Workshop on Making Cities ODF+

Swachh Maharashtra Mission, Urban

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Government of Maharashtra

स्वच्छ भारत
एक कदम स्वच्छता की ओर

स्वच्छ महाराष्ट्र अभियान
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Open Defecation Free City

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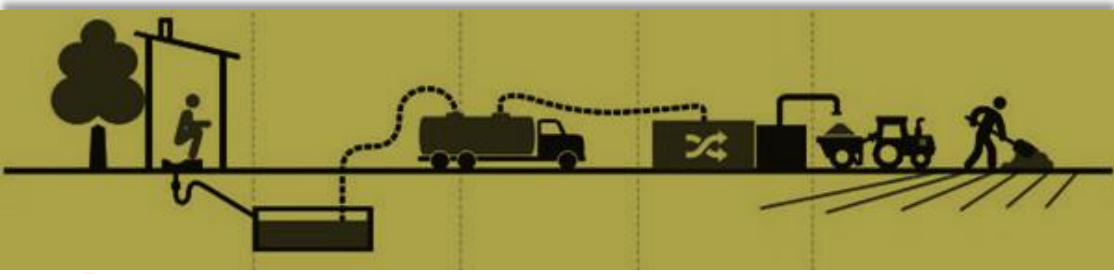
1 FAECAL SLUDGE AND SEPTAGE MANAGEMENT (FSSM)
Need for FSSM

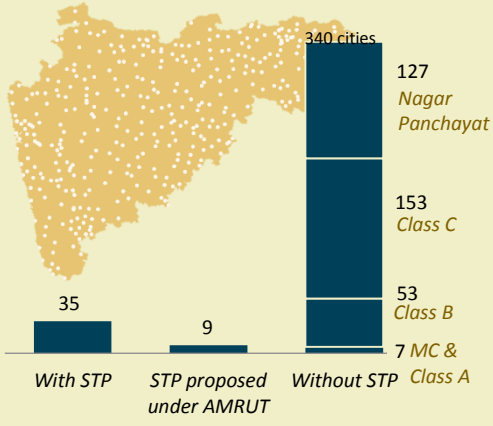


HIGH DEPENDENCE ON ONSITE SANITATION SYSTEMS

Sanitation systems in 6 Urban states in India
(PAS-SLB data 2016-17 for 904 cities)

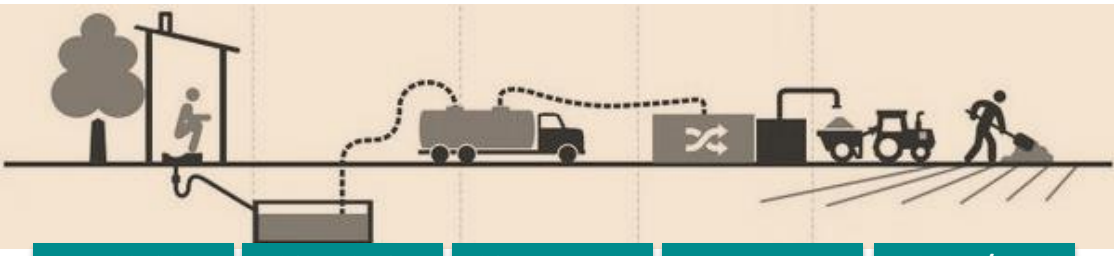
- India's largest cities have large, centralized sewerage systems which are expensive to build and even more expensive to operate.
- It is for this reason that India's smaller urban and peri-urban areas do not have such systems and depend on onsite sanitation systems.
- To manage this large amount of faecal matter, effective implementation of FSSM is necessary

A large amount of toilet infrastructure created under the Swachh Maharashtra Mission in order to end Open Defecation.
But where does all the waste from these toilets go?



- 334 Maharashtra cities are operating without any wastewater treatment infrastructure
- Sewage and Septage is being dumped in unsafe ways – on open land / in water bodies
- There is risk to our environment and human health
- 1 truck of Faecal Sludge and Septage carelessly dumped = 5,000 people defecating in the open!
- 1 Gram of Feaces may contain: 100 parasites eggs, 1000 Protozoa, 1,000,000 Bacteria, 10,000,000 Virus

GAPS ACROSS THE SANITATION VALUE CHAIN



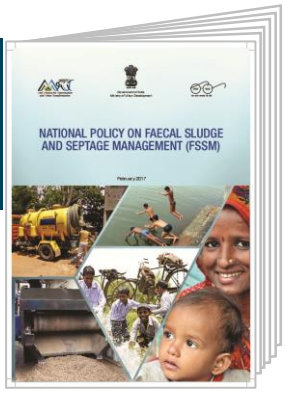
ACCESS	COLLECTION	CONVEYANCE	TREATMENT	RECYCLE/REUSE
Pour flush latrines	Existing Pit and Septic tank with drain field	Open / covered drains		Into river or natural drain
		No conveyance system in new developments		
		Suction trucks	No treatment of faecal sludge	Dumping along with solid waste
Need for improving conditions of on-site sanitation systems and insanitary toilets		**Lack of 100% coverage of conveyance system**	**Lack of treatment facility**	**Lack of scientific disposal of septage**

CONVENTIONAL SEWERAGE vs FSSM

	Water requirement	Capital and O&M Costs	Technical Expertise	Capacity to Operate	Maintenance Requirement	Implementation Charges
Conventional Sewerage	High	High	High	High	High on Service Provider Low on Household	High
FSSM	Low	Low	Low	Low	Low on Service Provider Medium on Household	Low

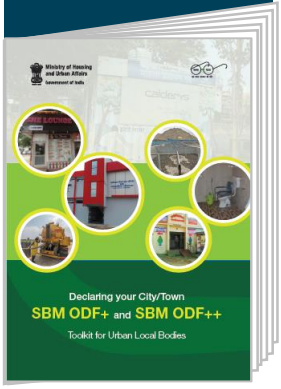
STATE'S FOCUS ON FSSM

National Policy On Faecal Sludge And Septage Management



Open Defecation Free Maharashtra Next Step is ODF+

National ODF+ and ODF++ Protocol



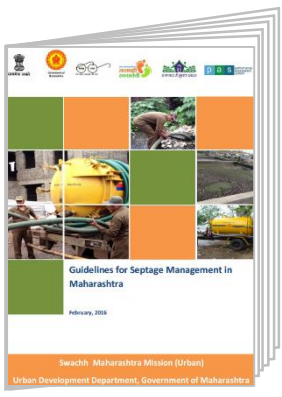
State ODF, ODF+ , ODF++ framework

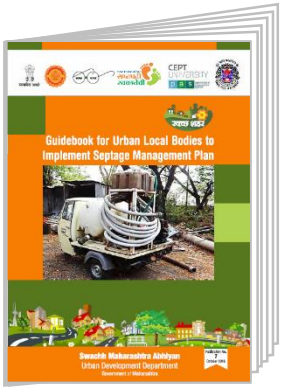
ODF Sustainability Charter

सप्तपदी सातत्याची
Sustainability Charter

We are committed towards the vision of swachh bharat. We shall ensure

Guidelines





Financial Incentives and Support

- Incentive grants and 14th FC funds to become ODF+ and move towards sustainability

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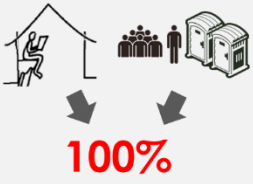
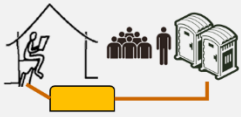
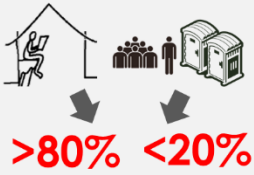
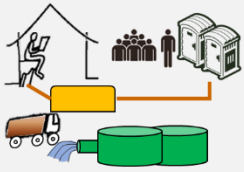
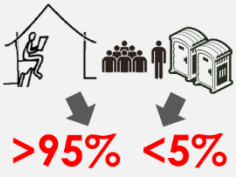
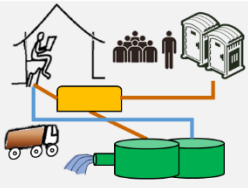
MOVING FROM ODF TO ODF+ AND ODF++ IN MAHARASHTRA

The Swachh Maharashtra Mission (Urban) was launched by the State Government with the aim of creating 'Sustainable ODF communities'.
After achieving ODF status, GOM envisages ODF+ and ODF++ Cities in upcoming years by implementing FSSM in Maharashtra

ODF			
	No visible OD, faeces	100% access to own/ community/ public toilet	All toilets connected to disposal system
ODF+			
	No visible OD, faeces	At least 80% access to own toilet; rest CT/PT	All toilets connected to disposal system; safe collection, conveyance and treatment of faecal matter
ODF++			
	No visible OD, faeces	At least 95% access to own toilet; rest CT/PT	All toilets connected to disposal system; safe collection conveyance and treatment of faecal matter and wastewater

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2 FAECAL SLUDGE AND SEPTAGE MANAGEMENT (FSSM)
Introduction to FSSM - Overview

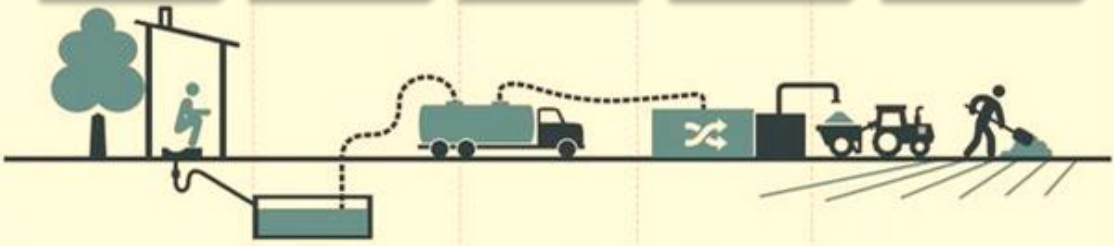
What is Septage? – It is the liquid and solid material that is pumped from septic tank, cesspool, or onsite treatment facility after it has accumulated over a period of time.

What is Faecal Sludge? - It is the solid or settled contents of pit latrines and septic tanks. It comes from onsite sanitation systems including pit latrines, non-sewered public ablution blocks, septic tanks etc.

WHAT IS FAECAL SLUDGE AND SEPTAGE MANAGEMENT?

Faecal Sludge and Septage Management (FSSM) covers the entire service chain from design of septic tank, collection, conveyance, safe treatment and reuse or safe disposal of septage.

ACCESS → COLLECTION → CONVEYANCE → TREATMENT → RECYCLE/REUSE



IMPACTS OF NOT MANAGING FAECAL SLUDGE

- Negative impacts on Urban Environment
- Risk of faecal matter re-entering the domestic environment
- Environmental Pollution
- Negative impacts on ground and surface water resources

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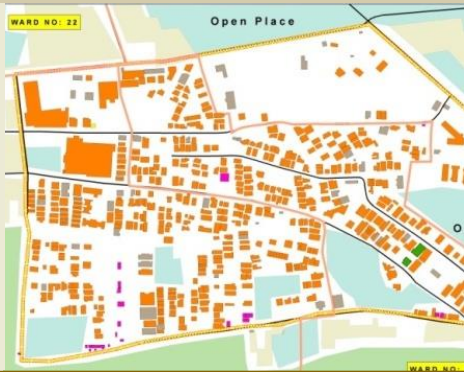
COMPONENTS OF FSSM

1. ASSESSMENT OF EXISTING TOILETS AND SEPTIC TANKS THROUGH SURVEYS

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

Required System - *To create a database for each HHs / property depicting details on Toilets, septic tanks, soak pits details through detailed questionnaire surveys.*

This can be done along with surveys done for property tax reassessment by ULB.
For citywide sanitation surveys, a mobile app and dashboard- ***Sanitab*** *has been developed.*



2. DESIGN AND CONSTRUCTION OF SEPTIC TANKS

The septic tanks need to be designed and constructed as per the norms suggested in:

- Swachh Bharat Mission Guidelines, 2014
- Manual on Sewerage and sewage treatment systems , CPHEEO, 2013
- National Building Code of India, 2005
- IS: 2470 - Code of practice for installation of septic tanks - Part 1: Design and Construction and Part 2: Secondary treatment and disposal of septic tank effluent 1985 (Reaffirmed 1996).

3. DESLUDGING OF SEPTIC TANKS

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

VACUTUG

Septic tanks which are located on site having narrow lanes, or lack proper access roads, smaller vehicles maybe used

SUCTION TRUCK

Septic tanks which are on sites which have proper access roads, larger vehicles can be used

4. TREATMENT OF FAECAL SLUDGE / SEPTAGE

- Once collected, the septage needs to be treated as per the CPCB and MPCB norms before disposal (CSE, 2011).
- Cities with underutilized STP capacity or located near a city with STP should explore co-treatment at STP
- If the Sewage Treatment Plants (STP) are not designed to deal with the septage, the plants can increase their aeration capacity and in some cases also expand their facility to cater to the excess waste (CSE, 2011).
- However, in the absence of an STP, ULB should plan a new septage treatment facility

3 FAECAL SLUDGE AND SEPTAGE MANAGEMENT (FSSM)
Septage Treatment

In urban Maharashtra, most of the cities lack adequate treatment facility. In many cities faecal sludge and septage is dumped in drains and open areas without any treatment, posing considerable health and environmental risks. Pathogens reaching the ground or surface water can lead to human diseases through direct consumption, recreational contact or consumption of contaminated shell fish. As per CPCB norms septage collected from the septic tanks or pits should not be disposed without any treatment.

Options for septage treatment

For Sewered Cities

Typology 1 (24 cities)
- **Municipal Corporation**
- Existing or planned sewer network with STP under AMRUT or any other scheme

Typology 2 (20 cities)
- **Municipal Council**
- Existing or planned sewer network with STP under AMRUT or any other scheme

No FSTP required

For Cities reliant on FSSM / Co-treatment

Typology 3 (45 cities)
- **Possibility of co-treatment**
- No existing or planned sewer network, however, proximity to city with STP

Co-treatment with nearby STP

Typology 4 (63 cities)
- **Population: Above 50,000**
- No current or planned sewer system
- 100% reliance on FSSM

Typology 5 (232 cities)
- **Population: Below 50,000**
- No current or planned sewer system
- 100% reliance on FSSM

Require independent **FSTP**

Quality testing

Testing for septage must be done to understand the quality of faecal sludge and septage that will be sent to treatment plant.

Septage samples from septic tanks must be collected at: Community toilets/ Public Toilets, Bungalows, Apartment

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

Some Parameters that must be considered for testing **– BOD, COD, Total suspended solids, Total Nitrogen, Ammonia Nitrogen, Total phosphorus**

Technology options

- Co-treatment with Sewage
- Co-Treatment with Solid Waste
- Planted/ Un-Planted Sludge Drying beds
- Anaerobic digester
- Pyrolysis
- Upflow Anaerobic Sludge Blanket Reactor (UASB)
- Moving Bed Biofilm Reactor (MBBR)
- Sequencing Batch Reactors (SBR)

PARAMETERS TAKEN INTO CONSIDERATION FOR SELECTING SEPTAGE TREATMENT SITE

- *Identification of septage treatment site is crucial for effective implementation of septage management plan.*
- *Following parameters to be taken into consideration before finalization of treatment sites:*

Land Availability

- *Whether Government Land is available or not?*
- *Possibility of developing a septage treatment facility at existing nearby sewage treatment plant or solid waste dumping or treatment site?*

Distance From The City

- *With increase in distance from city, hauling cost increases.*
- *Site that is close implies more trips, more revenue and less fuel costs to operators*

Availability of Electricity

- *Availability of Electricity becomes crucial if mechanical operated parts are to be installed.*
- *And as in case of fluctuations it will increase treatment time and will affect optimal utilization of treatment capacity.*

Neighbourhood

- *Septage treatment site should be located at appropriate distance from residential areas as it may generate odour causing nuisance to people near by.*

Geological Parameters

- *Ground water table*
- *Type of soil*
- *Prone to flooding*

Mobilizing Financial Resources

- For Capital expenditure ULB may utilize the funds from 14th FC and incentive finds according to GRs by Government of Maharashtra.
- Consider Private Sector Participation – eg. Design-Build-Operate-Transfer contract models
- Explore possibility of levying Sanitation tax to properties for operation and maintenance costs. The tax can be added either as surcharge on property tax or a new sanitation tax can be levied.

4 FAECAL SLUDGE AND SEPTAGE MANAGEMENT (FSSM) Scheduled Emptying

BENEFITS OF SCHEDULED EMPTYING

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

DEMAND Vs. SCHEDULED EMPTYING

On - Demand Basis

Cleaning is done **on-call** by the households 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 management service.

The ULB's operate trucks (owned or borrowed) when the demand arises.

Households pay certain amount once in >8-10 years to get tanks cleaned during overflow.

Scheduled Practice

Septic tanks are 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 **additional trucks to meet service standards**

Local taxes levied by ULB used to **recover operating expenses** for regular cleaning.

SCHEDULED EMPTYING

PROCEDURE IN SCHEDULED EMPTYING

Service – Desludging happens on a pre-decided fixed schedule for 3-5 years
Service provider – Contract can be given to a single private operator for entire schedule period.
Execution and monitoring - Private operator will be given fixed target of septic tanks. Operator will then plan accordingly to empty all septic tanks by the end of schedule period.

- Monitoring through GPS enabled systems with control center in the city.
- Target of septic tanks to be emptied daily is fixed, hence route plan can be made which will reduce the transportation cost (similar to SWM D2D collection process)
- Volume of septage received daily at the treatment plant is fixed
- Levy sanitation tax on property to avail service once in 3-5 years. Payment of the contractor can then be done through property tax
- It would be easy to collect tax and convince people to avail service




5 FAECAL SLUDGE AND SEPTAGE MANAGEMENT (FSSM)
Case study: Wai city

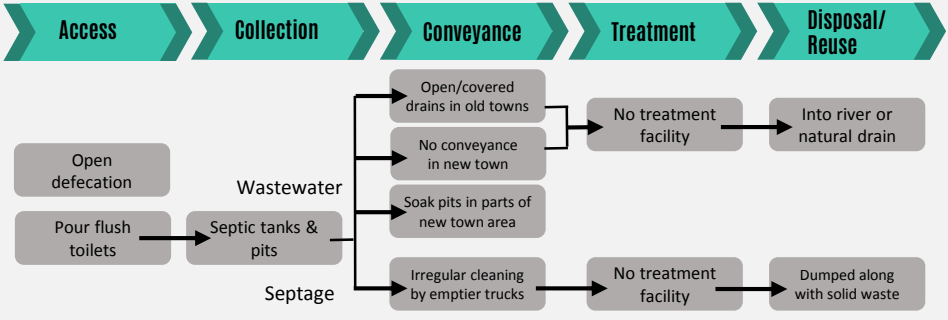
Location: 95 Km south of the city of Pune in Maharashtra
Population: ~ 43,000 (36,025 in Census 2011)
Area: 3.6 sq. km

Wai has already become **ODF+** by implementing Faecal Sludge and Septage Management Plan.

More than 80 % of households have **individual household toilets**. The rest have access to well maintained community toilets.

The city does not have any underground drainage system and toilets in city are connected to **septic tanks and pit latrines**

Situation before intervention



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FSSM Interventions in Wai

1. FSSM Resolution

Wai Council signed a resolution for FSSM covering these aspects-

- Citywide FSSM
- Involving Private sector
- Scheduled cleaning
- Land for treatment facility
- Taxes to be levied

1st city to pass such a resolution

2. Scheduled Emptying of Septic Tanks

Moving from a consumer complaint system of demand based emptying to a regular service oriented emptying system.

Developed a plan for scheduled septic tank emptying. All tanks to be emptied once every 3 years. 2 trucks to desludge ~2000 septic tanks annually

1st city to start scheduled emptying of septic tanks

3. Faecal Sludge Treatment Plant

Wai city constructed a Faecal Sludge Treatment Plant for treatment and safe disposal of collected septage.

Municipal Council allocated land near the solid waste processing site for the construction of a FSTP.

The construction and subsequent operation was done by Tide Technocrats (Bangalore) and the funding of the project has been done by Bill and Melinda Gates Foundation.

The FSTP uses pyrolysis technology.

4.Private Sector Participation

For scheduled emptying a private operator was engaged

A tender was floated on MahaTenders website and selection done through a transparent bidding process

An Escrow account was created for payments to remove late payment risk.

5.Financing through Sanitation Tax

A small Sanitation Tax was levied for financing scheduled emptying operations.

This amount is less than what citizens were paying as charge for each cleaning.

Surplus from property tax collection is also used.

6.Citizen Awareness

Awareness activities carried out for ensuring success of operations - Pamphlet distribution, Whatsapp video, Door-to-door visits

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6 FAECAL SLUDGE AND SEPTAGE MANAGEMENT (FSSM)
Case study: Sinnar city

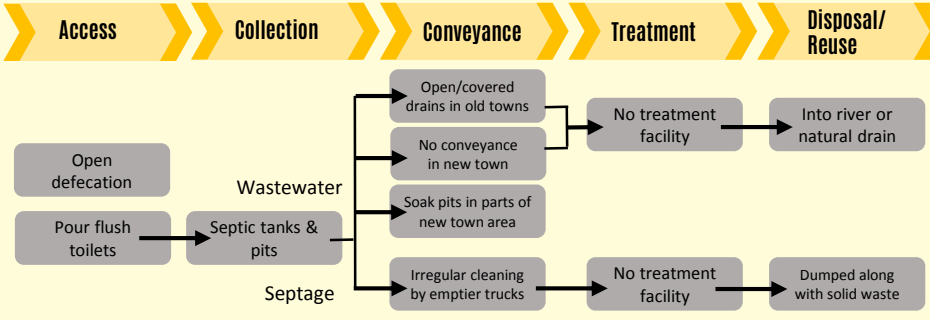
Location: 30 Km south-east of the city of Nashik in Maharashtra
Population: ~ 72,000 (65,251 in Census 2011)
Area: 51 sq. km

Sinnar became ODF in June 2017 and is fast on the way to becoming ODF+ by implementing Faecal Sludge and Septage Management Plan.

More than 75 % of households have **individual household toilets**. The rest have access to well maintained community toilets.

The city does not have any underground drainage system and toilets in city are connected to **septic tanks and pit latrines**

Situation before intervention



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FSSM Interventions in Sinnar

1. FSSM Resolution

Sinnar Council signed a resolution for FSSM covering these aspects-

- ❖ Citywide FSSM
- ❖ Involving Private sector
- ❖ Scheduled cleaning
- ❖ Land for treatment facility
- ❖ Taxes to be levied

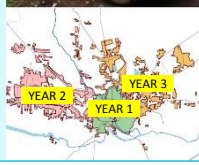
1st city to pass such a resolution

2. Scheduled Emptying of Septic Tanks

Moving from a consumer complaint system of demand based emptying to a regular service oriented emptying system.

Developed a plan for scheduled septic tank emptying. All tanks to be emptied once every 3 years. 3 trucks to desludge ~ 4000 septic tanks annually

Schedule emptying to begin soon



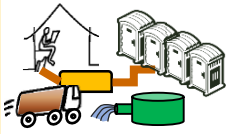
3. Faecal Sludge Treatment Plant

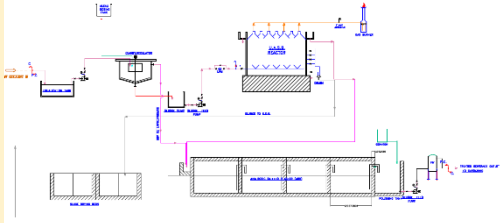
For treatment and safe disposal of collected septage, a Faecal Sludge Treatment Plant is under construction through private sector participation.

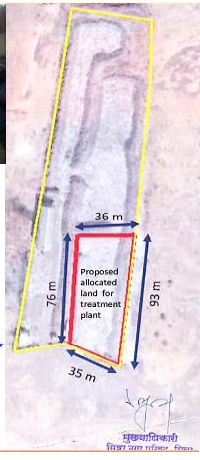
Municipal Council allocated land near the solid waste processing site for the FSTP.

The FSTP uses UASB technology.

This was fully financed by the ULB using 14th FC funds.







4.Private Sector Participation

For the FSTP, a tender was floated on MahaTenders website and a Design-Build-Operate-Transfer (DBOT) contract was done after selection of a private operator through transparent bidding process.

Similarly for scheduled emptying a private operator was engaged.

An Escrow account was created for payments to remove late payment risk.

5.Financing through Sanitation Tax

A small Sanitation Tax was levied for financing scheduled emptying as well as FSTP operations.

This amount is less than what citizens were paying as charge for each cleaning

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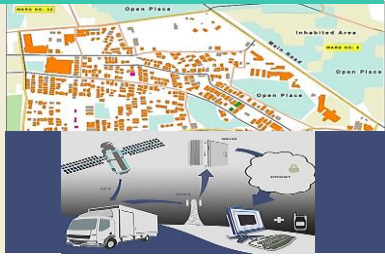
7 FAECAL SLUDGE AND SEPTAGE MANAGEMENT (FSSM)
Monitoring and Stakeholder Engagement

FSSM Components to be Monitored

- Design of septic tanks, pits etc.(adapted to local conditions) and methods of approval of building plans, or retro-fitting existing installations to comply with rules
- Septic tank emptying
  - Periodicity of septic tank emptying
  - Operating procedures during desludging such as use of safety equipment, no manual scavenging etc
  - Movement of septage trucks and safe disposal
- Output quality of treated septage

Ways to Monitor FSSM actitivites

- MIS DATABASE: Create a database of septic tanks and toilets
- Update the database every four years along with property tax assessment survey
- Link the database to e-governance help to update property level details regarding availability of toilets and septic tanks



- Licensing of private desludgers -Licensed operators are required to adopt approved standards and procedures for desludging
- Desludging forms with signatures of the household/property, suction truck operator and treatment plant operator should be submitted to the local government for their records.

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

Quality Testing: Regular testing of treated septage for adherence to CPCB safe disposal norms

STAKEHOLDER IDENTIFICATION, ENGAGEMENT AND AWARENESS GENERATION

All interested parties, be they individuals, groups, organizations or entities, are stakeholders. Relevant stakeholders like representatives of ULBs, public health and engineering departments and pollution control boards, as well as sanitary inspectors, masons, vacuum truck operators, media, farmers etc. should be identified for the target area.

AWARENESS GENERATION FOR RESIDENTS

Members of **Resident Welfare Associations, community organizers, self-help groups** and the **general public** should be **made sensitized periodically** regarding the **need for a septage management system.**

Health Hazards

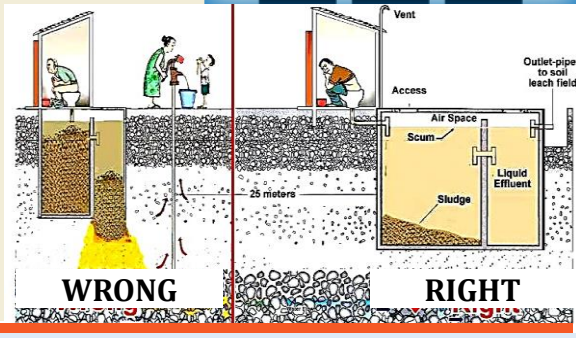
Health hazards associated with **improper collection** and **treatment of waste**, and the ill-effects of sewage discharge into fresh water/storm water drains **should be explained to the residents.**

Proper design of Septic tanks

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

Scheduled desludging

To ensure success of scheduled desludging operations, households must be made aware of the services being provided and what they must do to be ready for it – eg keep tank covers open



CAPACITY BUILDING FOR MUNICIPAL STAFF AND PRIVATE VENDORS/ SEPTAGE TRANSPORTERS

- Municipal Commissioners/ Chief Officers, Engineers, Sanitary Inspectors, Health Officers, and Sanitary Workers should be well trained in safe septage management and its best practices.
- Training sessions on safe collection, treatment and disposal of septage should be undertaken
- Local Bodies should ensure all safety norms are clearly explained to the septage transporters
- Private Operators and Transporters should be well trained in safe collection and transportation of septage.

***IEC & Capacity building funds**: IEC funds under SBM need be utilized for these awareness generation activities including capacity building for ULB staff, septage transporters, treatment plant operators and residents of city.*

Center for Water and Sanitation (C-WAS) at CEPT University carries out various activities – action research, training, advocacy to enable state and local governments to improve delivery of services. In recent years C-WAS has focused its work on urban sanitation. Indicators are developed for measuring on-site sanitation and a framework for citywide sanitation planning. C-WAS also supports cities in implementing city sanitation plans that focus on making cities open defecation free (ODF) and managing their faecal sludge and septage. In support of these efforts, the team is also working on developing innovative sanitation financing mechanisms.

Swachh Maharashtra Mission, Urban

सत्यमेव जयते

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एक कदम स्वच्छता की ओर

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Open Defecation Free City

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