FAECAL SLUDGE AND SEPTAGE MANAGEMENT
Training of Trainers (ToT) Module

PART-A: PRESENTATION SLIDES
Session 1  FSSM: Need of the hour
  •  Brief overview of sanitation situation at National level
  •  Overview of Sanitation situation in few states (Maharashtra, Gujarat)
  •  National level policies (FSSM, NUSP) and Programmes (SBM, AMRUT) that emphasis FSM
  •  Divergent challenges and opportunities across states and cities

Session 2  Discussion: Challenges and Opportunities of FSSM
  •  What are current practices and challenges in different states?
  •  What are institutional challenges in FSSM?
  •  Divergent Challenges faced by different stakeholders (Households, Private emptier, City government)
  •  What are monitoring Challenges in FSSM?

Session 3  Introduction to the FSSM process
  •  Introduction to stages of FSSM process
  •  Brief overview of different stages of FSSM
  •  Walk-through the FSM toolkit: look through various tools and resource materials present in the toolkit

Session 4  Assessing service performance across the service chain
  •  Assessment across the sanitation service chain
  •  Introduction to SaniTab

Session 5  Introduction to San Benchmark and online platform

Session 6  Planning and Technology selection for FSSM
  •  Access and collection system
  •  Conveyance system (Demand versus Schedule emptying)
  •  Treatment technologies
  Group Exercise
  •  Planning for Septic tank emptying services

Session 7  Financing FSSM
  •  Describing assessment of financial requirements and potential sources for capital/ O&M expenditures for FSM
  Group Exercise
  •  Estimating O & M requirements and Tariff levels for FSSM services

Session 8  SaniPlan
  •  Overview and browse-through SaniPlan

Session 9  Private Sector Participation in FSSM services
  •  Understanding ULB capacity for FSSM
  •  Need for PSP and procedures for engaging the private sector for FSSM

Session 10 Group Discussion: Design of Training Module
  •  Develop training agenda according to different target groups? Eg: Elected representatives, executive wing, Consultants (2 days/1 days)
  •  What are the key takeaways?
  •  How to translate lessons further?
  •  How to tweak this workshop model according to time constraints?
National Institute of Urban Affairs (NIUA) is a national nodal institute that works closely with the Ministry of Housing and Urban Affairs (MoHUA), Government of India. The Sanitation Capacity Building Platform (SCBP) anchored by NIUA aims to build local capacity for planning, designing and implementing non-sewer decentralized sanitation solutions, with specific focus on Faecal sludge and septage management (FSSM) and waste water.

SCBP is a partnership of various research organizations and non-profit institutions (CPR, BORDA/CDD, CEPT, CSTEP, UMC, CSE, CPR, WASHi, iDECK, Dasara, Ecosan Services Foundation, AIILSG). The platform works in partnership with national nodal training institutes working for Atal Mission for Rejuvenation and Urban Transformation (AMRUT) and Swachh Bharat Mission (SBM), with universities and research organizations and all stakeholders in the urban sanitation space. SCBP is supported by a grant from the Bill and Melinda Gates Foundation (BMGF).
The Swachh Bharat Mission has aimed to make India open defecation free by October 2019. The wide prevalence of on-site sanitation system in India necessitates the need to explore safe management of septage along with improved access to toilets. Recognising this, the Government of India has also emphasised septage management in its flagship programme of AMRUT and has also issued policy guidelines on Faecal Sludge and Septage Management (FSSM).

This handbook is to support trainers who facilitate Faecal Sludge and Septage Management (FSSM) training programs and workshops. The handbook provides trainer with a comprehensive material covering various aspects of methods and technologies available for faecal sludge collection, transportation, treatment and reuse. It covers all the aspects of assessment and planning for FSSM in a city:
- Introduction and need for FSSM,
- Assessing service performance across service chain,
- Planning and technology for FSSM,
- Financing FSSM,
- Private sector participation in FSSM services.

The key objective of this handbook is to facilitate trainers in conducting training programmes for FSSM planning and implementation. Trainers are recommended to adapt the material provided in this handbook to suit the local context, the level of participants and duration of training program.

The Handbook was developed by CEPT University under the SCBP program of NIUA which aims to build capacities of urban local bodies (ULBs) officials, para-state technical agencies, administrators and professionals from the private sector and Non-governmental organizations in FSSM. The C-WAS (Center for Water and Sanitation), at CEPT University has developed this handbook based on their field experience of implementing FSSM plans in cities. The handbook includes:
- Lecture notes and slides for each session
- Discussion points for each session
- Group exercises
- Case studies
- Resource Materials
<table>
<thead>
<tr>
<th>Session-1: FSSM - Need of the hour</th>
<th>The session is focused on setting the context of training program and gives an overview of FSSM situation in India. It highlights the emerging recognition of FSSM in India.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session-2: Challenges and Opportunities in FSSM</td>
<td>The session emphasizes the present practices that are being followed for each part of sanitation service chain and highlights various challenges that are encountered for proper implementation of FSSM services.</td>
</tr>
<tr>
<td>Session-3: Introduction to the FSSM process</td>
<td>The session explains the points to be kept in mind for planning FSSM activities. It also helps users identify key areas of assessment.</td>
</tr>
<tr>
<td>Session-4: Assessing Service Performance across the service chain</td>
<td>The session gives an overview on how and what information needs to be collected to assess existing FSSM services in the city.</td>
</tr>
<tr>
<td>Session-5: Introduction to SAN Benchmark and online platform</td>
<td>The session aims to introduce the San Benchmark framework of revised service level benchmarks for sanitation that assess the performance of citywide sanitation, capturing on-site sanitation systems and sewage management. San Benchmark is adopted in National Policy on FSSM for monitoring and Evaluation of Cities’ performance.</td>
</tr>
<tr>
<td>Session-6: Planning and Technology selection for FSSM</td>
<td>The session gives an overview on how to plan FSSM services in the city. Various approaches available for conveyance and considerable parameters for technology selection across service chain are explained.</td>
</tr>
<tr>
<td>Session-7: Financing FSSM</td>
<td>The session gives an overview on how to do an assessment of financial requirements for both capital and O&amp;M expenditures for implementation of FSSM in the city. It provides guidance on potential sources of finance for meeting these expenditures.</td>
</tr>
<tr>
<td>Session-8: SaniPlan</td>
<td>The session will help to understand the SANIPLAN tool developed at the CEPT University under the Performance Assessment System (PAS) Project. It is a decision support tool that provides a structured approach to planning for urban sanitation.</td>
</tr>
<tr>
<td>Session-9: Private sector Participation in FSSM services</td>
<td>The session presents Private Sector Participation (PSP) as a potential solution for the ULBs to ensure quality sanitation provision in the city. The session aims to understand ULB needs, interest and concerns for PSP.</td>
</tr>
<tr>
<td>Time</td>
<td>Session</td>
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<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>9:30 – 10:00</td>
<td>Registration</td>
</tr>
<tr>
<td>10:00-10:30</td>
<td>Welcome and Introduction • Overview of training objectives • Introduction of participants • Expectation from the training</td>
</tr>
<tr>
<td>10:30-11:00</td>
<td>FSSM: Need of the hour • Brief overview of sanitation situation at National level • Overview of Sanitation situation in few states (Maharashtra, Gujarat) • National level policies (FSSM, NUSP) and Programmes (SBM, AMRUT) that emphasis FSM • Divergent challenges and opportunities across states and cities</td>
</tr>
<tr>
<td>11:00-11:45</td>
<td>Discussion: Challenges and Opportunities of FSSM • What are current practices and challenges in different states? • What are institutional challenges in FSSM? • Divergent Challenges faced by different stakeholders (Households, Private emptier, City government) • What are monitoring Challenges in FSSM?</td>
</tr>
<tr>
<td>12:30-13:15</td>
<td>Assessing service performance across the service chain • Assessment across the sanitation service chain • Introduction to SaniTab • Q&amp;A</td>
</tr>
<tr>
<td>13:15-14:00</td>
<td>Lunch</td>
</tr>
<tr>
<td>14:00-14:45</td>
<td>Introduction to San Benchmark and online platform</td>
</tr>
<tr>
<td>14:45-15:30</td>
<td>Planning and Technology selection for FSSM • Access and collection system • Conveyance system (Demand versus Schedule emptying) • Treatment technologies • Q&amp;A</td>
</tr>
<tr>
<td>Time</td>
<td>Event</td>
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<tr>
<td>15:30-16:00</td>
<td>Networking Break</td>
</tr>
<tr>
<td>16:00-17:00</td>
<td>Group Exercise</td>
</tr>
<tr>
<td>17:00-18:00</td>
<td>Presentation on Training calendar – Each Institution</td>
</tr>
<tr>
<td><strong>DAY 2</strong></td>
<td></td>
</tr>
<tr>
<td>09:15-09:30</td>
<td>Recap of Day 1</td>
</tr>
<tr>
<td>09:30-10:00</td>
<td>Financing FSSM</td>
</tr>
<tr>
<td>10:00-10:45</td>
<td>Group Exercise</td>
</tr>
<tr>
<td>10:45-11:15</td>
<td>SaniPlan</td>
</tr>
<tr>
<td>11:15-12:15</td>
<td>Private Sector Participation in FSSM services</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>12:15-13:00</td>
<td>Group Discussion : Design of Training Module</td>
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<tr>
<td>13:00-13:30</td>
<td>Feedback from the participants</td>
</tr>
<tr>
<td></td>
<td>Certificate Distribution</td>
</tr>
<tr>
<td>13:30-14:30</td>
<td>Lunch and Departure</td>
</tr>
<tr>
<td>14:30-17:00</td>
<td>Discussion of participants with CEPT and NIUA</td>
</tr>
</tbody>
</table>
Training of Trainers
On
Faecal Sludge and Septage Management

Prepared for
Sanitation Capacity Building Platform (SCBP) of National Institute of Urban Affairs (NIUA)

17-18th August 2017
Starottel Hotel, Ahmedabad

Centre for Water and Sanitation (C-WAS), CEPT University

Session 1: FSSM need of the hour
Objective of the session . . .

- To highlight the need of FSSM in the context of sanitation situation in the country
- Understanding components of FSSM service chain
- Highlight factors that enable implementation of citywide FSSM services

Key Sanitation facts from CENSUS 2011 - INDIA

- 18.6% **URBAN HHs HAVE REPORTED NO TOILETS**
- 32.7% **OF URBAN HHs HAVE ACCESS TO PIPED SEWER**
- 38.2% **HHs HAVE SEPTIC TANKS**
- 6% **OF HHs DEPEND ON PUBLIC TOILET**
- 12.6% **OF HHs RESORT TO OD**
- 816 STPs IN 358 CITIES
Sanitation situation in INDIA . . .

<table>
<thead>
<tr>
<th>Access</th>
<th>Collection and Conveyance</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open defecation Community toilets</td>
<td>67,025</td>
<td>54,728</td>
</tr>
<tr>
<td>Individual toilets</td>
<td>82%</td>
<td>43%</td>
</tr>
<tr>
<td>Over 50% of HHs are dependent on Onsite system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methods of disposal of waste by HH with personal toilets in urban India (in 100 HHs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sewerage</td>
<td>44%</td>
<td>70%</td>
</tr>
<tr>
<td>Access to type of sanitation for HH in urban India (in 100 HHs)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Note: (1) Others includes primitive methods of C&K, such as pour flush toilets or other systems, might not be disposed into open drains and latrines serviced by humans and animals. (2) "Verification of sewage treatment plants" report by Central Pollution Control Board of India (CPCB), 2015. (3) Source: Based on Census of India 2011.

Swachh Bharat Mission (SBM) - Urban

Mission Objectives
- Elimination of open defecation
- Eradication of Manual Scavenging

SBM (Urban) aims to ensure that
- No households engage in the practice of open defecation;
- No new insanitary toilets are constructed during the mission period, and
- Pit latrines are converted to sanitary latrines.

Mission Components
- Household toilets, including conversion of insanitary latrines into pour-flush latrines
- Community toilets
- Public toilets and urinals

Source: [http://www.swachhbharaturban.in:8080/sbm/content/writereddato/SBM_Guideline.pdf](http://www.swachhbharaturban.in:8080/sbm/content/writereddato/SBM_Guideline.pdf)
Swachh Bharat Mission (SBM) - Urban

Physical Progress under SBM

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ind. Toilets</td>
<td>33,76,793</td>
<td></td>
</tr>
<tr>
<td>Community &amp; Public Toilets</td>
<td>1,28,946</td>
<td></td>
</tr>
<tr>
<td>Open Defecation Free</td>
<td>1,012</td>
<td></td>
</tr>
</tbody>
</table>

100% Door to Door Waste Collection: 43,200
Waste to Energy: 1,64,891.6
Waste to Compost: 1,64,891.6

ODF Status of Urban India

Toilets are being constructed but need to think beyond that . . .

Source: [http://www.swachhhbharaturban.in](http://www.swachhhbharaturban.in); Information retrieved as on 10-8-2017

What is Faecal Sludge . . .

“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.”

What is Septage . . .

“It 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”.


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
1,000 Protozoa
1,000,000 Bacteria
10,000,000 Virus

Source: [Charm. Rama]
Onsite sanitation and FSSM
– emerging questions

38% 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?

Need for Faecal Sludge and Septage Management (FSSM)

- Facilities like septic tanks, dry latrines, community toilets, or other types accumulate faecal 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

- Environmental pollution is caused by effluents of not regularly de-sludged septic tanks or community toilets;

- 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

Effluent and septage from septic tanks systems impacts ground and surface water resources
Emerging recognition of FSSM

- **National Policy on FSSM** by MoHUA, GoI
- **National declaration on Septage Management** by MoHUA, GoI
- One of the major **thrust areas of AMRUT**
- **Primer on septage Management** and **Rapid Assessment tool** for estimating **budget requirements** for FSSM
- **Septage Management Advisory** of Government of India provides references to CPHEEO guidelines, BIS standards, and other resources for preparing SMP / FSSM plan.

Emphasis on FSSM in National Policy

The **key objective** of the urban FSSM Policy is to set the context, priorities, and direction for, and to facilitate, nationwide implementation of FSSM services in all ULBs such that **safe and sustainable sanitation** becomes a reality for all in each and every household, street, town and city.

**Key Milestones:**
- Leveraging FSSM to achieve 100% access to safe sanitation
- Achieving integrated citywide Sanitation:
  - Mainstreaming Sanitation
- Sanitary and Safe disposal
- Awareness generation and behavior change
Emphasis on FSSM in AMRUT

- Service Delivery – Focus on infrastructure that leads to delivery of services to citizens.
- Incentives for achievement of Reforms – State to prepare FSSM policy
- Financial Allocation under AMRUT for FSSM related projects

Sanitation Service chain...

<table>
<thead>
<tr>
<th>Access</th>
<th>Collection</th>
<th>Conveyance</th>
<th>Treatment</th>
<th>Reuse/Disposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describes type of toilet facilities the user accesses.</td>
<td>Describes ways of collecting and sometimes treating the faecal waste generated by the users.</td>
<td>Describes transport of waste from collection to the treatment / disposal site</td>
<td>Describes way in which waste is treated</td>
<td>Describes the way in which waste reused / disposed off</td>
</tr>
</tbody>
</table>
**Type of Access . . .**

- Individual toilet
  - Toilets used by households at their home
  - On premise toilet

- Community toilet
  - Toilets used by residents / community that do not have toilet at their home
  - Located near a community / slum area

- Public toilet
  - Toilets used by floating population
  - Located in market area, bus stop, commercial area

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**Type of Collection systems . . .**

- Single pit toilet
- Twin pit toilet
- Septic tank
- Biogas
- Composting toilet
- Bio-digester
### Type of Conveyance systems...

- **Conventional Vacuum Tanker**
  - For septic tanks which have proper access roads, a larger vehicle maybe used

- **Mini-Vacuum Tanker (Vacutug)**
  - For septic tanks located in narrow lanes or those that do not have proper access roads, smaller vehicles maybe used

- **Gulper**
  - 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.

### Type of treatment systems...

- **Treating at an Existing Sewage Treatment plant**

- **Treating at an Independent Faecal Sludge and Septage treatment plant (FSSTP)**
Types of reuses / disposal systems...

Current situation of septage management in Small – Medium towns in India
Discussion points . . .

- For your state how will assess sanitation situation?
- What is the difference between faecal sludge and septage?
- Sanitation Service Chain for FSSM?

References

- Ministry of Urban Development (MoUD), (2013), "Advisory note on septage management in urban India". MoUD, GOI.
- Ministry of Urban Development (MoUD), (2016). "Primer on Faecal Sludge and Septage Management". MoUD, GOI.
- Ministry of Urban Development (MoUD), (2017), "National Policy on Faecal Sludge and Septage Management (FSSM)". MoUD, GOI.
Session 2: Challenges and Opportunities in FSSM

Objective of the session . . .

- Highlight current practices for each link of the sanitation service chain

- Highlight various challenges that are encountered for proper implementation of FSSM services.
Challenges in Access

- Space issues
- Affordability issues
- Inadequate water supply in selected regions
- Dilapidated/Quality
- Insanitary toilet - Unsafe toilet

- Poor condition
- Lack of O&M
- Water Supply and Electricity issue
- Limited time access
- Not adequate
- Require huge space at prime location
- Categorized as Unsafe toilet as per Joint Monitoring programme

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
- 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, faecal matter along with effluents is released into the drains

Challenges in Disposal system

- Disposal of septage at dump site
- NO TREATMENT OF FAECAL SLUDGE & SEPTAGE
- Disposal of septage in open land
- Disposal of septage in water bodies

Standards for Disposal

Effluent discharged standards for Sewage Treatment Plant are mentioned below:

<table>
<thead>
<tr>
<th>M. No.</th>
<th>Industry</th>
<th>Parameters</th>
<th>Standards for New STPs (Design after notification date)*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sewage Treatment Plant</td>
<td>pH</td>
<td>6.5-8.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BOD</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>COD</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TSS</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NH₃-N</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N-total</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Faecal Coliform (MPN/100ml)</td>
<td>&lt;100</td>
</tr>
</tbody>
</table>

Note:
(i) All values in mg/l except for pH and Coliform.
(ii) These standards will be applicable for discharge in water resources as well as for land disposal. The standards for Faecal Coliform may not be applied for use.

Source: Gazette notification by MoEF, 24th November 2015
http://www.moef.gov.in/sites/default/files/Draft%20notification%20onSewage%20Treatment%20plan.PDF

Standards of disposal of septage

Actual quality of septage that is being disposed off

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Parameter</th>
<th>Faecal Sludge &amp; septage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>pH</td>
<td>7.6-8</td>
</tr>
<tr>
<td>2</td>
<td>BOD</td>
<td>6000 - 16500</td>
</tr>
<tr>
<td>3</td>
<td>COD</td>
<td>11408 - 27776</td>
</tr>
<tr>
<td>4</td>
<td>TSS</td>
<td>9000 - 90000</td>
</tr>
<tr>
<td>5</td>
<td>Total Nitrogen</td>
<td>300-800</td>
</tr>
<tr>
<td>6</td>
<td>Faecal Coliform</td>
<td>&gt;1600</td>
</tr>
</tbody>
</table>

Discussion
Challenges and Opportunities of FSSM

• What are current practices and challenges from your state perspective?

• What are institutional and monitoring challenges in FSSM?

• Divergent Challenges faced by different stakeholders
  ➢ Households,
  ➢ Private emptier,
  ➢ City government
  ➢ End Users

• Links with SBM / AMRUT
The FSSM planning process . . .

“Main objective this session on Citywide FSSM process is to help users identify key areas of assessment while planning for FSSM activities.

This process can be facilitated by various tools that are available in the IFSM toolkit for assessment and planning purpose. This will help users make informed discussion with stakeholders and provide for ‘evidence-based’ decision making.”
Five Stages of Assessment . . .

Stage 1: Assessing Service Performance Across the Full Service Chain

Assessing service performance across the service chain through a city level assessment is the first step in planning process.

It is an important exercise, which provides an initial sense of the state of FSM in the city, help in understanding the context and identifying gaps in key services.

The data collection and field assessments in the city should start with a kick-off meeting with key stakeholders.
Stage 1: Assessment across sanitation Service Chain . . .

### Access
- Identify Dependence on Various Toilet Facilities
- Capture details of community / public toilets
- Spatial Variations

### Collection
- Assess details of Septic Tanks related to location, size, design and access
- Dependency on On-Site Systems
- Inaccessible Septic Tanks with sealed tops
- 3 chambered septic tanks of sufficient size with access covers

### Conveyance
- Assess available infrastructure and process for septic tank emptying
- Details related to type / size of Trucks
- Coverage in different parts of city
- Number of Septic tank emptied annually
- Private sector availability

### Treatment / Disposal / Reuse
- Identify present location of septage disposal/treatment
- Assess the capacity requirement / adequacy of a Septage Treatment Facility
- Reuse of treated septage
- Market and Demand for Reuse

Stage 1: Citywide Sanitation **assessment** through Indicators - SAN Benchmarks

<table>
<thead>
<tr>
<th>Citywide Sanitation Indicators (Sewerage system + Onsite systems)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Coverage of toilets</td>
</tr>
<tr>
<td>2. Coverage of adequate sanitation system</td>
</tr>
<tr>
<td>3. Collection efficiency of sanitation system</td>
</tr>
<tr>
<td>4. Adequacy of treatment capacity of sanitation system</td>
</tr>
<tr>
<td>5. Quality of treatment of sanitation system</td>
</tr>
<tr>
<td>6. Extent of reuse and recycling in sanitation system</td>
</tr>
</tbody>
</table>
Stage 1: Tools for assessing service performance

<table>
<thead>
<tr>
<th>Assessment areas</th>
<th>Assessment Tools</th>
<th>Download</th>
</tr>
</thead>
</table>
| Assessment through City level Performance Indicators | 1. SANIPLAN: Information collection and initial performance assessment | a. SaniPlan, SaniPlan-FSM  
b. Data for SaniPlan Input: List of sources |
| Assessment across each link in the service chain | 2. Physical and spatial analysis of city | a. Sample maps |
| Summary and vision | 3. Field assessment of toilets and onsite systems | a. SaniTab tool (Android installer .apk file/ sample questionnaire)  
b. Manual for Surveyors  
c. Template for survey of small contractors and masons  
d. Template for technical assessment of onsite systems |
| | 4. Field assessment of emptying services and treatment | a. Template: Onsite system emptying service  
b. Template: Wastewater quality assessment |

Source: IFSM toolkit - http://ifsmtoolkit.pas.org.in/

Stage 2: Assessment of enabling environment: Policy, Regulation and Institutions

It is important to understand and assess the prevailing enabling and regulatory environment as well as capacity of local stakeholders to manage the citywide FSM services.

This can be assessed by a review of: a) State/national policies and guidelines on FSM, b) Regulatory framework for treatment, disposal, and reuse of faecal matter, and c) assessing roles and responsibilities of local government for FSM.
Stage 2: Review of state policies, acts & programmes that enable FSSM

Stage 2: Assessing local capacity for FSSM

- Understand the governance and institutional mechanism of the local government (or the agency responsible for FSSM), and review of city wide plans, if any; especially those related to sanitation

- Assess the organizational structure and responsibilities related to septage management in the agency

- Review of outsourcing contracts and its management

- Capacity assessment of local government and gaps for FSSM – e.g. developing contracts and monitoring mechanisms
Stage 2: Tools for policy and governance assessment

**TOOLS available for**

**ASSESSING** policies, **REGULATIONS** and **CAPACITY** of Local government

<table>
<thead>
<tr>
<th>Assessment areas</th>
<th>Assessment Tools</th>
<th>Download</th>
</tr>
</thead>
<tbody>
<tr>
<td>National and state policy and guidelines</td>
<td></td>
<td>a. Sample policies and guidelines (NUSP, FSM guidelines GOI / GoM, GoTN, PSM in Urban Maharashtra, Other Sanitation Acts)</td>
</tr>
<tr>
<td>Regulatory regime for FSM and the institutional roles</td>
<td></td>
<td>b. Examples of Process mapping</td>
</tr>
<tr>
<td>Assessing local capacity for FSM</td>
<td></td>
<td>c. Interview guide for local government to assess capacity for PSP</td>
</tr>
</tbody>
</table>

5. Assessing policies and regulations affecting FSM at local levels
6. Assessing capacity at local level: local government and other stakeholders

Source: IFSM toolkit - http://ifsmtoolkit.pas.org.in/

Stage 3: Technology options for FSSM services

In designing a citywide IFSM service, it is important to **assess technology options** for each link in the **service chain**.

This ranges from **appropriate toilets** and **onsite systems** such as septic tanks to **conveyance** as well as **treatment** and reuse.

- Toilets and Its connectivity
  - Twin pit
  - Bio-digester toilet

- Emptying services
  - Conventional Vacuum Tanker
  - Mini-Vacuum Tanker (Vacutug)

- Treatment technologies
  - Sludge drying bed
  - Co-composting
Stage 3: Assessing options for toilets and septic tanks

Twin pit toilets

2-3 Chambered septic tanks

Bio Digester toilets

Source: Guidelines for Swachh Bharat Mission – Urban (2017), Ministry of Housing and Urban Affairs (MoHUA), Government of India (Gov)

Stage 3: Assessing options for emptying services and conveyance

“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.

Example

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

“Weary 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

Planning Decision

Demand desludging V/S Scheduled desludging

Sketch adopted from compendium of sanitation systems and technologies, Ezwag
Stage 3: **Vehicular options for septage collection**

**Conventional Vacuum Tanker**
For septic tanks which have proper access roads, a larger vehicle maybe used

**Mini-Vacuum Tanker (Vacutug)**
For septic tanks located in narrow lanes or those that do not have proper access roads, smaller vehicles may be used

**Gulper**
Smaller mechanized tricycle/motorcycle mounted collection tanks of 20-40 litres

**Four types of vacuum sludge removal techniques**

1. **Vacuum system**
   - High vacuum
   - Low airflow

2. **Constant air drag system**
   - Low vacuum
   - High airflow

3. **Pneumatic conveying**
   - High vacuum
   - Medium airflow

4. **Plug drag system**
   - High vacuum
   - Medium airflow


---

Stage 3: **Assessing options for treatment and reuse of faecal sludge/septage**

**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 generate energy and can be reused to reclaim parched land by application as soil conditioner, and/or as a fertilizer**

Source: Advisory note on Septage management in Urban India (2012). MoUD, Gov
Stage 3: Tools for assessing technology options

**TOOLS available for assessing technology options across service chain**

<table>
<thead>
<tr>
<th>Assessment areas</th>
<th>Assessment Tools</th>
<th>Download</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessing technical options for toilets and septic tanks</td>
<td>7. Assessing options for conveyance of septage services</td>
<td>a. Determining infrastructure required for septic tank emptying cycle</td>
</tr>
<tr>
<td>Assessing options for emptying services and conveyance</td>
<td></td>
<td>b. Template for licensing of septage transporter</td>
</tr>
<tr>
<td>Assessing options for treatment and reuse of fecal sludge/septage</td>
<td>8. Assessing options for treatment and reuse of fecal sludge</td>
<td>c. Template manifest form for emptying</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a. Factors influencing selection of treatment facilities</td>
</tr>
</tbody>
</table>

Source: IFSM toolkit - http://ifsmtoolkit.pas.org.in/

Stage 4: Exploring Potential private sector role across the service chain

While the city governments generally have the mandate to ensure service provision, often there is an active private sector that provides FSM services in the city. It is necessary to assess the current role of private sector providers as well as their potential role in a citywide service provision. The assessment will thus need to start with a quick landscape analysis, and can be followed by a detailed assessment after the FSM strategy is developed.
Stage 4: Tools for assessing potential of PSP

**TOOLS available for ASSESSING potential for PRIVATE sector PARTICIPATION**

<table>
<thead>
<tr>
<th>Assessment areas</th>
<th>Assessment Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessing local government capacity for PSP</td>
<td>a. Interview guide for Private sector players</td>
</tr>
<tr>
<td>Landscape study of private sector</td>
<td>b. Interview guide for Local government about FSM-PSP structure and contracts</td>
</tr>
<tr>
<td>Develop and review potential structure of PSP option</td>
<td>c. Model contract/bid documents (O&amp;M / construction)</td>
</tr>
</tbody>
</table>

Source: IFSM toolkit - http://ifsmtoolkit.pas.org.in/

Stage 5: Financial Assessment

To ensure financial **sustainability** of FSSM services, it is important to assess **capacity for financing** both capital and O&M expenditure over the plan period. This can start with an **assessment** of financial requirements for both capital and O&M expenditures.

The assessment also provides guidance on **potential sources of finance** for meeting these expenditures including through external **grants**, private sector **investments**, user contributions, external **debt** or through local government internal resources.

**Assessment of Financing requirement across FSSM service chain**

**Capex**: New septic tanks, Refurbishment of septic tanks, New Suction Emptier Trucks, Treatment Facility-Land cost, construction cost

**Opex**: Operation of Emptier trucks-Fuel cost, salaries of truck driver, etc, Operation of Treatment Facility-staff salary, electricity bill, pumps replacement, etc
Stage 5: Potential sources of finance

A. Potential sources of finance for Capital Expenditure

- **User Interface**
  - New septic tanks
  - Refurbishment of septic tanks
  - Households
  - Government Subsidy
  - CSR fund

- **Collection**
  - Central/state Grants
  - Private sector
  - Local government fund
  - CSR fund

- **Conveyance**
  - Suction Emptier Trucks
  - Private sector
  - Local government fund

- **Treatment/Disposal**
  - Treatment Facility

B. Potential sources of finance for O&M Expenditure

- **User Interface**
  - Operation of Emptier trucks
  - Sanitation Tax/tariff
  - Emptying fees

- **Collection**
  - Operation of Treatment Facility
  - Sanitation Tax/tariff
  - Sale of Septage

Stage 5: Review of required tariffs

- Local government become financially sustainable by levying taxes and/or user charges so as to recover O&M costs of recent urban development programmes.

- It is therefore imperative that any proposed investment plan includes ways to recover O&M costs.

- Besides meeting operating expenses, the ULB is required to keep sufficient surplus to meet repayment obligations in addition to its committed capital expenses.

Assessment of current tariffs levels across FSM service chain

Stage 5: Tools for assessing Financing requirement & options

**TOOLS available for ASSESSING FINANCE**

<table>
<thead>
<tr>
<th>Assessment areas</th>
<th>Download</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment of finance requirements and potential sources</td>
<td>a. SaniPlan, SaniPlan-FSM</td>
</tr>
<tr>
<td>Potential sources of finances for capital/ O&amp;M expenditures</td>
<td>b. Financial planning using SaniPlan</td>
</tr>
<tr>
<td>Review of required tariffs</td>
<td></td>
</tr>
</tbody>
</table>

11. SANIPLAN: Financing plan and tariff review

12. Assessing willingness to pay and to charge

Source: IFSM toolkit - http://ifsmtoolkit.pas.org.in/

Link to website - http://ifsmtoolkit.pas.org.in/

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Citywide Integrated Faecal Sludge Management (IFSM) planning involves assessment and planning across the full service chain. Citywide approach suggests universal coverage of services in all areas and for all properties in the city. It also involves a review of the full service chain – user interface, storage, conveyance, treatment and reuse. The focus here is on providing effective and sustainable sanitation services by the local government and other service providers.

Citywide IFSM planning is a consultative process and the tools for citywide assessment presented here help informed discussion among stakeholders and provide for ‘evidence-based’ decision making by city authorities. The process should start off with a kick-off meeting with key stakeholders. Consultations with key stakeholders should be planned during key stages in the planning process.

The IFSM planning process is facilitated by SANIPLAN, a decision support tool that has three main areas: a) assessment of service performance across the full service chain, b) designing an action plan to ensure service improvements across the chain, and c) developing a financing plan for both capital and O&M costs for the full plan period.

**City-wide Assessment**

City-wide assessment of FSH is the first key step for IFSM planning. The tools are organized around five key areas. Assessing the current situation of FSH in these five areas is important to develop a FSH plan that is technically appropriate and financially feasible at local level. Assessment in each area entails review of available information at city level, identifying information gaps, and conducting field studies where necessary.
Discussion points

- Key stages of assessment
- Use of tools from the toolkit

References


- Ministry of Urban Development (MoUD), (2013), "Advisory note on septage management in urban India". MoUD, GOI.

- Ministry of Urban Development (MoUD), (2017), "National Policy on Faecal Sludge and Septage Management (FSSM)". MoUD, GOI.


Session 4: Assessing Service Performance across the service chain

Objective of the session

- Assessment is an important exercise that provides an **initial sense** of the **state of FSSM in the city**, help in understanding the context and in **identifying key stakeholders before developing proposals**.

- This session gives a brief overview on what and how **information needs to be collected** to assess **existing FSSM services** in your city.

- Understand how to identify issues and challenges in existing services.

- The session also provides guidance on **SaniTab tool**

Source: IFSM toolkit - http://ifsmtoolkit.pas.org.in/
Assessing Service Performance across the Service Chain

1. Assessment through Performance Indicators

2. Across each link in the Service Chain

3. Summary and Vision

Assessment through City-Level Performance Indicators

- Collect and Assess Available Information
  - Obtain background information about the city
  - Identify available plan documents, any recent surveys done by the local government as well as by any research / academic institutions in the city.

- Coverage of households with individual toilets in city / slums
- Coverage of households with adequate sanitation system
- Adequacy of wastewater and septage treatment capacity
- Quality of wastewater and septage treatment

- Efficiency of wastewater and septage collection system
- Extent of reuse/recycling of treated wastewater and septage
- Efficiency in redressal of customer complaints
- Efficiency in collection of wastewater charges and taxes
- Extent of cost recovery in wastewater services
SanBenchmark across the service chain

**SAN Benchmarks** provides a framework for performance assessment of city wide sanitation by capturing onsite sanitation systems along with the conventional sewerage systems.

At the national level, SAN Benchmark has been adopted by the Government of India and is now a part of “National Policy on Faecal Sludge and Septage Management”.

Link to the policy:-

Link to SAN Benchmarks – Framework and Indicators on PAS Website:-

Assessing Service Performance across the Service Chain

1. Assessment through Performance Indicators

2. Across each link in the Service Chain

3. Summary and Vision
Assessment of Access . . .

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

- Individual, Community or Shared
- Open Defecation Spots
- Non-Slum/Slum access to sanitation

**Reasons for not owning an individual toilet:**
- Lack of Space?
- Lack of Finance?
- Lack of Legal Clearances?

**Details of Community/Public Toilets**
- No. of toilet seats?
- No. of users per seat?
- Location in slum/non-slum areas?
- O&M by Private or ULB?

Spatial Assessment . . .

**Spatial Assessment of Toilet Availability**

- Household level access to toilet availability
- Toilets connected to various systems
- Location of Community Toilets and OD spots
**Tool – SaniTab for Household Level Sanitation Survey . . .**

**SANITAB** is an android-based tool for household / property level survey and creating database for Onsite Sanitation Systems.

**Key Features:**
- Citywide digital data collection tool
- Providing enabling environment for spatial analysis
- Quick and ease in survey, minimizing human error
- "Real time" monitoring of survey activity
- Survey at scale

- Toilet availability
- Disposal System Toilet is connected to
- Size and shape of septic tank, No. of chambers in septic tank, Accessibility of septic tanks
- Cleaning frequency of septic tanks, Problems encountered while cleaning and Reasons for emptying septic tanks

**Four Types of questionnaire available**

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Defecation Free</td>
<td>Toilet availability, OD and CT dependency</td>
</tr>
<tr>
<td>Integrated ODF-FSM</td>
<td>Toilet connectivity</td>
</tr>
<tr>
<td>Faecal Sludge Management</td>
<td>Willingness to build own/shared toilets</td>
</tr>
<tr>
<td>Basic Information</td>
<td>Financial capability</td>
</tr>
</tbody>
</table>

**Septic tank details**
- Information about emptying and cleaning
- Number of septic tanks

**Assessment captures the following aspects**

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

**Dependency on Septic Tanks & pits**

**Cleaning Frequency**

**Design specifications**

**Soil conditions, ground water table, flooding possibilities on the site**

**Is there a separate grey water system?**
(In order to determine whether the inflow of on-site system is wastewater from toilet alone or both including kitchen & bath?)

**TEMPLATES –**
- Survey of Small Contractors and Masons
- Technical Assessment of On-Site Systems

**Link to Dashboard –**
http://smartmuni.in/pass/app/

**QR Code to SaniTab**

**CEPT has developed a**
generic Mobile Application -”SaniTab”

To create database for Onsite sanitation system

SaniTab can be used by any ULBs

---

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Tool - Survey of small contractors and Masons

Survey of small contractors and masons is a tool to understand current construction practices of toilets and septic tank.

**a. Contractor Profile**
- Type of firms, size, scale and geography of operations, access to suppliers' credit
- Broad assessment of their capacity,
- Scale of work they can handle

**b. Awareness and Capacity**
- Knowledge and awareness about design norms, rules and regulations related to construction of toilets and septic tanks
- How do they decide the size of toilet and septic tanks? Is there a standard size of toilet or Septic tank that they construct
- Interest in training organized by ULB for standard toilet and septic tank design
- How could the local contractors help in creating awareness generation of the toilet scheme

**c. Costs and Surveys of Toilets built**
- Their assessment of costs - For standard design of toilet and septic tanks as given in SBM, how the block cost would vary for different materials i.e. Brickwork, R.C.C, sheet roof etc.
- What are the constraints, if any?

Refer Part A, Chapter 9 on On-Site sanitation in CPHEEO Manual, 2013 for designing septic tanks.

Assessment of Conveyance . . .

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

**Assess Available Infrastructure**
Capture details like - Number, type and size of septic tank emptier available

**Extent of Service**
- How many septic tanks are emptied in a year?
- How many emptying tractors are used?

**Capacity of Private Companies**
- No. of septic tank emptiers
- Cost per emptying visit
- Registers maintained by them.

**Coverage in different parts of the city**

**Monitoring and Complaint Redressal Systems**

**Cost per Emptying visit, Sanitation Tax**

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Assessment of treatment and disposal

The ULBs must not dispose septage collected from the Septic Tanks without any treatment. ULBs should first:

• Identify present location where the septage is being treated / dumped.
• Assess the possibility of septage treatment at existing STP in the city or nearby city by checking the available capacity and treatment technology.
• Assess extent and nature of reuse of treated septage.

Assessing Service Performance across the Service Chain

1. Assessment through Performance Indicators

2. Across each link in the Service Chain

3. Summary and Vision
**Summary: Identify Gaps across the Sanitation Value Chain**

- Summarize service performance across the service chain
- Develop a vision of what the city needs to achieve across each link in the service chain
- Discuss the summary and vision at a multi-stakeholder meeting

**Current Situation**

- Lack of universal access to improved toilets
- Lack of adequate data base on toilets for properties
- Septic tanks lack manhole covers
- Septic tanks are not of standard site
- No database on septic tanks for properties
- Only 4% of septic tanks cleaned annually
- No facility for faecal sludge treatment
- Septage disposed off on dumping site without treatment

**Vision: Developing vision for end to end FSSM Plan**

- Summarize service performance across the service chain
- Develop a vision of what the city needs to achieve across each link in the service chain
- Discuss the summary and vision at a multi-stakeholder meeting

**Vision for end to end FSSM Plan**

- Converting unimproved toilets to improved toilets
- Ensuring 100% access to improved toilets
- Data base on toilets for all properties
- Providing access manhole covers to allow regular cleaning
- Enforcing regulations on septic tank design
- Data base of properties with septic tanks
- Preparing a schedule for period cleaning of septic tanks, to ensure that all septic tank are cleaned at least once in 3 years
- Enforcing regulations and penalties for periodicity of septic tank cleaning and safe handling of sludge
- Payment using local taxes using escrow mechanisms
- Installing treatment facility for the treatment of septage
- Safe dumping of treated faecal matter and/or the sale of septage at a fixed rate to nearby farms or agro-businesses

Revenue from compost
Discussion points....

- In your view, which information is likely to be difficult to obtain in your state / city?

- How and in what way can we involve different type of stakeholders in FSSM assessment?

References


- Ministry of Urban Development (MoUD), (2009). "Handbook of service level benchmarking”. MoUD, GOI.

- Ministry of Urban Development (MoUD), (2017). "National Policy on Faecal Sludge and Septage Management (FSSM)”. MoUD, GOI.

Session 5: Introduction to SanBenchmark & Online platform

Current monitoring framework for WSS (MOUD, GoI)

Service Level Benchmark framework:
Basis to measure service delivery outcomes

- Performance monitoring through Service Level Benchmarks (SLB) under 13th and 14th Finance commission
- SLB under SLIP for AMRUT
- SLB put the focus on measurement of service delivery performance. Benchmarks published for each of the four sectors:
  - Water supply,
  - Waste water,
  - Solid Waste Management (SWM) and
  - Storm water
- This framework comprises of 28 SLB indicators
Are SLB indicators for Wastewater captures ground reality?

<table>
<thead>
<tr>
<th>Water supply</th>
<th>Wastewater</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coverage of water supply connections</td>
<td>Coverage of toilets</td>
</tr>
<tr>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Per capita supply of water</td>
<td>Coverage of sewage network services</td>
</tr>
<tr>
<td>133 lpcd</td>
<td>100%</td>
</tr>
<tr>
<td>Extent of metering of water connections</td>
<td>Collection efficiency of the sewage network</td>
</tr>
<tr>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Extent of Non-Revenue Water (NRW)</td>
<td>Adequacy of sewage treatment capacity</td>
</tr>
<tr>
<td>20%</td>
<td>100%</td>
</tr>
<tr>
<td>Continuity of water supply</td>
<td>Quality of sewage treatment</td>
</tr>
<tr>
<td>24 hours</td>
<td>100%</td>
</tr>
<tr>
<td>Quality of water supplied</td>
<td>Extent of reuse and recycling of sewage</td>
</tr>
<tr>
<td>100%</td>
<td>10%</td>
</tr>
<tr>
<td>Efficiency in redressal of customer complains</td>
<td>Efficiency in redressal of customer complaints</td>
</tr>
<tr>
<td>80%</td>
<td>80%</td>
</tr>
<tr>
<td>Cost recovery in water supply services</td>
<td>Extent of cost recovery in sewage management</td>
</tr>
<tr>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Efficiency in collection of water supply related charges</td>
<td>Efficiency in collection of sewage charges</td>
</tr>
<tr>
<td>90%</td>
<td>90%</td>
</tr>
</tbody>
</table>

Solid Waste Management

<table>
<thead>
<tr>
<th>Storm Water Drainage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household level coverage of solid waste management services</td>
</tr>
<tr>
<td>100%</td>
</tr>
<tr>
<td>Efficiency of collection of municipal solid waste</td>
</tr>
<tr>
<td>100%</td>
</tr>
<tr>
<td>Extent of segregation of municipal solid waste</td>
</tr>
<tr>
<td>100%</td>
</tr>
<tr>
<td>Extent of municipal solid waste recovered</td>
</tr>
<tr>
<td>80%</td>
</tr>
<tr>
<td>Extent of scientific disposal of municipal solid waste</td>
</tr>
<tr>
<td>100%</td>
</tr>
<tr>
<td>Efficiency in redressal of customer complaints</td>
</tr>
<tr>
<td>80%</td>
</tr>
<tr>
<td>Extent of cost recovery in SWM services</td>
</tr>
<tr>
<td>100%</td>
</tr>
<tr>
<td>Efficiency in collection of SWM charges</td>
</tr>
<tr>
<td>90%</td>
</tr>
</tbody>
</table>

SLB indicators only captures performance of underground sewer network

Need for San Benchmark?

Funding for FSM available under SBM, AMRUT and Smart city Programmes

No Monitoring framework available for onsite sanitation system
Indicators for Onsite sanitation systems

Onsite system – Septic tank with Settled Sewer/lined drain

1. Coverage of toilets
2. Coverage of onsite sanitation system
3a. Collection efficiency of septime
3b. Collection efficiency of effluents from septic tank and grey water
4a. Adequacy of septime treatment plant
4b. Adequacy of effluent and grey water treatment plant
5a. Quality of septime treatment plant
5b. Quality of effluent and grey water treatment plant
6a. Extent of reuse and recycling of treated Septage
6b. Extent of reuse and recycling of treated effluent and grey water

Indicators for Onsite sanitation systems

Onsite system – Septic tank with Soak pit

Toilets connected to septic tank
Septage collection through septic tank emptying service
Treatment of septage
Reuse and recycling of treated septage
Effluents from septic tank and grey water are collected and treated in soak pit

Onsite system – Double Pit toilet

Toilets
Toilet connected to double pit
Reuse as manure in Agriculture
**SAN Benchmarks: Citywide assessment of sanitation service delivery Including on-site sanitation**

### Revised Sanitation Indicators
(Sewerage system + Onsite systems)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Coverage of toilets</td>
<td>Percentage of properties with access to toilet facility in the city.</td>
</tr>
<tr>
<td>2. Coverage of adequate sanitation system</td>
<td>Percentage of households with individual toilets connected with adequate sanitation systems (sewer network/ septic tank / double pit system) to total households in the city.</td>
</tr>
<tr>
<td>3. Collection efficiency of sanitation system</td>
<td>Weighted average of collection efficiency of each sanitation system, weighted by share of households dependent on each sanitation system.</td>
</tr>
<tr>
<td>4. Adequacy of treatment capacity of Sanitation System</td>
<td>Weighted average of adequacy of treatment plant capacity available for each sanitation system, weighted by share of households dependent on each sanitation system.</td>
</tr>
<tr>
<td>5. Quality of treatment of sanitation system</td>
<td>Weighted average of quality of treatment of each sanitation system, weighted by share of households dependent on each sanitation system.</td>
</tr>
<tr>
<td>6. Extent of reuse and recycling in sanitation system</td>
<td>Weighted average of extent of reuse of treated wastewater and sludge after adequate treatment as a percentage of wastewater and sludge received at the treatment plant, weighted by share of household dependent on each sanitation system.</td>
</tr>
</tbody>
</table>
### SAN Benchmarks: Citywide assessment of sanitation service delivery
Including on-site sanitation

<table>
<thead>
<tr>
<th>Key Indicators</th>
<th>Detailed Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capture</td>
<td>Collection</td>
</tr>
<tr>
<td>1. Coverage of toilets (%)</td>
<td>2. Coverage of each sanitation system</td>
</tr>
<tr>
<td>- Coverage of households with own toilets (%)</td>
<td>- Percentage of households connected to septic tank (%)</td>
</tr>
<tr>
<td>- Percentage of functional community toilet seats (%)</td>
<td>- Percentage of households connected to septic tank as per design standards (%)</td>
</tr>
<tr>
<td>- Percentage of households connected to septic tank (%)</td>
<td>- Percentage of households connected to septic tank (at %)</td>
</tr>
<tr>
<td>- Percentage of households connected to septic pit system (%)</td>
<td>- Percentage of septic tanks connected to septic tank cleaning services (Y/N)</td>
</tr>
<tr>
<td>- Percentage of households connected to sewer network (%)</td>
<td>- User charges levied per emptying</td>
</tr>
<tr>
<td>- Percentage of illegal sewage network connections (%)</td>
<td>- Percentage of septic tanks connected to septic pit for effluent disposal (%)</td>
</tr>
<tr>
<td>- Percentage of identified illegal sewage network connections (%)</td>
<td>- Collection efficiency of effluent (from septic tank) and grey water (%)</td>
</tr>
<tr>
<td>- Percentage of area covered with sewer network (%)</td>
<td>- Coverage of sewage network [open or covered] (%)</td>
</tr>
</tbody>
</table>

Indicator definition, formula and rationale have been developed...

### SAN Benchmarks – Monitoring and Evaluation framework

- National policy on faecal sludge and septage management (FSSM) has adopted SAN Benchmarks for monitoring performance of citywide sanitation
- As per FSSM, State Government will be responsible for Monitoring and Evaluation of its Cities’ performance, and hence needs to devise data collection and reporting systems using indicator framework developed for Sanitation Benchmark.
- ULBs in turn need to develop database, registry of certified on-site sanitation system, robust reporting format to track compliance of households (establishments, etc.) with outcomes and process standards.

Source: National policy on faecal sludge and septage management, page no 26
Started with 2 states, 416 Cities
68 Million population

Now 6 states,
more than 900 cities
96.5 Million population

Annual service delivery profile for 400+ cities in Gujarat and Maharashtra for 8 years

Online Performance Assessment System

- Performance measurement framework (PMF) has been developed for state-wide implementation of the benchmarking of water and sanitation with a focus on a ‘real’ developing country context.

- It is align with the Government of India’s initiative Service Level Benchmarks (SLB).

- In addition to SLB indicators, it also includes aspect of equity and SAN-Benchmarks to capture the ground realities in Indian cities.

- Online tool is also used by cities of Chhattisgarh, Assam, Jharkhand and Telangana for publication of service level benchmarks.
SLB Framework has been implemented by PAS Project, CEPT University and is being used since last 8 years, for:
- 13th FC
- 14th FC
- SBM
- AMRUT
- Smart city mission

Handholding support to State for training and data entry

SAN Benchmarks: State Level Sanitation Assessment

- Maharashtra has 259 urban local bodies (ULBs) of various sizes ranging from 3000 to 3.5 million population (excluding greater Mumbai)
- Only 34 ULBs has partial underground sewer network and 22 ULBs has sewage treatment plant

Revised indicators show better performance for coverage of adequate sanitation system and collection efficiency.
Adequacy decreases as only a few cities treat septage and grey water
None of the city reuses treated septage

Note: State level values are calculated using weighted average, above chart excludes Greater Mumbai, Akola, Aurangabad and Miralhaoyatar ULBs values.
**SAN Benchmarks: State Level Sanitation Assessment**

- Chhattisgarh has 43 urban local bodies (ULBs) of various sizes ranging from 11,000 to 1.2 million population
- Only 2 ULBs has partial underground sewer network and only 1 ULBs (Bilaspur) has sewerage treatment plant

Revised indicators show **better performance for coverage of adequate sanitation system and collection efficiency**.

- Adequacy increases because it captures treatment of **grey water through septic tank connected to soak pit**
- None of the city treat septage

*Note: State level values are calculated using weighted average*

---

**SAN Benchmarks: City Level Sanitation Assessment**

**Nagpur:**
- 82% of properties are connected to sewer network. 13% have septic tanks with soak pits.
- WW generated: 276 MLD
- STP capacity: 100 MLD
- 12% of septic tanks are cleaned annually and treated in existing STP
- Quality tests are not carried out for sludge treatment

**Kalyan Dombivli:**
- 19% of properties are connected to sewer network. 78% have septic tanks with soak pits.
- WW generated: 370 MLD
- STP capacity: 123 MLD
- 8% of septic tanks are cleaned annually and treated in existing STP
- Quality tests are not carried out for sludge treatment
- 30 MLD treated sewage is reused
SAN Benchmarks: City Level Sanitation Assessment

- Sinnar:
  - 45% of households are connected to septic tanks with lined drains and 14% connected to septic tank with soak pit
  - WW generated: 5 MLD
  - 6% of septic tanks are cleaned annually and discharged on land without treatment
  - SLB indicators show zero value for all indicators. Proposed sanitation indicators show performance of coverage, collection efficiency and adequacy of treatment (effluent treatment through soak pits).
  - Implementation of faecal sludge management plan is not reflected in old SLB indicators. Whereas proposed sanitation indicators framework shows improvements in sanitation service.

Session 6: Planning and Technology selection for FSSM
Objective of the Session

- In designing a citywide IFSM service, it is important to **plan** and **assess technology options** for each link in the **service chain**. This ranges from **appropriate toilets** and **onsite systems** such as septic tanks to **conveyance** as well as **treatment** and reuse.

- The session will give brief overview on how to plan FSSM services in a city.

- The session will also provide guidance on various parameters that need to be considered to select **appropriate technology** based on local conditions.

FSSM Planning objectives . . .

- Convert insanitary toilet systems (eg: single pit) to sanitary toilets
- Refurbish existing septic tank to avoid leakage
- New systems as per standard design
- Safe emptying and transport of faecal sludge to avoid environmental and health hazard
- Proper treatment and reuse of faecal sludge and septage
Planning and Technology selection for FSSM

- Planning and technology option for onsite systems
  - Demand based desludging
- Planning and technology selection for emptying and conveyance
  - Scheduled desludging
- Planning and technology option for treatment and reuse
  - Factors affecting identification of new Septage treatment site
  - Factors for selecting Septage treatment technology
Technology option for onsite systems (1/3)

Applicability: Water use 25-50 lpcd
Soil characteristic: Highly permeable soil
O&M Requirement: 1. Desludging, once pit is full
2. The undigested and unutilized sludge must be treated and disposed of safely.
Limitation and risk: 1. Manual desludging of excreta and its indiscriminate disposal
2. Not applicable if the bottom of the pit is < 2 m above the groundwater table
3. Problems arise when water use increases
4. Not designed to cater for surface water
Linked technologies: Pit emptying and faecal sludge treatment

TWIN PITS TOILETS

Technology option for onsite systems (2/3)

Applicability: 1. Where there is no sewerage network.
2. Appropriate in peri-urban settlements as they do not require any centralized infrastructure.
Soil characteristic: 1. Must be suitable for infiltration of effluent
2. Micro wetland can help through increased evaporation-transpiration losses and moisture intake
O&M Requirement: Septic tank must be removed and transported off-site for treatment prior to disposal.
Limitation and risk: 1. High cost and space requirements for the soak away or drain field
2. Common practice is to discharge effluent directly into an open drain as leaching system is often not constructed
3. Retention time is insufficient if Septic tank receives too much wastewater
4. Commonly the household bypasses the soak away and connects the overflow directly to a surface water drain
5. Performance monitoring of septic tanks is rarely undertaken
6. Regulation to control private desludging operators is problematic
Linked technologies: Periodic emptying

TOILET WITH SEPTIC TANKS
Technology option for onsite systems (3/3)

Bio-Digester toilets

Bio-toilet

Source: Guidelines for Swachh Bharat Mission – Urban (2017), Ministry of Housing and Urban Affairs (MoHUA), Government of India (GoI)

Planning and Technology selection for FSSM

Planning and technology option for onsite systems

Planning and technology selection for emptying and conveyance

Planning and technology option for treatment and reuse

Planning and technology selection for septage treatment and reuse

Factors affecting identification of new sewage treatment stations

Factors for selecting septage treatment technology

Demand based desludging

Scheduled desludging
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


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.
Technology options for emptying and conveyance

Conventional Vacuum Tanker
For septic tanks which have proper access roads, a larger vehicle may be used

Mini-Vacuum Tanker (Vacutug)
For septic tanks located in narrow lanes or those that do not have proper access roads, smaller vehicles may be used

Gulper
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.

Parameters for assessing conveyance options

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
Parameters for assessing conveyance options

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Mini Vacuum Truck (Vacutug)</th>
<th>Conventional Vacuum truck</th>
<th>Gulper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance of treatment plant from emptying point</td>
<td>Small-Haul distance</td>
<td>Long-Haul distance</td>
<td>No means of disposing the sludge off site</td>
</tr>
<tr>
<td>Road width</td>
<td>To be used where road widths are narrower</td>
<td>To be used where road widths are broader</td>
<td>Can be used in narrower road widths</td>
</tr>
<tr>
<td>Access to site</td>
<td>To be used where site access is difficult for large vehicles</td>
<td>To be used where site access is easy for large vehicles</td>
<td>Can access most locations</td>
</tr>
<tr>
<td>Type of onsite sanitation system (septic tanks/ pits) and characteristics of septage</td>
<td>Difficulty emptying high viscosity sludge</td>
<td>Can handle high viscosity sludge</td>
<td>Hand pumps can be used for liquid and, to a certain degree, viscous sludge</td>
</tr>
<tr>
<td>Size of septic tanks/pits</td>
<td>Applicable for Smaller volume (900-3100 litres)</td>
<td>Applicable for Larger size (5000-9000 litres)</td>
<td>Cannot empty entire pit (if pit is deep); Slow emptying times</td>
</tr>
<tr>
<td>Traffic congestion</td>
<td>To be used in areas with high traffic congestion</td>
<td>Difficulty in moving in areas with high traffic congestion</td>
<td>Not affected by traffic congestion</td>
</tr>
<tr>
<td>Fuel requirement and its implication in opex</td>
<td>Requires less fuel; low opex</td>
<td>Requires more fuel; high opex</td>
<td>No fuel requirement; very low Opex</td>
</tr>
<tr>
<td>Financial budget of emptying services</td>
<td>Not financially viable for long-haul transport</td>
<td>Proves to be financially viable for long-haul transport</td>
<td>Not financially viable for large septic tanks/pit size and for long-haul transport</td>
</tr>
</tbody>
</table>

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.

Use of safety gears by a sanitation worker
Demand v/s Scheduled Emptying

**On-Demand Basis**

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.

The ULB operates the trucks (either owned or borrowed) when the demand arises.

Households generally pay a certain amount once in >8-10 years to get tanks cleaned during the time of overflow.

**Scheduled Practice**

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.

Each town will require an additional number of trucks to meet service standards (which can be operated by a private player).

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
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.

Divide the city into zones and prepare a yearly plan

2-3 nos of trucks of 5000 litre capacity are required for cleaning HHs and non-residential septic tanks.

<table>
<thead>
<tr>
<th>Year</th>
<th>Zones</th>
<th>No. of septic tanks to be cleaned annually</th>
<th>No. of Days required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>Zone 1</td>
<td>1589</td>
<td>201</td>
</tr>
<tr>
<td>Zone 2</td>
<td>947</td>
<td>101</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2536</td>
<td>302</td>
<td></td>
</tr>
<tr>
<td>Year 2</td>
<td>Zone 1</td>
<td>1262</td>
<td>135</td>
</tr>
<tr>
<td>Zone 3</td>
<td>1598</td>
<td>130</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2844</td>
<td>303</td>
<td></td>
</tr>
<tr>
<td>Year 3</td>
<td>Zone 3</td>
<td>2762</td>
<td>294</td>
</tr>
<tr>
<td>Total</td>
<td>2762</td>
<td>294</td>
<td></td>
</tr>
</tbody>
</table>

Regulating emptying services...

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.

Sample licensing format

Source: Operation guidelines for septage management for urban and rural local bodies in Tamil Nadu (2014)
Design Emptying and transport plan

Awareness for regular emptying

- Determine emptying frequency
- Determine number of septic tanks/pit to be emptied per day
- Volume of septage to be collected per day
- Type and size of emptying vehicle based on local conditions
- Number of emptying trucks required
- Implementation and Monitoring of emptying services

Proper Regulations for regular emptying

Planning and Technology selection for FSSM

Planning and technology option for collection systems

Planning and technology option for emptying and conveyance

Planning and technology option for treatment and reuse

Factors affecting identification of new septage treatment site

Factors for selecting septage treatment technology

Demand based, scheduled
Septage quality results of cities...

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Parameter</th>
<th>Unit</th>
<th>Wai Household Septage</th>
<th>Wai Community Public toilet septage</th>
<th>Sinnar Household Septage</th>
<th>Sinnar Community Public toilet septage</th>
<th>Test results</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>BOD5 at 20°C</td>
<td>mg/l</td>
<td>6009 - 16500</td>
<td>228 - 5400</td>
<td>336 - 39000</td>
<td>346 - 2533</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>COD</td>
<td>mg/L</td>
<td>11408 - 27776</td>
<td>395.2 - 9523</td>
<td>1000 - 88000</td>
<td>920 - 7200</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Total Solids by volume</td>
<td>%</td>
<td>0.992 - 8.97</td>
<td>0.071 - 1.36</td>
<td>0.42 - 7.74</td>
<td>0.43 - 1.06</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Total Nitrogen (as N), by volume</td>
<td>%</td>
<td>0.044 - 0.019</td>
<td>0.012 - 0.057</td>
<td>0.02 - 0.16</td>
<td>0.06 - 0.11</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Phosphorus (as P), by volume</td>
<td>%</td>
<td>0.004 - 0.009</td>
<td>0.003 - 0.007</td>
<td>0.0002</td>
<td>0.0002</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Potassium (as K) by volume</td>
<td>%</td>
<td>0.004 - 0.014</td>
<td>0.005 - 0.015</td>
<td>0.006 - 0.027</td>
<td>0.017 - 0.029</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Gross Calorific Value, on dry basis</td>
<td>cal/g</td>
<td>4148</td>
<td>*</td>
<td>3226 - 4817</td>
<td>1281 - 2732</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Fecal Coliforms</td>
<td>/100ml</td>
<td>&gt;1600</td>
<td>&gt;1600</td>
<td>22 - 920</td>
<td>32 - 170</td>
<td></td>
</tr>
</tbody>
</table>

Note: * Not analyzed due to insufficient quantity of sample

- **BOD and Total Solids are affected by emptying frequency**
  - The more frequently the septic tank is emptied: Less is the BOD and Total solids and vice versa
- **The emptying frequency is also dependent on type of housing.**
  - Flats are emptied more frequently as compared to bungalows / row houses

Septage Quality differs City to City...

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
Identify new Septage treatment site...

i. Distance of treatment site
   - Long distance: costly
   - A site that is too far away implies fewer trips per day, less revenue and more fuel costs to private operators.

ii. Land availability
   - Government land availability
   - ULB should also explore the possibility of developing septage treatment facility at solid waste dumping or treatment site.

iii. Reliability of electricity
   - If treatment technology has mechanical operated parts.

iv. Neighborhood
   - A treatment site may generate nuisance, especially bad odors.
   - It should be located at an appropriate distance from the residential areas.

v. Geological Parameters
   - Groundwater table
   - Type of soil
   - Prone to flooding


Identify and compare treatment Technology based on following factors...

- Technical performance of treatment option:
  - Technology providing required quality output,
  - Popularity in local context, advantages and disadvantages,
  - Requirement of pre-treatment or post treatment,
  - Level of difficulty in handling or discharging endproduct generated, etc.

- Site condition: Permeability, groundwater table, soil type etc

- Capital and operating cost

- Simplicity in Construction & Operation

- Level of mechanization required for its operation

- Efficiency of energy recovery
Various Septage treatment options are available...

Based on literature reviews and international case studies...

Case studies showing combination of these technologies...
Proposed Wai FSTP

<table>
<thead>
<tr>
<th>Population</th>
<th>~40,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant capacity</td>
<td>70 m³/day</td>
</tr>
<tr>
<td>Area</td>
<td>1000 Sqm</td>
</tr>
<tr>
<td>Commission year</td>
<td>Under construction</td>
</tr>
<tr>
<td>Operated by</td>
<td>Private sector</td>
</tr>
</tbody>
</table>

Proposed Sinnar FSTP

<table>
<thead>
<tr>
<th>Population</th>
<th>~75,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant capacity</td>
<td>70 m³/day</td>
</tr>
<tr>
<td>Area</td>
<td>650 Sqmt</td>
</tr>
<tr>
<td>Commission year</td>
<td>Under Construction</td>
</tr>
<tr>
<td>Operated by</td>
<td>Private sector</td>
</tr>
</tbody>
</table>
**Devanahalli, Karnataka**

- **Population**: 28,051
- **Plant capacity**: 6 m³/day
- **Area**: 625 Sq. mt
- **Construction cost**: 70 lakhs
- **O&M cost**: 3.4 lakhs/annum
- **Commission year**: Nov 2015
- **Operated by**: Private sector

**Stakeholder and Responsibilities**

At present the FSTP is being maintained by the CDD society. They have a contract to design, construct and train the operator for an year. The faecal sludge is transported through trucks owned by the TMC Devanahalli.

**Khulna, Bangladesh**

- **Population**: 15 lakhs
- **Plant capacity**: 180 m³/day
- **Area**: 6000 Sq. mt
- **Construction cost**: $2,00,000
- **O&M cost**: $3000/annum
- **Commission year**: Not started
- **Operated by**: ULB

**Process Description:**

- In the first process the waste is emptied from tankers in sand drying beds.
- The permeate of the sand drying beds is then sent to the constructed wetland. The sludge from the sand drying beds is sent for composting.
- From the constructed wetland the clean permeate is discharged.
- After the constructed wetland is filled with sludge, the sludge would be removed and sent for composting/further treatment or direct application.
- In the second process, the tankers are emptied into planted drying beds. The process is similar to the first process wherein the permeate is sent to the same constructed wetlands as the first process.
- The sludge from the planted drying beds here is used directly as fertilizer.
Other septage treatment plants . . . (2/2)

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:

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

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
Discussion points....

- Idea of Scheduled v/s demand based emptying? Which is feasible in your state / city context

- Is Co-treatment of sludge/septage in STP an option in your state/city?

- Is there a market for treated sludge in your state/city

References

- Ministry of Urban Development (MoUD), (2013), “Advisory note on septage management in urban India”. MoUD, GOI.
- Ministry of Urban Development (MoUD), (2017), “National Policy on Faecal Sludge and Septage Management (FSSM)”. MoUD, GOI.
### Prepare FSSM plan for a city

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

<table>
<thead>
<tr>
<th>Sr.No</th>
<th>Description</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Input details</strong></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Population</td>
<td>65251</td>
</tr>
<tr>
<td>B</td>
<td>Total households (HHs)</td>
<td>13112</td>
</tr>
<tr>
<td>C</td>
<td>HHs having toilets with septic tanks</td>
<td>9901</td>
</tr>
<tr>
<td>D</td>
<td>No. of community/ public toilets having septic tanks</td>
<td>21</td>
</tr>
<tr>
<td>E</td>
<td>Average volume of household and community toilet septic tanks (cum)</td>
<td>5</td>
</tr>
<tr>
<td>F</td>
<td>Septic tank cleaning cycle for HHs (Years)</td>
<td>3</td>
</tr>
<tr>
<td>G</td>
<td>Septic tank cleaning cycle for CT/PT (Days)</td>
<td>7</td>
</tr>
<tr>
<td>H</td>
<td>No. of working days in an year</td>
<td>300</td>
</tr>
<tr>
<td>I</td>
<td>No. of trips possible per emptying vehicle per day (trip/day/vehicle)</td>
<td>4</td>
</tr>
</tbody>
</table>
Key Outputs . . .

- **Number of tanks to be emptied daily** = _______ daily
  - HHs toilets connected to septic tank / cleaning cycle for HHs = _____ annually
  - HHs toilets to be cleaned daily = annual cleaning / number of working days = _______ daily
  - CTs connected to septic tank / cleaning cycle for CTs = _____ daily

- **Number of trucks required** = _____ nos
  - Number of tanks to be emptied daily / Number of trips per day = _____ nos

- **Volume of septage to be treated** = _____ cum/day
  - Average volume of HHs and CTs septic tanks x Number trips per day = ___ cum/day

---

Session 7: Financing FSSM
Objective of the Session

- This session will highlight that to ensure financial sustainability of FSM services, it is important to assess capacity for financing of both capital and O&M expenditure over the plan period.

- The session will give brief overview on how to assess financial requirements for both capital and O&M expenditures for implementation of FSSM in a city.

- The session will also provides guidance on potential sources of finance for meeting these expenditures including through external grants, private sector investments, user contributions, external debt or through local government internal resources.

Financial Requirements for FSSM

Assessment of Financing requirement across FSM service chain

- The first step in Financial Assessment is to determine the financing requirements for proposals for the full service chain – starting with toilets in the user interface, to collection, conveyance and treatment or disposal.

- The finance requirements are essentially based on costs of achieving the various improvement activities planned.

- It is also important to ensure that both capital costs and O&M costs are assessed.
**Potential sources of Financing**

- For developing a financing plan for FSM, potential sources of funds for capital expenditures will be required and terms and conditions for each will need to be identified.

- The potential sources for capital expenditures may include grants from national/provincial government; own resources of local government, CSR funds from corporate sector or loan from financial institutions.

- In case of private sector participation, the willingness of private players to meet capital expenditure will also need to be assessed.

- Similarly, background assessment of various ongoing programmes at the state and national levels will provide an idea of the possibility of accessing such funds to meet the capital expenditure requirements.

- The potential sources for operating expenditure may include local government own fund, levy of user charge or tax, sale of treated sludge to end users.

---

### Identify potential sources of Financing

<table>
<thead>
<tr>
<th>Access</th>
<th>Conveyance</th>
<th>Treatment/Disposition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CAPEX</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New toilets and Refurbishment of septic tanks</td>
<td>Suction Emptier Trucks</td>
<td>Treatment Facility: Land and construction cost</td>
</tr>
<tr>
<td>Households</td>
<td>Central/State Grants</td>
<td>Central/State Grants, VGF</td>
</tr>
<tr>
<td>Government Subsidy</td>
<td>Local Govt. funds</td>
<td>Local Govt. funds</td>
</tr>
<tr>
<td>CSR fund, Crowdfunding, Credit</td>
<td>Private Sector/PPP</td>
<td>Municipal Bonds/Public Finance</td>
</tr>
</tbody>
</table>

| **OPEX** | | |
| Repair of toilets and septic tanks | Operation of Emptier trucks: Fuel cost, salaries of truck driver, etc | Operation of Treatment Facility: Salary, electricity, pumps replacement, etc |
| Households, Housing society fees | Sanitation Tax/Other Taxes | Sanitation Tax/Other Taxes |
| | User Charges (Emptying fees) | Sale of Compost |
**Assess sources for CAPEX....**

- Current Government Programmes and funds availability
  (eg: SBM, AMRUT, 14th FC)

- Own funds of Urban Local Body for capital financing

- Willingness of Private sector to invest

- Innovative financing
  Eg: CSR, Crowdfunding, loans

---

**CAPEX: Emptying & Conveyance**

**A. Potential sources of finance for Capital Expenditure**

<table>
<thead>
<tr>
<th>Source/Service</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suction Emptier Trucks</td>
<td>Central/state Grants/ Local Government Funds</td>
</tr>
<tr>
<td>Demand based FSM Services</td>
<td>Several states have earmarked funds/ grants for procurement of vacuum trucks for urban local governments.</td>
</tr>
<tr>
<td>Scheduled FSM Services</td>
<td>Private sector is already investing as per demand</td>
</tr>
<tr>
<td>Private sector</td>
<td>Private sector is generally willing to bring investment for vacuum trucks</td>
</tr>
</tbody>
</table>
CAPEX: Treatment system

A. Potential sources of finance for Capital Expenditure

<table>
<thead>
<tr>
<th>FSSTP</th>
<th>Demand based FSM Services</th>
<th>Scheduled FSM Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central/state Grants</td>
<td>Size of treatment units is relatively small. Large cities may mobilize from own funds. Small cities may mobilize from 14th FC funds/AMRUT.</td>
<td>- Large cities may use ongoing national level programmes. - Small cities may require small size of grant from state programme or mobilize from 14th FC funds.</td>
</tr>
<tr>
<td>Local governments</td>
<td></td>
<td>Private sector is willing with VGF.</td>
</tr>
<tr>
<td>Private/VGF</td>
<td></td>
<td>CSR, Social Impact Investor, Donor funding etc.</td>
</tr>
<tr>
<td>Innovative Finance</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Identify Existing Revenue sources

To make FSM activities sustainable, assessing the revenue sources is very important

- Local government become financially sustainable by levying taxes and/or user charges so as to recover O&M costs of recent urban development programmes.
- It is therefore imperative that any proposed investment plan includes ways to recover O&M costs.
- Besides meeting operating expenses, the ULB is required to keep sufficient surplus to meet repayment obligations in addition to its committed capital expenses.

Assessment of current tariffs levels across FSM service chain

Provision of Sanitation Tax/ user charge/ fee

<table>
<thead>
<tr>
<th>State</th>
<th>Sanitation Tax</th>
<th>User charge/ fees/ cess</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gujarat</td>
<td>General sanitation tax upon private latrines, premises or compounds cleansed by municipal agency</td>
<td></td>
</tr>
<tr>
<td>Maharashtra</td>
<td>Special sanitary tax upon private latrines, premises or compounds cleansed by municipal agency</td>
<td></td>
</tr>
<tr>
<td>West Bengal</td>
<td>-</td>
<td>a fee with regard to a scavenging</td>
</tr>
<tr>
<td>Uttar Pradesh/ Uttarakhand</td>
<td>a conservancy tax in areas in which the Corporation undertakes the collection, removal and disposal of excrementitious and polluted matter from privies, urinals and cesspools</td>
<td></td>
</tr>
<tr>
<td>Punjab</td>
<td>Scavenging tax as percentage of annual value</td>
<td>Sewerage Cess</td>
</tr>
<tr>
<td>Haryana</td>
<td>-</td>
<td>a fee with regard to a scavenging</td>
</tr>
<tr>
<td>Rajasthan</td>
<td>-</td>
<td>User charge for provision of drainage and sewerage</td>
</tr>
</tbody>
</table>

Per capita Property Tax

Source: Municipal finances and service delivery in India (2014), ASCI
Assess HHs willingness to pay & reuse market

**HHs willingness to pay**
- Assess how much the people are willing to pay for regular or demand based emptying service
- Assess willingness of the local government to levy sanitation charges/taxes

**Landscape assessment of reuse market**
- Identify nearby industries or agriculture land
- Assess their willingness to reuse the treated septage and water
- Assess how much they are willing to pay to buy treated septage and water

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.

![Flow Diagram](image-url)
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.

Discussion points

- What are key issues in financing FSSM?
- Emptying charge or Sanitation tax?
- Potential Sources for CAPEX and OPEX in your state?
  - Emptier trucks
  - Treatment plant
References


Group Exercise
### Tariff requirement to recover O&M cost

#### Step 1: O&M cost for schedule septic tank emptying service

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Formula</th>
<th>Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fuel cost for schedule emptying service = (Number of septic tank to be emptied daily * 300 * Average distance * 2 * Fuel price / Fuel efficiency)</td>
<td>- Assume Fuel efficiency for truck = 5 km per liter</td>
<td>Fuel cost calculation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Assume Fuel price = Rs 70 per liter</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Repair and maintenance cost = (Number of suction emptier truck requirement * 12 * 2,000)</td>
<td>- Assume average repair &amp; maintenance cost = Rs 2,000 per month</td>
<td>Repair cost calculation</td>
</tr>
<tr>
<td>3</td>
<td>Establishment expenses = ((Number of suction emptier truck requirement * 12 * No of manpower * Monthly Salary)</td>
<td>- Assume, 2 manpower requirement per truck</td>
<td>Establishment expenses calculation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Assume, Salary = Rs 10,000 per month</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Sub-total = (1+2+3)</td>
<td></td>
<td>Sub-total calculation</td>
</tr>
<tr>
<td>5</td>
<td>Overhead + Insurance + other Miscellaneous cost = Sub-total(4) * X%</td>
<td>- Assume, other cost as X% of sub-total (4)</td>
<td>Overhead calculation</td>
</tr>
<tr>
<td>6-A</td>
<td>Total O&amp;M cost for schedule septic emptying service = (4+5)</td>
<td></td>
<td>Total cost calculation</td>
</tr>
</tbody>
</table>

#### Step 2: O&M cost for septage treatment facility

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

A. **Annual O&M Cost** = 6-A + 6-B =

B. **Per property tariff requirement for septage management** =
   = (Annual O&M cost (A)/ total properties) * collection efficiency

- Considering tax collection efficiency = 70%
- Note: Users may calculate differential tariff structure across property uses; properties with toilet facility v/s properties dependent on community toilet etc.

---

Session 8: SaniPlan
Saniplan

Decision support excel based tool for planning citywide sanitation

Key Features:
- Multi-year planning framework
- Menu of improvement actions
- Integrate Project and Municipal Financial Planning
  - Capex and Opex
- Inbuilt scenario comparison
- Public health impact

Conventional Approach versus SaniPlan approach

**Conventional Approach**

- Focus on achieving **OUTPUTS**
- Starting point is an assessment of available grant funding - **SUPPLY DRIVEN**
- Focus on developing **INDIVIDUAL PROJECTS** of various sectors

**SANIPLAN Approach**

- Focus on achieving **OUTCOMES**
- Starting point is measurement of current performance and local priorities - **NEED DRIVEN**
- Focus on developing integrated **SECTORAL SOLUTIONS**
SaniPlan framework

Baseline Info → Performance Assessment → Action Planning → Financial Planning → Comparison

Iterative

Baseline Information across sanitation value chain

What if there is no baseline sanitation information available at household level

"SaniTab": Android based application for Creating Database for Onsite Sanitation System

Key Features:
- Citywide digital data collection tool
- Spatial analysis
- "Real time" monitoring of survey activity
- Survey at scale
Baseline Info

- **Access**: 7580 HHs, 5145 Toilets, 4425 Septic tanks
- **Conveyance**: 4 MLD??
- **Treatment**: 3/4th HHs - own toilets, 1/4th - community toilets or OD
- **Disposal**: 85% toilets connected to septic tanks

- Increased health risk
- Only 2% of septic tanks are empty
- Effluent discharged directly in open drains to water bodies...
- Environmental and Health hazards
- No treatment Facility - Dumped in SWM dumping site

Performance Assessment

**Key Performance Indicators - comparison against peer groups**

- Coverage of toilets: 58%
- Coverage of HHs with adequate sanitation system: 5%
- Efficiency of collection system: 5%
- Adequacy of treatment capacity: 0%
- Extent of reuse: 0%

- Quality of treatment: 0%
- Efficiency in redressal of customer complaints: 70%
- Collection of taxes and charges: 0%
- Cost recovery: 0%

**Peer comparison with other cities**

**Local Action Indicators - indicated through graphs**

- Households with adequate sanitation system

- City
- Slum

- Severed sanitation
- On-site sanitation
- Unsafe sanitation
- Unserved HHs
### Integrated Financial Planning

**Matching financial requirements with available funds in an iterative manner**

- **Baseline Info**
  - Assess aggregate funding demand from all improvement actions

- **Performance Assessment**
  - Financial implications of each improvement action
    - Capital expenditure
    - Revenue generation
    - Operating and maintenance expenditure
    - Effect of inflation based on phasing

- **Action Planning**
  - Aligning both these financial streams to evolve sustainable financing plan

- **Financial Planning**
  - External sources of funds
    - Exploring funding patterns possible for each improvement action
  - Internal sources of funds
    - Exploring options to increase revenue from own income sources

- **Assess financial health and extent of revenue surplus available**

- **Municipal finances of urban local bodies**
  - Past trends of municipal finances
  - Forecasting for finances for business as usual scenario
In Indian context - SaniPlan can assist in developing SLIPs for AMRUT

**SLIP (Service level improvement plans)**
- Assess the service level gap
- Examine alternatives
- Estimate the cost (both capital and O&M)
- Prioritize based on local demands
- Financing: Investment requirements, revenue improvements and resource mobilization

**SaniPlan**
- In SaniPlan, SLBs are used to assess gaps
- Various action areas available for use, each action shows impact on service levels
- Model computes Capital and O & M cost for 10 years
- Enables decision makers to evaluate options and identify proposals
- It is the only available model that links infrastructure decisions to finance and helps evaluate various financing plan options

**Session 9 : Private Sector Participation in FSSM services**
Objective of the session

- Understanding ULB needs, interest and concerns for PSP
- Understanding the role of the contractor in providing sanitation services in small towns/cities, and how to effectively manage their participation
- Planning and implementing engagements with the private sector right from assessing potential players to contracting of project and monitoring
- Learning about key challenges encountered before, during and after awarding the contract

Source: PSP toolkit for FSSM, CEPT University

Need for exploring PSP

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.
Typical challenges and opportunities for PSP across sanitation chain

<table>
<thead>
<tr>
<th>Access</th>
<th>Collection</th>
<th>Conveyance</th>
<th>Treatment</th>
<th>Disposal/ Reuse</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Improper onsite systems</td>
<td>Inadequate suction trucks, manpower</td>
<td>No treatment facility</td>
<td>Unsafe disposal</td>
</tr>
<tr>
<td></td>
<td>• Onsite systems lack access manhole covers and are not of standard size</td>
<td>• Very few onsite systems cleaned annually</td>
<td>• No facility for faecal sludge treatment</td>
<td>• Septage disposed in the open without treatment</td>
</tr>
<tr>
<td>1</td>
<td>Regular emptying of onsite systems to ensure that 1/3 of the onsite systems in the town/city are cleaned every year as per GOI guidelines</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Regular refurbishment of the onsite systems which includes providing access manhole covers to allow regular emptying, and repair of onsite system (if needed)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Construction of Septage Treatment Facility (STFs) for the treatment of faecal sludge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Regular reuse / disposal of treated sludge and cleaning of STF</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

Aspects to be assessed while engaging private sector

- Enabling environment for PSP
- Potential Contract structures
- Prior experience with PSP
- Landscape analysis of private sector players

Aspects
Enabling environment for PSP

- a. Legal and political environment
- b. Key processes involved
- c. Procurement process

Favourability toward PSP from a legal and political standpoint
Existing drivers that can propel a potential PSP
Feasibility and ease of engaging with contractors

Tool: Checklist for assessing enabling environment for PSP

Understand the key processes involved in implementing private engagements

Note: Functions highlighted over the dotted line are done by both the stakeholders. *If tender value is over INR 1 million, e-tendering is required*
Source: Interviews with Wai city officials, City contract documents
Understand the procurement process . . .

Procurement process

Draft contract and place a request for proposals
- officials hold initial discussions with potential private players to understand their requirements
- Chief officers (CO) approves tender drafted by the Sanitary Inspector (SI)
- Bids are then solicited in local newspaper

Receive bids from private players
- Private players submit their bids including:
  - Business license and registration
  - Employee Provident fund details
  - Tax records
  - Previous work experience
  - Pricing quote

Evaluate bids and sanction work order
- Received bids are evaluated by the council and negotiated by the officers
- Contractors meeting the minimum specified criteria and offering the lowest bid are issued a Work order

Key Gaps

- Focus on lowest cost: Service quality or level is not the main award criteria. Current requirements include the most basic legal requirements, which are met by most bidders. As a result, contracts are awarded to the lowest bidder resulting in lack of focus on service levels. Even when service levels are found to be higher, bids must be negotiated down to the lowest level offered by other players.

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

Prior experience with PSP engagement . . .

- Has the ULB engaged the private sector for FSSM or in other sectors previously?
- What has been the ULB’s experience and satisfaction in such engagements?
- What was the structure of the contracts?
- What were the risk mitigations terms in the contracts?

Output
A list of do’s and don’ts for future engagements with the private sector

Tool: Interview guide for Local government to assess capacity for PSP
Assess the existing contracts which the LG has taken up . . .

<table>
<thead>
<tr>
<th>Sector</th>
<th>Type of the contract</th>
<th>LG responsibilities</th>
<th>Contractor responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>🚚</td>
<td>Management contract for door collection of waste and cleaning of drains</td>
<td>Fixed monthly payment made to the contractor</td>
<td>Door to door collection of waste and cleaning to drains</td>
</tr>
<tr>
<td>🌍</td>
<td>Management contract for the O&amp;M of vermi-compost treatment plant</td>
<td>Monthly payment made to contractor for operation and maintenance of compost plant constructed by the LG</td>
<td>Provision of labor, equipment and utilities for the plant</td>
</tr>
<tr>
<td>🚅</td>
<td>Management contract for the O&amp;M of community toilets</td>
<td>Monthly payment made to contractor</td>
<td>Provision of labor required</td>
</tr>
<tr>
<td>🧼</td>
<td>Management contract for cleaning of pre-monsoon drain cleaning</td>
<td>Fixed monthly payment made to contractor</td>
<td>Provision of equipment required to undertake cleaning</td>
</tr>
</tbody>
</table>

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

Understand the Overall satisfaction of the officials related to provision of private sector services

- **Risk mitigation**
  
  “Our experience with these contracts has been quite good. The LG has not received any complaints so far. It is a relief for our staff.”
  
  - A city Engineer

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

Source: Interviews with Wai city officials
Understand the contractual engagements that the municipality has entered into with the private sector

**Contract to be assessed on the following parameters**

<table>
<thead>
<tr>
<th>Features</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contract length</strong></td>
<td>3 years</td>
<td>3 years</td>
<td>3 years</td>
<td>Annual</td>
</tr>
<tr>
<td><strong>Renewal</strong></td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td><strong>Tender type</strong></td>
<td>Open bid</td>
<td>Open bid</td>
<td>Open bid</td>
<td>Open bid</td>
</tr>
<tr>
<td><strong>Payment duration</strong></td>
<td>Monthly</td>
<td>Monthly</td>
<td>Monthly</td>
<td>Monthly</td>
</tr>
<tr>
<td><strong>Item rate or lump sum/flat fee</strong></td>
<td>Fixed fee</td>
<td>Fixed fee</td>
<td>Fixed fee</td>
<td>Item rate</td>
</tr>
<tr>
<td><strong>Rate per unit (INR)</strong></td>
<td>1,90,000 per month</td>
<td>221,000 per month</td>
<td>1,55,000 per month</td>
<td>1500-2000 per truck trip, <em>&lt;50/month</em></td>
</tr>
<tr>
<td><strong>Penalty clause for non-performance</strong></td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td><strong>Number of bids received last year</strong></td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

**Key features**

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

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

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

---

Understand the Current contracts in terms clauses for dispute resolution and termination risk and whether they mitigate key risks faced by the private player

**Priority contract clauses for effective engagements**

<table>
<thead>
<tr>
<th>Features</th>
<th>Door-to-door waste collection</th>
<th>O&amp;M of vermi-compost plant</th>
<th>Cleaning of community + public toilets</th>
<th>Pre-monsoon drain cleaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Redress of user complaints</td>
<td>✗</td>
<td>NA</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Dispute resolution mechanism</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Mitigating payment risk</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Mitigating termination risk</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
</tbody>
</table>

**Key features**

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

*"In case of any complaint or a conflict regarding the public lavatory, it would be my responsibility to solve the complaint and I will not involve the municipal council in the matter."*

- Complaint redress clause in contract for community toilet cleaning

*"I agree that the Town Council has reserved the right to cancel this contract if the work is not satisfactory and the work is not improved after due notice and instructions."

- Termination clause in contract for vermi-compost plant

Source: Interviews with Wai city officials
Landscape study of private sector...

- a. Are contractors available to provide the proposed services?
  - Who are the relevant contractors for the proposed project?
  - How can they be identified?

- b. 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?

- c. What are their key considerations or interests?

Tool: Player Assessment Checklist

Scope possible players for bundled and unbundled FSSM activities

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

- Collection
  - Septic tanks
    - Refurbishment of septic tanks with access manhole covers
  - Suction emptier trucks
    - Periodic cleaning of septic tanks along a regulated schedule

- Conveyance
  - Treatment facility
    - Construction treatment facility
    - Operation and maintenance of treatment facility

- Treatment
  - Revenue from treated septage
    - Sale of septage at a fixed rate to nearby farms or agro-businesses

- Disposal / Reuse

Proposed value chain

Activities required

- Small scale players (<10 employees)
- Medium scale enterprises (>10-50 employees)
- Labor contractors for septic tank cleaning
- Septic tank cleaning companies
- Pure-play treatment players
- Integrated fecal sludge management providers
- Buyers of septage
  - Organic Farming Association
  - Agro-based industries
  - Local farmers and growers associations
Assess their work profiles, interests and capacity...

Name: Company X

Geographic focus: Maharashtra, Karnataka, Tamil Nadu, Goa and Delhi NCR

Services offered: Company X core business is the manufacture and supply of recyclable portable toilets, but they also offer commercial and residential septic tank cleaning and septic tank treatment

Business model (conveyance):
- Scale: ~60 Mercedes Benz suction emptier trucks, each operated by a driver and a technician
- Customers: Mostly residential, but also some commercial clients
- Payment structure: Charges INR ~400 - 1000 per trip. Run trucks on a regulated “DHL - like” schedule, but also take emergency calls
- Expected return: 20 - 25% EBITDA margin

Interest in business opportunity
“We have invested in high quality trucks so that our employees do not have to come into contact with the waste at all. We want them to feel proud of the work they do. Customers don’t care, they just want the job done. But we have a rule book, and it clearly tells the customers what we will and will not do.”

“We would be interested in an integrated contract for faecal sludge management. In terms of profitability, the business is only viable if you’re doing at least a 20-25% EBITDA”

Key Concerns

Exploring their willingness of players to undertake various activities in the sanitation value chain as per their competencies and interests

<table>
<thead>
<tr>
<th>Key</th>
<th>Interested, with previous experience</th>
<th>Interested, no previous experience</th>
<th>Experienced, not interested</th>
<th>Not interested, not experienced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor contractors</td>
<td>Company 1</td>
<td>Company 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small-scale septic tank cleaners</td>
<td>Company 3</td>
<td>Company 4</td>
<td>Company 5</td>
<td></td>
</tr>
<tr>
<td>STP companies</td>
<td>Company 6</td>
<td>Company 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integrated players</td>
<td>Company 8</td>
<td>Company 9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Six step processes in structuring a PSP option for FSSM

1. Operational role of the private contractor
2. Source of revenue
3. Investment/ownership of capital asset
4. Payment structure
5. Contract length and value
6. Risk mitigation and allocation

Selecting an appropriate PSP Option

Bundled or Unbundled contract?
How to address the major risks for the private player and the ULB?
What is the appropriate contract duration for private and ULB?

Who should invest in capital assets?

Checklist to decide contract structure
Financial Assessment tool for contract length and value
Sample Contracts

Operational role of the private contractor – creating bundled contracts

Collect
Transport
Treat
Dispose

Option 1
Contract 1A
Contract 1B

Option 2
Contract 2A
Contract 2B

Option 3
Contract 3A

Refurbishment and emptying of onsite systems + O&M of STTs
Construction of STTs

Refurbishment and emptying of onsite systems

Refurbishment and emptying of onsite systems; construction and O&M of STTs
Bundling contracts simplifies vendor management, and ensures greater accountability

<table>
<thead>
<tr>
<th>Advantages of bundled contracts</th>
<th>Advantages of unbundled contracts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ensures greater accountability:</strong> Having a single point of contact avoids the issue of players blaming each other for lapses in service</td>
<td><strong>Diversifies non-performance risk:</strong> With a bundled contract, non-performance puts all activities at risk</td>
</tr>
<tr>
<td><strong>Aligns performance incentives:</strong> Creates incentives for the private player to manage each element of the chain successfully</td>
<td><strong>Takes advantage of player expertise:</strong> Contracts can be awarded to the most qualified player for each activity</td>
</tr>
<tr>
<td><strong>Simplifies contract management:</strong> Reduces the number of transactions needed to co-ordinate with different players</td>
<td></td>
</tr>
</tbody>
</table>

The elements of integrated faecal sludge management are highly connected and success of one element is closely tied to the success of the others. Hence, bundled contracts have tangible benefits over unbundled contracts for IFSM.

Identify revenue sources

- Identify the different sources of revenues
- Assess the different options on the basis of sustainability and reliability

<table>
<thead>
<tr>
<th>ULB sources</th>
<th>Government sources</th>
<th>Miscellaneous sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can be used individually or in combination</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- 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?
Sanitation tax as a revenue source: A Case of Wai

Current taxes levied

Appropriate awareness can ensure willingness to increase local taxes

- Currently, households clean their septic tanks 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.

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

Sale of treated septage for reuse: source of revenue

*Larger farmers who export their crops are bound by restrictions on the use of animal and human waste. Sludge can be sold mainly to small and marginal farmers, who lack access to synthetic fertilizers.*

- Person X

*"Faecal sludge cannot be used in organic farming due to concerns about e-coli and shigella infections. However, it is often used by small farmers as 'son-khad'"*

- Person Y, Farming association

*"We make compost from solid waste. The market is extremely seasonal. Creating a continuous market for this waste is tough. People say that you are creating compost from waste so we don’t want to use it. Source is very important."*

- Person Z, Entrepreneur

*I often have to pay farmers to dump sludge in their farms. I do not think the sale of septage is a viable revenue source.*

- X Enterprises

*"It (sale of septage) is possible, but will require investment in marketing and distribution, which we do not do."

- Y Enterprises

There is demand for sludge among small and medium farmers, but willingness to pay is unclear
Decide ownership of capital assets

Types of capital expenditure

- Purchase of suction trucks (determined by number of trucks needed, existing capacity of the contractor)
- Construction of the septage treatment facility (determined by the number of STFs needed and land acquisition details) (USUALLY LARGE INVESTMENT)

Gauge the willingness of contractors...

- ..to invest in trucks (how many trucks)
- ..to invest in STFs
- ..to invest in both

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.

Case Study: Assessment of contractors revealed that contractors 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)

<table>
<thead>
<tr>
<th>Option</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA</td>
<td>2</td>
</tr>
<tr>
<td>No</td>
<td>1</td>
</tr>
<tr>
<td>Yes, can invest 3 trucks</td>
<td>4</td>
</tr>
<tr>
<td>Yes, can invest 1 truck</td>
<td>2</td>
</tr>
</tbody>
</table>

“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.”

- X Enterprises

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

- Y Cleaning Services

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

<table>
<thead>
<tr>
<th>Option</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA</td>
<td>3</td>
</tr>
<tr>
<td>No</td>
<td>5</td>
</tr>
<tr>
<td>Yes</td>
<td>1</td>
</tr>
</tbody>
</table>

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

- Z Company

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

- V Enterprise
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.

Define payment structure for different activities

Factors to decide payment structure

Key activities

- Refurbishment of septic tanks
- Regular cleaning of septic tanks
- Emergency Cleaning of septic tanks
- O&M of FSTPs
- Construction of FSTPs

Payment structure

<table>
<thead>
<tr>
<th>Frequency of the activity</th>
<th>Whether outputs are measurable</th>
<th>Whether total costs are known</th>
<th>Whether timelines are known</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed fee per unit</td>
<td></td>
<td></td>
<td></td>
<td><strong>Refurbishment is a one time activity in which the cost per tank is known, but the number of tanks is not. Hence a fixed fee per refurbished tank is paid</strong></td>
</tr>
<tr>
<td>Recurring fixed fee</td>
<td></td>
<td></td>
<td></td>
<td>Because of the ULB HH survey, the number of tanks to be cleaned and the schedule is well determined. Hence it is an ongoing activity for which a fixed monthly fee is paid given the schedule being followed and proper field reports are submitted by the private sector.</td>
</tr>
<tr>
<td>Fixed fee per emptying service</td>
<td></td>
<td></td>
<td></td>
<td>The emergency septic tank emptying service can be provided by the ULB using its own vehicle. The fee of this would be kept high as a deterrent for users to not opt out of regulated services</td>
</tr>
<tr>
<td>Recurring fixed fee</td>
<td></td>
<td></td>
<td></td>
<td>O&amp;M of FSTPs is an ongoing activity for which the costs and procedures are well defined. Hence, a recurring fixed fee is paid</td>
</tr>
<tr>
<td>Overall fixed fee</td>
<td></td>
<td></td>
<td></td>
<td>Construction of FSTPs would be a one time activity. Since the design is specified by the ULB, the costs would be well known. Hence, an overall fixed fee can be given</td>
</tr>
</tbody>
</table>
Define contract length and value . . .

Estimating the contract length and value
- Estimates of capital expenditure required for cleaning and refurbishment of onsite systems and construction and O&M of STPs
- Estimates of operating expenditure required for cleaning and refurbishment of onsite systems and construction and O&M of STPs

Contract value options
- Contract value options for operation of suction trucks
- Contract value options for operation of suction trucks and O&M of STPs
- Contract value options for construction and O&M of STPs

Revenue to be collected from households
- Sanitation Tax
- Emergency cleaning charge

Sample contract structures . . .

<table>
<thead>
<tr>
<th>Contracts</th>
<th>Source of revenue</th>
<th>Ownership of asset</th>
<th>Payment method</th>
<th>Contract length and value</th>
<th>Tax /annum/property</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>Refurbishment and cleaning of septic tanks + O&amp;M of FSTPs</td>
<td>LG</td>
<td>Private player</td>
<td>Recurring fixed fee with Fixed fee per unit for refurbishment</td>
<td>2-3 year, ~INR 32-36 lakhs in City Y and ~INR 15-17 lakhs in City X</td>
</tr>
<tr>
<td>1B</td>
<td>Construction of FSTPs</td>
<td>LG</td>
<td>LG</td>
<td>Overall fixed fee on a pre-decided schedule</td>
<td>~INR 66 lakhs in City Y and ~INR 71 lakhs in City X lasting the time period of construction</td>
</tr>
<tr>
<td>2A</td>
<td>Refurbishment and cleaning of septic tanks</td>
<td>LG</td>
<td>Private player</td>
<td>Recurring fixed fee with Fixed fee per unit for refurbishment</td>
<td>2-3 year, ~INR 27-32 lakhs in City Y and ~INR 14-15 lakhs in City X</td>
</tr>
<tr>
<td>2B</td>
<td>Construction and O&amp;M of FSTPs</td>
<td>LG</td>
<td>ULB</td>
<td>Overall fixed fee on a pre-decided schedule + recurring fixed fee for O&amp;M</td>
<td>12-18 months, Construction cost plus ~4.5 lakhs annually for O&amp;M in City Y and ~4-5 lakhs in City X</td>
</tr>
<tr>
<td>3A</td>
<td>Integrated contract involving refurbishment, cleaning of septic tanks, construction and O&amp;M of FSTPs</td>
<td>LG</td>
<td>Trucks - Private FSTP - LG</td>
<td>Recurring fixed fee for cleaning and O&amp;M with Fixed fee for Construction and Fixed fee per unit for refurbishment</td>
<td>Payment for refurbishment, cleaning and O&amp;M as in 1 above; payment for construction as in 1B above</td>
</tr>
</tbody>
</table>
Risk Assessment

Project planning and development
- Commissioning risk

Construction phase
(FSTP construction and septic tank refurbishment)
- Demand risk
  - Performance risk
  - Cost escalation
  - Design risk
  - Payment delay and default

Operation
(Cleaning of septic tanks and operation of FSTPs)
- Termination (at cause and at will)
- Legal risks, including dispute resolution
- Force majeure risk

Source: ADB, "Toolkit for Public Private Partnerships in Urban Water Supply for the State of Maharashtra, India: Ministry of Finance, Government of India, "PPP Toolkit for Improving PPP decision-making processes in water and sanitation, PPIAF, Vijay Sarma, "Risks in PPP projects in Western India"

Protecting Private enterprise interests...

Termination
- "The contract should have a clause defining a 3 month notification period in case of termination. It should also have a dispute resolution mechanism."
  - X Enterprises

Delayed payments
- "Ideally, bills should be cleared in 30 days, and for late payments, interest should be paid at the rate of 8% per annum."
  - Y Enterprises

Transparent procurement
- "We would rather not deal with the ULB directly, there are always issues with internal politics. If there is a mediator in between then we would be interested."
  - Z Company

Cost escalation
- "For a fixed fee contract for regulated schedule, we cannot offer 24 hour emergency service. We will only work 8 hours a day, otherwise it is likely that we will over-use our truck."
  - AA Enterprises
- "Another key issue is the escalation of fuel costs. The contract should clearly account for that."
  - ZY Enterprises

Performance risks
- "If we work on a regulated schedule, it will be difficult to get household signatures. That will become complicated, and I don't want my payment to suffer."
  - AB Septic Tank Cleaning Services
- "I have tried to do a regulated schedule on my route, but that has been difficult. People always say, "come back later", and it falls apart."
  - AX Enterprises
### Risk mitigation: Performance and meeting contract clauses

<table>
<thead>
<tr>
<th>Risk</th>
<th>Mitigation</th>
<th>Allocation of remaining risk</th>
</tr>
</thead>
</table>
| Private player uses manual scavenging for cleaning septic tanks or SDWs | • Requirement of safety gear for all personnel  
• A clear description of activities that constitute manual scavenging | • Contract terminated if complaints of manual scavenging are received from HH or ULB staff |
| • Clean septic tanks as per schedule  
• Signatures collected whose septic tanks have been cleaned  
• Undertaking random inspections of HH whose signatures have been submitted  
• A complaint redress mechanism to be opened by the ULB for the HH | |
| Private player damages tanks during cleaning | • As above | • Work would have to be remedied within a specified days of complaint and the cost borne by the private player |
| Private player spills septage during transportation  
Private player dumps septage in the open | • A complaint redress mechanism to be opened by the ULB for the HH  
• A portion of monthly payment is tied to signatures collected from the SDB operator | • Complaints of spillage and illegal dumping must be addressed within a specified period, to avoid a fine  
• If the number of complaints exceeds a specified number in a time period, the contract can be terminated |

### Risk mitigation: Payment and costs

<table>
<thead>
<tr>
<th>Risk</th>
<th>Mitigation</th>
<th>Allocation of remaining risk</th>
</tr>
</thead>
</table>
| Payment delays | • ULB is unable to make timely payments towards the project  
• Ensuring budgetary allocation for contracts before procurement  
• Establishment of an escrow account for payment | • ULB to pay interest for the payment, delayed by X months or more, at a negotiated rate of interest |
| Cost escalation | • Cost of inputs increase over the course of contract  
• Adjustment of contract value annually for inflation  
• Inclusion of a cost re-negotiation clause | • Private player would be responsible for bearing the cost escalations within the negotiated period |

Source: Adapted from ‘Improving sanitation outcomes through service level agreements’ – Castalia Partners
Each contract option along with draft tender clauses should be discussed with the contractor and ULB to understand their concern and requirement.

Aspects covered with ULB
- Obligations before and after signing of contract
- Scope of work for contract
- Payment mechanism of contracts
- Critical performance standards – linked to payment terms
- Termination clauses
- Payment delay clauses
- Cost escalation

Additional Aspects covered with ULB
- Pros & Cons of each option
- Contract costs
- Taxes to be levied
- Bid document process and requirements

Following this process bid documents have been rolled out in few cities of Maharashtra.
Following this process bid documents have been rolled out in these cities (2/2)

Table of Contents
Section-1 Invitation for Bid
Section-2 Instruction to Bidders
Section-3 Qualification criteria and Bid Evaluation Framework
Section-4 Bidding Forms
Section-5 Conditions of Contract
Section-6 Scope of Work
Section-7 Price Bid and Terms of Payment
Section-8 Technical Specifications

Discussion points

- Can PSP in FSSM be worked out in your cities and state?
- Is there private sector available in your cities and state for providing FSSM services?
- Do you envisage any hurdles in implementing the PSP for FSSM?
References


Group Discussion
Design of Training Module . . .

- Develop training agenda according to different target groups? Eg: Elected representatives, executive wing, Consultants (2 days/ 1 days)

- What are the key takeaways?

- How to translate lessons further?

- How to tweak this workshop model according to time constraints?
What is SCBP
Sanitation Capacity Building Platform (SCBP) is an initiative of the National Institute of Urban Affairs (NIUA) for addressing urban sanitation challenges in India. The 3 year programme (starting 2016) is supported by a Gates Foundation grant. It is aimed at promoting decentralised urban sanitation solutions for septage and waste water management.

The Platform is an organic and growing collaboration of universities, training centres, resource centres, non-governmental organizations, consultants and experts. The Platform currently has on board CEPT University, CDD Society and BORDA, ASCI, AIILSG, UMC, ESF, CSE, WaterAid, CPR, IDECK, CSTEP and WASHi. The Platform works in close collaboration with the National Faecal Sludge and Septage Management Alliance (NFSSMA).

What we do
The Platform lends support to the Ministry of Housing and Urban Affairs (MoHUA), Government of India, by focussing on urban sanitation and supporting states and cities to move beyond the open defecation free (ODF) status by addressing safe disposal and treatment of faecal sludge and septage.

The Platform supports National Urban Sanitation Missions, States and Towns, by developing and sourcing the best Capacity Building, Policy Guidance, Technological, Institutional, Financial and Behaviour Change advise in favour of decentralised sanitation solutions.

How does the Platform work
NIUA initiates and facilitates engagement of the SCBP Platform Partners at the State government level, for advocating and awareness generation for Faecal Sludge and Septage Management (FSSM). Followed by on demand support for capacity building and implementation of decentralised sanitation solutions at state and city level. SCBP promotes a four-module based Capacity Building support.

Goal
To build the capacity of cities and other stakeholders working in urban sanitation to ensure improved delivery of sanitation services through decentralized approaches.
Why Decentralised Sanitation Solutions

Given that 49% of the urban population in India relies on on-site sanitation, such as septic tanks and pits, decentralized sanitation options, such as Faecal Sludge and Septage Management (FSSM) and Decentralized Wastewater Treatment Systems (DEWATS) are critical for achieving the goals for urban sanitation under various national missions. Decentralized sanitation options are scientifically proven solutions to complement centralized systems, serving the underserved, particularly in peri-urban areas and informal settlements.

FSSM is the collection and transportation of faecal sludge from the containment system, treatment of the sludge at a designated site, followed by safe disposal or reuse of the treated sludge. DEWATS uses sewers to convey domestic wastewater from a neighbourhood or local catchment to a small, local treatment plant where it is treated through natural processes without any requirement for external energy to operate the system.

Target Audience

All stakeholders ranging from National Missions, State and Town Officials (Public Health, Engineering and Administration), Elected Representatives, Private Sector Consultants and Vendors, NGOs, Academia, Masons and the Citizens at large.

The Platform provides a sharing and cross learning opportunity for SCBP Partners. To pool in their knowledge resources on all aspects of urban sanitation capacity building. Facilitates joint development of training modules, learning and advocacy material including developing Key Messages and Content. And a platform for sharing and dissemination of FSSM Research, Advocacy and outreach to State governments and Urban Local Bodies.

FSSM Capacity Building Focus

- State Level Capacity Building for FSSM
- Institutional Capacity Building for FSSM at National Level
- Evidence Based Advocacy for FSSM

Training Modules Development under SCBP

- FSSM Training of Trainer Module
- Integrated waste Water and Septage Management Module
- FSSM Orientation Module and Handbook
- Orientation Module for ULB Elected Representatives
- Specialized Module(3 day Advanced Technical Training Module for FSSM)
- Specialized Module(3 day Advanced Technical Training Module on Integrated Waste Water and Septage Management)
- ODF and FSSM Training Module
- Consultants Training Module on FSSM DPR preparation
- FSSM Training Module for Masons
- Learning Material on International FSSM experience

All Modules and learning materials translated in Hindi
1. State Level Capacity Building for FSSM

Supporting select State governments, their Para state Agencies, Towns and Urban Local Bodies
- Orientation and exposure visits for understanding septage and faecal sludge risks and challenges
- Institutional capacity strengthening through Training of Trainers programmes
- Four Modules Based FSSM Capacity Building Strategy

Capacity building activities are planned to cover all stakeholders involved in the FSSM value chain – government officials, elected representatives, masons, private sector and community

Capacity Building for FSSM:
- Uttar Pradesh (UP)
  - Developing the State FSSM Operations Policy Guideline (Draft)
  - Exposure visits and Orientation on FSSM for SBM Director and ULBs
  - Planning support. Submission of Faecal Sludge Treatment Budget for 61 AMRUT towns for the State Annual Action Plan(SAAP)
  - Technical Support. Development of the first DPR for an FSTP in the state(Unnao town), and adopted for other towns
  - State Nodal Agency Capacity Building. Supporting RCUES Lucknow in conducting FSSM Training for ULBs and conducting independent research in new towns

Capacity Building for ODF and FSSM:
- Rajasthan
  - Division level ODF and ODF++ City Trainings. Followed by Exposure visits to Maharashtra and Madhya Pradesh(conducted for 90 officials)
  - Four Module based FSSM capacity building strategy
    - Sensitization/orientation training for 191 ULBs (till date 250 officials trained)
    - First Specialized Training
      - Integrated waste water management and exposure visit to Pune (conducted for 30 officials)
      - Technology option for FSM and exposure visit to Devanahalli (cities where DPR is planned)
    - Second Specialized Training
      - Planning and Financing of FSSM projects (planned for officials from 10-15 towns – for incremental improvements in managing septage and sludge, Assessments)
    - International Exposure visit for State officials and ULB officials (planned)
2. Institutional Capacity Building for FSSM at National Level

Nodal AMRUT Agencies Capacity Building Support for FSSM Trainings
- Training of Trainers on FSSM Planning: Eight AMRUT Institutes faculty
- Training of Trainers on Integrated Waste Water & Septage Management: Ten AMRUT Institutes
- Four AMRUT training agencies supported for integrating Training on FSSM into AMRUT training frame work - covering 200 officials from 12 states
- Exposure visits on Faecal Sludge Treatment Plant (FSTP) visit: 80 officials from 7 states to Devanahalli
- Exposure visit and integrated Waste Water and Septage Management (IWWSM) Training in Pune
- Advanced FSSM Technology Training

Private Sector Capacity Building
- National Consultation on private sector engagement in FSSM held in 2017
- Study initiated for developing a strategy for supporting manufacturers, vendors and project management consulting companies capacity building strategy
- Training Module developed for Consultants capacity building

Supporting Academia
- National consultation held in 2017 for 20 Faculty members from 15 academic institutes, to orient them on FSSM and explore demand for support by the academia
- Specific University level support plans being developed
- Workshops for Training of Trainers (ToT) support for universities and institutes. For integrating FSSM content in existing course work
- Developing dedicated Modules and related support for research and internships for students
- Promoting a platform for learning and exchange, research and advocacy

3. Evidence Based Advocacy for FSSM

Collation of existing knowledge, promoting new research, documentation and dissemination and learning
- Developing Training Modules, appropriate for different contexts (States, FSSM Thematic priorities and Stakeholders)
- Collating and creating Advocacy and Knowledge resources for all stakeholders on different aspects of FSSM service chain
- Urban Sanitation Research on urban sanitation status, pro poor implications of existing and proposed plans: for the states of Madhya Pradesh, Odisha, Karnataka, Telangana, Jharkhand, UP, Rajasthan and Uttarakhand
- FSSM Workshops, Advocacy and Learning events: Financing, Technology and Life Cycle costs of FSSM projects, Monitoring, Behaviour Change, etc
- Landscaping Study of Septage Treatment initiatives. Documentation and dissemination experiences and lessons of setting up and operations of Faecal Sludge Treatment Plants
- Research and advocacy on thematic FSSM challenges: Legal and Institutional, Operations, Financing, etc

SCBP Publications and Reports
- Capacity Need Assessment for FSSM Report
- Assessment of FSSM for 100 small towns of Rajasthan
- City sanitation Plans for four AMRUT cities in Odisha
- Detailed Project Reports (DPRs) for FSSM for UP, Rajasthan and Bihar
- Draft FSSM Operations Policy for UP and Rajasthan
- Assessment of legal and Institutional Frame work for FSSM in Uttar Pradesh
- FSSM Training Modules (7)
- Workshop Reports:
  - Practitioners Meet on Capacity Building for FSSM
  - Private Sector in FSSM
  - Academia engagement for FSSM
  - ToT Workshops for Institutes
  - Exposure Visits to Maharashtra
  - Rajasthan State Workshop
  - Achieving ODF: Recommendations for Rajasthan
## Key Results

### SCBP FSSM Capacity Building

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## About NIUA

NIUA is a premier national institute for research, capacity building and dissemination of knowledge in the urban sector, including sanitation. Established in 1976, it is the apex research body for the Ministry of Housing and Urban Affairs (MoHUA), Government of India. NIUA is also the strategic partner of the MoHUA in capacity building for providing single window services to the MoHUA/states/ULBs.

The Institute includes amongst its present and former clients Housing and Urban Development Corporation, Niti Aayog, City and Industrial Development Corporation of Maharashtra, USAID, World Bank, Asian Development Bank, GIZ, UNICEF, UNEP, UNOPS, Cities Alliance, Bill & Melinda Gates Foundation, Rockefeller Foundation, Global Green Growth Institute, and Bernard van Leer Foundation.

Some of the major areas of work include:

- Provide research support to MoHUA
- Conduct research studies on contemporary urban issues
- Coordinate capacity building and training activities
- Disseminate information through networks and knowledge hubs
- Analyze and promote policy change agenda
- Monitor and evaluate Government of India’s urban programmes/schemes