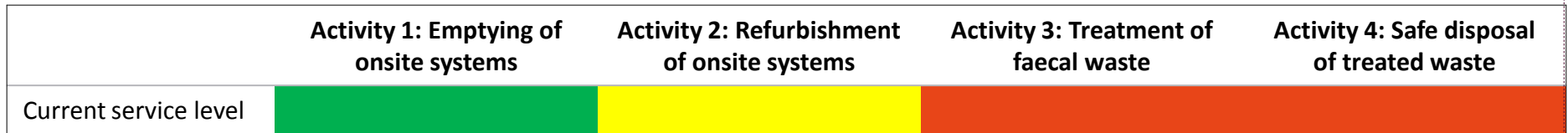


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# Tool 1: Sample output and recommendations

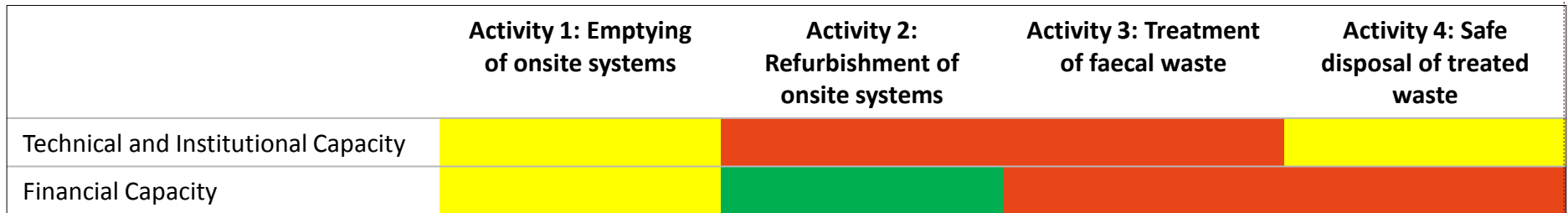
*Illustrative*

*Illustrative output of the Preliminary Assessment Tool*



**Key**

	<i>Service currently not provided by ULB</i>		<i>Service provided but service levels below CPHEEO standards</i>		<i>Service provided with service level as per CPHEEO standards</i>
--	--	--	---	--	--



**Key**

	<i>ULB has no capacity</i>		<i>ULB has some capacity</i>		<i>ULB has the required capacity</i>
--	----------------------------	--	------------------------------	--	--------------------------------------

**Final recommendation:** *The ULB is currently not able to provide the required service standards and does not have the capacity to do so*

II. Identify need for PSP in IFSM

# PSP Validation Tool

## Objective of the tool

The objective of this tool is to assess if there is an enabling environment to encourage private sector participation by understanding the legal and political support for the PSP and assessing the public sector capacity to support a PSP

## Key inputs

### Data to assess legal and political implications

- Information on **existing laws and policies** limiting or endorsing private sector participation
- Any **existing political connections** that can be leveraged
- Data around **land availability/ acquisition** that a potential PSP initiative may entail

### Understanding ULB capacity

- Information on existing public sector expertise in PSP, support
- Existing public sector funding assistance programs

## Outputs

Favourability toward PSP from a legal and political standpoint

Existing drivers that can propel a potential PSP



**Feasibility and ease of engaging with the private sector**



Microsoft Word Document

## Tool 2: Sample output and recommendations

*Illustrative*

*Illustrative output of the PSP validation tool<sup>1</sup>*

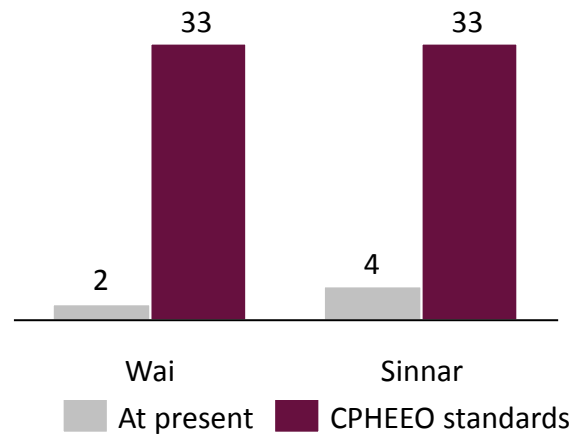
Very Attractive to do a PSP
<b>Attractive to do a PSP</b>
Possible to do a PSP
Difficult to do a PSP
Not Possible to do a PSP

**Final recommendation:** *The ULB can leverage private sector players in the provision of IFSM*

# Case Study: Understanding current service levels

**Collection: Households get their onsite systems cleaned only once in 8-10 years, resulting in the release of effluent with solids into the drainage system**

## Percent of household onsite systems cleaned annually



- The CPHEEO<sup>1</sup> manual and the MoUD septage management advisory recommend that household onsite systems be cleaned **every ~2-3 years, i.e. ~33% of them should be cleaned each year**
- In addition to the fact that tanks are often over-sized, the driving factor behind **the infrequent cleaning is the lack of awareness among households** who do not bear the environmental impact of infrequent cleaning

## Resulting issues



- onsite systems **often overflow** and fecal matter along with effluent is released into drains
- In addition, **septage hardens and cannot be easily suctioned off**, often requiring manual intervention or the application of a lot of water to break the solids

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: PAS database, City Sanitation Plan, PAS Project – CEPT University

## Group brainstorming session

---

**Please fill out the Preliminary Assessment Tool and the PSP Validation Tool in your groups and answer the following questions:**

- 1. What information do you think will be readily available for your town/ city?**
- 2. Any suggestions to make this assessment easier and more comprehensive?**
- 3. Based on your high level understanding do you think your town can support a PSP?**

- Each group to fill out one tool (20 minutes per group)*
- Each group to share their findings with the audience (2 minutes per group)*

# Agenda for the workshop

Agenda	Objective of the session
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Plan and manage private sector engagement	Designing contracts and monitoring systems to track private sector performance



## Introduction to the session

---

- Once we have established the need for PSP in IFSM the town/ city, the next step is to understand the availability and capability of the private sector operators operating in the region
- A ULB may not have the knowledge or resources to assess whether there are private players available with the required level of expertise, to provide the proposed services
- The objective of this section is to help the ULB **identify**, and **assess** the private players to engage with

# Key questions to consider



1. Are private players available to provide the proposed services?

- Who are the relevant private sector operators for the proposed project?
- How can they be identified?



2. Do these players have expertise in delivering similar projects?

- Do the players possess relevant technical expertise and knowledge?
- Do they have prior experience in IFSM?
- Do they have prior experience of working with the public sector?



3. What are their key considerations or interests?

- What is their required return on investment?
- What are the key risks or challenges for them? (e.g. ownership of assets)

Relevant tool

Final output

Player Assessment Checklist

1. Detailed player profiles
2. Shortlist of private sector players to engage

# Player Assessment Checklist

## Objective of the tool

This tool is designed to evaluate the (i) availability, (ii) expertise, and (iii) interest of private sector players to engage in a PSP for IFSM services

## Key inputs

Background of the private sector player

Questions related to expertise and experience in IFSM

Private player's interest and preference in engaging with public sector

## Outputs

Engagement with which private player will be the most fruitful and cost effective

***This information should be provided by the private players or drawn via detailed conversations with these parties***



# Agenda for the workshop

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<b>Plan and manage private sector engagement</b>	<b>Designing contracts and monitoring systems to track private sector performance</b>

## Important terms for this section

---

**Performance Based Contract** is a results-oriented contracting method that focuses on the outputs, quality, or outcomes that may tie at least a portion of a contractor's payment, contract extensions, or contract renewals to the achievement of specific, measurable performance standards and requirements

**Bundling** is defined as the "consolidation of two or more procurement requirements for goods or services previously provided or performed under separate smaller contracts into a solicitation of offers for a single contract that is likely to be unsuitable for award to a small business concern

**Ownership of capital assets** for major cost intensive assets in IFSM are the suction trucks that will be used and the cost incurred in the construction and maintenance of the septage treatment facility (land and manpower cost). Party that will take ownership and incur the cost of these needs to be determined

## Introduction to the session

---

- Typically, most public sector contracts with private sector are based on inputs rather than on outputs, which creates perverse incentives in terms of private sector performance
- A Performance Based Contract (PBC) can help plan private sector role, and create direct motivations for high quality project delivery
- A PBC also incorporates a robust monitoring framework to help track project progress, and create accountability for service delivery
- The objective of this section is to understand how to design a PBC by:
  - Understanding the basic elements of a PBC
  - Creating a performance based monitoring system
  - Incorporating relevant clauses in the PBC

# Key questions to consider



1. What are the basic parameters of a private sector engagement?

- Introduction to a performance based contract (PBC)
- Understanding 5 key steps to create a PBC



2. How to create a performance based monitoring and payment system?

- Identifying metrics to assess service levels
- Developing monitoring mechanisms
- Linking monitoring to penalties and incentives



3. What are the key clauses for a private sector contract?

- Identify key clauses for the contract, such as termination, risk mitigation etc.

## Relevant tool

1. Checklist to
  - Create bundled contracts
  - Identify revenue sources
  - Decide ownership of assets
  - Define payment structure
2. Financial Assessment Tool

1. Sample service levels & performance metrics
2. Reporting templates
3. Sample payment terms monitoring

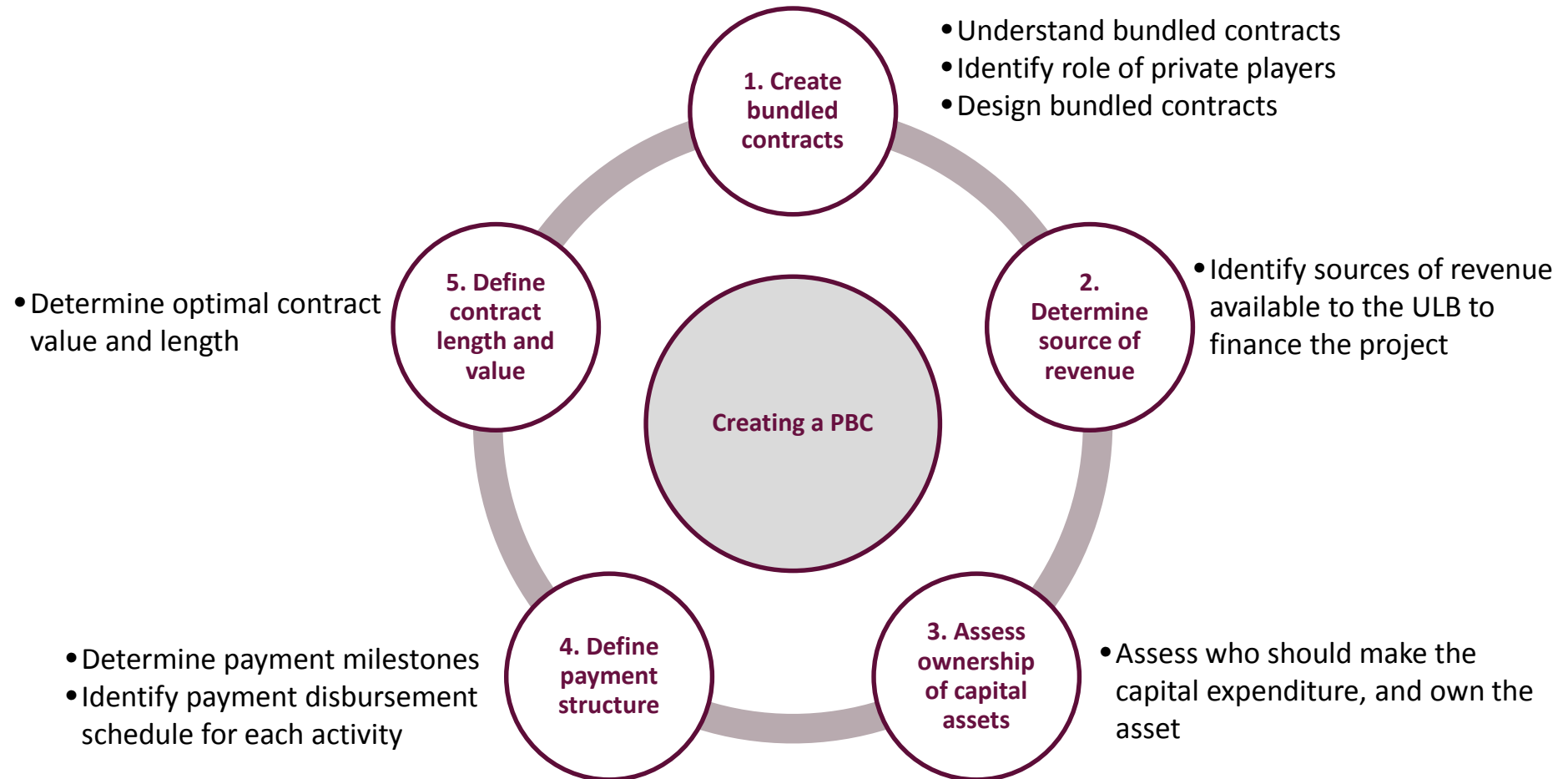
1. Sample key clauses

## Final output

Sample contracts & bid documents

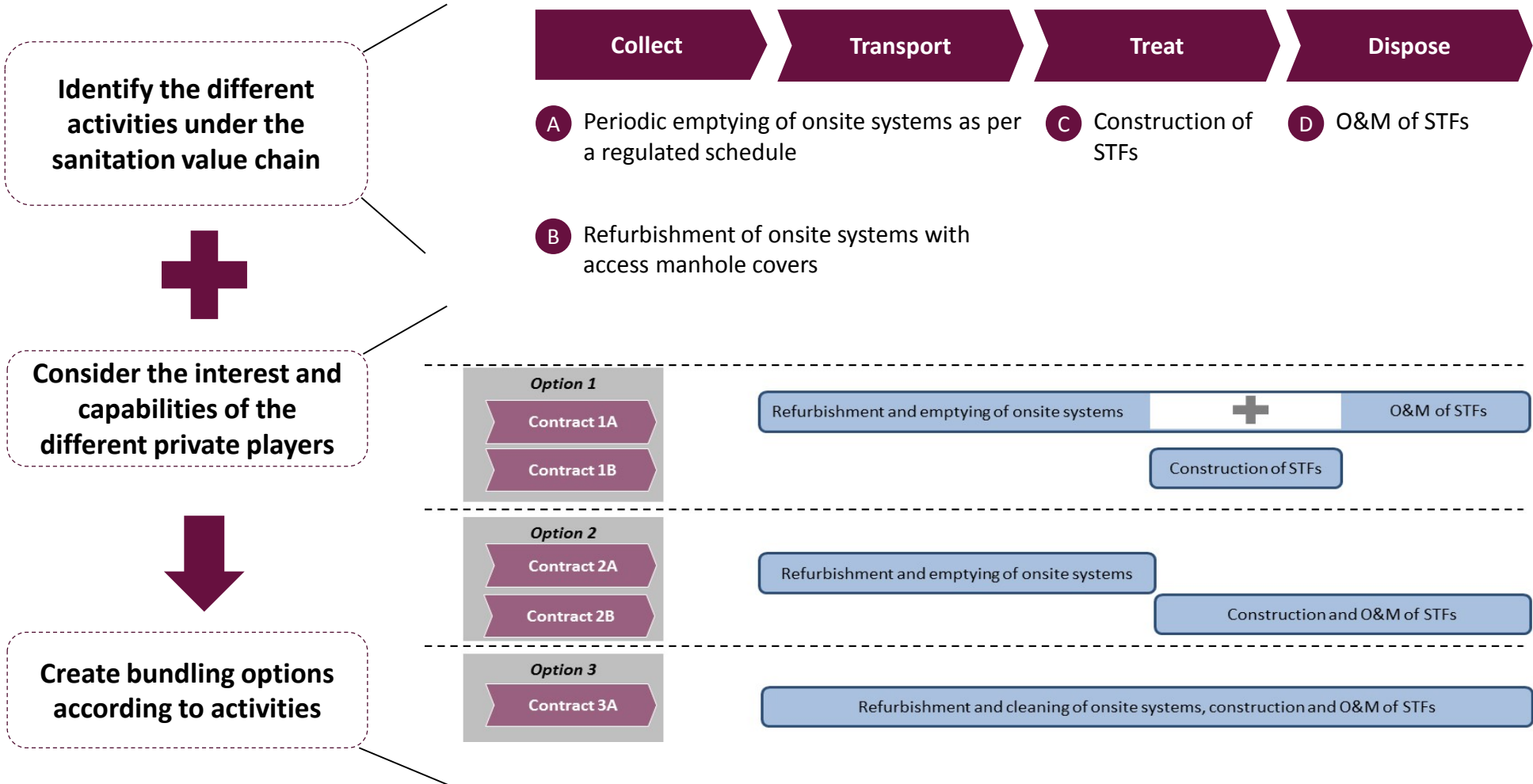
# Basic parameters of a private sector engagement (PBC and its components)

## STEPS TO CREATE A PERFORMANCE BASED CONTRACT





# Step 1: Create bundled contracts



# Checklist to create a bundled contract

## Objective of the tool

The objective of this checklist is to assess whether a bundled or an unbundled contract is feasible for the proposed project

## Key inputs

Experience details of private players

Willingness of private players to provide these services

## Outputs

Evaluation of these contract options based on private player experience and interest, and can then be evaluated for their financial viability

### Overview

The objective of this tool is to assess whether a bundled or an unbundled contract is feasible for the proposed project. The tool is in the form of a checklist that draws upon 2 key aspects: (i) do available private players have experience in providing specific activities, and (ii) are these players willing to provide particular activities. Financial feasibility of various kinds of bundled contract is considered later in Section IV.

### How to use this tool

- Inputs: ULBs must consider 2 sources of information to answer this
  - Interviews with private sector players: ULBs must conduct private sector players to better understand their interest in proposed project.
  - Section III of this toolkit: This tool builds on the information collected in Section III of the toolkit, where private players were assessed for PSP in I from Toolkit # XX (Private Player Assessment) will serve as key input.
- The tool will assess the experience and willingness of private sector players to provide the services included under the proposed contract. The tool will use the following contract options depending on how IFSM activities are broken down:

Contract option	Refurbishment of septic tanks	Periodic cleaning of septic tanks	Construction of STFs
Option 1			
Option 2			
Option 3			
Option 4			
Option 5			
Option 6			

### Checklist

The table below needs to be filled out for each of the private players under consideration for the proposed project.

Private Player 1: XXXXXX

Activity	Previous experience (Yes/ No)	Interested (Yes/ No)
Refurbishment of septic tanks		
Periodic cleaning of septic tanks		
Construction of STFs		
O&M of STFs		

### Sample output:

Feasibility of contract options:

Contract option	Feasibility based on private player availability (High/ Medium/ Low)
Option 1	High
Option 2	Medium
Option 3	Low
Option 4	Low
Option 5	Low
Option 6	High

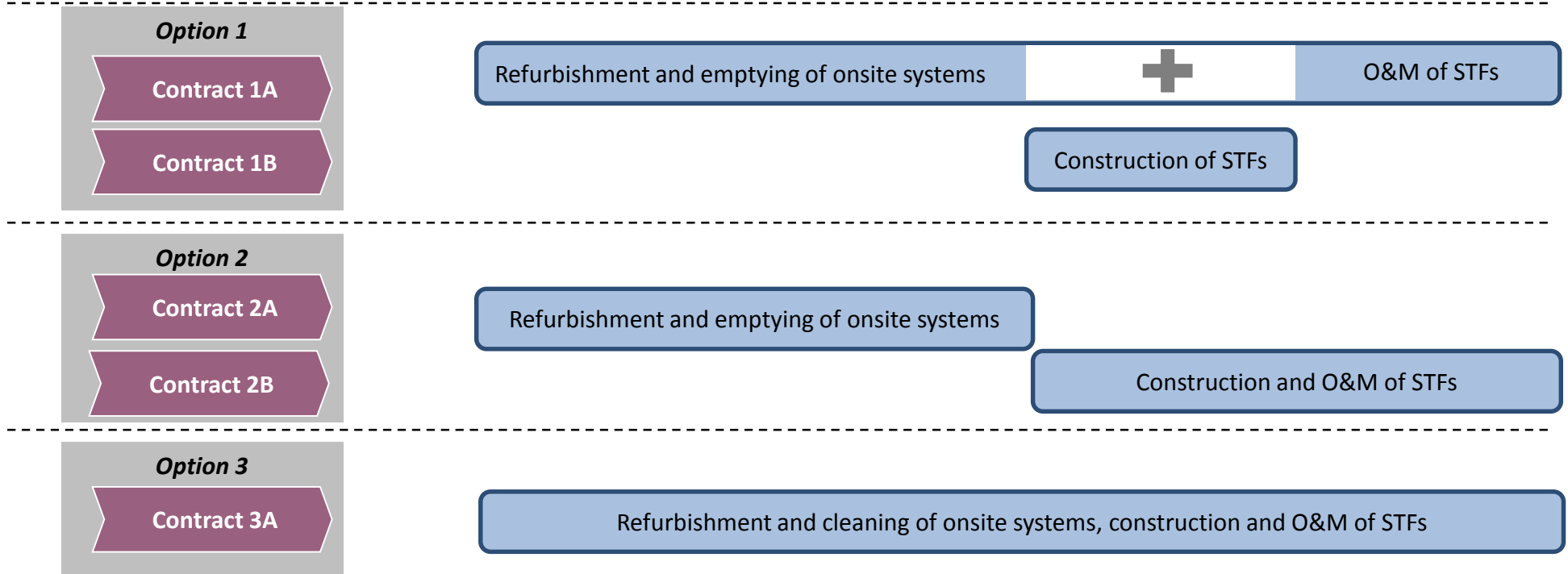
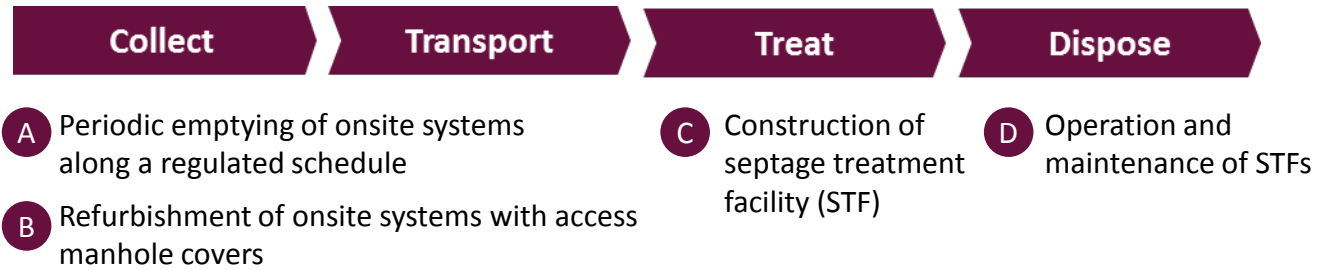
### Rating scale:

Rating	Description
High	More than 1 private sector player offering each of the services under the contract
Medium	At least 1 private sector player offering each of the services under the contract
Low	Gaps in private player experience and interest in offering services as per the contract option



Microsoft Word Document

# Case Study: Given the interest and capabilities of identified players around Wai and Sinnar, three possible options for contract bundles were identified



## Step 2: Identify revenue sources

Identify the different sources of revenues



Assess the different options on the basis of sustainability and reliability

ULB sources

Government sources

Miscellaneous sources

Can be used individually or in combination

Is fund available through the duration of the contract?

Are the financing terms acceptable to ULB?

Is revenue source reliable in terms of guarantee?

Does the source of active political and community support?

Does the cash flow timing match the requirement?

# Checklist for identifying relevant sources of revenue

## Objective of the tool

The objective of this tool is to identify and assess the most appropriate sources of revenue to finance the PSP contract

## Key inputs

Different revenue sources

Assessing the different sources

## Outputs

Recommendation on which sources are most relevant for the ULB

### Overview

The objective of this tool is to assess and identify the most appropriate sources of revenue to finance the PSP contract. This is done via two steps – first, identifying potential sources of revenue available to the ULB, and second, by checking which one of the identified sources are reliable, and sustainable given the nature of the proposed PSP contract.

This builds on the assessment of the ULB and external finances done in Section II of this toolkit.

### How to use this tool

- The checklist is divided into 2 parts:
  - Section 1: Assessing potential revenue sources:** This section identifies potential revenue sources for the ULB, including – i) ULB budget, ii) government sources (loans and grants), and iii) other sources (loans or grants from corporates, or multilaterals). At the end of this section, all options available to the ULB are shortlisted.
  - Section 2: Evaluating sustainability and reliability of the sources shortlisted**
- Inputs:** ULBs must consider the following sources of information to answer this checklist:
  - Section II of this toolkit:** This tool builds on the information collected by the ULB in Section II of the toolkit, where sources of funding for the ULB are assessed through the following 2 tools (Tool # XX: Preliminary competency assessment tool, and Tool # XX: PSP Validation Tool).

### Section 2: Checking for Sustainability and Reliability

For the sources shortlisted, consider the following questions:

Criteria	Shortlisted Source 1:	Shortlisted Source 2:	Shortlisted Source 3:
1. Are the financing terms acceptable to the ULB	Yes / No	Yes / No	Yes / No
2. Is the funding available for the duration of the contract?	Yes / No	Yes / No	Yes / No
3. Does that cash flow timing match the requirement (i.e. is the amount available lump sum, or in tranches)	Yes / No	Yes / No	Yes / No
4. Does the source have active political or community support	Yes / No	Yes / No	Yes / No
5. Is the revenue source reliable in terms of guarantee of disbursement	Yes/No	Yes/No	Yes/No



Microsoft Word Document

# Case Study: In our work in Wai and Sinnar, we recognized the possibility of the ULB compensating private players using local taxes

- Currently, households clean their onsite systems once in 8-10 years and spend INR ~1000 in Wai and INR ~400 - 800 in Sinnar
- Property owners currently have to pay local taxes of about Rs 2200/annum in Wai and Rs.1600/annum in Sinnar
- To cover the costs of a cleaning cycle of ~3 years would require **an increase** in annual tax spend for a household of about **10% in Wai and 20% in Sinnar**.
- As these are reasonable increases for a regular service and related environmental as well as personal benefits, it is expected that with appropriate awareness there will be willingness to pay additional taxes.

## Current taxes levied in Wai

**वाई नगरपरिषद, वाई**

नमुना ४८ (नियम नं. ७७ पहा) No. 6400  
१-४-२० ते ३१-३-२० रोजी संपणाऱ्या कालावधीच्या करांचे बील

घर नंबर \_\_\_\_\_  
नांव \_\_\_\_\_  
पत्ता \_\_\_\_\_ मागणी नोंदवहीतील अनुक्रमांक \_\_\_\_\_

समासाच्या स्तंभ ३ मध्ये दर्शविण्यात आलेले \_\_\_\_\_ रुपये रकमेचे कर आपणाकडून  
संकलित कर वगैरे करांच्या संबंधात येणे असून आपण ते हे बिल दिव्यापासून पंधरा  
दिवसांच्या आत नगरपरिषदेकडे भरावेत अशी आपणांस विनंती करण्यात येत आहे.

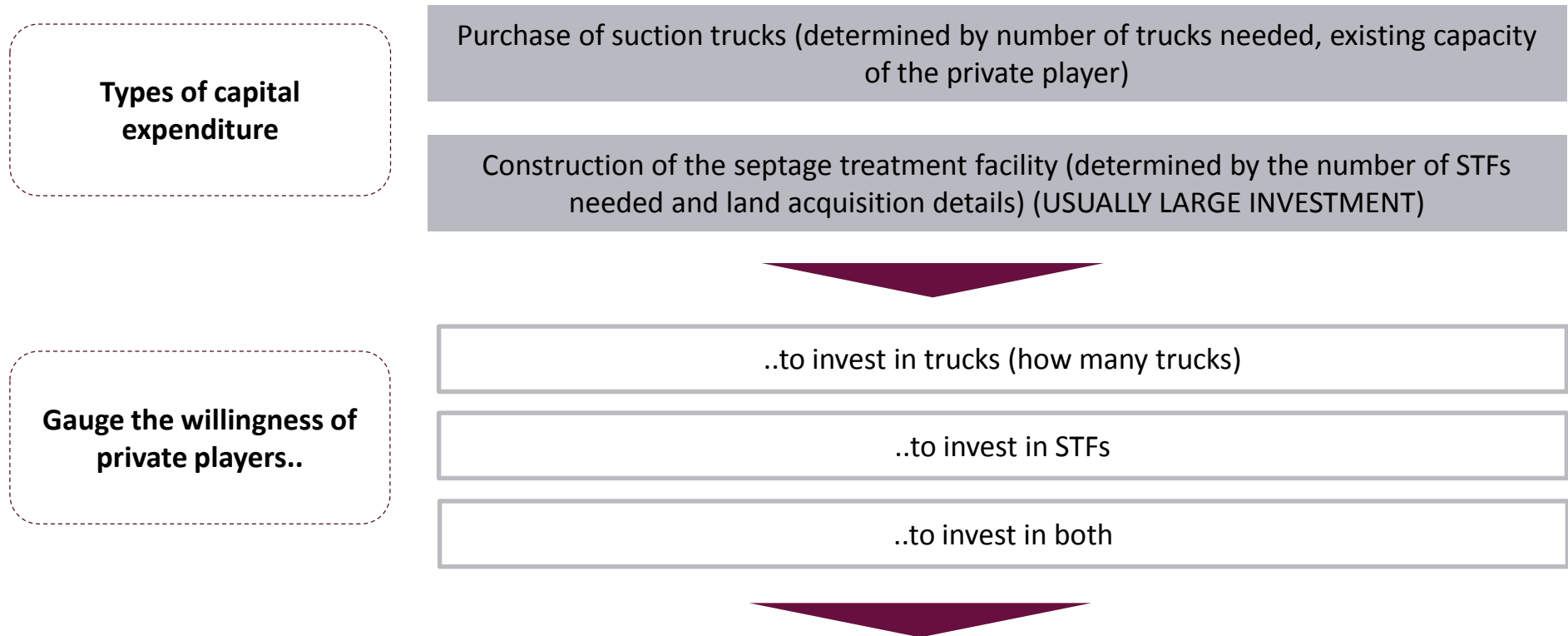
करांचे नांव	मागील धकदाकी	चालू मागणी	एकूण	
१	२	३	४	
संकलित कर				पंधरा दिवसांच्या उक्त काळातधीन अ) या बिलात मागणी केलेली रकम देण्यात न आल्यास किंवा ब) ती का देण्यात येऊ नये यावरून मुख्य अधिकाऱ्याची स्वारी पेटेल असे कोणतेही कारण दर्शविण्यात याचे नाही तर किंवा क) महाराष्ट्र नगरपरिषद अधिनियम १९६५ चा १६ वा कलम नं. १६९ अनुसार कोणतेही अर्पील दाखल करण्यात आले नाही तर उक्त रकम देण्यासंबंधी आपल्यावर मागणी नोंदीस वजविण्यात येईल.
वृक्ष कर				
शिक्षण कर				
रोजगार हमी कर				
पाणी कर				
अग्नीशमन कर				
इतर कर				
एकूण				
१% दिवसानंतरचे व्याज				
एकूण				

कार्यालयीन वाई नगरपरिषद दिनांक - \_\_\_\_\_ मुख्याधिकारी

टीप - समासाच्या स्तंभ २ मध्ये दर्शविलेली रकम चालू मागणीच्या रकमेबरोबर घेण्यात येईल.

***The ULB can consider using its local taxes to support the integrated fecal sludge management plan, and will need to compensate private players directly through a management fee***

## Step 3: Assess ownership of capital assets



The **PSP contract must clearly define who will purchase or pay for the asset** and who will pay for maintenance, and if there is a transfer of asset after a specified period of time

# Checklist to assess ownership of capital assets

## Objective of the tool

The objective of this checklist is decide whether the private sector actor or the ULB should incur the capital expenditure as part of the proposed project

## Key inputs

Is the private sector willing to make the capital investment

Can the ULB afford to make the capital investment

## Outputs

Recommendation on who should own the capital assets

### Overview

The objective of this tool is decide whether the private sector actor or the ULB should incur the capital expenditure as part of the proposed project. It considers two key types of capital investment:

- a. Purchase of honeysuckers
- b. Construction of Sludge Treatment Facility (STF)

### How to use this tool

- This tool considers 2 key questions:
  1. Is the private sector willing to make the capital investment?
    - a. If **Yes**, is the capital investment financially viable for the private player?
    - b. If **No**, can ULB support them to make the investment through financial or support?
  2. Can the ULB afford to make the capital investment?
- For each of the decision questions above, the checklist provides a list of questions that must consider in order to make the decision.
- **Inputs:** To answer the questions described above, and detailed in this checklist, consider the following sources for inputs:
  1. **ULB / Town Sanitation Budget:** The City/ Town's budget and financial reports (present and past) will help identify sources such as surpluses, provisions or allocations used for purchase of assets for the proposed project.

### Checklist for Assessing Ownership of Capital Assets

Checklist	Purchase of <u>honeysuckers</u>	Construction of STFs
<b>1. Is the private sector operator willing to invest in the capital asset?</b>	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>
<b>2. If Yes,</b>		
<ul style="list-style-type: none"> <li>• Does the private sector operator have the capacity to make the upfront capex?</li> </ul>	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>
<ul style="list-style-type: none"> <li>• Can the revenues or cash flows from the asset pay back for its cost during its lifetime?</li> </ul>	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>
<ul style="list-style-type: none"> <li>• Can the asset be redeployed in case of premature termination?</li> </ul>	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>
<ul style="list-style-type: none"> <li>• Can the private player easily sell the asset in case of premature termination</li> </ul>	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>
<b>3. If No,</b>		
<ul style="list-style-type: none"> <li>• What is the key reason for their unwillingness?</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of financial resources</li> <li>• Inherent risks from ownership of asset (such lack of exit options)</li> <li>• Others</li> <li>• All of the above</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of financial resources</li> <li>• Inherent risks from ownership of asset (such lack of exit options)</li> <li>• Others</li> <li>• All of the above</li> </ul>

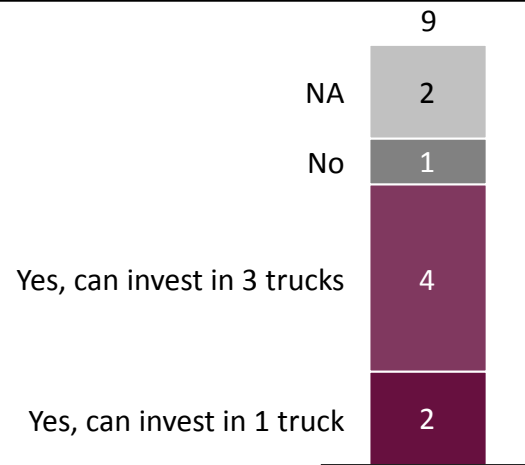


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# Case Study: Assessment of private players revealed that private players were willing to invest in suction trucks, but not want in the construction of STFs

**Willingness to invest in a suction truck**  
(Number of players)



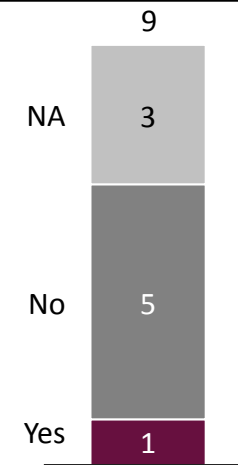
*“Yes, I can procure a truck and operate it on the regulated schedule... I can use (the truck) for other business in case the contract does not work out.”*

- Kadam Enterprises

*“I cannot afford to buy more than one truck. I have just ordered a truck, and faced financial troubles there too.”*

- Ugale onsite system Cleaning Services

**Willingness to invest in construction of STFs**  
(Number of players)



*“Payment needs to be mile-stone based, ~40% up-front, 50% when materials are delivered to the site and 10% post-completion.”*

- Envicare

*“It would be interesting to explore an integrated contract structured as a build-operate-transfer concession agreement.”*

- 3S Shramik

# Step 4: Define payment structure

Defining different activities

Considering various parameters w.r.t to these activities

## Different payment structures

Refurbishment of onsite systems
Regular emptying of onsite systems
Emergency Cleaning of onsite systems
Construction of STFs
O&M of STFs

Frequency of the activity
Whether outputs are measurable
Whether total costs are known
Whether timelines are known

Contract Type	Source of revenue	Ownership of asset	Payment method
1A Refurbishment and cleaning of onsite systems + O&M of STFs	ULB	Private player	Recurring fixed fee with Fixed fee per unit for refurbishment
1B Construction of STFs	ULB	ULB	Overall fixed fee on a pre-decided schedule
2A Refurbishment and cleaning of onsite systems	ULB	Private player	Recurring fixed fee with Fixed fee per unit for refurbishment
2B Construction and O&M of STFs	ULB	ULB	Overall fixed fee on a pre-decided schedule + recurring fixed fee for O&M
3A Integrated contract involving refurbishment, cleaning of onsite systems, construction and O&M of STFs	ULB	<ul style="list-style-type: none"> <li>Trucks – Private</li> <li>STFs – ULB</li> </ul>	Recurring fixed fee for cleaning and O&M with Fixed fee for Construction and Fixed fee per unit for refurbishment

# Checklist to define payment structure

## Objective of the tool

The objective of this tool is decide the payment structure for the contract, for each of the activities covered within the contract

## Key inputs

Frequency, timelines, cost and output expected from each of the activities that is outsourced to the private sector operator

## Outputs

Payment structure that the ULB should opt for

### Overview

The objective of this tool is decide the payment structure for the contract, for each of the activities covered within the contract. The key determinants of the payment structure are the frequency, timelines, cost and output expected from each of the activities that is outsourced to the private sector operator.

### How to use this tool

- The checklist considers the nature of the various activities within the contract, the checklist provides a list of questions that the ULB must consider to make the decision.
- **Inputs:** To answer the questions the ULBs must consider the preliminary report that defines the nature of each of the activities within the scope of the contract.
- Based on the inputs selected by the ULB in the checklist, the recommendation will be displayed at the end of the checklist.

### Checklist for identifying appropriate payment structure

Given the agreed upon contract with the private sector operator, consider the following set of questions to be completed as part of the project:

- a. Scheduled/ regulated O&M of septic tank
- b. Emergency O&M of septic tank
- c. Construction of STF
- d. O&M of STF
- e. Other

The following set of question must be answered for all activities selected above:

### Select Activity: (Drop down menu to select from the above 5 options)

1. What is the frequency of the activity?
  - a. One time
  - b. Recurring or regular
  - c. Not sure
2. Are the outputs for the activity clearly defined? E.g., number of houses / septic tanks/SDBs to clean
  - a. Yes
  - b. No
  - c. Not sure / Not Applicable
3. Are the total costs for the activity known?
  - a. Yes
  - b. No
  - c. Not sure / Not Applicable
4. Are the timelines for the delivery for each outputs clearly defined?
  - a. Yes
  - b. No
  - c. Not sure / Not Applicable



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## Case Study: We identified different combinations of payment methods based on the revenue sources, and ownership structure

	Contract Type	Source of revenue	Ownership of asset	Payment method
1A	Refurbishment and cleaning of onsite systems + O&M of STFs	ULB	Private player	Recurring fixed fee with Fixed fee per unit for refurbishment
1B	Construction of STFs	ULB	ULB	Overall fixed fee on a pre-decided schedule
2A	Refurbishment and cleaning of onsite systems	ULB	Private player	Recurring fixed fee with Fixed fee per unit for refurbishment
2B	Construction and O&M of STFs	ULB	ULB	Overall fixed fee on a pre-decided schedule + recurring fixed fee for O&M
3A	Integrated contract involving refurbishment, cleaning of onsite systems, construction and O&M of STFs	ULB	<ul style="list-style-type: none"> <li>Trucks – Private</li> <li>STFs – ULB</li> </ul>	Recurring fixed fee for cleaning and O&M with Fixed fee for Construction and Fixed fee per unit for refurbishment

## Step 5: Define contract length and value

The toolkit contains an excel model to help the ULB in defining contract length and value, and has the following structure:

Sheet name	Description	Type of Sheet
Assumptions	<ul style="list-style-type: none"><li>• Key assumptions for model</li></ul>	Input
Capital cost estimates	<ul style="list-style-type: none"><li>• Estimates of capital expenditure required for cleaning and refurbishment of onsite systems and construction and O&amp;M of STFs</li></ul>	Input
Operating cost estimates	<ul style="list-style-type: none"><li>• Estimates of operating expenditure required for cleaning and refurbishment of onsite systems and construction and O&amp;M of STFs</li></ul>	Input
Financial Analysis - Option 1	<ul style="list-style-type: none"><li>• Contract value options for operation of suction trucks</li><li>• Tax to be collected from households</li></ul>	Output
Financial Analysis - Option 2	<ul style="list-style-type: none"><li>• Contract value options for operation of suction trucks and O&amp;M of STFs</li><li>• Tax to be collected from households</li></ul>	Output
Financial Analysis - Option 3,4	<ul style="list-style-type: none"><li>• Contract value options for construction and O&amp;M of STFs</li><li>• Tax to be collected from households</li></ul>	Output

**Estimating the contract length and value**

**Calculate the total taxes that need to be raised from the households to finance the increased expenditure**

# Financial Assessment Tool

## Objective of the tool

The objective of this tool is to estimate the total length and value of the contract and determine the total taxes that would need to be raised from households

## Key inputs

Key requirements (Trucks, workers, STFs)

Capital estimates (Unit costs)

Operating and other expenses

Key assumptions

## Outputs

The key output generated from this model is contract values for various contract options

The screenshot displays the Financial Assessment Tool interface, which is a Microsoft Excel-based application. It features several panels for data entry and analysis:

- Option 3: Operation of section emptying trucks:** Contains sections for Financing (Equity deployment on capital assets, Share of debt, Number of years, Interest), Depreciation Assumptions (Value of capital assets, Rate of depreciation, Depreciation, Book value of asset), and WACC assumptions (Expected rate of return, Cost, Population).
- Refresh contract value:** A button to update the model's calculations.
- Option 3: Operation of section emptying trucks (Data):** A table with columns for 'Year' (1, 2, 3) and 'Total'. It lists various costs and values in M\$ (Million Swiss Francs).
- Option 3: Operation of section emptying trucks (Contract length):** A table with columns for 'Year' (1, 2, 3, 4) and 'Total'. It lists various costs and values in M\$.
- Inputs:** A panel with fields for Number of trucks, Cost of truck (M, Land), Total investment required in trucks (M, Land), Size of fuel tank, Cost per liter (M), Total investment required in fuel (M), Office furniture and equipment (M, Land), Storage area and office area construction (M, Land), Area (M, Land), Salaries per number of people, Cost of wages for one person (M, Land), Total investment required in salaries (M, Land), Uniforms (Number of people), Cost of uniforms for one person (M, Land), Total investment required in uniforms (M, Land), and Total investment.
- Outputs:** A panel showing the results of the calculations, including Total investment and Total wages.



## Case study: Based on the financial analysis, a fully integrated contract was found to be the most viable

### Contract valuations for a city

S. No.	Types of contract	Contract length	City X		
			Annual contract value (INR, Lakhs)	Sanitation tax per residential property (INR)	Sanitation tax per non-residential property (INR)
1A	Refurbishment and regular cleaning of septic tanks with O&M of treatment facility	2 - 3 years	15-17	~190	~230
1B	Construction of treatment facility	Duration of construction	24-28	N.A.	N.A.
2A	Refurbishment and regular cleaning of septic tanks	2 - 3 years	11-13	~140	~170
2B	Construction and O&M of treatment facility	1 year	28-33	N.A.	N.A.
3A	Refurbishment and regular cleaning of septic tanks with construction and O&M of treatment facility	2 - 3 years	39-45	~190	~230

Property owners currently have to pay local taxes of about Rs \_\_\_\_\_/annum in City X

To cover the costs of a cleaning cycle of ~3 years would require an increase in annual tax spend for a household of about \_\_\_\_\_% in City X

## Group brainstorming session

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**Please go through first 4 checklists that have been covered (2 per group) and answer the following questions**

- 1. How will you source the information needed to fill out the checklist**
- 2. What information may be difficult to source?**
- 3. Are there any additional parameters that should be added to the tool?**

- Each participant to go through the tool and brainstorm within the group(20 minutes)*
- Each group/table to share their output individually (2minutes)*



# Performance based monitoring and payment system

*There are 3 steps to creating a monitoring and reporting framework for private sector partnerships:*

**1. Identify metrics to assess service levels**

**2. Develop monitoring mechanisms**

**3. Link monitoring to penalties and incentives**

## Key activities

- Define service levels for each of the activities covered by the contract
- Define output based and quantifiable performance metrics for each service level
- Identify important actors /sources that will provide inputs
- Create a clear and effective reporting mechanism for each source
- Tie performance metrics to penalties and incentives in the PBC to ensure compliance

Each of the three steps also help identify the key risks in PSP, and the steps to mitigate them in the form of clear service levels, penalties or termination clauses etc. A list of key risks, and mitigation strategies has been provided at the end of this section

# Step 1: Identify metrics to assess service levels

Define service levels

Define performance metrics

Cleaning of onsite systems

Refurbishment of onsite systems

Construction of STFs

O&M of STFs

Output focused rather than input focused

Easily demonstrable and verifiable

Low-cost to measure and collect

Within the control of the service provider

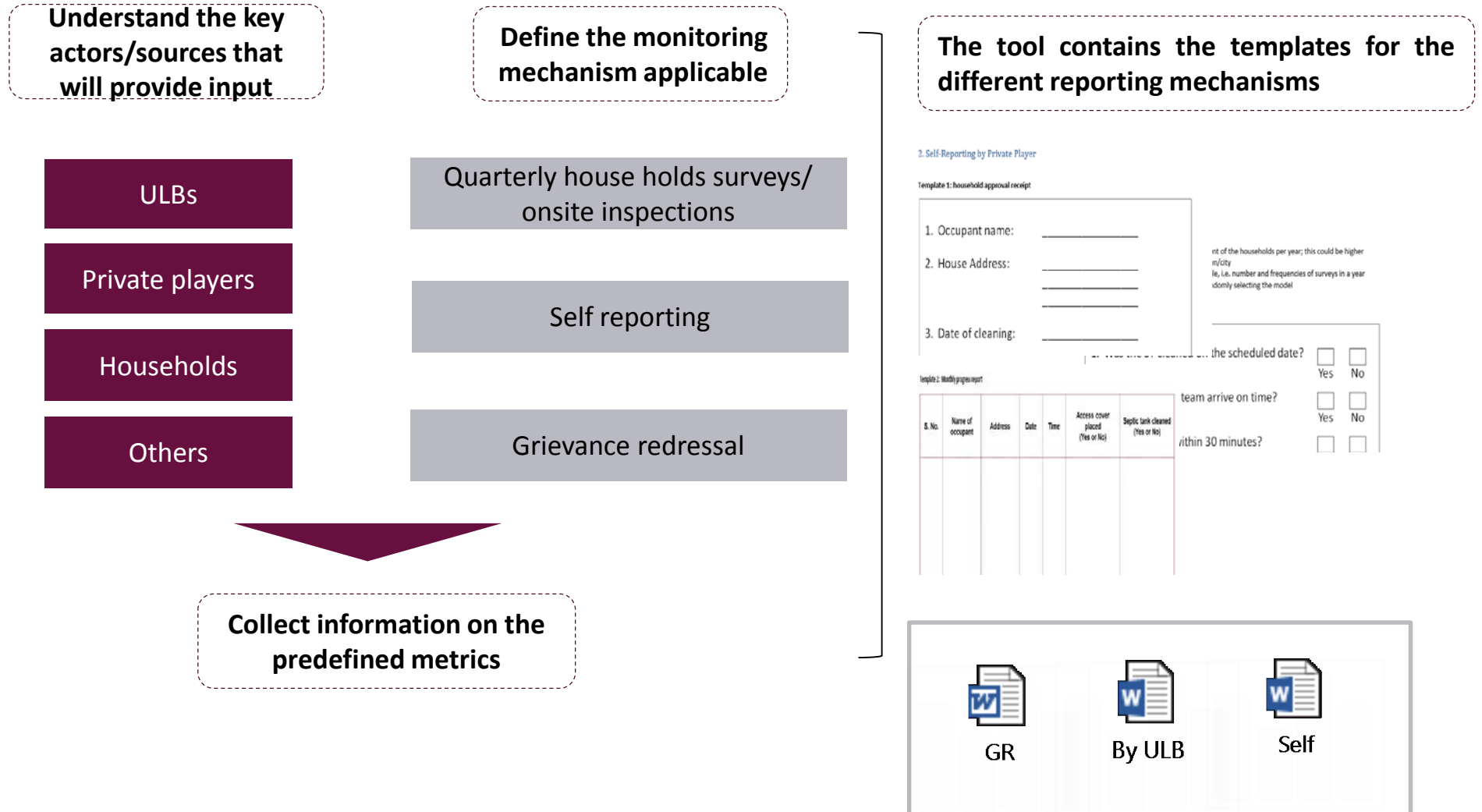
Comparable to benchmarks or other similar standards to capture trend

The tool details the service levels and metrics for the 4 key activities that have been mentioned



Microsoft Word Document

## Step 2: Develop monitoring mechanisms



**Collect information on the predefined metrics**

# Step 3: Link monitoring to penalties and incentives

- The third step in developing a performance based monitoring mechanism is to link the monitoring metrics and reporting systems to tangible payment clauses in the contract
- These clauses to ensure that performance is tied to tangible outputs, and payment terms and incentives / penalties are clearly demarcated for the private sector

The tool contains the sample payment terms for each monitoring process and activity

## A. Cleaning and refurbishment of septic tanks

Metric 1: Percentage of HHs cleaned as per schedule

	Monitoring Process	Payment terms
Self-Reporting	<ul style="list-style-type: none"> <li>The private player collects HH signatures for every septic tank cleaned and informs ULB about HH who are 'unavailable' or 'unwilling'</li> <li>The private player submits a monthly report</li> </ul>	<p><u>End of Quarter</u></p> <ul style="list-style-type: none"> <li>The private player gets paid the number of septic tanks cleaned</li> <li>Proportional payment for per cleaned E.g. 70% of payment if cleaned (Unavailable and uncounted as a part of the target)</li> </ul>

## B. Construction and O&M of STFs

Metric 1: Instances of safety regulations not being adhered to, at treatment site

	Monitoring Process	Payment terms
ULB random site inspection	<ul style="list-style-type: none"> <li>ULB undertakes random monthly inspections of treatment site to ensure that safety regulations are being followed by operator while dealing with septage</li> </ul>	<ul style="list-style-type: none"> <li>In case of non-compliance with safety regulation is observed or verified based on ULB inspection, the contract will be terminated with immediate effect</li> </ul>

Metric 2: Number of instances of contaminated waste dumping

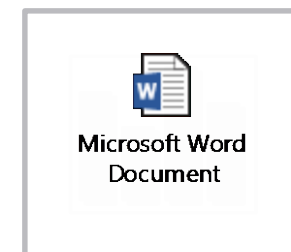
Metric 3: BOD and COD level of effluent and septage coming out of STFs



# Key clauses for the private sector contract?

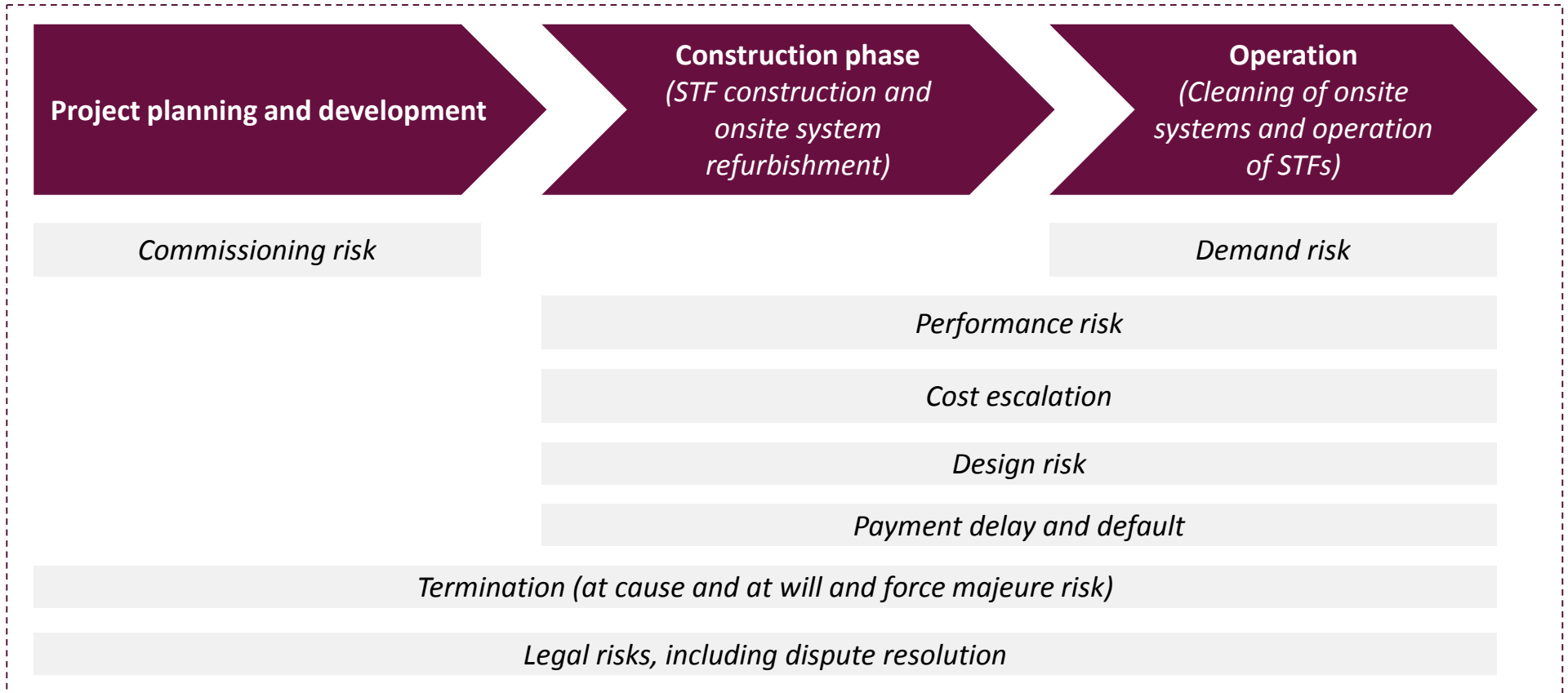
- There are 7 key types of other important aspects for the PSP contract that the ULBs must consider in their contract. These are related to:
  1. **Obligations before signing of a contract**
  2. **Obligations after signing**, but before work begins
  3. **Terms of work** during contract, related to expected standard of service
  4. **Payment**: Details of responsible party, amount due and mechanism of payment to the private player for services provided
  5. **Penalties & Incentives**, for instances when service standards are not met by the private player, as well as incentives to reward strong performance (some of these have been highlighted in the previous sub section (Question 2))
  6. **Termination** of contract
  7. **Others**, related to miscellaneous events
- These also helps **ensure that all risks related to the project are addressed appropriately** by the contract
- These must be **considered separately for each type of activity**, and thus each type of contract. Sample clauses for each type of activity are highlighted on the next few pages

**Tool:** Sample clauses for each these aspects can found at this link.



# Good risk mitigation and allocation can attract good contractors and help reduce contract price

## UNDERSTANDING TYPES OF RISK IN PSP CONTRACTS



# Thank you

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