Workshop on Making Cities ODF+ (FSSM)

Government of Maharashtra

सप्तपदी स्वच्छतेची

CEPT UNIVERSITY

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ALL INDIA INSTITUTE OF LOCAL SELF-GOVERNMENT

RCUES Mumbai

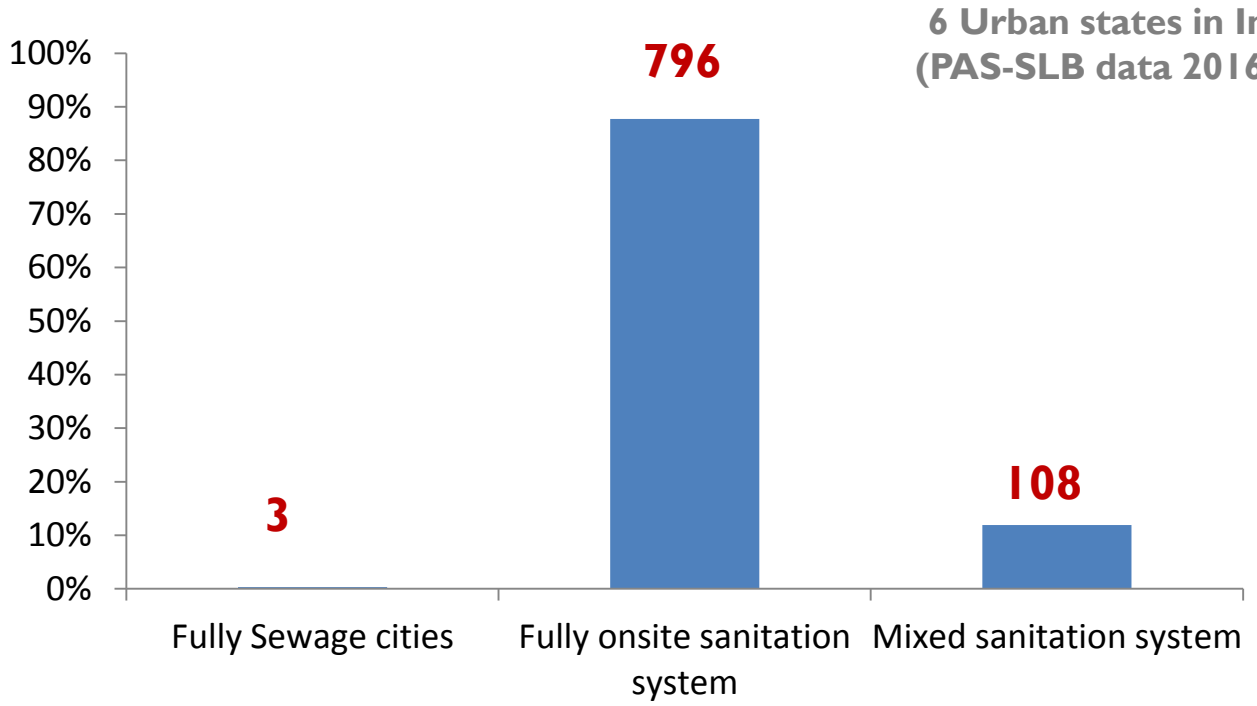
National Institute of Urban Affairs

SCBP

Session 1:
ODF+ (FSSM)
Need of the hour

High dependence on Onsite systems in Urban India!!

Based on the PAS-SLB data by 6 states covering 907 cities, 2016-17



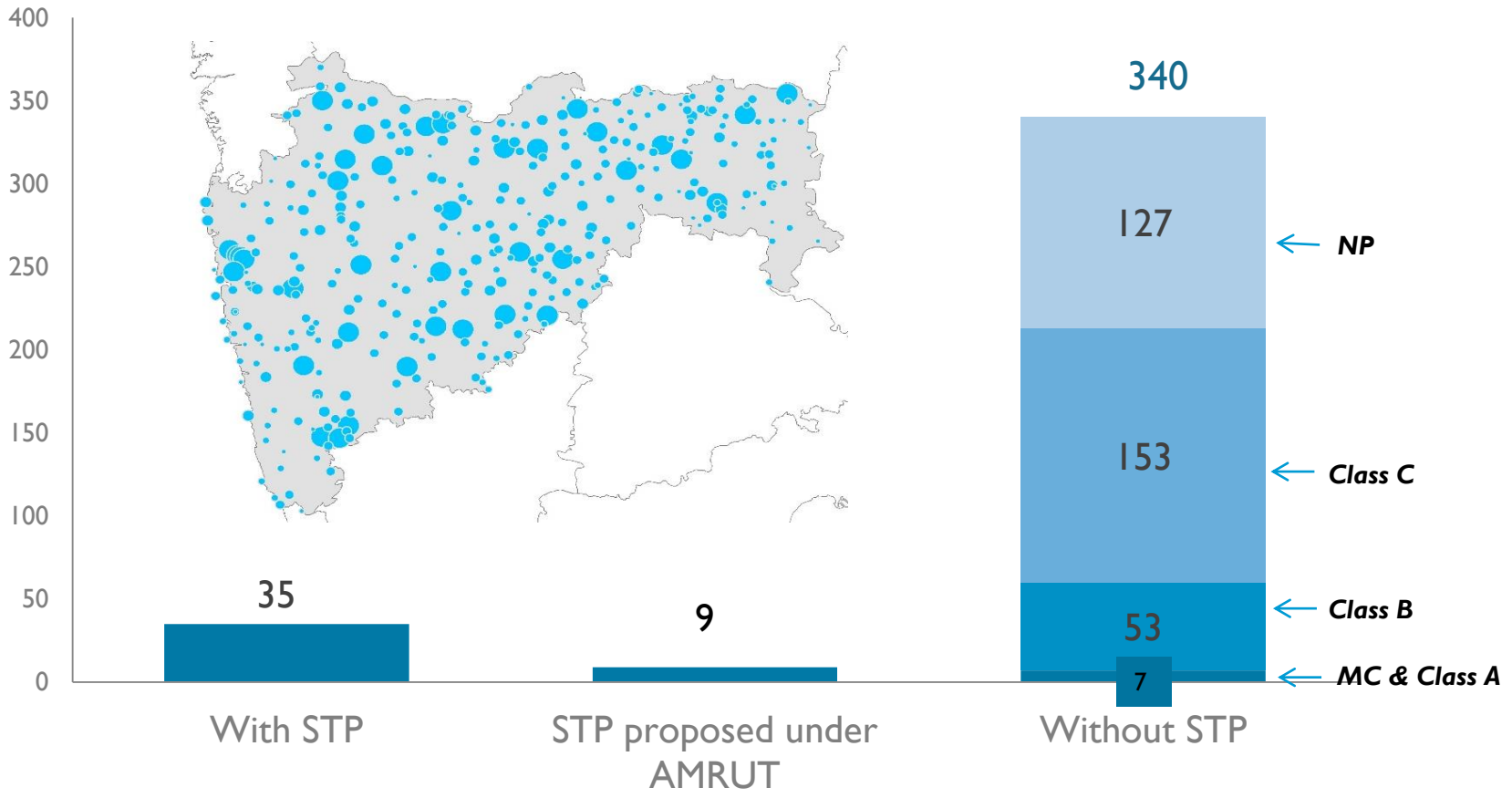
- ✓ Only 3 cities in Gujarat are reported to have 100% sewerage system
- ✓ Nearly 800 cities have fully onsite sanitation systems

88% of cities in **India** are fully dependent on **on-site sanitation systems**

12% are dependent on **mixed sanitation systems**

Status of waste water treatment in Maharashtra

- Majority of cities do not have under ground drainage systems
- 340 Cities are without any Sewage Treatment facility



Source: PAS-SLB 2016-17

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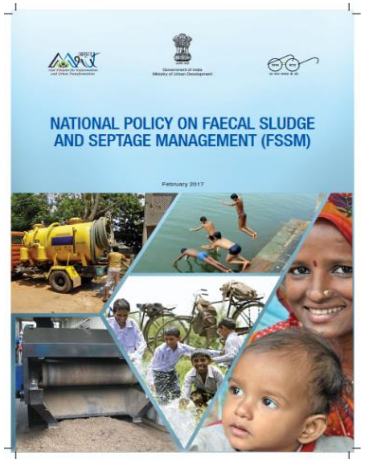
Some Definitions



"**Faecal sludge** is the solid or settled contents of pit latrines and septic tanks.

Faecal sludge (FS) comes from onsite sanitation system such as pit latrines, non-sewered public ablution blocks, septic tanks, aqua privies, and dry toilets."

"**Septage** is the liquid and solid material that is pumped from a septic tank, cesspool, or such onsite treatment facility after it has accumulated over a period of time.

Septage is the combination of scum, sludge, and liquid that accumulates in septic tanks".

Source : http://amrut.gov.in/writereaddata/FSSM_Policy_Report_23Feb.pdf

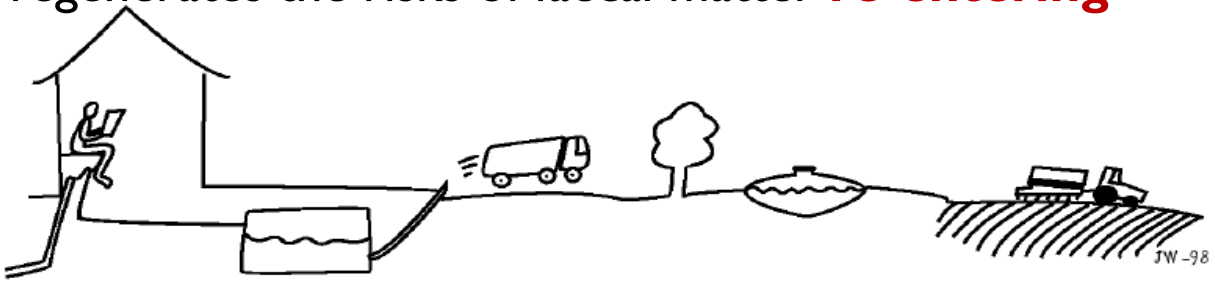
Need for Faecal Sludge and Septage Management (FSSM)

- Facilities like **septic tanks**, dry latrines, community toilets, or other types **accumulate fecal sludge**

- **Septage** needs to be **removed periodically**. If this septage is **not properly managed**, **negative impacts** on the urban **environment** and on **public health** may result

- **Pollution of groundwater and surface water sources** caused by **effluents from household or community toilet septic tanks** that are not desludged regularly

- **Improper handling** of septage regenerates the risks of faecal matter **re-entering the domestic environment**



Source : Advisory note on septage management in urban India, MoUD January 2013

Why is Faecal Sludge and Septage Management (FSSM) important ! ! !

1 truck of Faecal Sludge and Septage carelessly dumped
= 5,000 people shitting in the open!

1 Gram of Feaces may contain:

100 parasites eggs

1000 Protozoa

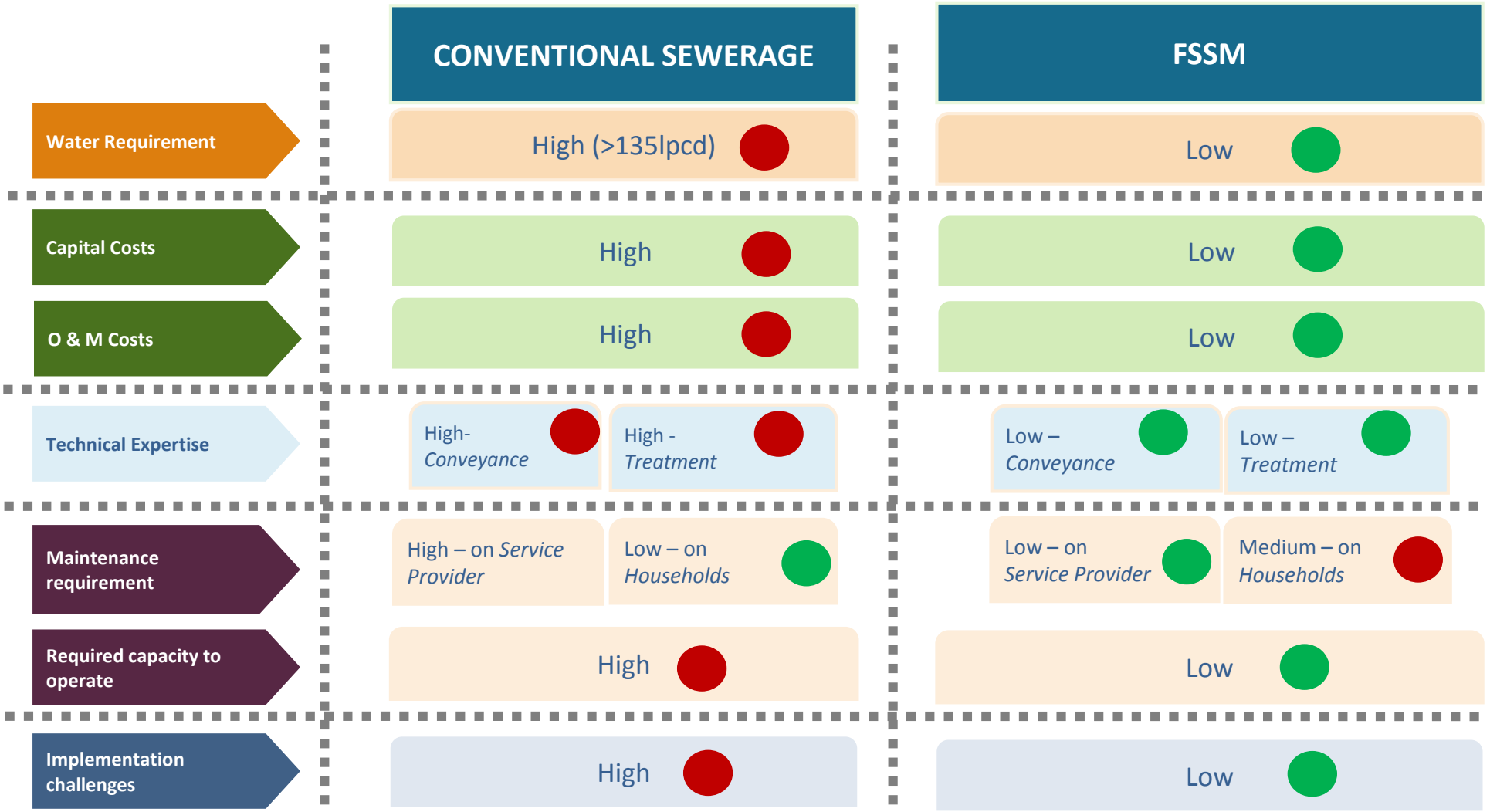
1,000,000 Bacteria

10,000,000 Virus

Are we really ODF !!!

Source : Chary, Srinivas, (2017), "City Wide Approach to Sanitation : Operationalizing FSM Regulations A Case study of Warangal City" at Ujjain Workshop by Water Aid, ASCI *(mimeo)*

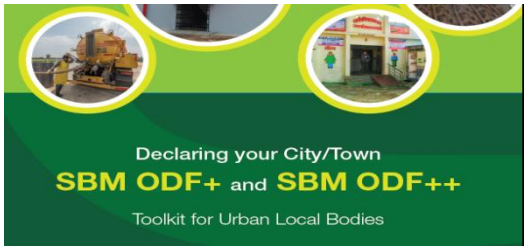
FSSM as compared to conventional sewerage systems



Recognition of FSSM in India

- **SBM focus** on having sanitary toilets and eradicating Manual scavenging
- **Post SBM context -** Toilets are being constructed but need to think beyond that . . .
- **National Policy** on FSSM by MoHUA, GoI
- **States** beginning to roll out **similar policies**
- **National declaration** on **Septage Management** by MoHUA, GoI
- One of the major **thrust areas** of **AMRUT** – Financial allocations
- **Primer** on septage Management and **Rapid Assessment tool** for estimating **budget requirements** for FSSM
- National **ODF+ and ODF++ protocol**

अमृत
Atal Mission for Rejuvenation and Urban Transformation

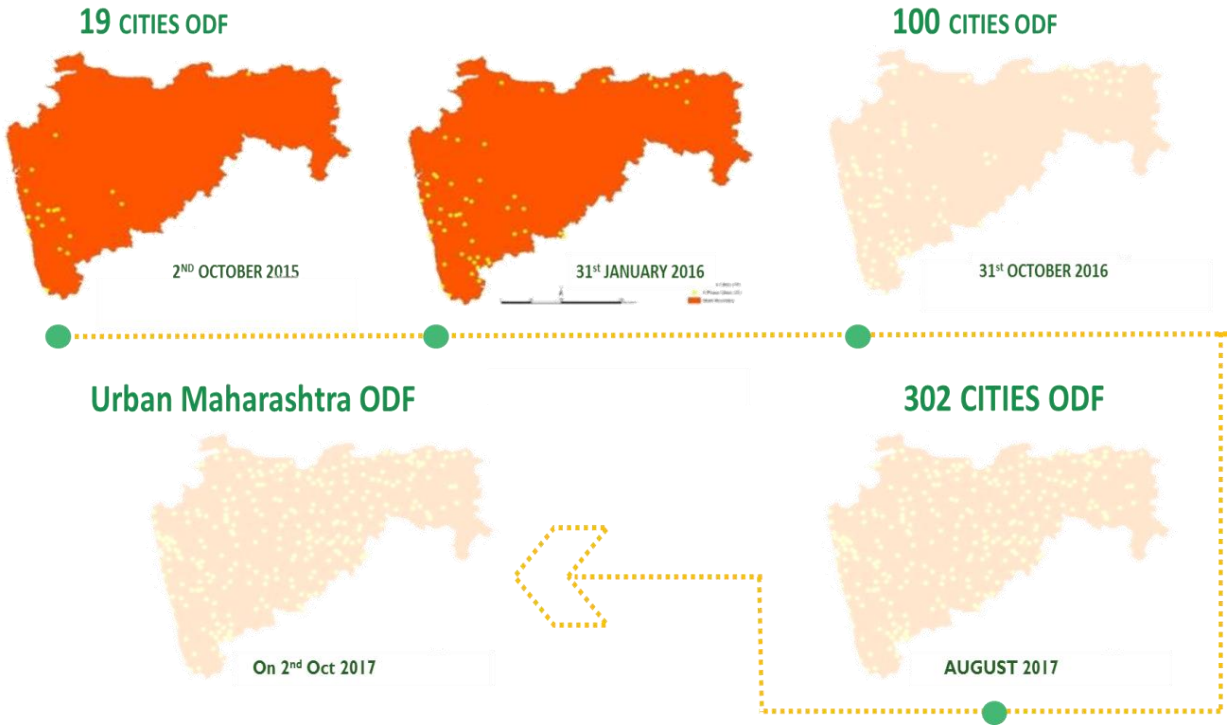


Journey of Urban Maharashtra to become ODF

Swachh Maharashtra Mission, Urban

Launch of SMMU

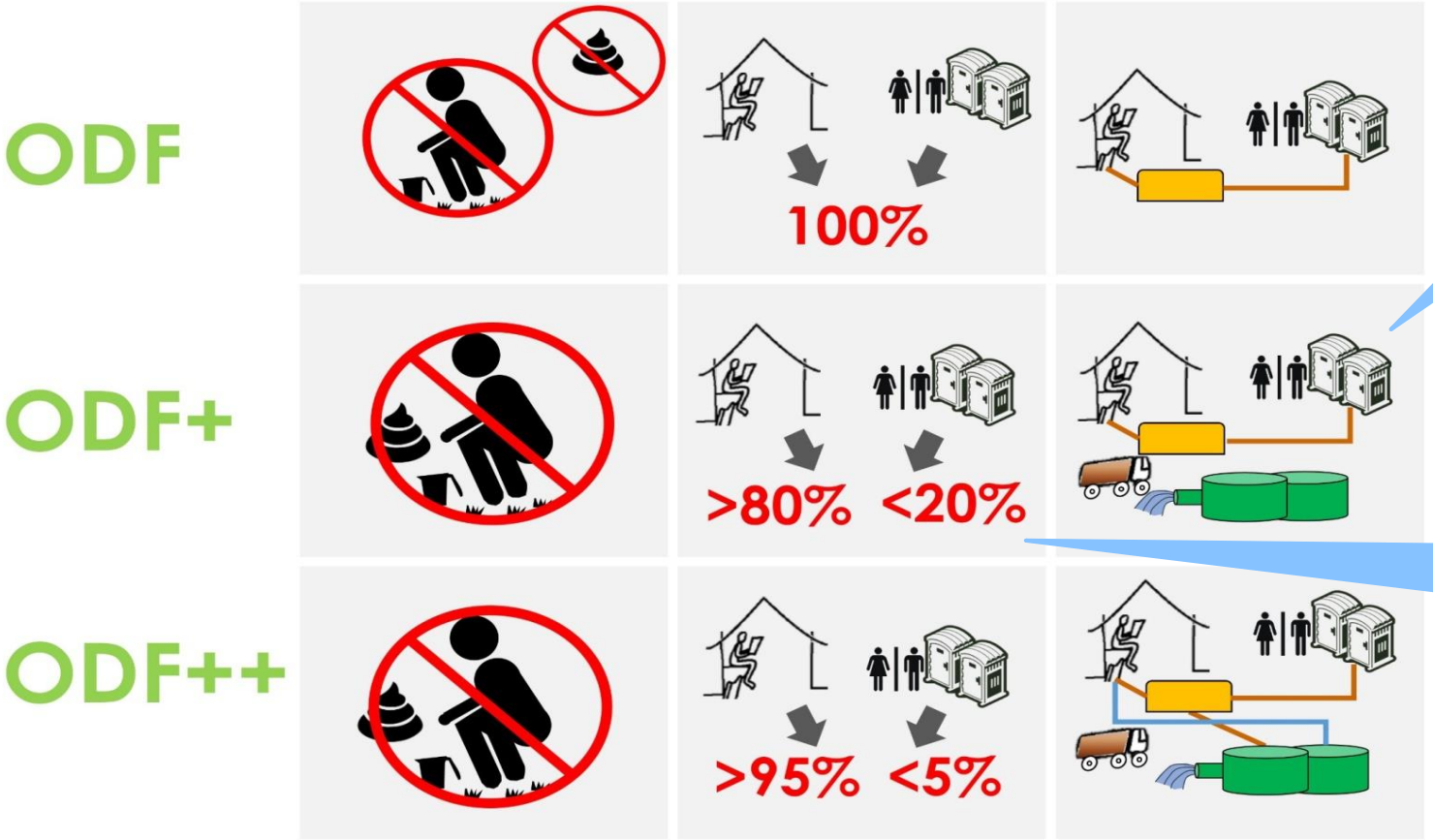
15th May 2015



A near impossible task achieved in a short time…

In Maharashtra…

- "Move beyond toilets" – concept of ODF, ODF+, ODF++ cities - GoM GR dated 17th March. 2017
- Emphasis on quality – discouraging prefab toilets & contractor constructed toilets - GoM GR dated 20th November 2015 – Septic tanks with toilets



Sustainability Charter Launched by the Chief Minister

सप्तपदी सातत्याची

Sustainability Charter

We are committed towards the vision of Swachh Bharat. We shall ensure ODF sustainability in Maharashtra by:

#1. Achieving universal access to Individual Household Level Latrines (IHHL), which is a leading development priority.

#2. Ensuring adequate, clean and reliable access to public/ community toilets across urban Maharashtra, wherever IHHL are not possible.

#3. Ensuring ODF sustainability through effective participation of government, elected representatives, schools, donors, implementers, NGOs, SHGs, CBOs and the communities.

#4. Continuing and institutionalizing rigorous ODF validation and monitoring process through "OD Watch" and "ODF sustainability tracker"

#5. Auditing the performance of community/ public toilet and encouraging development of OD spots into usable public spaces.

#6. Recognizing and awarding sustained performance

#7. Moving towards ODF+/++ by ensuring effective collection and adequate treatment of human fecal waste

Mr. Devendra Fadnavis
Chief Minister, Maharashtra

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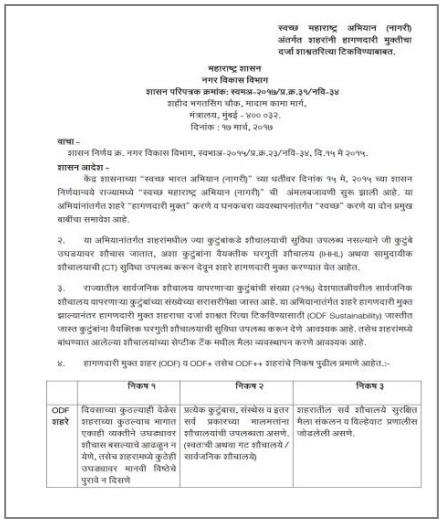
Focus on FSSM by Government of Maharashtra

- **Increased focus on moving ODF cities towards ODF+ after declaring Urban Maharashtra ODF**

- **Maharashtra Government has passed two resolutions, directing to move towards ODF+ and to utilize Incentive grant and 14th FC funds for ODF+ activities**



स्वच्छ महाराष्ट्र अभियान (नागरी) अंतर्गत शहरांची हागणदारी मुक्तीचा दर्जा शाश्वतरित्या टिकविण्याबाबत.

महाराष्ट्र शासन
नगर विकास विभाग
शासन परिपत्रक क्रमांक: स्वमअ-२०१७/प्र.क्र.३९/नवि-३४
शहीद भगतसिंग चौक, मादाम कामा मार्ग,
मंत्रालय, मुंबई - ४०० ०३२.
दिनांक : १७ मार्च, २०१७

वाचा -
शासन निर्णय क्र. नगर विकास विभाग, स्वमअ-२०१५/प्र.क्र.२३/नवि-३४, दि.१५ मे २०१५.

शासन आदेश -
केंद्र शासनाच्या "स्वच्छ भारत अभियान (नागरी)" च्या धर्तीवर दिनांक १५ मे, २०१५ च्या शासन निर्णयान्वये राज्यामध्ये "स्वच्छ महाराष्ट्र अभियान (नागरी)" ची अंमलबजावणी सुरु झाली आहे. या अभियानांतर्गत शहरे "हागणदारी मुक्त" करणे व घनकचरा व्यवस्थापनांतर्गत "स्वच्छ" करणे या दोन प्रमुख बाबींचा समावेश आहे.

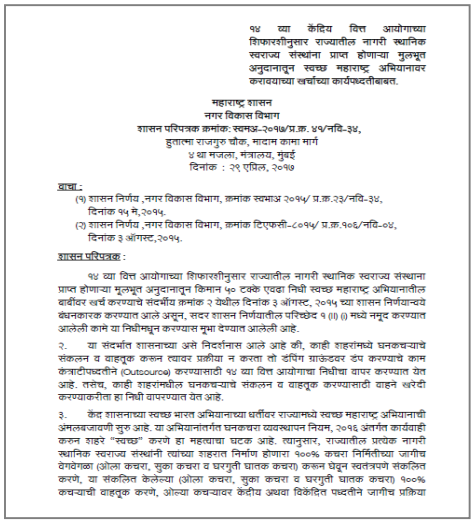
२. या अभियानांतर्गत शहरांमधील ज्या कुटुंबांकडे शौचालयाची सुविधा उपलब्ध नसल्याने जी कुटुंबे उघड्यावर शौचास जातात, अशा कुटुंबांना वैयक्तीक घरगुती शौचालय (IHHL) अथवा सामुदायीक शौचालयाची (CT) सुविधा उपलब्ध करून देवून शहरे हागणदारी मुक्त करण्यात येत आहेत.

३. राज्यातील सार्वजनिक शौचालय वापरणाऱ्या कुटुंबांची संख्या (२१%) वेशपालाजीवरील सार्वजनिक शौचालय वापरणाऱ्या कुटुंबांच्या संख्येच्या सरासरीपेक्षा जास्त आहे. या अभियानांतर्गत शहरे हागणदारी मुक्त झाल्यानंतर हागणदारी मुक्त शहराचा दर्जा शाश्वत रित्या टिकविण्यासाठी (ODF Sustainability) जास्तीत जास्त कुटुंबांना वैयक्तिक घरगुती शौचालयाची सुविधा उपलब्ध करून देणे आवश्यक आहे. तसेच शहरांमध्ये बांधण्यात आलेल्या शौचालयांच्या सेप्टीक टँक मधील मैला व्यवस्थापन करणे आवश्यक आहे.

४. हागणदारी मुक्त शहर (ODF) व ODF+ तसेच ODF++ शहरांचे निकष पुढील प्रमाणे आहेत.:-

	निकष १	निकष २	निकष ३
ODF शहरे	दिवसाच्या कुठल्याही वेळेस शहराच्या कुठल्याच भागात एकही व्यक्तीने उघड्यावर शौचास बसल्याचे आढळून न येणे, तसेच शहरामध्ये कुठेही उघड्यावर मानवी विष्ठेचे पुरावे न दिसणे	प्रत्येक कुटुंबास, संस्थेस व इतर सर्व प्रकारच्या मालमत्तांना शौचालयाची उपलब्धता असणे. (सार्वजनीक अथवा गट शौचालये / सार्वजनिक शौचालये)	शहरातील सर्व शौचालये सुरक्षित मैला संकलन व विल्हेवाट प्रणालीस जोडलेली असणे.

GR on ODF,ODF+ and ODF++ framework



७४ व्या केंद्रिय वित्त आयोगाच्या शिफारशीनुसार राज्यातील नागरी स्थानिक स्वराज्य संस्थांना प्राप्त होणाऱ्या मूलभूत अनुदानातून स्वच्छ महाराष्ट्र अभियानावर करावयाच्या खर्चाच्या कार्यपध्दतीबाबत.

महाराष्ट्र शासन
नगर विकास विभाग
शासन परिपत्रक क्रमांक: स्वमअ-२०१७/प्र.क्र. ४७/नवि-३४,
हुतात्मा राजगुरु चौक, मादाम कामा मार्ग
४ था मजला, मंत्रालय, मुंबई
दिनांक : २९ एप्रिल, २०१७

वाचा -
(१) शासन निर्णय ,नगर विकास विभाग, क्रमांक स्वमअ २०१५/ प्र.क्र.२३/नवि-३४, दिनांक १५ मे,२०१५.
(२) शासन निर्णय ,नगर विकास विभाग, क्रमांक टिएफसी-८०१५/ प्र.क्र.१०६/नवि-०४, दिनांक ३ ऑगस्ट,२०१५.

शासन परिपत्रक :
७४ व्या वित्त आयोगाच्या शिफारशीनुसार राज्यातील नागरी स्थानिक स्वराज्य संस्थाना प्राप्त होणाऱ्या मूलभूत अनुदानातून किमान ५० टक्के एवढा निधी स्वच्छ महाराष्ट्र अभियानातील बाबींवर खर्च करण्याचे संदर्भीय क्रमांक २ येथील दिनांक ३ ऑगस्ट, २०१५ च्या शासन निर्णयान्वये बंधनकारक करण्यात आले असून, सदर शासन निर्णयातील परिच्छेद ७ (ii) (i) मध्ये नमूद करण्यात आलेली कामे या निधीमधून करण्यास मुभा देण्यात आलेली आहे.

२. या संदर्भात शासनाच्या असे निदर्शनास आले आहे की, काही शहरांमध्ये घनकचऱ्याचे संकलन व वाहतूक करून त्यावर प्रक्रीया न करता तो डंपिंग ग्राऊंडवर डंप करण्याचे काम कंत्राटीपध्दतीने (Outsource) करण्यासाठी ७४ व्या वित्त आयोगाचा निधीचा वापर करण्यात येत आहे. तसेच, काही शहरांमधील घनकचऱ्याचे संकलन व वाहतूक करण्यासाठी वाहने खरेदी करण्याकरीता हा निधी वापरण्यात येत आहे.

३. केंद्र शासनाच्या स्वच्छ भारत अभियानाच्या धर्तीवर राज्यामध्ये स्वच्छ महाराष्ट्र अभियानाची अंमलबजावणी सुरु आहे. या अभियानांतर्गत घनकचरा व्यवस्थापन नियम, २०१६ अंतर्गत कार्यवाही करून शहरे "स्वच्छ" करणे हा महत्वाचा घटक आहे. त्यानुसार, राज्यातील प्रत्येक नागरी स्थानिक स्वराज्य संस्थांनी त्याच्या शहरात निर्माण होणारा १००% कचरा निर्मितीच्या जागीच वेगवेगळा (ओला कचरा, सुका कचरा व घरगुती घातक कचरा) करून घेवून स्वतंत्रपणे संकलित करणे, या संकलित केलेल्या (ओला कचरा, सुका कचरा व घरगुती घातक कचरा) १००% कचऱ्याची वाहतूक करणे, ओल्या कचऱ्यावर केंद्रीय अथवा विकेंद्रित पध्दतीने जागीच प्रक्रिया

GR on use of Incentive Funds

Chief Minister Speech on occasion of declaring Urban Maharashtra ODF on 2nd October 2017

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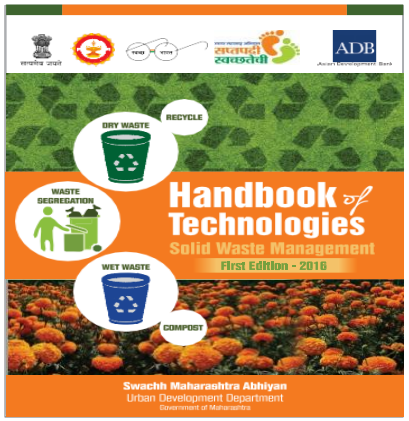
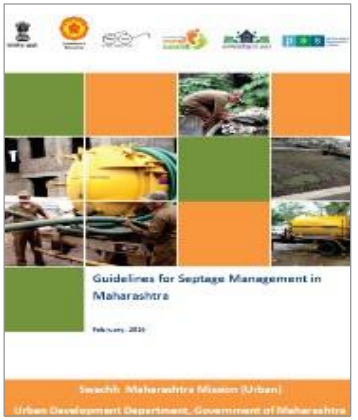
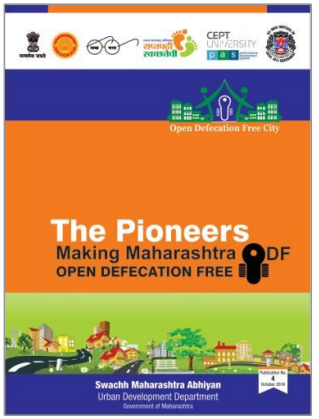
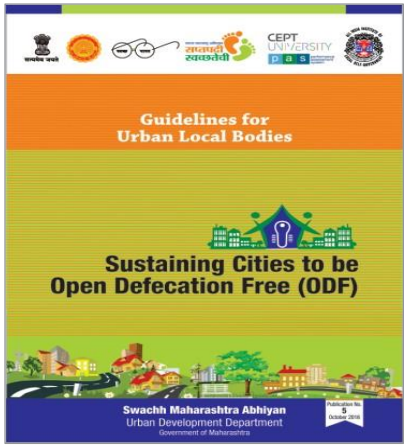
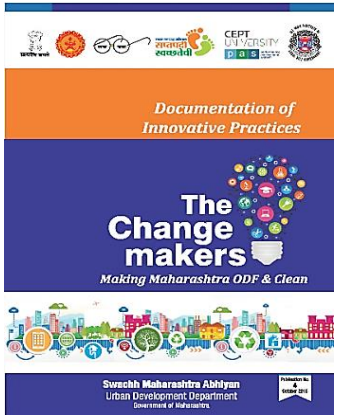
Documentation, policy and guidelines for FSSM

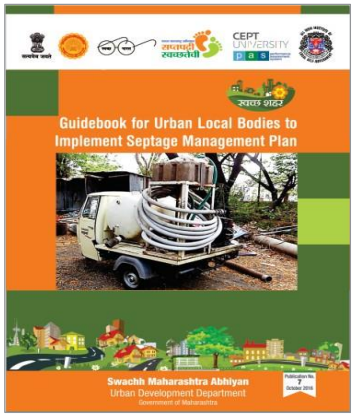


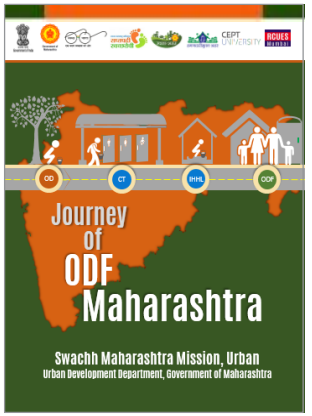












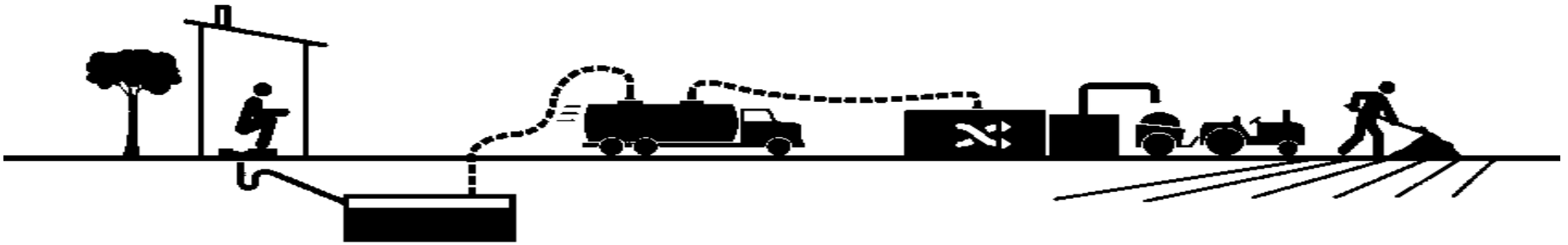
Monitoring by State for ODF + activities . . .

- State is going to provide training to ULBs for preparing ODF+ plans
- State to follow up with ULBs regarding :
  - Whether cities have done an assessment for preparing FSSM plan
  - Whether cities have developed an FSSM plan
    - Emptying plan
    - Treatment plan
  - Have cities allocated land for construction of FSTP
  - Have cities allocated funds for financing capital and O&M of FSSM services
  - By when does the city plan to implement the FSSM plan
  - Timeline of all these activities

Challenges we are trying to resolve through FSSM . . .

Understanding the Sanitation Service Chain . . .

User interface | Containment | Conveyance and Transport | Treatment | Use or Disposal



Access → Containment → Conveyance → Treatment → Reuse/Disposal

Describes **type of toilet facilities** the user accesses.

Describes **ways of collecting** and sometimes treating the **faecal waste** generated by the users.

Describes **transport of waste** from collection to the treatment / disposal site

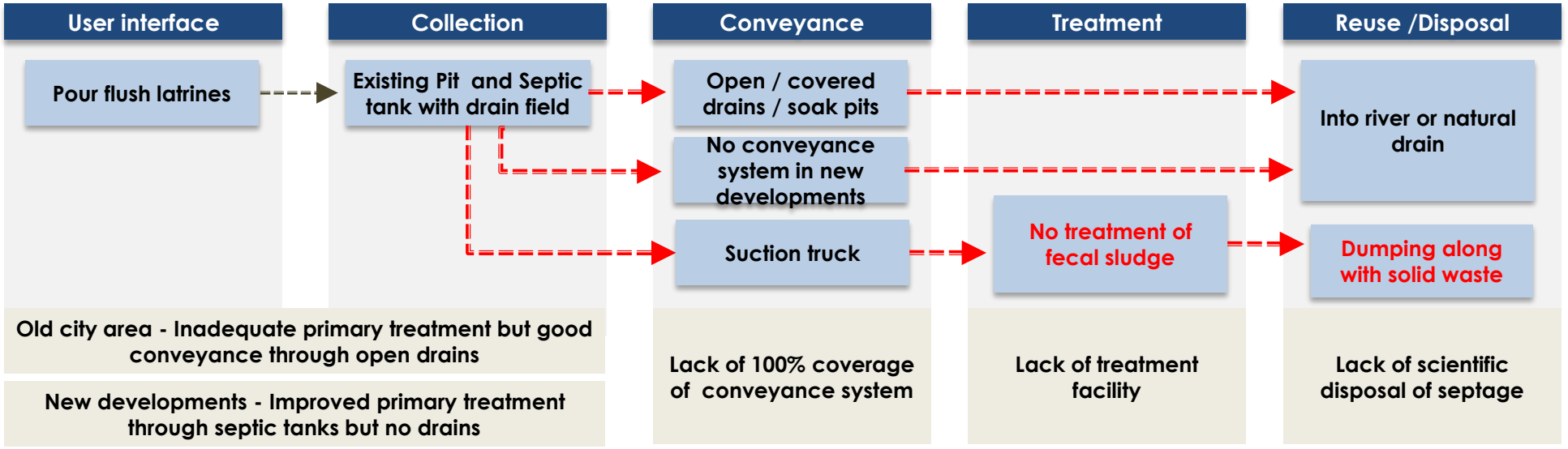
Describes way in which waste is **treated**

Describes the way in which waste **reused / disposed off**

On-site sanitation technology

Faecal Sludge Management

Sanitation service chain of medium-small cities of Maharashtra



Challenges in Collection system

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

Inaccessible septic tanks with sealed tops

Septic tanks located near drains and sealed from the top

Single pit toilets

Oversized septic tanks

Toilets directly connected to drains

Challenges in Conveyance system

Services mainly provided by city governments

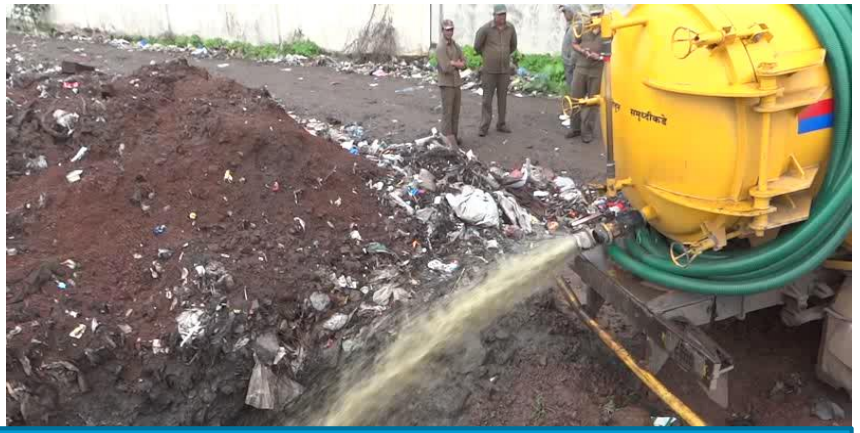
Unsafe handling of septage

Informal Private sector

Emptying when the tank is full

- No monitoring mechanism for informal sector
- Cleaning cycle greater than 8-10 years against recommended cycle of 2-3 years
- Due to infrequent cleaning, septage begins to solidify in tanks and septic tank fills up, fecal matter along with effluents is released into the drains

Challenges in Treatment and Disposal



Disposal of septage at dump site

NO TREATMENT OF FECAL SLUDGE & SEPTAGE

Disposal of septage in open land

Disposal of septage in water bodies

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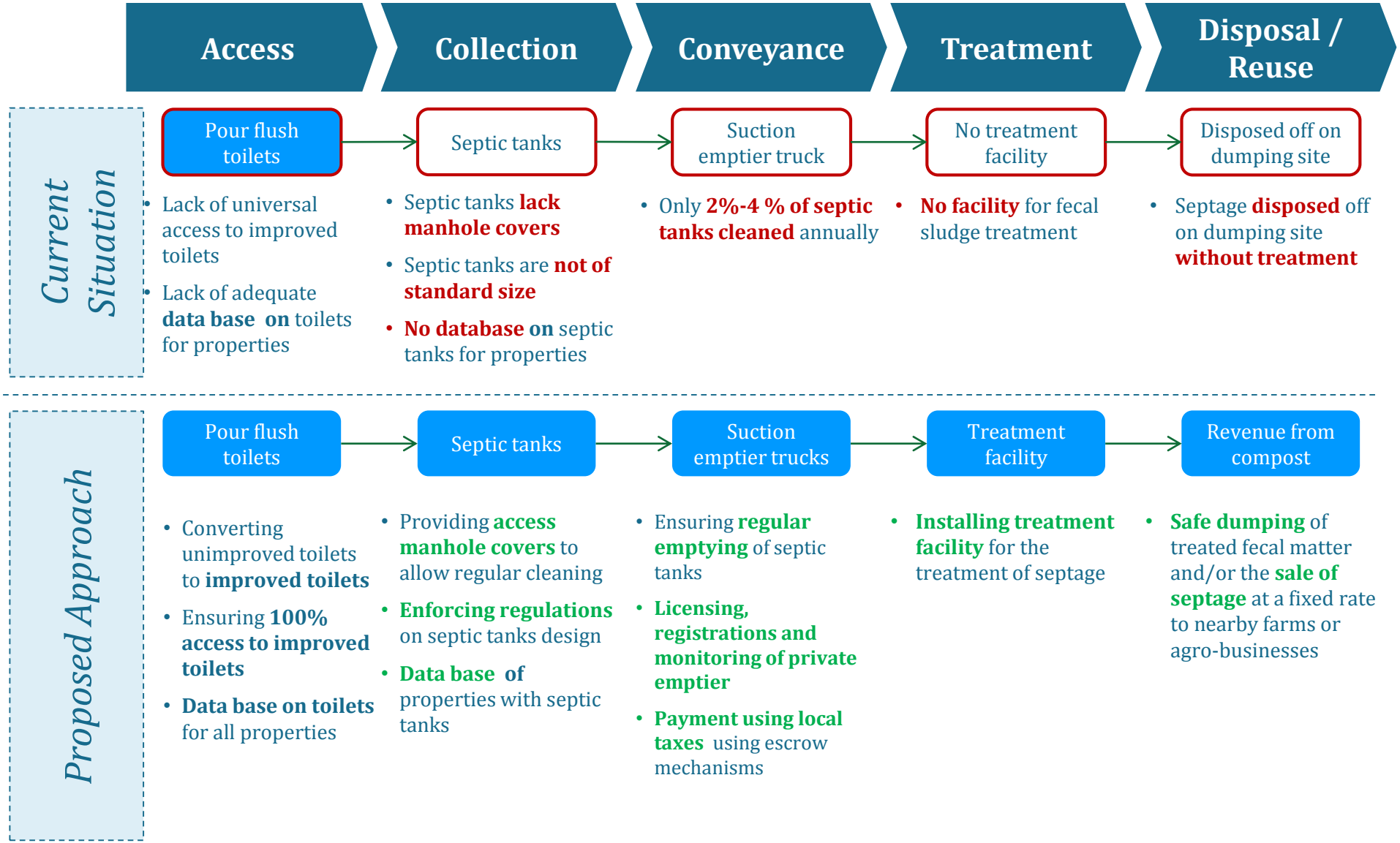
Source : Chary, Srinivas, (2017), "City Wide Approach to Sanitation : Operationalizing FSM Regulations A Case study of Warangal City" at Ujjain Workshop by Water Aid, ASCI *(mimeo)*

FSSM as a solution for Moving from RED to GREEN



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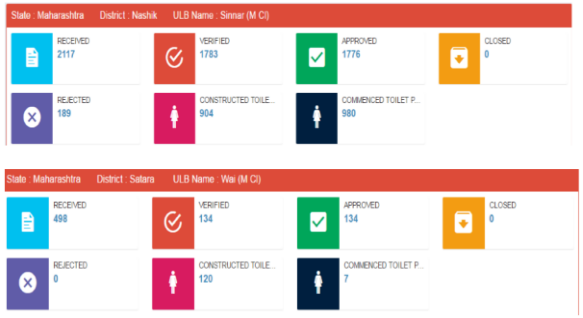
Journey of Wai and Sinnar in moving towards ODF+

Wai and Sinnar have been declared as an ODF City by GoM &GoI



~2600+ applications have been received

~1900 applications have been approved for construction

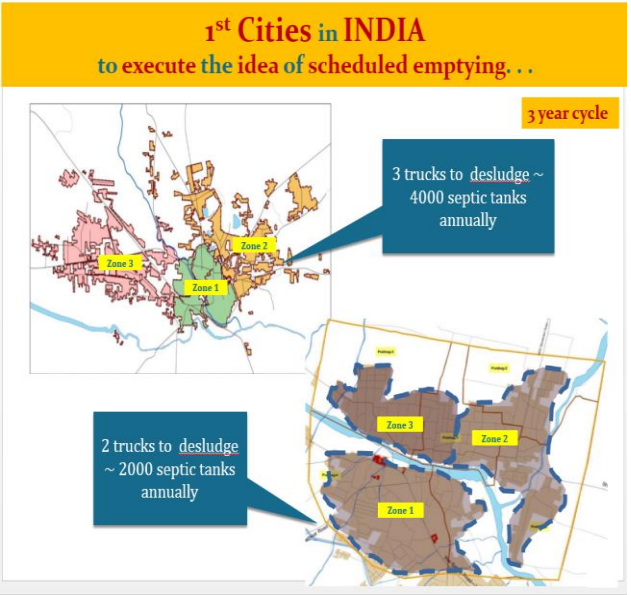
~1100 toilets constructed

Both councils has signed resolution to implement FSM plans

The resolution covers aspects like:

- ❑ Citywide IFSM
- ❑ Involving Private sector
- ❑ Scheduled cleaning
- ❑ Land for treatment facility
- ❑ Taxes to be levied
- ❑ Escrow account

1st Cities in INDIA to execute the idea of scheduled emptying. . .



Wai and Sinnar – The FSTP are setup in both the towns

- Wai has allocated land for treatment facility
- 70cum/day FSTP by Tide technocrats in Wai funded by BMGF
- Plant is operational from June, 2018.
- Sinnar had floated DBOT tender for 70cum/day plant and Lowest - technically qualified tender has been identified.
- The Project is 100% funded by ULB own funds
- The project to commission in next 4 months

- ✓ Councils signed to implement FSM plans
- ✓ 1st cities in India to execute scheduled desludging
- ✓ Built FSTP for treating septage
- ✓ Private sector participation for emptying services
- ✓ Escrow account to minimize payment risks for private operator
- ✓ Funding through Sanitation tax levied on all properties

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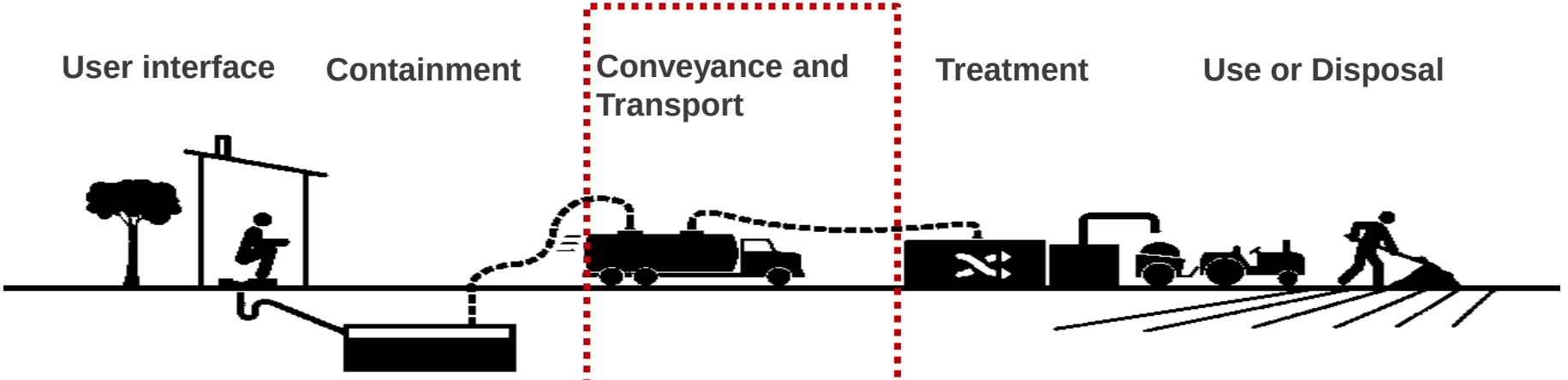
Sinnar Movie

Session 2:
Planning for emptying services

Understanding the Sanitation Service Chain . . .



Access → Containment → Conveyance → Treatment → Reuse/Disposal

Describes **type of toilet facilities** the user accesses.

Describes **ways of collecting** and sometimes treating the **faecal waste** generated by the users.

Describes **transport of waste** from collection to the treatment / disposal site

Describes way in which waste is **treated**

Describes the way in which waste **reused / disposed off**

On-site sanitation technology

Faecal Sludge Management

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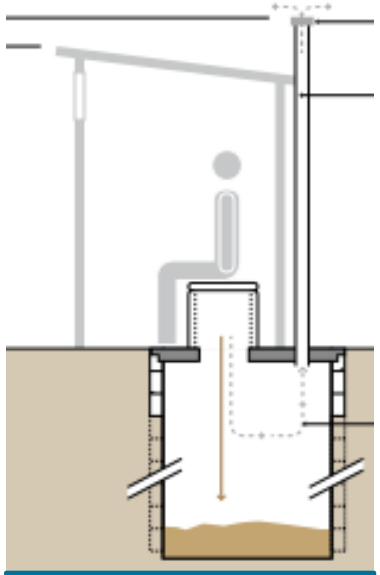
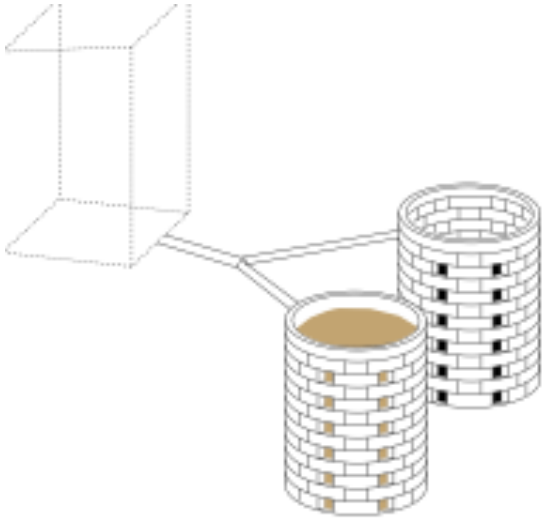
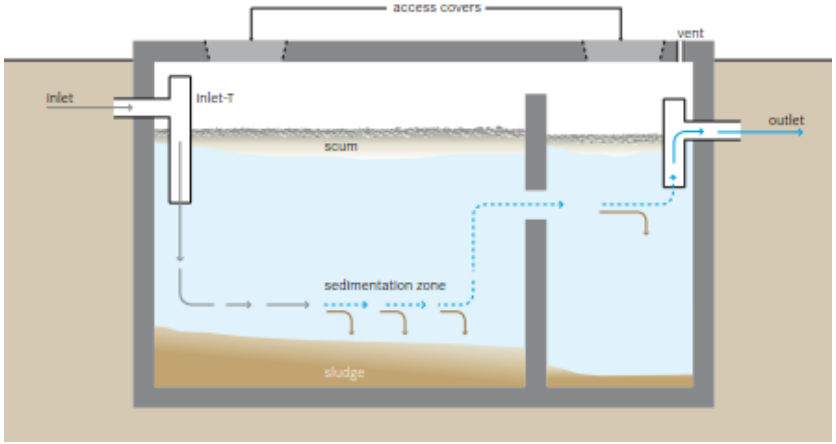
Type of collection Systems



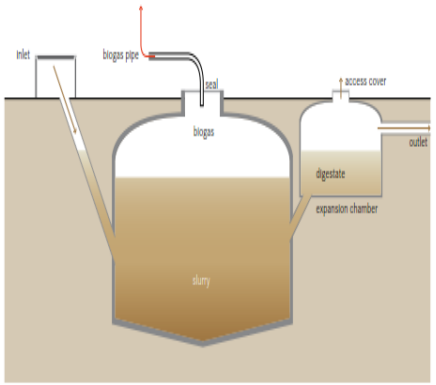
Single pit toilet



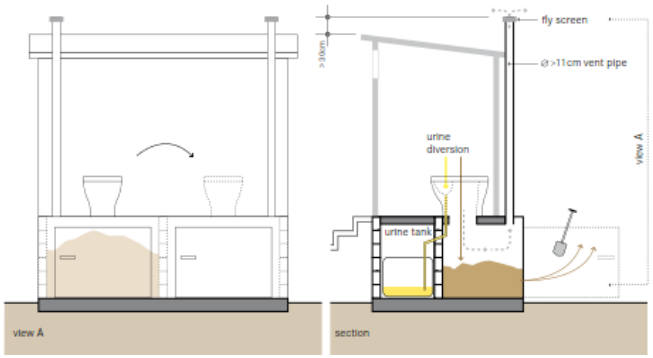
Twin pit toilet



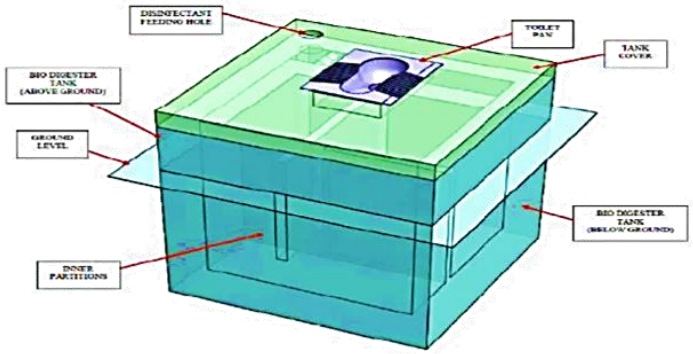
2-3 chambered Septic tank



Biogas



Composting toilet



Bio-digestor

Existing types of emptying & conveyance systems

Services mainly provided by city governments

Unsafe handling of septage

Informal Private sector

Emptying when the tank is full

- No monitoring mechanism for informal sector
- Cleaning cycle greater than 8-10 years against recommended cycle of 2-3 years by GoI advisory on Septage Management
- Due to infrequent cleaning, septage begins to solidify in tanks and septic tank fills up, faecal matter along with effluents is released into the drains

Manual Scavenging Act

Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013

Came into force on Dec 6, 2013

"Prohibition of Insanitary Latrines and Employment and Engagement for cleaning of Sewers or Septic Tanks as Manual Scavenger

Prohibition of Activity

Local authorities to survey **Insanitary latrines and provide Sanitary community latrines.**

Survey of manual scavengers in urban areas by Municipalities.

Duty of local authorities and other agencies to use modern **mechanical technology for cleaning of sewers and onsite systems,** etc.

Rehabilitation

Rehabilitation of persons identified as Manual Scavengers by a Municipality.
Housing and Financial Assistance to be given.

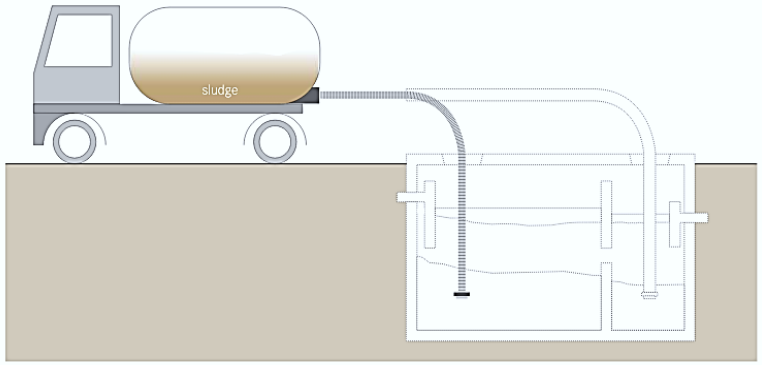
Need for periodic cleaning of septic tanks

"When the pit is Full".

Often a tank is emptied when it is full. There is a tendency to use/build oversized septic tanks to avoid frequent emptying. It is important to assess how often a septic tank is emptied. Such information will need to be gathered through a household surveys.

Planning Decision

Demand desludging **V/S** **Scheduled desludging**



Sketch adopted from compendium of sanitation systems and technologies, Eawag

Example

In India: the Central Public Health Engineering and Environmental Organization (CPHEEO) suggests:

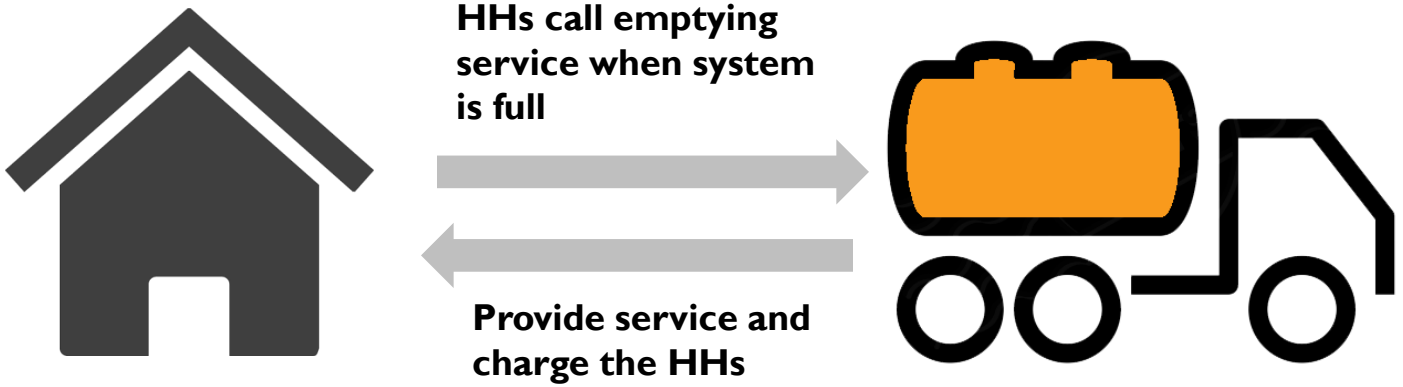
"***Yearly desludging of septic tank is desirable***, *but if it is not feasible or economical, then* ***septic tanks should be cleaned at least once in two - three years***, *provided the tank is not overloaded due to use by more than the number of persons for which it is designed*"

Pg 9-22, CPHEEO Manual

Demand v/s Scheduled Emptying

On-Demand Basis	Scheduled Practice
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.	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
The ULBs operates the trucks (either owned or borrowed) when the demand arises.	Each town will require an additional **number of trucks to meet service standards** (which can be **operated by a private player)**
Households generally pay a certain amount once in >8-10 years to get tanks cleaned during the time of overflow.	**Local taxes levied** by the ULB will be used to **recover** the **operating expenses** for regular cleaning.

Demand Based emptying services



If non-regulated,

- **No regular cleaning**
- **Overflowing system pose environmental and health risk**
- **Private emptier may charge higher**
- **No safety precautions**
- **No monitoring of septage disposal**

Plan for Regulated Demand based emptying services

- Awareness and regulations to HHs for regular desludging
- Empanelment and training of desludging operators
- Monitoring of emptying services through GPS enabled trucks
- Mandatory safety measures during desludging
- Regulations for emptying charge/tax system

Dakar Model

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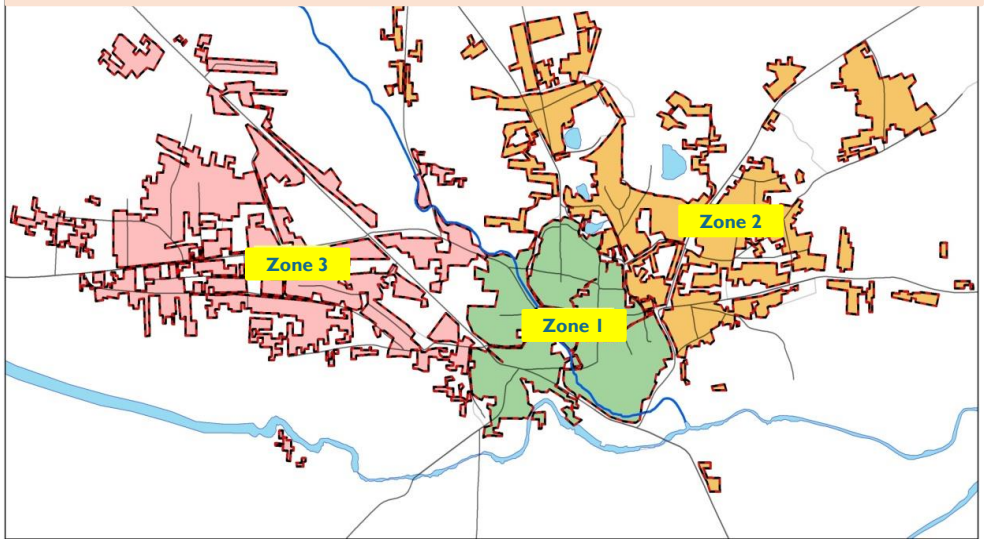
Schedule of emptying services

Septic tank cleaning cycle of 3 years

- To maintain a cycle of 3 years, roughly **2800 septic tanks** need to be **cleaned annually**
- **Each vehicle** needs to make **4 to 5 trips daily**
- Roughly **300 Working Days are required**
- To clean 2800 septic tanks, **2-3 nos of suction emptier trucks** of **5000 capacity** would be **required**

2-3 nos of trucks of 5000 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

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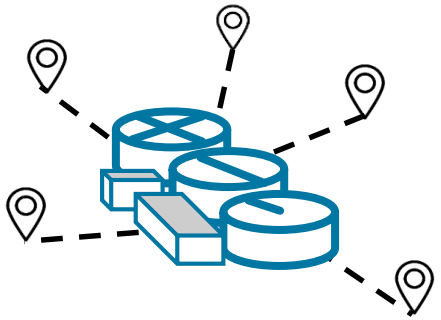
Benefits of Scheduled Emptying

- **Equitable services** - all households / properties are covered by services
- **Pricing** – Services are offered at lower prices, due to efficiency gains
- **Behavior change** - Contribution to ODF sustainability as toilet usage can increase
- **Manual scavenging** - Removal of need for manual scavenging due to regular emptying
- **Infrastructure optimization** - More predictable loads for treatment facility and route optimization of trucks
- **Environmental benefits** - Likely reduction in BOD and coliform in septic tank effluent, as well as lower likelihood of septic tank overflows

Parameters while planning emptying and conveyance

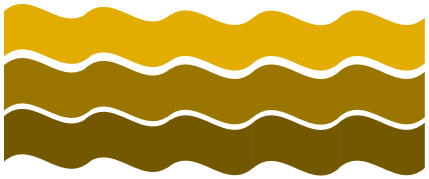
i. Distance of treatment site



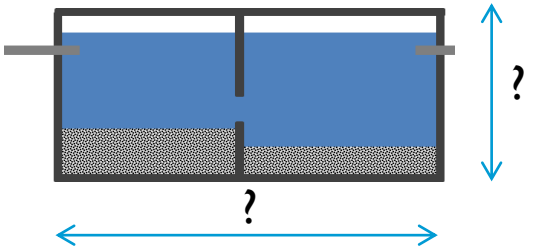
ii. Road Width

iii Access to site

iv. Characteristics of septage



v. Size of septic tanks/pits



vi. Traffic congestion

vii Fuel requirement and its implication in opex

viii Financial budget of emptying services

Technology options for emptying and conveyance

Conventional Vacuum Tanker	Mini-Vacuum Tanker (Vacutug)	Gulper
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	**Smaller mechanized tricycle/ motorcycle mounted collection** tanks of 20–40 litres capacity with gulper or smaller vacuum pumps at the primary level backed by a secondary transport system may work in the informal slum settlements.

Emptying service provision through licensing/contracting

Licensing of septage transporters

Emptying services by ULB or by **private agencies**: management contracts. 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:

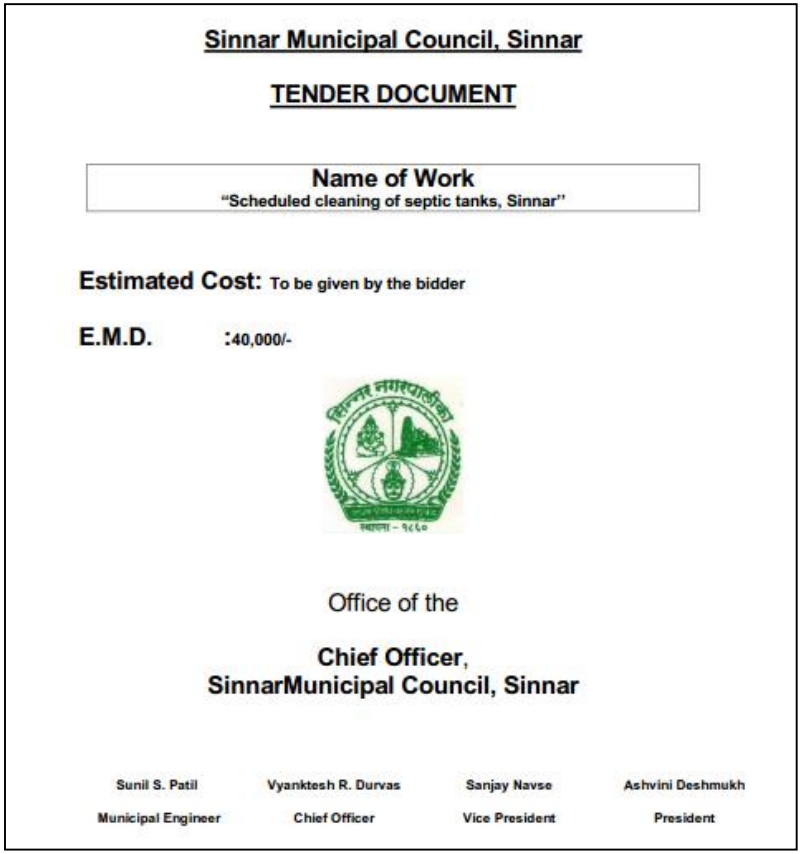
____ CHECK IF RENEWED PERMIT

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

Contracting the service to private sector

The service for **de-sludging and transport** of septage can be **contracted out to private sector** for a predefined period of **time and cost** of the service. A detailed tender document should be made detailing out all the **necessary terms and conditions**



Sinnar Municipal Council, Sinnar

TENDER DOCUMENT

Name of Work
"Scheduled cleaning of septic tanks, Sinnar"

Estimated Cost: To be given by the bidder

E.M.D. :40,000/-

Office of the

Chief Officer,
SinnarMunicipal Council, Sinnar

Sunil S. Patil	Vyanktesh R. Durvas	Sanjay Navse	Ashvini Deshmukh
Municipal Engineer	Chief Officer	Vice President	President

Septic tank emptying tender document

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Occupational Safety

- Municipalities should provide workers with safety gear.
- Each worker should be made aware of the risks of the work through trainings.
- Workers should be held liable for not using available protective gear.

Safety Gears

Use of safety gears by a sanitation worker

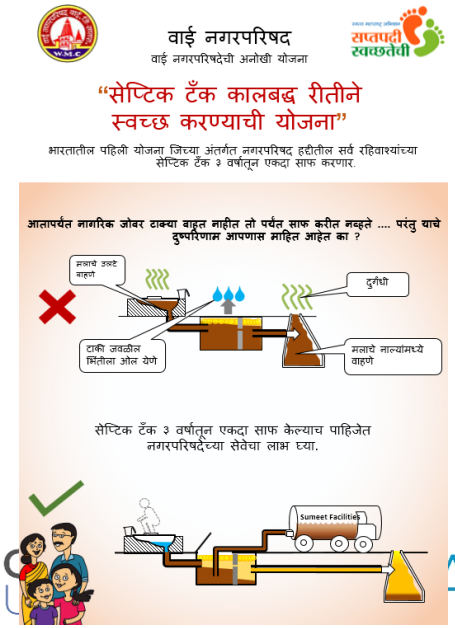
Awareness Material and Activities for FSSM . . .

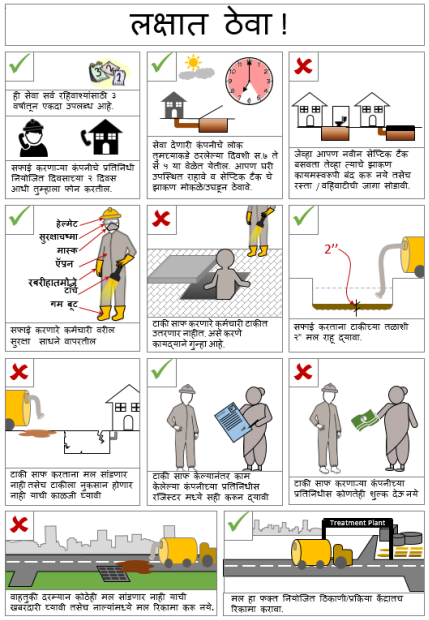
Banners

Video

Facebook page

Flyers





Awareness material should focus on importance of emptying, details of scheme, precautions to be taken etc.

Awareness activities such as:

- Distribution of pamphlets
- Share video over whatsapp and local cable channel
- Auto rickshaw announcements
- Ward wise gatherings

can be planned with a **detailed schedule using different material…**

Monitoring and Regulating emptying services

Monitoring of emptying service is required to:

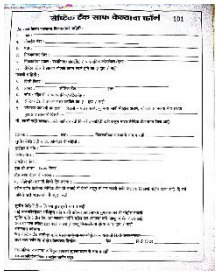
- Use of GPS enabled trucks to monitor emptying services
- Keep a check on operations of private service provider and regulate the payment
- Build a data base of toilets and septic tanks in the city
- Develop records on when septic tanks are emptied
- Monitor the quality of septage etc.

Different stakeholders such as **Municipal Council, private service provider, citizens, treatment plant operator etc.** can benefit from a robust monitoring process

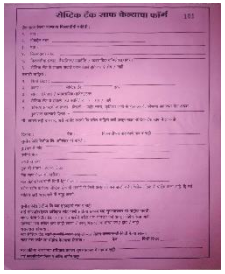
Source: Operative guidelines for septage management for urban and rural local bodies in Tamil Nadu.(2014)

Formats for monitoring emptying services

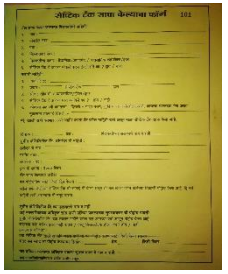
Daily report formats to monitor emptying process.



Municipal Council's copy



Property holder's copy

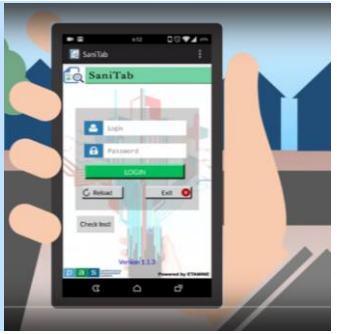


Emptying service provider's copy

Treatment plant's copy

These records can be linked to the payment of private emptying service provider

Use of mobile based applications for monitoring the emptying process



Template Manifest form for emptying

Manifest forms are 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. These records can be linked to the payment of the emptier operator in such a way that the emptier operator is only paid if there are signatures of all the stakeholders

Collection and transport records form / manifest forms[1]

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.

[1] Adapted from operative guidelines for septage management for urban and rural local bodies in Tamil Nadu.(2014)

Need for exploring PSP in FSM services

Urban Local Body

- Mandate to ensure service provision
- Challenges in FSSM
  - Improper onsite systems that do not conform to standards
  - No treatment facility and unsafe disposal
  - Limited funds, manpower, equipment
  - Low technical know-how

+

Private sector

- Already Active
- Better access to technology and knowhow
- Competitive prices

=

Win-Win situation

- ULB able to ensure adequate services and standards
- Citizens get timely services at competitive prices
- Entrepreneurs get business opportunities
- Current govt policies and schemes support and encourage PSP in urban infrastructure projects

Existing resources to guide PSP in large scale sanitation projects, but need for guidance on engaging contractors in small-scale sanitation projects based on the FSSM approach.

Private sector investment in trucks has significant benefits for the ULB

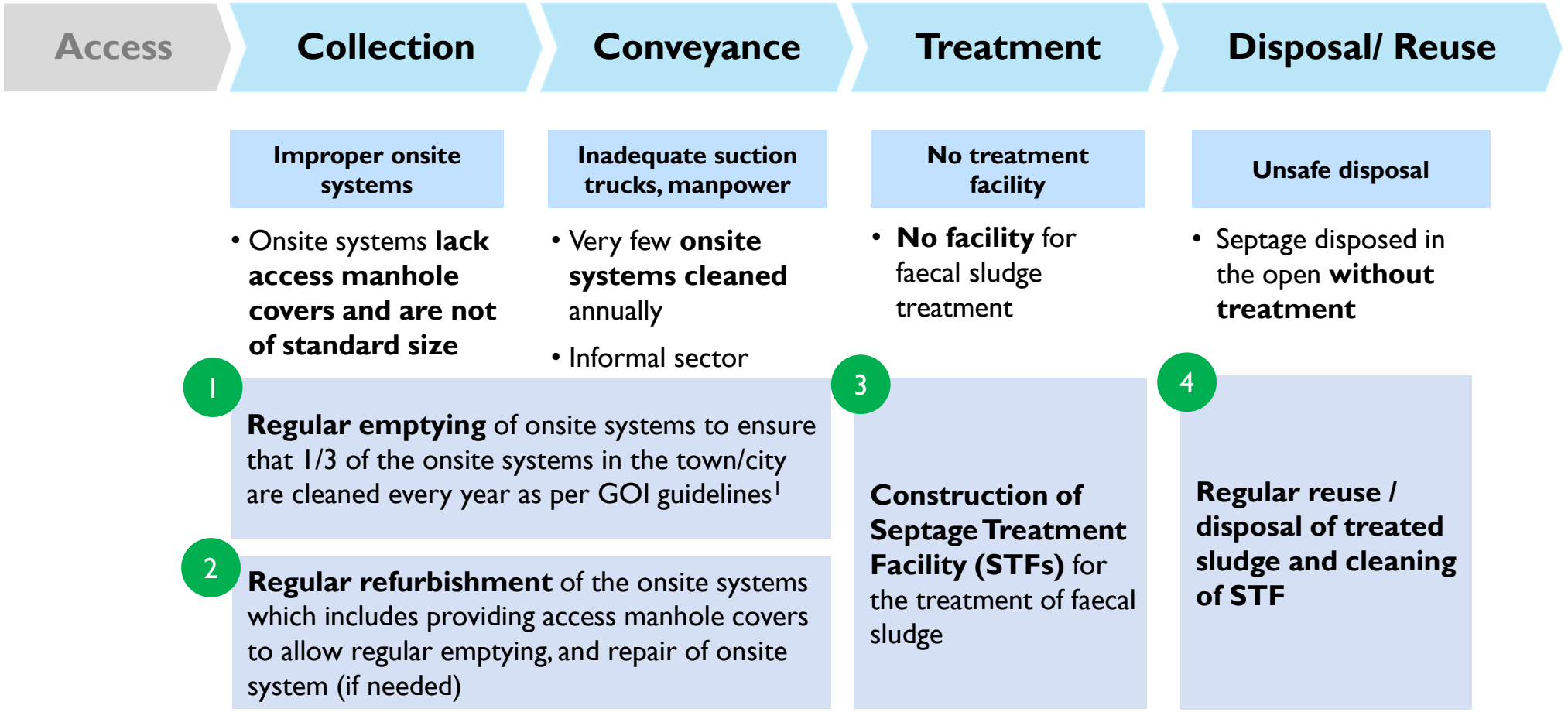
Benefits to public sector

- ✓ **Ease of procurement:** ULB procurement of the truck would require floating a tender, inviting, evaluating and negotiating bids. This is likely to be time consuming, and involve transaction costs that can be avoided if the private player purchases the truck.
- ✓ **Aligns private sector incentives:** Private sector investment in trucks incentivizes the player to use and maintain the truck well.
- ✓ **Allows investment in quality:** ULBs are often bound to minimize cost, while the private sector can invest in quality trucks with longer lifecycles and additional features like water jets.

Benefits to private sector

- ✓ **Facilitates access to finance:** Having a contract from the ULB can make it easier for the private player to raise capital for the truck and negotiate better financing terms.
- ✓ **Provides a platform for business expansion:** A contract with the ULB serves as a low-risk platform for private sector players to scale by providing access to guaranteed demand to recoup investment in a truck.

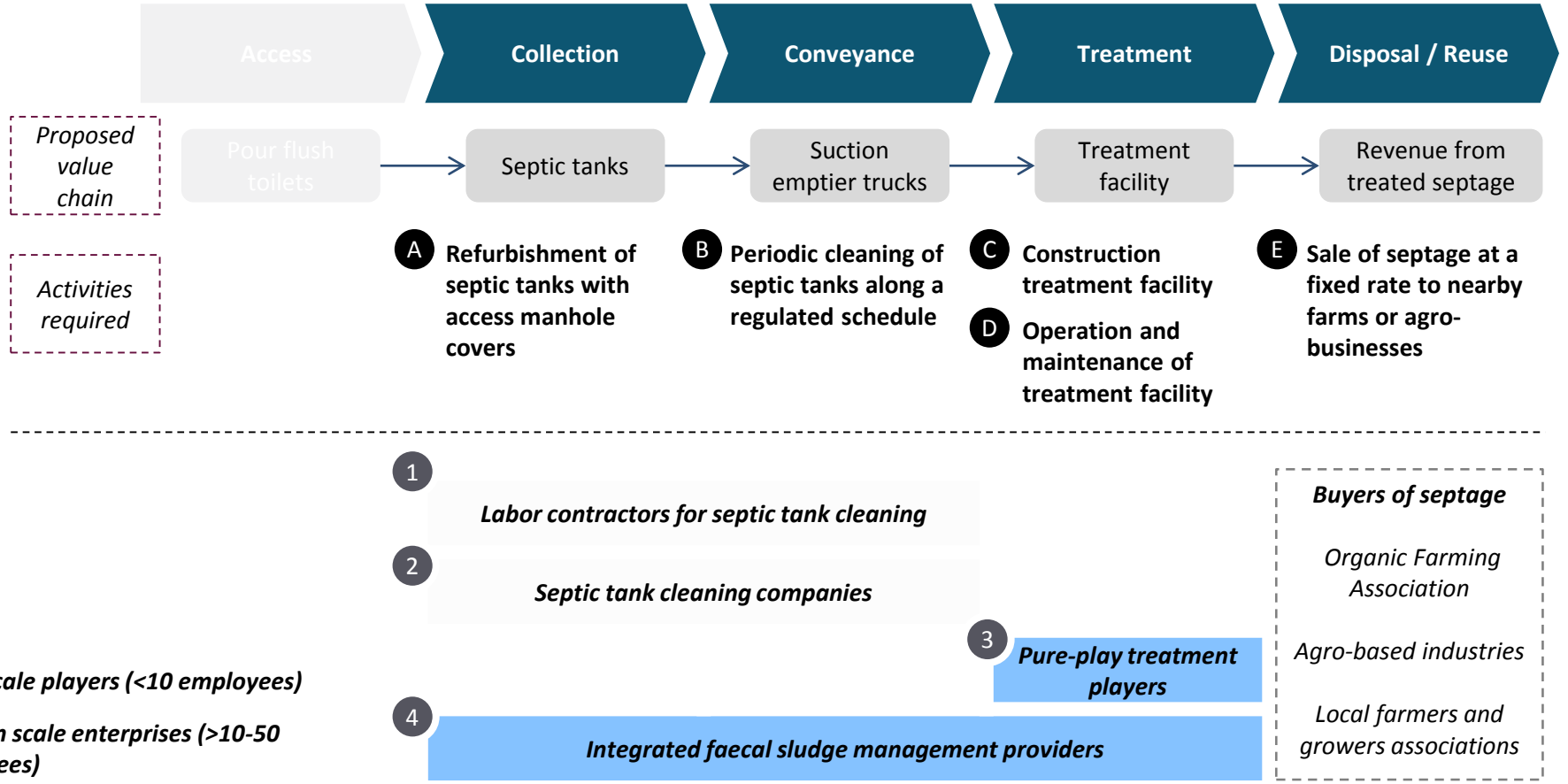
Typical opportunities for PSP across sanitation chain



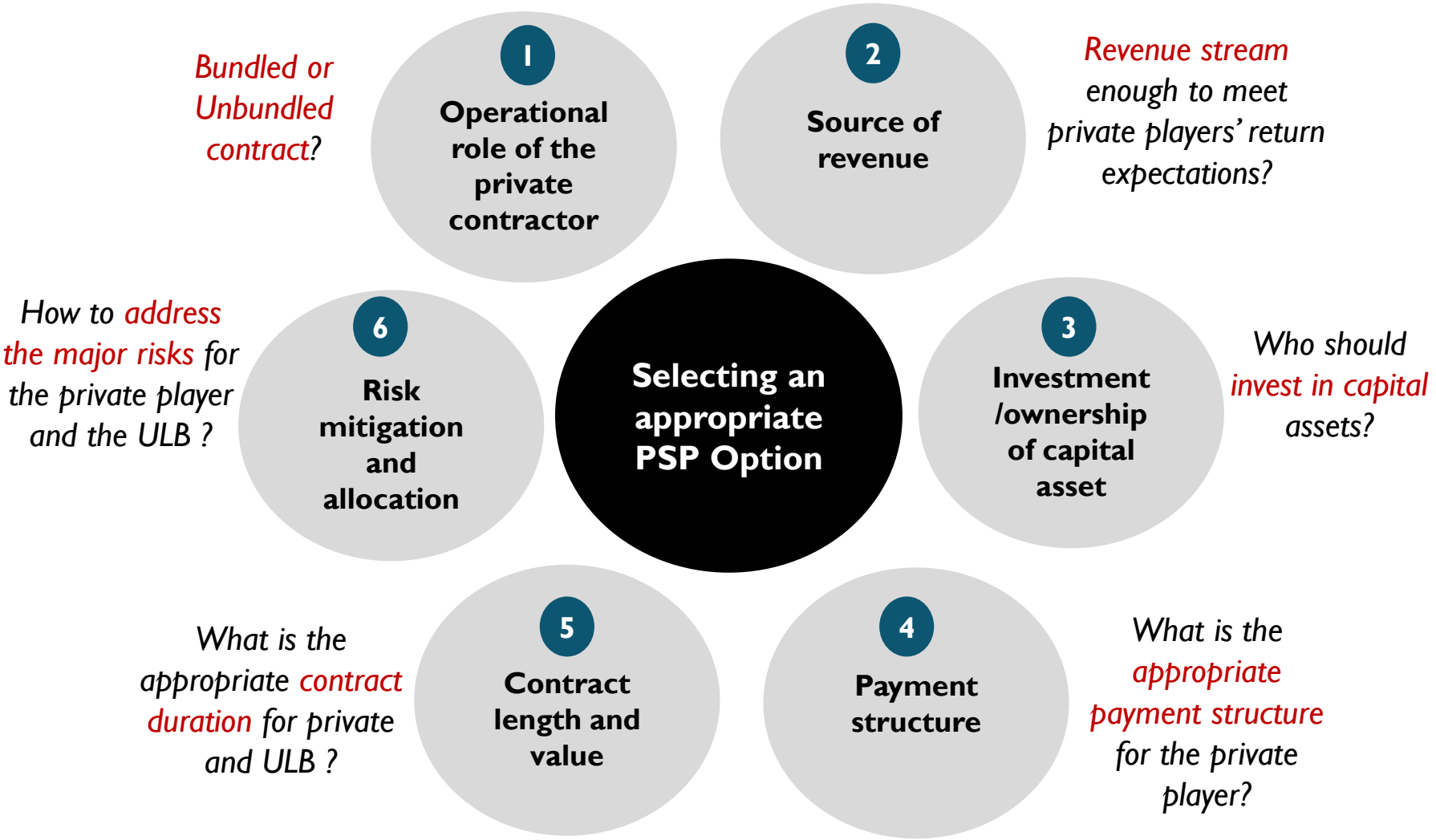
Note: (i) As per MoUD guidelines, a household onsite system/onsite system must be emptied every 3 years hence 33% of all onsite systems/ onsite systems should be emptied annually

Private sector is available for FSSM services . . .

ULB can invite Expression of interest (EoI) to scope possible players



Developed tender for emptying services covering these aspects



MODEL TENDER covering this aspects is AVAILABLE for FSSM

Following this process bid documents have been rolled out in few cities of Maharashtra

Sinnar Municipal Council, Sinnar

TENDER DOCUMENT

Name of Work
"Scheduled cleaning of septic tanks, Sinnar"

Estimated Cost: To be given by the bidder

E.M.D. :40,000/-

Office of the

Chief Officer,
SinnarMunicipal Council, Sinnar

Sunil S. Patil	Vyanktesh R. Durvas	Sanjay Navse	Ashvini Deshmukh
Municipal Engineer	Chief Officer	Vice President	President

Septic tank emptying Tender document

CONTENTS

Validate Print Help

Item Rate BoQ

Tender Inviting Authority: Sinnar Municipal Council, Nashik

Name of Work: Scheduled cleaning of septic tanks, Sinnar

Contract No:

Bidder Name :

PRICE SCHEDULE

(This BOQ template must not be modified/replaced by the bidder and the same should be uploaded after filling the relevent columns, else the bidder is liable to be rejected for this tender. Bidders are allowed to enter the Bidder Name and Values only)

NUMBER	TEXT #	NUMBER #	TEXT #	NUMBER	NUMBER #	NUMBER #	TEXT #
Sl. No.	Item Description	Quantity	Units	Estimated Rate	BASIC RATE In Figures To be entered by the Bidder Rs. P	TOTAL AMOUNT Inclusive of all Taxes	TOTAL AMOUNT In Words
1	2	4	5	6	13	53	55
2	Schedule B						
3	Cleaning of 4000 septic tanks per year for three years of households/properties as per schedule and emergency cleaning with appropriate safety gears for septic tank empyting cleaners and operators, transportation of septage in GPS mounted suction emptier trucks owned by private sector and safe disposal of collected sludge in septage treatment facility The bidders shall also undertake IEC activities to spread awareness about regular cleaning of septic tanks in areas where scheduled cleaning needs to be undertaken	1.00	Per year			0.00	INR Zero Only
Total in Figures						0.00	INR Zero Only

Model Tender document is available

How to finance emptying services?

Identify revenue sources….

A. Potential sources of finance for Capital Expenditure

Financial Requirement	**Suction Emptier Trucks**
Potential Sources of Fund	Central/state Grants
	Private sector/PPP
	Local government fund

B. Potential sources of finance for O&M Expenditure

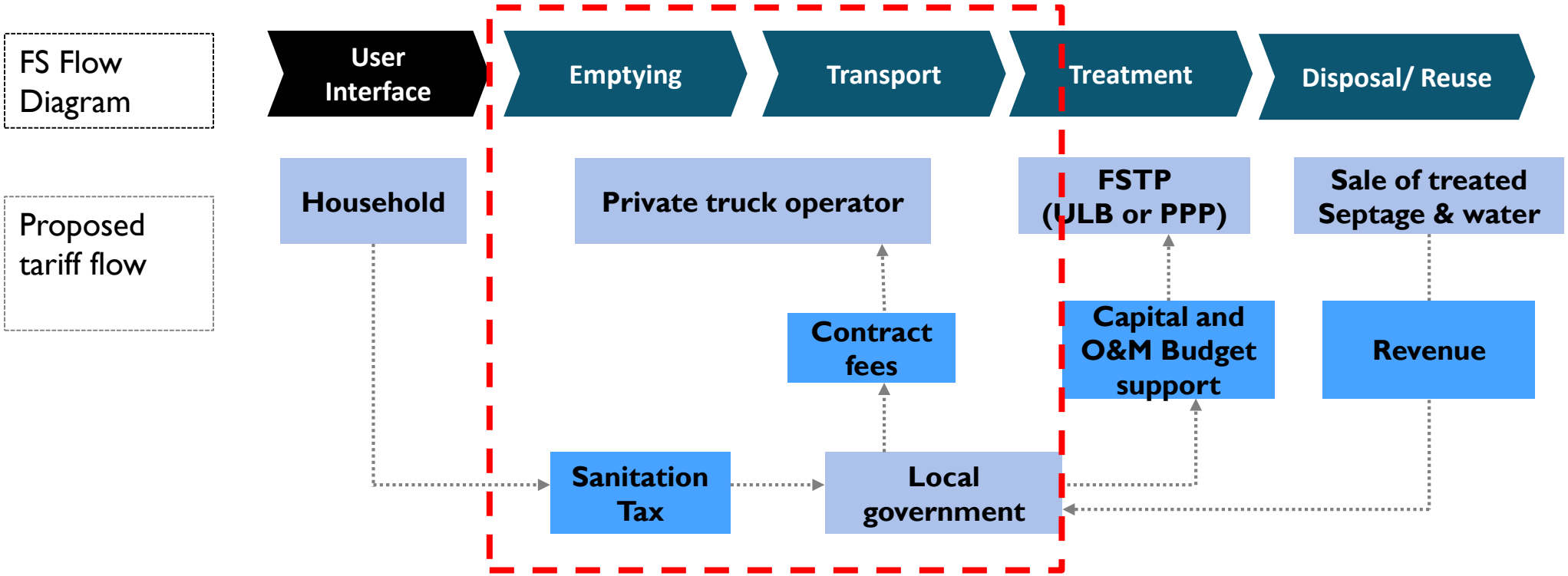
Financial Requirement	**Operation of Emptier trucks**
Potential Sources of Fund	Sanitation Tax/ Other tax
	User charge (Emptying fees)

Potential Revenue structure

Scheduled Desludging through Sanitation Tax

Basis - a) sanitation tax collected from owners of OSSs, and
b) mandatory scheduled desludging of tanks/pits.

Sanitation tax is collected by the local authority either as a percentage of property tax or by the public utilities as a surcharge on water bills.



Levied differential tax on all properties for financing FSSM services

Differential taxation rates

Residential Properties **with / without toilets**–
Rs. 300 / annum

Non Residential Properties **with toilets** –
Rs. 300 / annum

Non-residential properties **without toilets**–
Rs. 100 / annum

City level resolution for taxation

सिन्नर नगरपरिषद,सिन्नर मे.विशेष सभा
ठराव क्रमांक ६१ दिनांक २४/०३/२०१७

विषय क्रमांक ५) सिन्नर नगरपरिषद तर्फे आकारण्यात येणारा स्वच्छता कर,घनकचरा व्यवस्थापन कर व मैला व्यवस्थापन कर यांची पुर्न:रचना करणेबाबत चर्चा करुन निर्णय घेणे.

प्रस्तावाचा मजकुर - कार्यालयीन टिपणीचे सभागृहात चर्चा होवुन सिन्नर नगरपरिषदे तर्फे सद्या आकारण्यात येणारे विशेष स्वच्छता कर,विशेष घनकचरा कर व मैला व्यवस्थापन कर यांची पुर्न:रचना करुन यापुढे सन २०१७-१८ या आर्थिक वर्षापासुन खालील प्रमाणे मैला व्यवस्थापन कर व घनकचरा कर म्हणुन आकारण्यात यावेत व त्याप्रमाणे बिल तयार करुन मालमत्ता धारकांना देण्यात यावेत.

वार्षिक कराचे दर (रुपये)

अ.क्र.	कराचे नांव	निवासी मालमत्ता		बिगर निवासी मालमत्ता	
		शौचालय असलेले	शौचालय नसलेले	शौचालय असलेले	शौचालय नसलेले
१.	मैला व्यवस्थापन कर	३००/- (प्रति सिट)	३००/-	३००/- (प्रति सिट)	१००/-

वार्षिक कराचे दर (रुपये)

अ.क्र.	कराचे नांव	निवासी	बिगर निवासी
१	घनकचरा व्यवस्थापन कर	१००/-	३००/-

वरीलप्रमाणे कर आकारणी करणेस सदरची सभा सर्वानुमते मान्यता देत आहेत. त्याप्रमाणे प्रशासकीय कार्यवाही करण्यात यावी.

सुचक :- श्री. लोखंडे गो.वि.
अनुमोदन :- श्री. चोथवे प्र.झुं.
ठराव सर्वानुमते मंजुर

अध्यक्ष,
सिन्नर नगरपरिषद,सिन्नर

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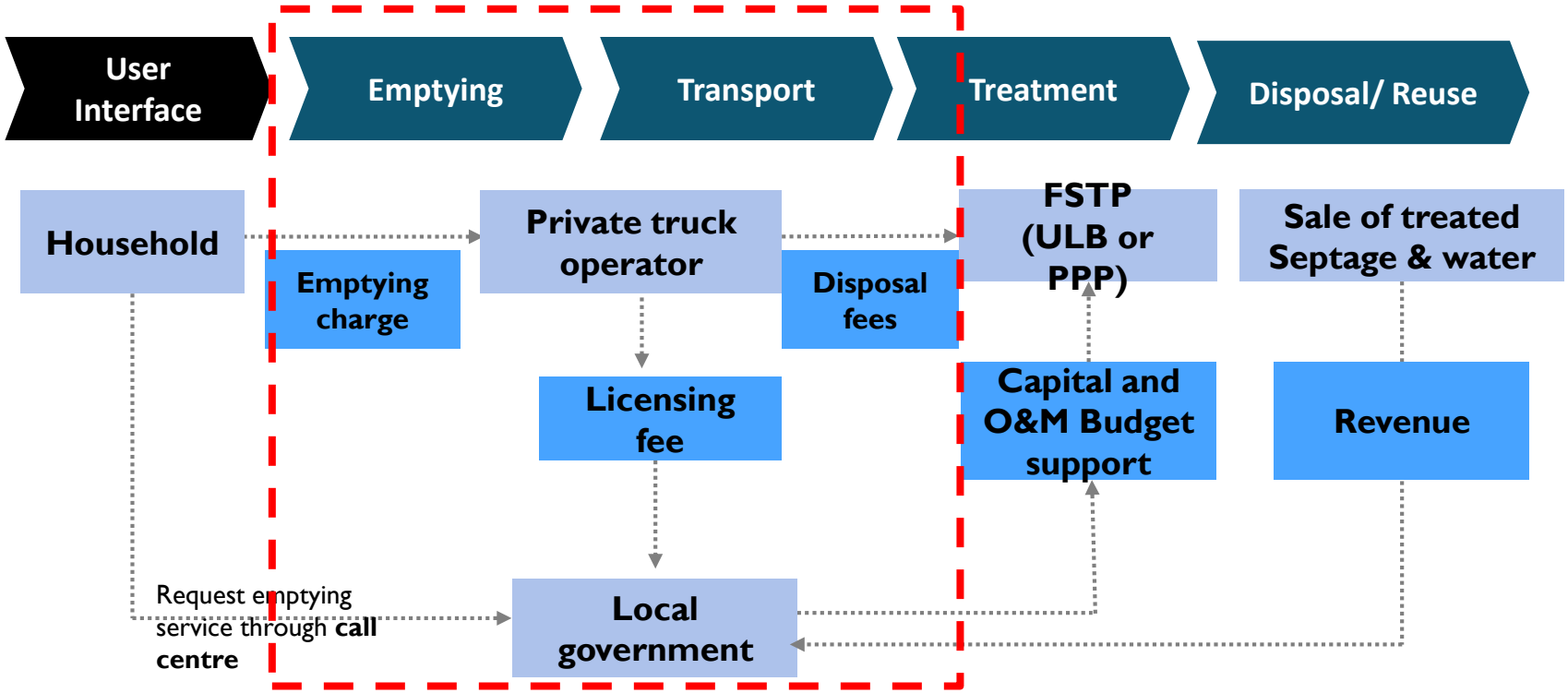
Potential Revenue structure

Demand Based Desludging through emptying charge

Basis - Requires setting up a call center or a customer help center managed by the local authorities which acts as a network orchestrator linking users of OSSs with vacuum truck operators. The truck operators register with the call center for a fixed annual fee which can also double up as a license or permit. Users of OSSs call the help center when their septic tanks or pits are full.

FS Flow Diagram

Proposed tariff flow



Group Work

Part I - Prepare FSSM plan for a city

Participants will plan for Emptying infrastructure that is required for implementing a FSSM plan for a city.

FSSM PLAN		
Sr.No	**Description**	**No.**
	Input details	
A	Total number of Septic tanks in the city (no)	
B	Average volume of septic tanks (cum)	
C	Septic tank cleaning cycle (Years)	
D	No. of working days in an year	
E	No. of trips possible per emptying vehicle per day (trip/day/vehicle)	

Infrastructure required

- **Number of septic tanks to be emptied daily**
  - Number of septic tanks to be emptied daily

    = Total number of Septic tanks in the city
    (Septic tank cleaning cycle * No. of working days in an year)

    = _____daily

- **Number of trucks required (Nos.)**
  - Number of trucks required

    = Number of septic tanks to be emptied daily
    Number of trips possible per truck per day

    = _____ nos

- **Volume of septage to be treated (cum/day)**
  - Average volume of septic tanks x number of septic tanks emptied per day

    = ____ cum/day

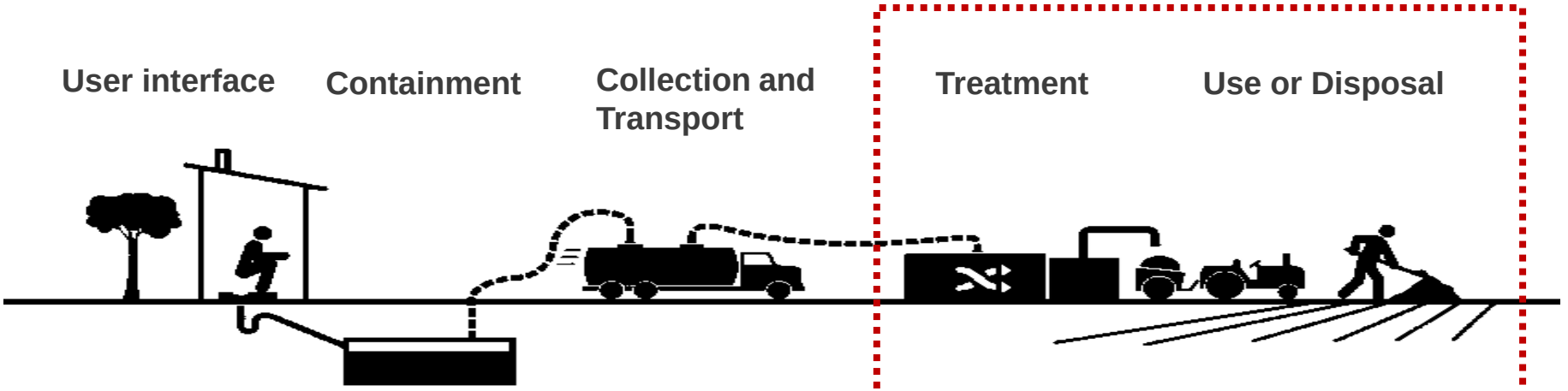
O&M cost of emptying services

O& M cost for schedule septic tank emptying service

1	Fuel cost for schedule emptying service = (Number of septic tank to be emptied daily **X** Number of working days in a year **X** Average distance **X** 2 **X** (Fuel price **/** Fuel efficiency)) - *Assume Fuel efficiency for truck = 5 km per liter* - *Assume Fuel price = Rs 70 per liter* - *Assume number of working days in a year= 300 days*	
2	Repair and maintenance cost = (Number of suction emptier truck requirement **X** months in a year **X** avg repair and maintenance cost per month) - *Assume average repair & maintenance cost = Rs 2,000 per month*	
3	Establishment expenses = ((Number of suction emptier truck requirement **X** 12 **X** No of manpower **X** Monthly Salary) - *Assume, 2 manpower requirement per truck* - *Assume, Salary = Rs 10,000 per month*	
4	**O&M cost per year Sub-total = (1+2+3)**	
5	Overhead **+** Insurance **+** other Miscellaneous cost = Sub-total(4) **X** 10% - *Assume, other cost as 10 % of sub-total (4)*	
6 –A	**Total O&M cost for schedule septic emptying service = (4+5) (Per year)**	
6-B	**Sanitation Tax (per property per year)** = Total O&M cost (6-A) **/** Total number of properties in city	

Session 3: Planning for Treatment services

Understanding the Sanitation Service Chain . . .



Access → Containment → Conveyance → Treatment → Reuse/Disposal

Describes **type of toilet facilities** the user accesses.

Describes **ways of collecting** and sometimes treating the **faecal waste** generated by the users.

Describes **transport of waste** from collection to the treatment / disposal site

Describes way in which waste is **treated**

Describes the way in which waste **reused / disposed off**

On-site sanitation technology

Faecal Sludge Management

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Fecal sludge Vs. Wastewater characteristics

Physical and chemical characteristics of Fecal Sludge

Parameter	Fecal Sludge characteristics		Wastewater characteristics
	Range	Average	
BOD	440-78,600	6,480	250
COD	1500-703,000	31,900	425
Total Solids	1,132-130,745	34,106	637
Total volatile solids	353-71,400	23,100	262.5
Total suspended solids	310-93,378	12,862	375
Total Nitrogen	66-1,060	588	50
Ammonia Nitrogen	3-116	97	32.5
Total phosphorus	20-760	210	7.1

Source : Advisory note on Septage management in Urban India, MoUD Jan 2013 & CPHEEO Manual 2013, chapter-5

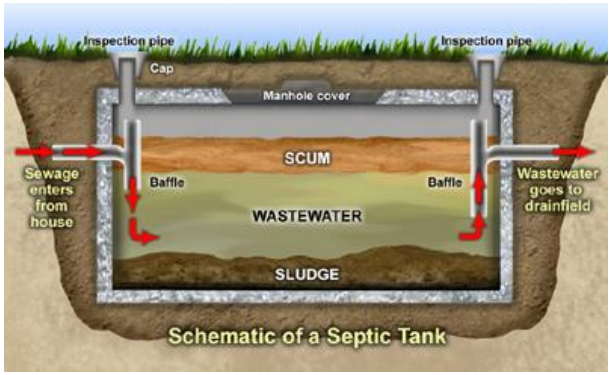
Septage Quality Tests

Septage samples must be collected from:

- **Community toilets/ Public Toilets**
- **Bungalows**
- **Apartment**

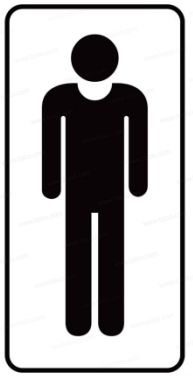
Period of desludging must be considered. **Samples with long desludging frequency (7-8 years) and samples with shorter desludging frequency (2-3 years) must be considered for selecting the samples**

Septage Quantity calculation. .



Volume of Septic tank

- Requires detailed survey of each property (residential, community, commercial, institutional)
- Total volume of all types of collection system



Per capita generation Standard

- Based on Std norm of 230 litres/capita/year (GOI septage guidelines)
- Septage quantity (litres/year)= population*230

Treatment Options

Typologies of Cities

Sewered Cities

Cities reliant on FSSM / Co-treatment

Typology 1 (24 cities)	Typology 2 (20 cities)	Typology 3 (45 cities)	Typology 4 (63 cities)	Typology 5 (232 cities)
• **Municipal Corporation** • Existing or planned sewer network with STP under AMRUT or any other scheme	• **Municipal Council** • Existing or planned sewer network with STP under AMRUT or any other scheme	• **Possibility of co-treatment** • No existing or planned sewer network, however, proximity to city with STP	• **Population: Above 50,000** • No current or planned sewer system • 100% reliance on FSSM	• **Population: Below 50,000** • No current or planned sewer system • 100% reliance on FSSM
No FSTP required		**Co-treatment** with nearby STP		Require independent **FSTP**

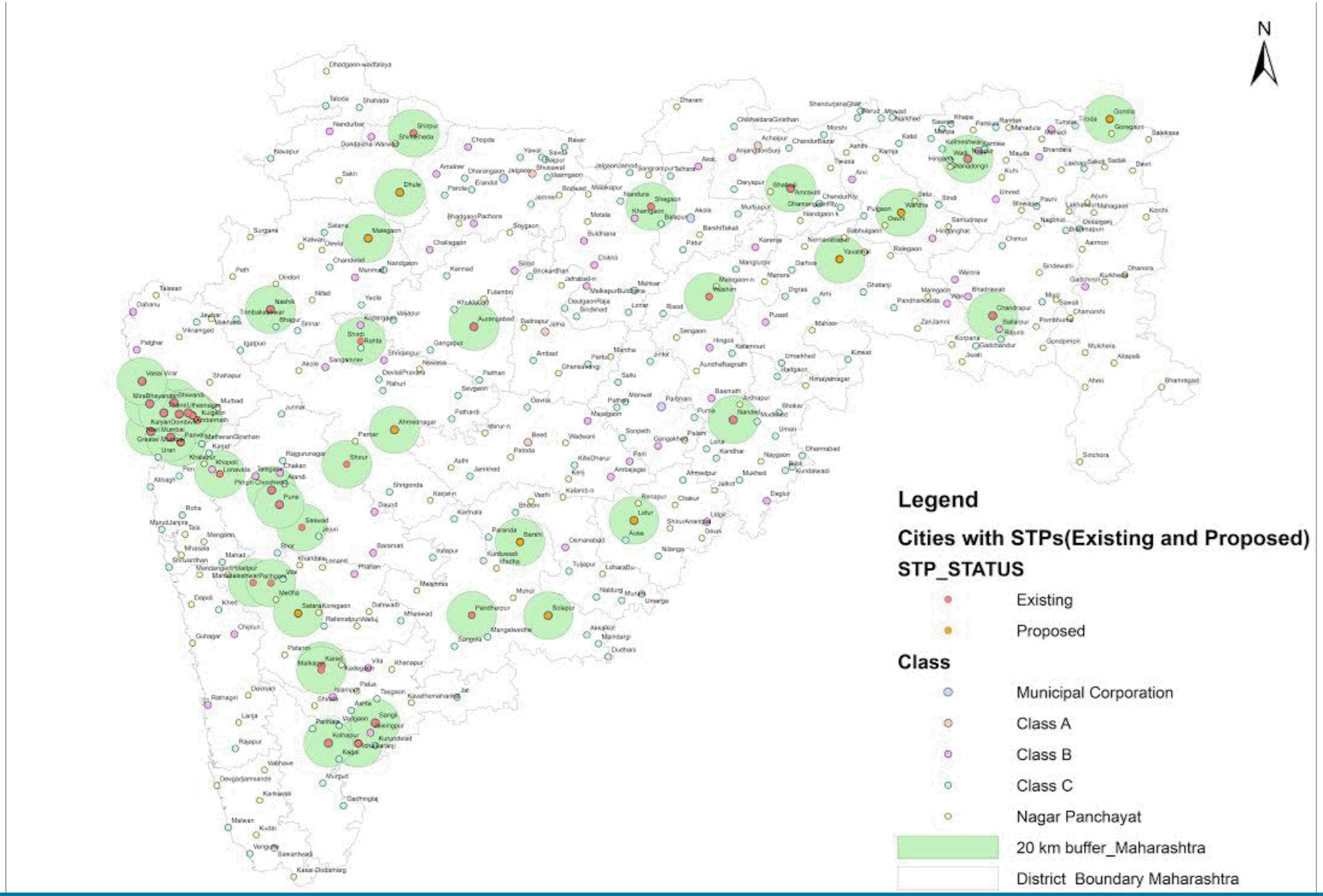
Septage Treatment options

Co-treatment with own STP or nearby City STP

Co-treatment with SWM

Independent FSTP

Co-treatment with STP



Cities within 20 km vicinity of nearby city with STP can explore this option

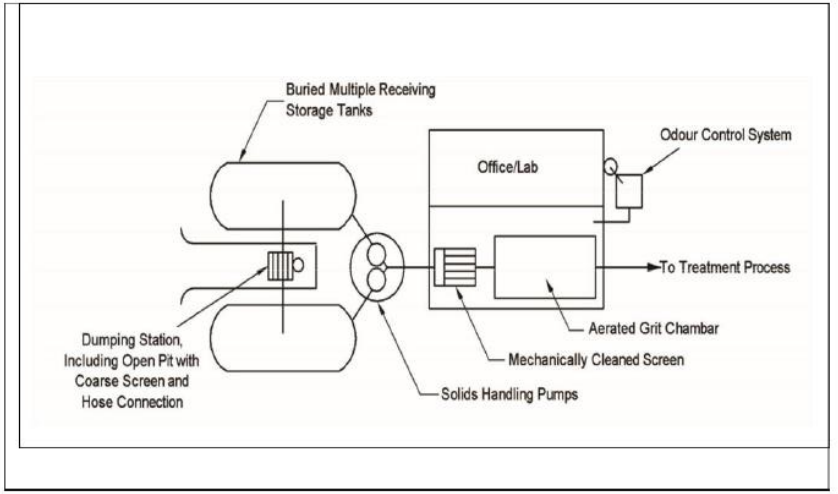
Co-treatment at nearby STP

- **Septage addition to nearest sewer manhole-** Septage could be added to a sewer upstream of the sewage treatment plant, and substantial dilution of septage occurs prior to it reaching the sewage treatment plant, depending on the volume of sewage flowing in the sewer.

- **Septage addition to STP-** Septage could be added to sewage immediately upstream of the screening and grit removal processes. It is economical because of the very simple receiving station design (As shown in figure) and also allows the wastewater treatment plant staff to have control of the septage discharge

- **Septage addition to sludge digesters/sludge drying beds:** Dewater septage or sludge can be added to sludge drying bed of STP. The liquid fraction from sludge or septage can be directed to the STPs.

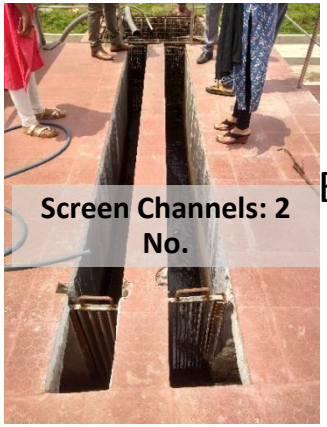
Schematics of Septage receiving station



Puri FSTP (Co-treatment with STP)

- Puri is co-treating faecal sludge at their existing sewerage treatment plant
- Capacity of FSTP(Settling tank and SDB) : 50 KLD
- Wastewater treated at STP of 15MLD capacity
- Capex: INR 1.74 crores
- O&M : INR 17.58 lakhs/annum
- Land Area : 1000 Sq m.
- Year of Commissioning: December-2017
- Operated by: Private Operator

Effluent



Effluent

Sludge

Effluent

Septage Treatment options

Co-treatment with own STP or nearby City STP

Co-treatment with SWM

Independent FSTP

Co-treatment with SWM

Septage

Dewatering unit

Liquid

Facultative pond

Chlorination tank

Reuse / Disposal

Solid in ratio **1:3**

Organic Waste

Windrow/ Drum Composting

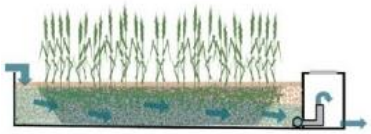
Drying

Reuse / Disposal

Septage

Bio-Methanation

Liquid



Planted Gravel filter

for effluent treatment

Chlorination tank

Reuse / Disposal

Organic Waste

Solid

Drying

Reuse / Disposal

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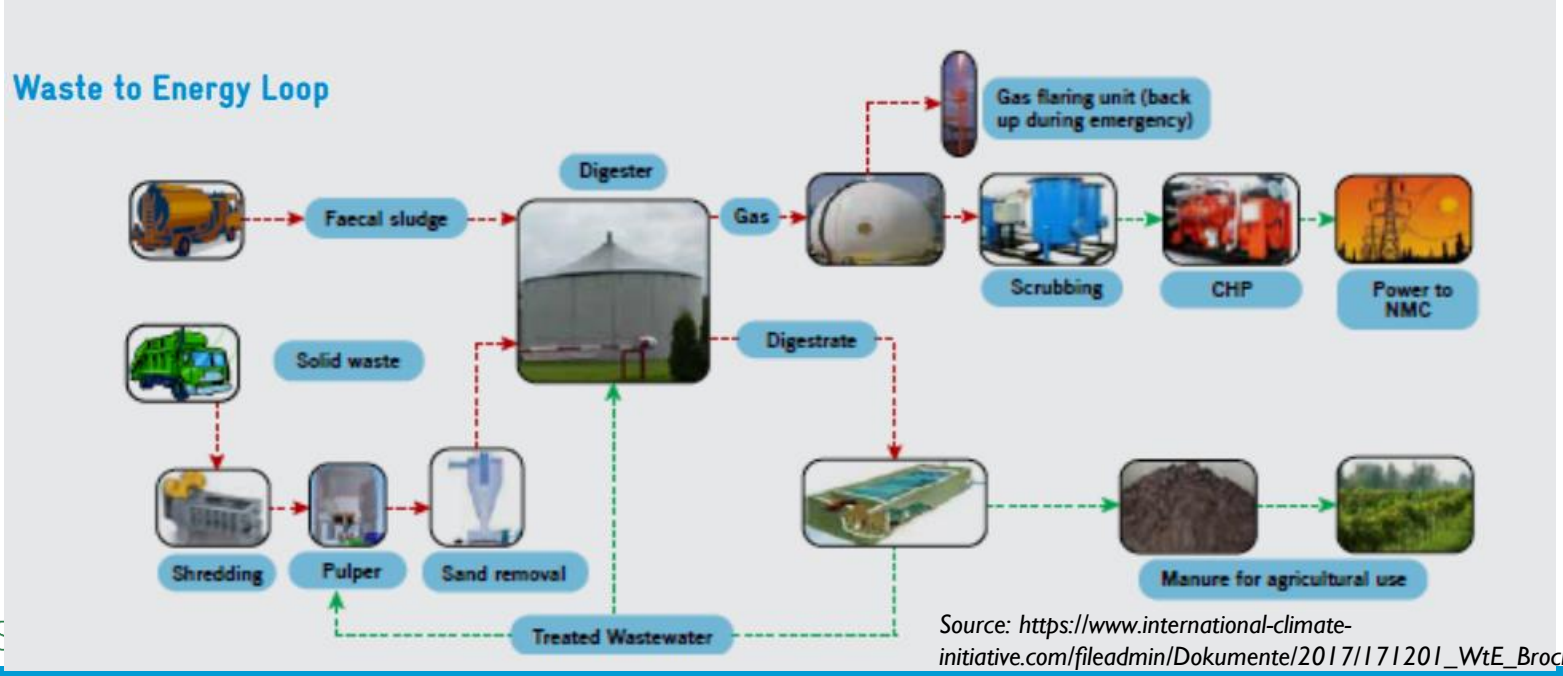
Co-treatment with Solid Waste

Waste to Energy through Co-fermentation of Organic Waste and Septage in Nashik

The Waste to Energy Project in Nashik, is a project of Nashik Municipal Corporation in cooperation with GIZ as implementation partner. The plant is treating biodegradable waste and septage generated in the city and generates energy through biogas for feeding it into the Maharashtra power grid. It is one solution which, through co-processing of septage (faecal sludge) with organic solid waste will generate energy from urban waste. This project is an attempt to showcase a viable business model for implementation of waste to energy projects through a Public Private Partnership (PPP) and is built on a comprehensive financial and operational model.

Daily 10 to 15 tons of food and vegetable waste from approximately 500 restaurants and 10 to 20 tons of septage from 400 community toilets are collected by trucks and delivered to the plant. The organic waste from hotels is segregated at the collection points. In a first step, organic waste and septage will be treated separately. The organic waste will once more be cleared from any foreign matter, fed to a crusher and then mixed with septage to form a slurry. The slurry is continuously agitated and forwarded to the digester. Option of pasteurization of septage using excess heat is kept open for further use of excess digest-ate to produce organic fertiliser. The co-fermentation process takes place in the bio-digester producing approx. 2,500m3 biogas per day



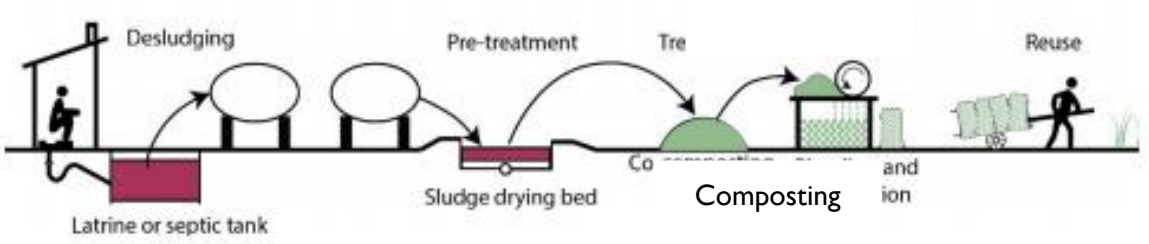
Source: https://www.international-climate-initiative.com/fileadmin/Dokumente/2017/171201_WtE_Brochure.pdf

Co-treatment with SWM

Bansberia, West Bengal

Capacity: 50cum/day
Land: 27000 sq.mt
Commissioned: 2009

Capital cost: NA
O&M: Rs 13.5 lakh/year



Sand Drying bed and co-composting with SWM

Septage Treatment options

Co-treatment with own STP or nearby City STP

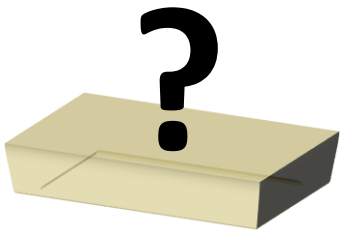
Co-treatment with SWM

Independent FSTP

Treatment technology selection criteria for independent FSTP

- Identification of septage treatment technology is crucial for effective implementation of septage management plan.
- The Technology assessment is based on site specific criteria.
- Following parameters to be taken into consideration before finalization of treatment technology:

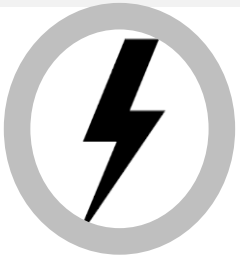
i. Land availability



Projects are often delayed because of non-availability or high price of land.

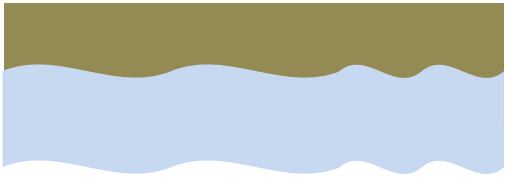
Treatment technology depends on parcel on land available. If huge land is available then non-mechanized technology can be adopted; while in shortage of land, city has to go for mechanized treatment technology.

ii. Reliability of electricity



It is also important to assess the availability and reliability of electricity if treatment technology has mechanical operated parts.

iii. Climatic conditions



Assessment of existing climatic conditions on site like rainfall pattern, average temperature, prone to flooding, is always recommended as it may directly affect selection of technology option.

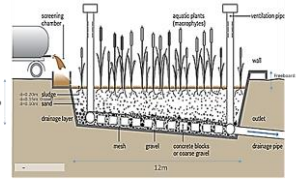
iv. Funds

Assessment of capital cost and O&M cost is always recommended as it may affect selection of technology option that are financially viable.

Planted Sludge Drying Bed

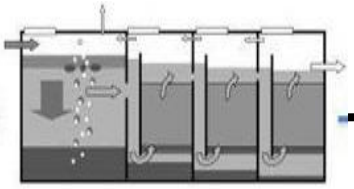
Septage from septic tank

Screen/ Grit removal

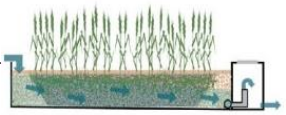


Planted Sludge Drying Bed

Liquid



Anaerobic Baffle Reactor (ABR)



Horizontal Planted Gravel filter

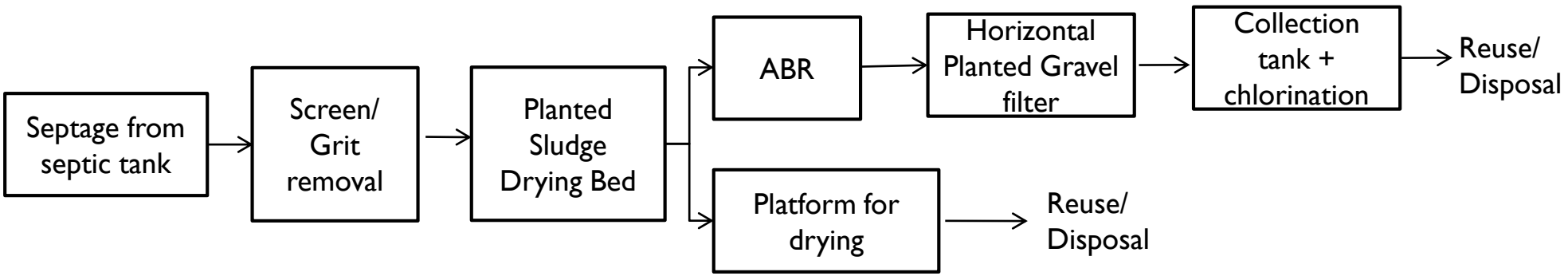
Collection tank + chlorination

Reuse / Disposal

Solid

Platform for Drying

Reuse / Disposal



Planted Sludge Drying Bed

Advantages:

- Simple operation
- No energy is requirement

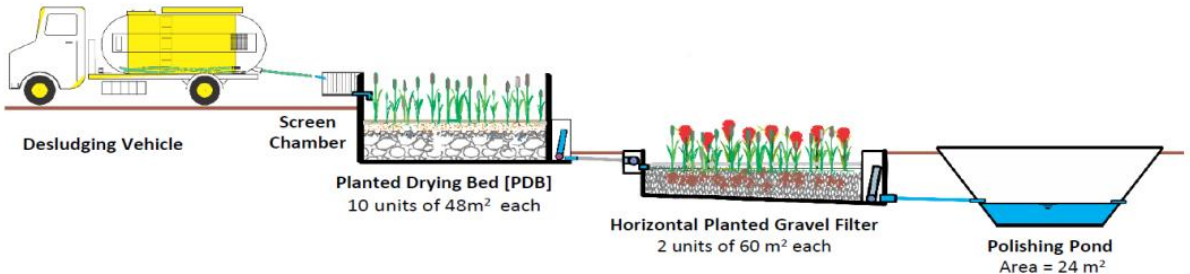
Disadvantages:

- Large land requirement
- Not Favorable in regions of high rainfall or required sheds during rainy season which increase capital cost

Examples:

Capacity: 12 cum/day
Land: 720 sq.mt

Capital cost: Rs 52 lakhs
O&M: Rs 10 lakh/year
Commissioned: 2017



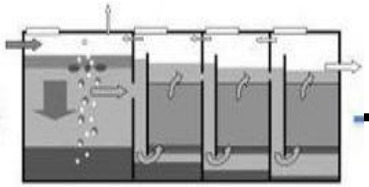
UnPlanted Sludge Drying Bed

Septage from septic tank

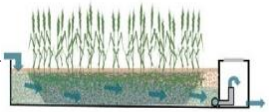
Settling tank with screen

Unplanted Sludge Drying Bed

Liquid



Anaerobic Baffle Reactor (ABR)



Horizontal Planted Gravel filter

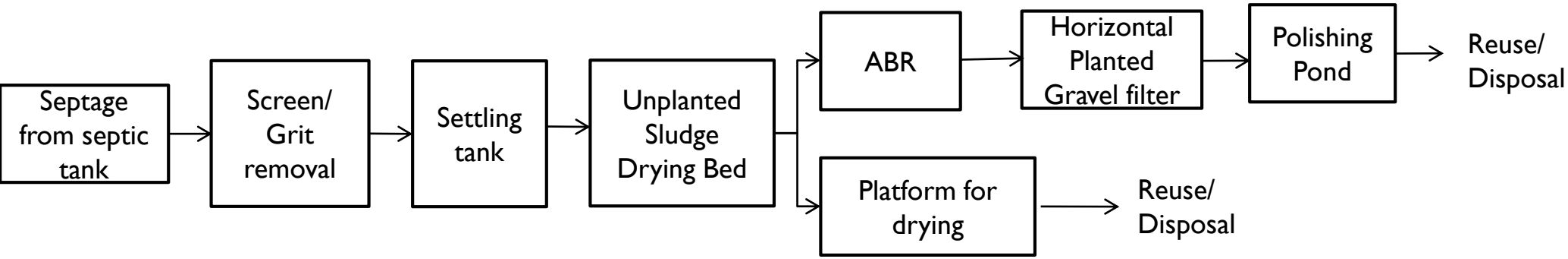
Polishing pond

Reuse / Disposal

Solid

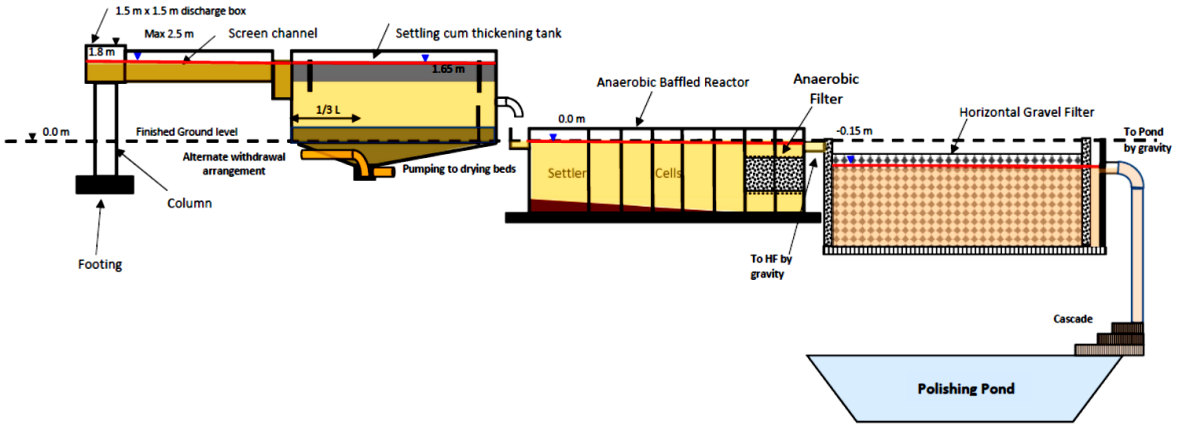
Platform for Drying

Reuse / Disposal



Bhubaneshwar, Odisha

- Capacity : 75 KLD
- Capex: INR 2.85 crores
- O&M : INR 19.25 lakhs/annum
- Land Area: 10117 Sq m.
- Year of commissioning: June-2018
- Operated by: Private Operator



Effluent

Effluent

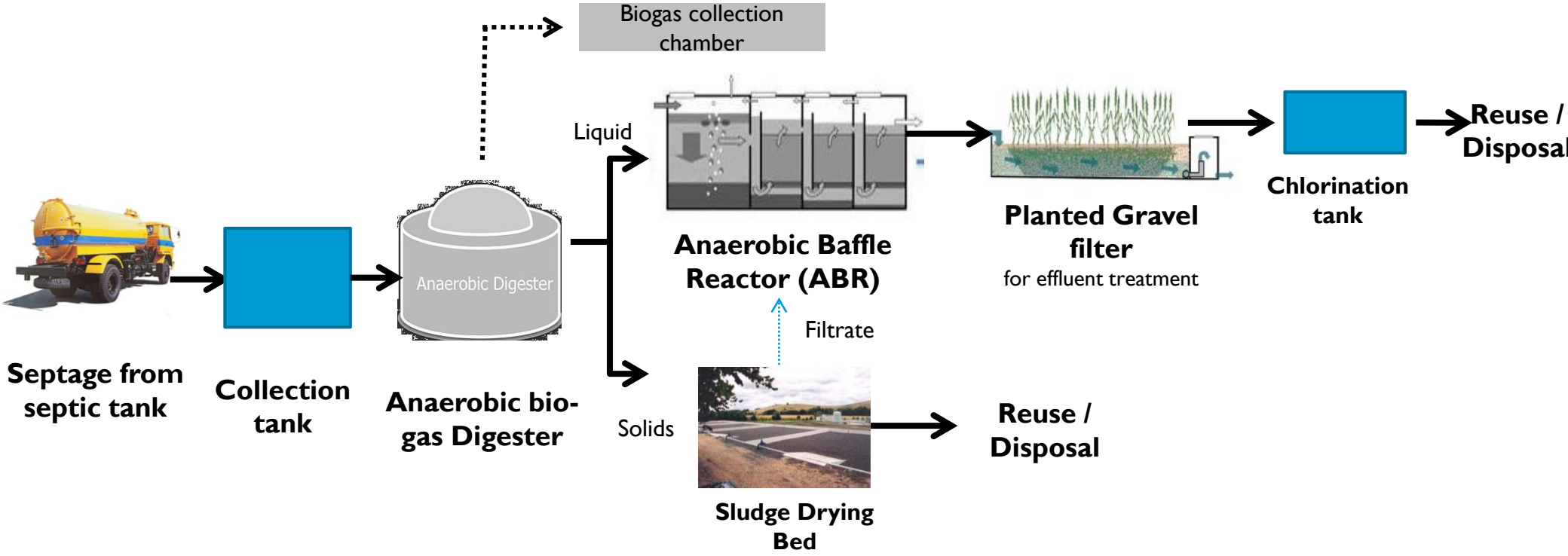
SDB: 10 No.

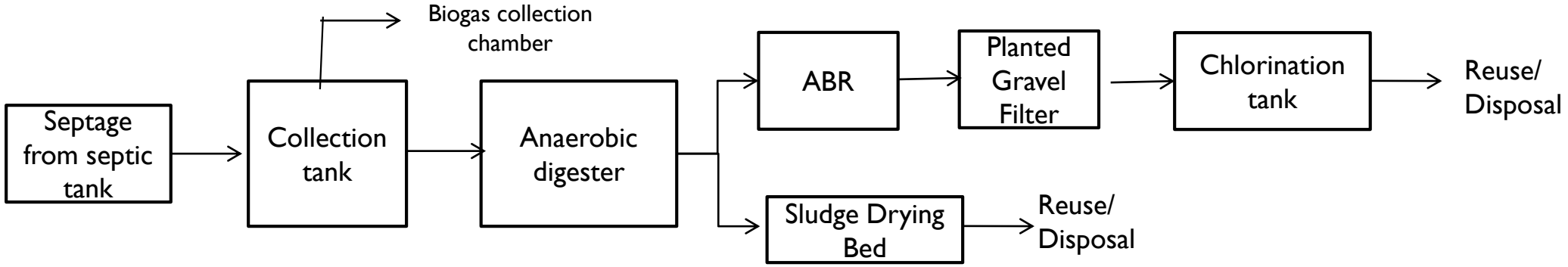
Horizontal Planted Gravel Filter: 2 No.

Effluent

Polishing Pond: 1 No.

Anaerobic Digester





Anaerobic Digester

Advantages:

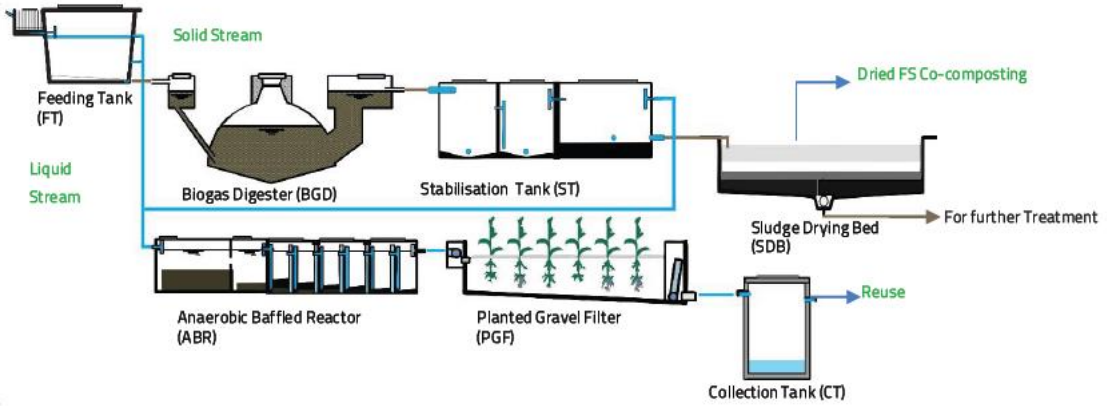
- Simple operation
- No energy is requirement

Disadvantages:

- Large land requirement
- Requires expert design and skilled construction

Examples:

Devanahalli FSTP



Capacity: 6 cum/day
Land: 520 sq.mt

Capital cost: Rs 67 lakhs
O&M: Rs 6 lakh/year
Commissioned: 2015

Pyrolysis

Septage from septic tank

Waste Water Treatment – Soil Bio Filter: treats the waste water and sewage at site. Passive treatment system using *Chrysopogon zizanioides*

Waste Water → Waste Water Treatment

Receipt, Screening and Grit removal → Pasteurization → Dewatering → Sludge → Drying of sludge → Pyrolysis → End product usage

Pasteurization: removes pathogens and helminth eggs from the septage, making it biosafe

Mechanical Dryer: further dries the sludge received from dewatering

Thermal Energy Generation and Reuse

Pyrolyser: converts the dried sludge into Biochar & generates reusable energy

Pyrolysis

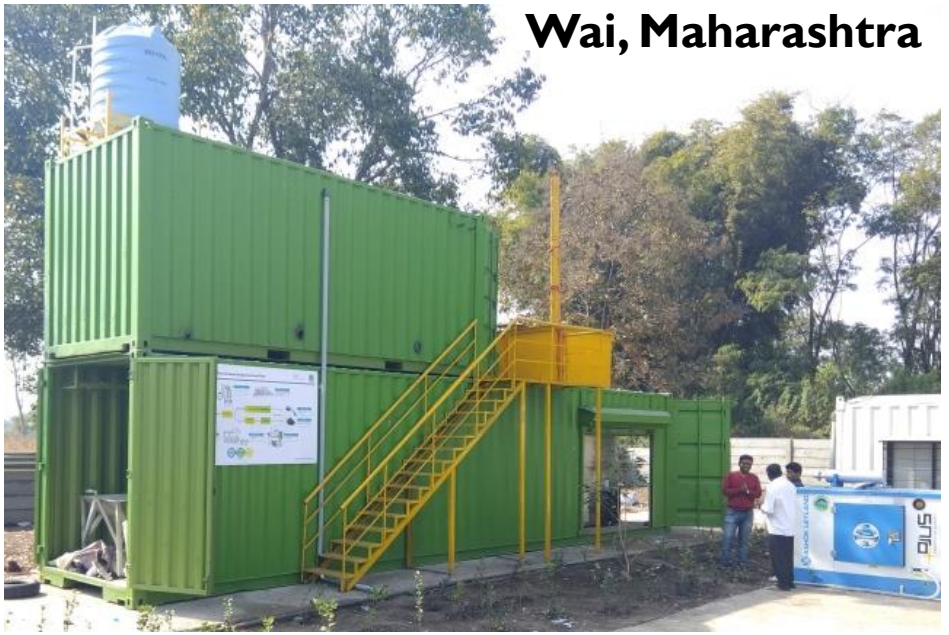
Warangal, Telangana

Capacity: 15 cum/day
Land: 1000 sq mt

Capital cost: Rs 1.2 cr
O&M: Rs 10-15 lakh/year
Commissioned: 2017

Planned with sanitation resource park

Wai, Maharashtra



Capacity: 70 cum/day
Land: 1200 sq mt

Capital cost: Rs 1.8 cr
O&M: Rs 24 lakh/year
Under construction

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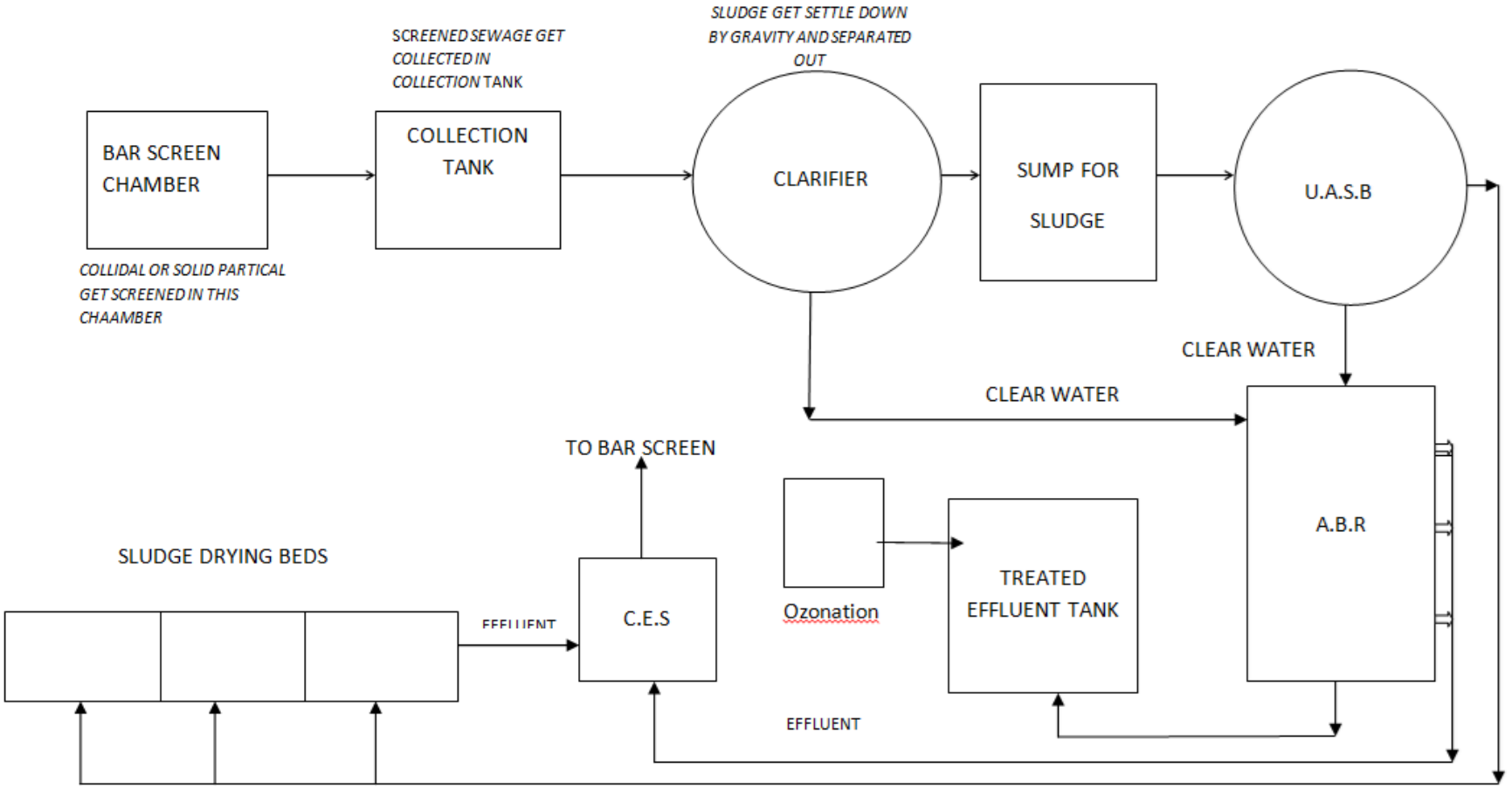
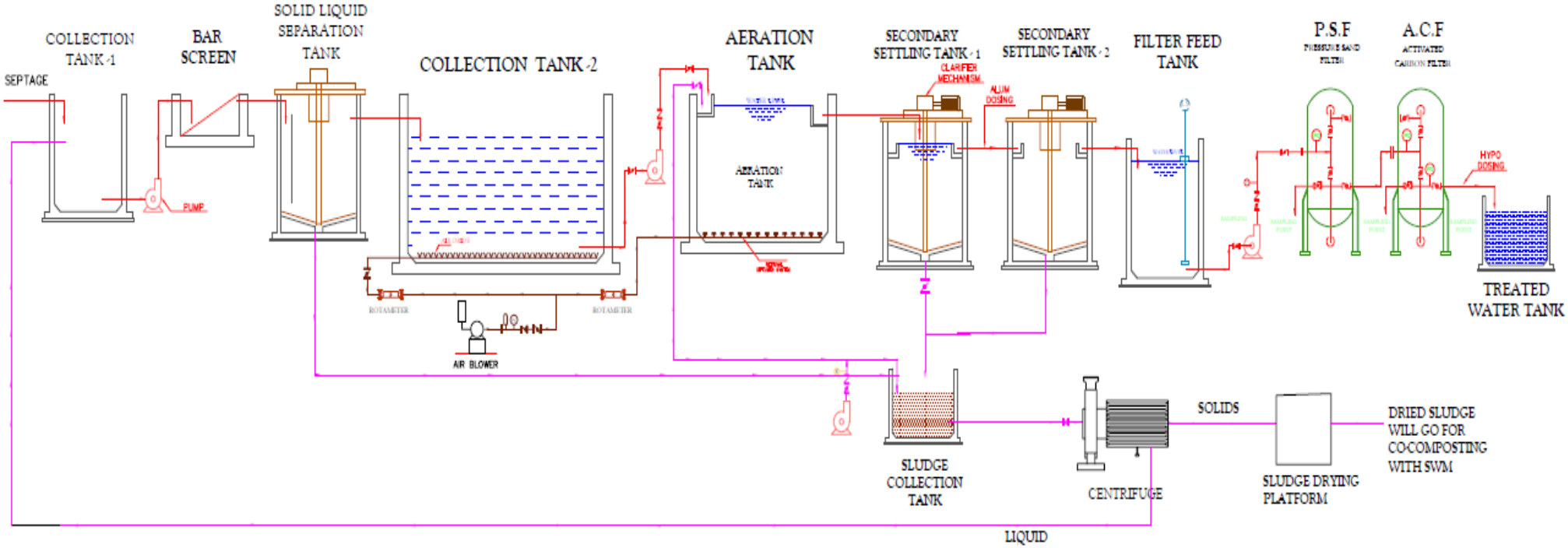
UASB– Conventional STP



MBBR- Co-composing with SWM



UASB/ MBBR/SBR

Sinnar, Maharashtra

Capacity: 70 cum/day
Land: 1547 sq.mt

Capital cost: Rs 1.63 cr
O&M: Rs 8.3 lakh/year
Under technical sanction

Cochin, Kerala

Capacity: 100 cum/day
Land: 1200 sq mt

Capital cost: Rs 2.75 cr
O&M: 24-30 lakh/year
Commissioned: 2015

Comparison of Treatment Technologies

Sr. No	Treatment Technology	Land Requirement	Energy Requirement	Climatic condition	Examples	Estimated Capex Cost (Rs. In lakhs/ cum)	O&M Cost (Rs. in lakhs/ Year)
1	Sludge drying bed (SDB) + Oxidation pond	High	Nil-low	Low - Medium rainfall	Leh, Punjab, West Bengal	0.75 - 1	10-12
2	Anaerobic Digester + ABR+PGF	High	Nil-low	Low - Medium rainfall	Devanahalli, Trichy	1.5-2	10-12
3	Dewatering unit+ co-treatment with SWM (windrow composting/ bio-methanation)+ Oxidation pond/PGF for liquid treatment	High-Medium	Medium	Nil	Nashik, Ganga basin cities *(Mughalsarai and Gangaghat)*, Ghana	1.5-2	12.3-12.8
4	Geobag+ Oxidation pond for liquid treatment	Medium	Medium	Nil	Malaysia	2-2.5	10-12
5	Pyrolysis	Low	High	Nil	Wai, Warangal, Narsapur	2.5-3	10-20
6	UASB/MBBR/SBR	Low	High	Nil	Sinnar, Kohima, Cochin, Periyanaicken-palayam	2.5-5	8-15

Fecal sludge treatment service through DBOT Tender

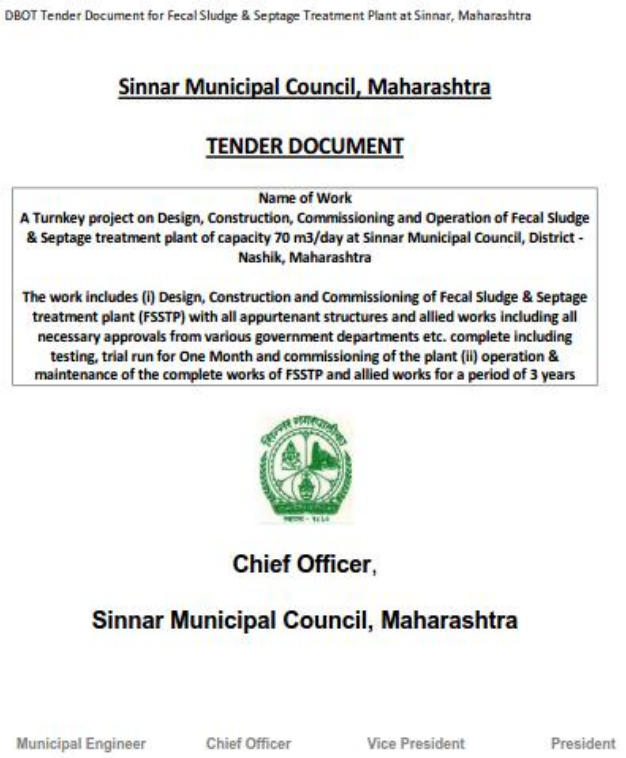
- Bidder **responsible for planning and designing, constructing as well as operation and maintenance** for the first few years before the responsibility of the facility is transferred to the ULB

- **Technology neutral tender; Performance based contracts**

- **Sinnar and Umred** have rolled out for a DBOT tender for their septage treatment facility

- **Can be rolled out easily and quickly with sample tender document**

- **Many bidders have shown interest; competitive prices, innovative technologies**



DBOT Tender Document for Fecal Sludge & Septage Treatment Plant at Sinnar, Maharashtra

Sinnar Municipal Council, Maharashtra

TENDER DOCUMENT

Name of Work
A Turnkey project on Design, Construction, Commissioning and Operation of Fecal Sludge & Septage treatment plant of capacity 70 m3/day at Sinnar Municipal Council, District - Nashik, Maharashtra

The work includes (i) Design, Construction and Commissioning of Fecal Sludge & Septage treatment plant (FSSTP) with all appurtenant structures and allied works including all necessary approvals from various government departments etc. complete including testing, trial run for One Month and commissioning of the plant (ii) operation & maintenance of the complete works of FSSTP and allied works for a period of 3 years

Chief Officer,

Sinnar Municipal Council, Maharashtra

Municipal Engineer Chief Officer Vice President President

DBOT Tender document

This has been done for
- 76 FSTPs in AP
- 71 FSTPs in Telengana
- 2 FSTPs in Maharashtra

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Fecal sludge treatment service through DPR based Tender

- A Detailed Project Report (DPR) that entails initial assessment, planning and finalized design and details of financing the project for FSSM in the city prepared by an organization.
- The DPR is sent for technical and financial approval to MJP / IIT Mumbai
- Once the DPR is approved, a tender for implementation of the project is then floated which includes construction and preferably operation and maintenance for fixed duration

Identify potential sources of Financing

CAPEX	**Treatment Facility-** Land and construction cost
	14th Finance Funds and ODF incentive funds
	ULB own resources
	Central and State schemes
	CSR, Donor grants
	Private Sector/PPP
OPEX	**Operation of Treatment Facility-** Salary, electricity , pumps replacement, etc
	Sanitation Tax/Other Taxes
	Sale of Compost

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 :***
  - Faecal 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

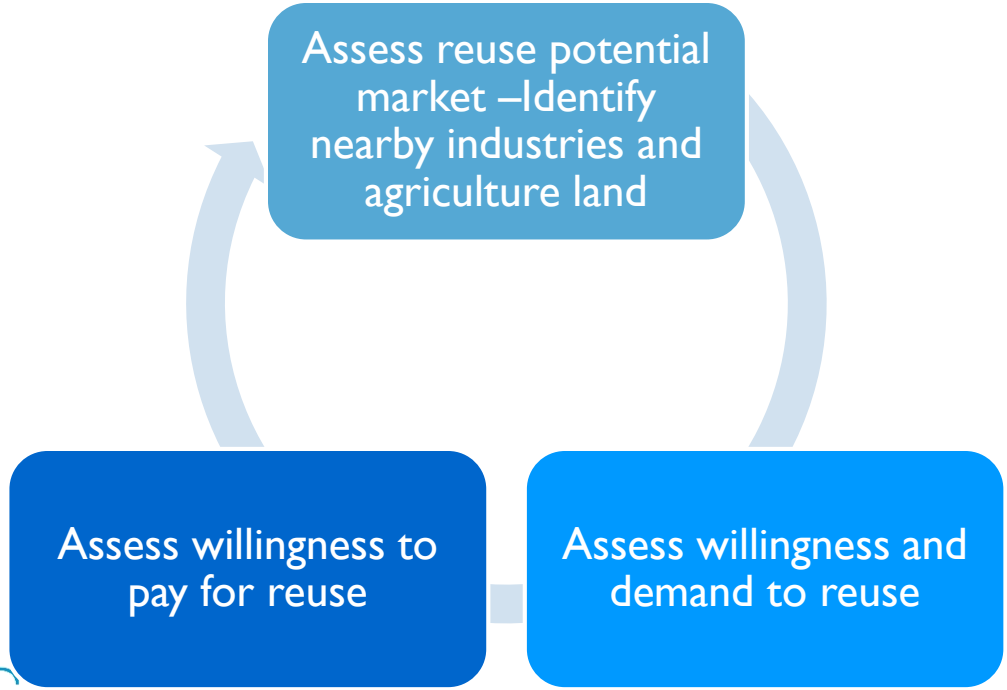
Properly **treated sludge** can be **reused to reclaim parched land** by application as soil conditioner, and/or as a fertilizer.

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**

Source : Advisory note on Septage management in Urban India, MoUD Jan 2013

Assessment of Reuse market

- Landscape Assessment of Reuse Market
  - Possible market demand
    - Identify nearby industries or agriculture land
    - Assess how much they are willing to pay to buy treated Septage and water
  - Social Factors - Assess their willingness to reuse the treated Septage and water



Group Work

Discuss and plan treatment services

- What would be the prefer treatment option and Why? (co-treatment with STP, Co-treatment with SWM or independent treatment plant)
- Is land available for construction of treatment plant?
- What would be source of financing for construction and O&M of treatment plant?
- What would you prefer DBOT or DPR for tendering out treatment plant?
- What would be the major challenges in implementation of treatment services?

Tariff requirement to recover O&M cost

O& M cost for septage treatment facility

1	Energy cost for Septage treatment facilities = (Energy cost per month * 12) **Energy cost** - *< 25 cum/day = Rs 5,000 per month* - *25-50 cum/day = Rs 10,000 per month* - *50-75 cum/day = Rs 15,000 per month* - *> 75 cum/day = Rs 20,000 per month*	
2	Repair and maintenance cost = (Avg. Repair & maintenance cost * 12) - *Assume average repair & maintenance cost = Rs 10,000 per month*	
3	Establishment expenses = (No. of manpower*Monthly Salary *12) - *Assume, 4 manpower requirement (in 2 shifts)* - *Assume, Salary = Rs 10,000 per month*	
4	**Sub-total = (1+2+3)**	
5	Overhead + Insurance + other Miscellaneous cost = (4*X%) - *Assume, other cost as X% of sub-total (4)*	
6-B	**Total O&M cost for managing Septage treatment facility = (4+5)**	

Key Steps for implementation of ODF+ in your cities

Key Steps for implementation of ODF+ in your cities

Decide mode of **Emptying services** (scheduled or demand)

Decide the **treatment technology**

Decide **source of financing** the project (capex and opex of emptying and treatment)

Pass **council resolution** for implementation of **FSSM**

Key Steps for implementation of ODF+ in your cities

Float tender and appointment of **Private Service Provider** for emptying and treatment (if required)

Conduct **Awareness Activities**

Establish **Monitoring Mechanism** for emptying and treatment services

Action Plan for your city

Prepare Action plan for implementation of FSSM plan in your city

FSSM Action Plan for your city

S. no.	Description of action plan	Timeline
1	**Assessment of onsite sanitation systems** (Septic tanks, pit toilets) in your city?	
2	**FSSM plan for your city and its timeline for implementation**	
2.a	**Decide mode of Emptying services** - (Scheduled or demand)_____ - If scheduled based emptying what would be emptying cycle (2/3/5 years)?_____ - Number of septic tanks to be emptied daily_____ - Number of trucks required_____ - O&M cost of emptying services (per year)_____ - Sanitation tax (per property per year)_____ - Will you explore private sector for providing emptying services (Yes/No)_____	
2.b	**Decide Fecal Sludge treatment option** - Co-treatment with own STP_____ - Co-treatment with nearby city STP (city name and distance)_____ - Co-treatment with SWM_____ - Independent treatment plant_____ - Volume of septage to be treated (cum/day)_____ - Mode of implementation (DBOT/DPR)_____	
3	**Council resolution** for implementation of FSSM plan (timeline)	
4	**Source of financing** for Emptying and Treatment? - **Emptying:** Capex_____ Opex_____ - **Treatment:** Capex_____ Opex_____	
5	City allocates **land for treatment plant**? (timeline)	
6	City **implements the FSSM plan** (timeline)	
7	What all **Awareness** activities city plans to undertake?_____	
8	What type of **Monitoring mechanism** will city setup for emptying and treatment? _____	

Thank You

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Government of Maharashtra

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