EXPRESSION OF INTEREST (EOI) FOR SELECTION OF CONCESSIONAIRE(S) FOR SETTING UP OF FAECAL SLUDGE AND SEPTAGE TREATMENT PLANTS (FSTP) ON DESIGN, BUILD, OPERATE & TRANSFER (DBOT) BASIS IN URBAN LOCAL BODIES OF ANDHRA PRADESH FOR EFFECTIVE TREATMENT AND SAFE DISPOSAL OF FAECAL SLUDGE

Swachha Andhra Corporation (SAC), MA & UD, GoAP invites competitive bids from select Concessionaire(s) for setting up of **Faecal Sludge and Septage Treatment Plants (FSTP)** on Design, Build, Operate & Transfer (DBOT) basis in 78 (Seventy-Eight) Urban Local Bodies (ULBs) in the State of Andhra Pradesh. Interested firms, having prior experience and expertise in building and operating Waste water/Septage management//Bio-methanation projects, are requested to submit the EOI to develop the Project. Further terms & conditions shall be spelt out in the Request for Proposal(RFP)/Draft Concession Agreement during the RFP stage.

The RFP shall comprise both Technical and Financial bids, and the final selection shall be based on Least Cost Selection (LCS) Process. Financial Bids of the Bidders who secure minimum technical score of at least 70% shall only be opened.

The last date & Time for submission of EOI: On or before 15.00 hours of 30.01.2018.
The Pre-bid meeting Date, Time and Venue: shall be intimated at a later stage

Managing Director, Swachha Andhra Corporation reserves the right to accept or reject any or all EOIs without assigning any reason thereto.

Address for submission: The Managing Director, Swachha Andhra Corporation (www.sac.ap.gov.in), Flat NO 303, Vijayalakshmi Residency, ESI Road, Gunadala, Vijayawada – 520004, Telefax: 0866 2456708, Mail: swachhaandhra2015@gmail.com.

For any clarifications/queries on the EOI, please contact:

Name of Issuing Officer	**:**	**Mr.P. Anand Rao**
Designation of Issuing Officer	**:**	**Chief Engineer,SAC**
Address of Correspondence	**:**	**#Flat 303, Vijaya Lakshmi Residency, ESI Hospital Road, Gunadala, Vijayawada – 520004, Andhra Pradesh.**
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1. Introduction

Government of Andhra Pradesh (GoAP) launched Swachh Andhra Mission with a goal of achieving total sanitation in line with the vision of Swachha Bharat Mission (Urban). With concerted efforts, on 2nd October 2016, the GoAP declared its urban areas Open Defecation Free (ODF) through provision of individual household toilets as well community/public toilet. However, sanitation is more than just having access to toilets and better hygienic practices, and it covers the management of faecal sludge and septage[1] from the point of generation to its treatment for reuse or safe disposal. Accordingly, the State of Andhra Pradesh is now gearing to move towards the status of ODF + which is a step ahead of being ODF, it also includes waste water management and treatment of faecal sludge and septage.

Further, Government of India (GoI) through the Ministry of Housing and Urban Affairs (MoHUA) has launched a National Policy on Faecal Sludge and Septage Management (NFSSM) **(Annexure 1)** in 2017 and encouraged States to set up systems towards the safe collection, treatment and disposal of all human waste that is collected from on-site sanitation systems. In accordance with this, GoAP has notified **G.O. 134 (Annexure 2)** on 31st March 2017 outlining the policy and operative guidelines for Faecal Sludge and Septage Management (FSSM) in Urban Local Bodies.

To comprehensively establish improved sanitation practices and systems, the GoAP has decided to set up **Faecal Sludge and Septage Treatment Plants in all urban local bodies** to tackle the health and environmental hazard caused when human excreta is disposed in open areas and water bodies due to lack of treatment facilities. It is to be noted that pollution load of septage is much higher vis-à-vis sewage and needs immediate attention.

To achieve the vision of making urban areas ODF+, the Swachha Andhra Corporation (SAC) proposes to establish FSTPs in 78 ULBs). The Project may be divided into 2 or more Packages at the discretion of SAC and the details of the same shall be provided in the RFP stage.

SAC has accordingly decided to invite competitive bids to select Concessionaire(s) to whom the setting up of FSTPs in 78 ULBs of Andhra Pradesh on Design, Build, Operate & Transfer (DBOT) basis would be awarded. The Selected Bidder (Concessionaire) is responsible for effective treatment and safe disposal of faecal sludge and septage. In this regard, the Concessionaire has to comply with the environmental and all other regulatory norms that are in vogue from time to time during the entire Concession Period.

2. Project Development Options

It is proposed to follow technology agnostic approach for Project development and therefore, the Selected Bidder is free to employ any of the technology options tested in India for setting up of FSTPs. However, it is to be noted that the Technical Advisory Committee (TAC) constituted with ASCI, GIZ, APUFIDC, ENCPH and C & DMA by GoAP will have to approve

[1] Septage is the liquid and solid material that is pumped from a septic tank, cesspool, or such onsite treatment facility after it has accumulated over a period of time. It has high pollution potential and is currently disposed in water bodies or on land without any treatment causing public health and environmental risk.

the technology proposed by the Selected Bidder before it is implemented. The Bidder has to propose their technology during the EOI and RFP stage as well.

The Bidders have to explore the pros and cons of various technology options and propose an option that is best suitable to the proposed Project based on the local conditions and the quantity of septage generated at present and its incremental volume in the next 10 years. The average volume of septage generated ranges from 30 kl to 60 kl per day per ULB.

3. Scope of Work

The broad scope of work of the Project is as detailed hereunder:

- The concessionaire is responsible for construction, operation and maintenance of the FSTPs for each of the ULBs for effective treatment of feacal sludge in respective ULBs on design, build, operate & transfer (DBOT) basis at the Sites being provided by SAC/ULBs and in conformity with the Specifications and Standards as set forth in the Draft Concession Agreement that will be made available during RFP stage. To achieve economies of scale, cluster approach will be followed for setting up of FSTPs.

- To install bore wells at the FSTPs and it includes re-boring, in case of failure of water source;

- Concessionaire to develop storage facility at the Project Site for septage & sludge treated;

- The Concessionaire is responsible for marketing, distributing and selling soil conditioner/bio-fertilizer and/or bio-gas and the recycled water;

- Concessionaire to undertake a mass awareness / sensitization program in the surrounding residential / village area, so as to ensure local people are aware of the facility and to take them into confidence of the FSTP activities;

- Looking at the increase in city population, the Concessionaire shall plan the facility to handle incremental FSTP for the next 10 years; and

- Perform and fulfill such other obligations incidental to the proposed activities.

4. Concessionaire's Role & Responsibility

The broad role and responsibilities of the Concessionaire during the Concession Period are as detailed hereunder:

- The Concessionaire to use proven technologies only. The treatment and disposal of septage & feacal sludge shall be in compliance with all the environmental and other applicable regulatory norms in vogue from time to time in Andhra Pradesh;

- The Concessionaire to take precautions of minimizing flies, rodents and bird menace and fire hazards and to take necessary steps and processes that would bring in control of odour and leachate in the region;

- The Concessionaire to provide fire protection measures and safety equipment;

- The Concessionaire is responsible for all Permissions & Clearances – Environment Protection Act, 1986, The Air (Prevention and Control) Pollution Act 1981 and Water (Prevention and Control) Pollution Act 1974 as amended from time to time and other permits as applicable to the proposed Project.

- The Concessionaire to set a soil and ground water baseline situation. Concessionaire to monitor ground water quality, work zone air quality and ambient air quality monitoring within the site from authorized laboratories/agencies and submit the report on monthly basis;

- The Concessionaire to monitor noise levels at the site and interface of the facility with plant boundary and surrounding area; and

- The Concessionaire will have to enter into a land lease agreement with the respective ULBs and to pay a lease rental of Rs. 1 per sq. ft. per annum.

  The Concessionaire will have to develop green belt and water harvesting measures in the premises

5. SAC /ULBs - Role & Responsibilities

The broad role and responsibilities of the SAC/ULBs during the Concession Period are as detailed hereunder:

- The Project will be funded by SAC and accordingly, the capital expenditure and the periodical O & M expenses will be financed by SAC on Hybrid Annuity basis as per the provisions of the RFP.

- Provide encumbrance free land for project development. The respective ULBs shall allot the land for setting up of the FSTP. Further details on the land shall be furnished in the RFP;

- Motorable road and electricity supply up to the Project site;

- regulate desludging operators and direct them to deliver feacal sludge at the Project Site for treatment;

- Assist in all approvals & permissions including for sourcing of water both potable and for treatment; and for environmental clearances

6. Concession Period

The Concession Period is 10 years which includes both Project Construction period and Operations & Maintenance period.

7. Bidding Process

Eligibility Criteria: The bidding firm must meet all the following eligibility criteria to get itself qualified for the bidding, i.e., RFP stage. The qualification criteria to be fulfilled by the firm are:

1. The firm to be a company registered in India under the act of 1956/2013 and in existence for the last three years;

2. The firm to have prior experience and expertise in building and operating Waste Water/ Septage/Bio-methanation projects. The Bidder should have commissioned at least one project of similar nature in the last 5 years; and

3. Bidders have to submit a "Project Appreciation Note" of their preferred option of Project development with details on the proposed technology to be used, the land required for the Project Development, etc., in not more than 4 pages.

4. Pre-bid meeting will be conducted with the interested firms/organizations after submission of EOIs where in the firms will be required to make a detailed presentation on EOI and options of Project development and the support needed from SAC, if any.

5. The RFP document shall be uploaded on the SAC website (www.sac.ap.gov.in) for the interested bidders in this endeavor. The RFP stage involves evaluation of both technical and financial bids of the bidders using Least Cost Selection (LCS) process. The Bids would be evaluated on the basis of lowest assessed Bid Price (the "Bid Price"). The Bid Price shall be the summation of (a) Bid Project Cost and (b) Net Present Value (NPV) of O & M Cost (the "O & M Cost) during the O & M Period, required by a Bidder for implementing the Project and shall be paid as per the provisions of RFP.

The bidder should bear all the costs associated with the preparation and presentation of the proposal and SAC will not be liable or responsible for the costs, regardless of the conduct or outcome of the bidding process. The bidders are advised to visit the ULBs for better understanding of the ground conditions.

The bidder is advised to submit the **EOI in a sealed envelope superscribed "Expression of Interest for setting up of FSTPs in 78 ULBs of Andhra Pradesh on Design, Build, Operate & Transfer basis".**

The interested Firms must submit the following as per the sequence:

a. Copy of Certificate of Incorporation;

b. Extracts of Audited Balance Sheets for the last 3 years /Auditor (CA) Certificate;

c. Work Orders, Completion Certificates from the Clients and copies of relevant documents in support of eligibility along with a very brief, 1-2-page summary of their eligibility. It shall also contain the Contact Person and his/her contact details such as phone number and email id for communication; and

d. The “Project Appreciation Note” of their preferred option of Project development with details on the proposed technology to be used, the land required for the Project Development, etc., in not more than 4 pages.

स्वच्छ भारत
एक कदम स्वच्छता की ओर

सत्यमेव जयते
Ministry of Urban Development
Government of India

अमृत
Atal Mission for Rejuvenation and Urban Transformation

Date: 11th February 2017

Ministry of Urban Development invites citizen feedback on new National Policy on Faecal Sludge and Septage Management (FSSM)

India is one of the few developing countries to launch a National Policy on FSSM

Citizen-Engagement at the forefront of the National Policy on Faecal Sludge and Septage Management

The Ministry of Urban Development invites feedback and comments from citizens and civil society bodies, for its new National Policy on Sewerage and Septage Management, which will be launched shortly.

The ministry will be launching the policy soon keeping in mind the immediate need for Faecal Sludge Management, a topic that has largely been ignored in the past. In India, there exists a huge gap between the sewerage infrastructure and the sewage generated. The sewerage network and treatment infrastructure is too costly to build and as a result, only around 40% of the waste generated in the country per day, is treated. About 48% of urban Indian households depend on onsite facilities such as on-site pit latrine and septic tanks.

As such, the NFSSM policy addresses the need of managing the sludge and septage, thus approaching the issue of sanitation in a holistic manner. The policy has an overarching objective of making the cities and towns sanitized, healthy and liveable, by leveraging on faecal sludge and septage management approaches. It sets the direction and priorities for nationwide implementation of FSSM services in all States and ULBs. Moreover, it also describes the roles and responsibilities of several stakeholders and sets an agenda for the implementation strategy and city-level assessment.

MoUD has embarked on an extensive feedback and consultative process to strengthen the policy. For encouraging citizen engagement with the initiative, the Ministry is inviting comments and suggestions from civil society and citizens of the country. Faecal sludge and septage comes under the purview of the flagship initiatives of MoUD: Swachh Bharat Mission (SBM) and Atal Mission for Rejuvenation and Urban Transformation (AMRUT).

The policy has been uploaded at http://www.swachhbharaturban.in:8080/sbm/content/writereaddata/Draft%20FSM%20Policy%20document_Final.pdf.

Comments can be submitted to sbmurban.moud@gmail.com.

For regular updates, please follow the mission's official social media properties:

Facebook Page - Swachh Bharat Mission - Urban | Twitter Handle - @SwachhBharatGov

Government of India
MINISTRY OF URBAN DEVELOPMENT

DRAFT POLICY DOCUMENT

National Policy on Urban Faecal Sludge and Septage Management (FSSM)

December 2016

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Terminology

List of technical keywords used.

Faecal Sludge: "Faecal Sludge" is raw or partially digested, in a slurry or semisolid form, the collection, storage or treatment of combinations of excreta and black water, with or without grey water. It is the solid or settled contents of pit latrines and septic tanks. The physical, chemical and biological qualities of faecal sludge are influenced by the duration of storage, temperature, soil condition, and intrusion of groundwater or surface water in septic tanks or pits, performance of septic tanks, and tank emptying technology and pattern.

Faecal sludge is the solid or settled contents of pit latrines and septic tanks. Faecal sludge (FS) comes from onsite sanitation technologies, and has not been transported through a sewer. Examples of onsite technologies include pit latrines, non-sewered public ablution blocks, septic tanks, aqua privies, and dry toilets.

Septage: "Septage" is the liquid and solid material that is pumped from a septic tank, cesspool, or another treatment facility after it has accumulated over a period of time. Usually, septic tank retains 60% to 70% of the solids, oil, and grease that enter it. The scum accumulates on the top and the sludge settles to the bottom comprising 20 to 50% of the total septic tank volume when pumped. Offensive odour and appearance are the most prominent characteristics of Septage. It is a host of many disease-causing organisms because of the contamination of significant level of grease, grit, hair, and debris.

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

The effluent from the septic tank can be collected in a network of drains and/or sewers and treated in a treatment plant designed appropriately. The accumulating sludge at the bottom of the septic tank however, has to be also removed and treated once it has reached the designed depth or at the end of the designed desludging period whichever occurs earlier. Such a removal is possible only by trucks. While sucking out the sludge, the liquid in the septic tank will also be sucked out. Such a mixture is referred to as septage.

Septic tank: An underground tank that treats wastewater by a combination of solids settling and anaerobic digestion. The effluents may be discharged into soak pits or small-bore sewers, and the solids have to be pumped out periodically.

1 Introduction

1.1 Current situation

According to Census 2011, India's urban population is 377 million or 31% of the total population. These numbers are expected to increase to 600 million by 2031. The Census 2011 also showed that in 4,041 statutory towns, 7.90 million households (HHs) do not have access to toilets and defecate in the open[1]. Under the Swachh Bharat Mission (SBM), it is envisaged that nearly 80% of these 7.90 million HHs (or nearly 6.3 million HHs) will meet their sanitation needs through newly-built individual household toilet (IHHT) and the remaining 20% (or nearly 1.6 million HHs) will rely on existing or newly-built community toilets. Weak sanitation has significant health costs and untreated sewage from cities is the single biggest source of water resource pollution in India.

India's largest cities have large, centralized sewerage systems with vast underground pipelines, pumping stations and huge treatment plants. These systems are expensive to build and even more expensive to operate effectively, as they require continuous power, a large amount of water, skilled operators and extensive electro-mechanical maintenance. It is for this reason that India's 7,000+ small towns do not have such systems and are unlikely to be covered by centralised sewerage systems in the foreseeable future.

[1] SBM Urban Guidelines, Ministry of Urban Development, Government of India

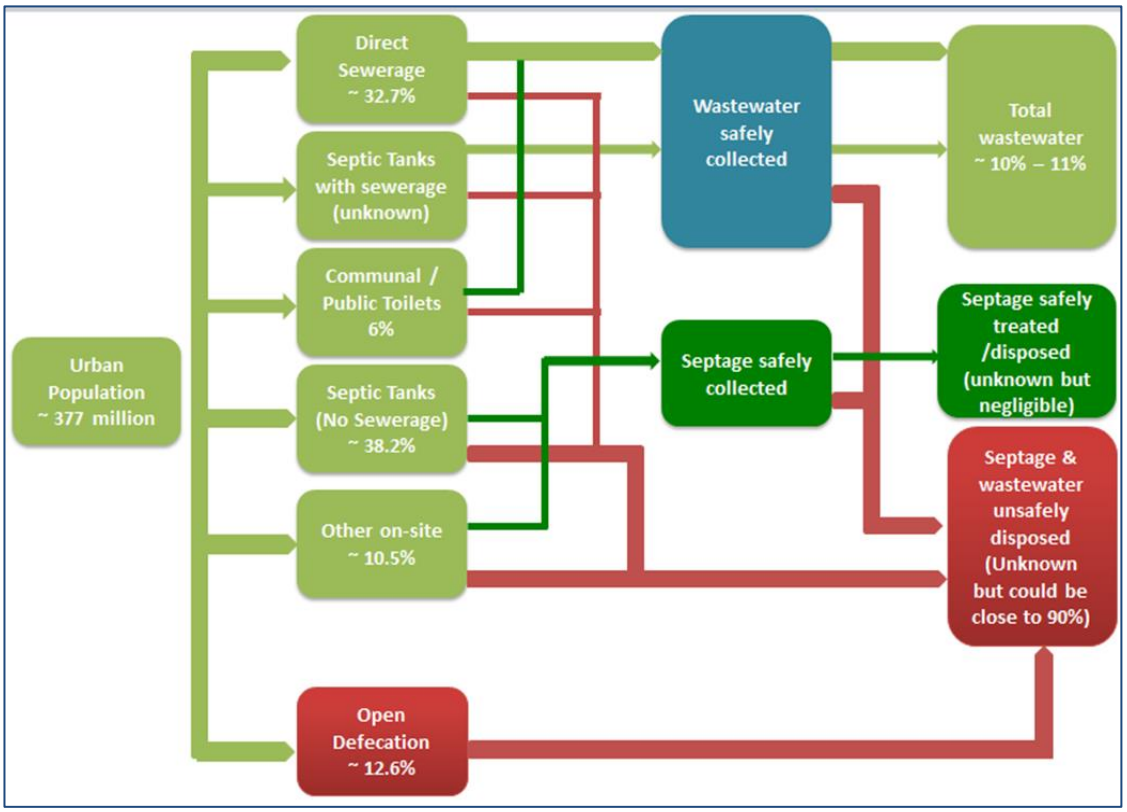


Figure 1: Status of Sanitation in Urban India (Source: Census 2011, CPHEEO Ministry of Urban Development Government of India (2012), Central Pollution Control Board Government of India (2009), CPR Analysis)

According to the data released in the report "Inventorization of Sewage treatment plants, 2015" by the Central Pollution Control Board, out of the 816 municipal sewage treatment plants (STPs) listed across India, 522 are operational (only 64% are functioning), 79 STPs are Non Operational, 145 STPs are under construction and 70 STPs are proposed. The treatment capacity that is available is only for 37% of the total 62,000 MLD (million litres per day) of human waste that is generated in urban India.

Currently (See Figures 1 & 2), on-site pit latrines and septic tanks account for a substantial proportion of toilets in urban India – over 48% of urban Indian households depend on onsite facilities (Census 2011) and this proportion is increasing. Further, as urban households without toilets obtain facilities over the next few years under SBM, it is likely that many will acquire on-site arrangements like pit latrines and septic tanks in cities at locations where sewerage systems are not available. Thus, while the containment of human waste will be largely achieved under SBM, its treatment still poses a huge challenge.

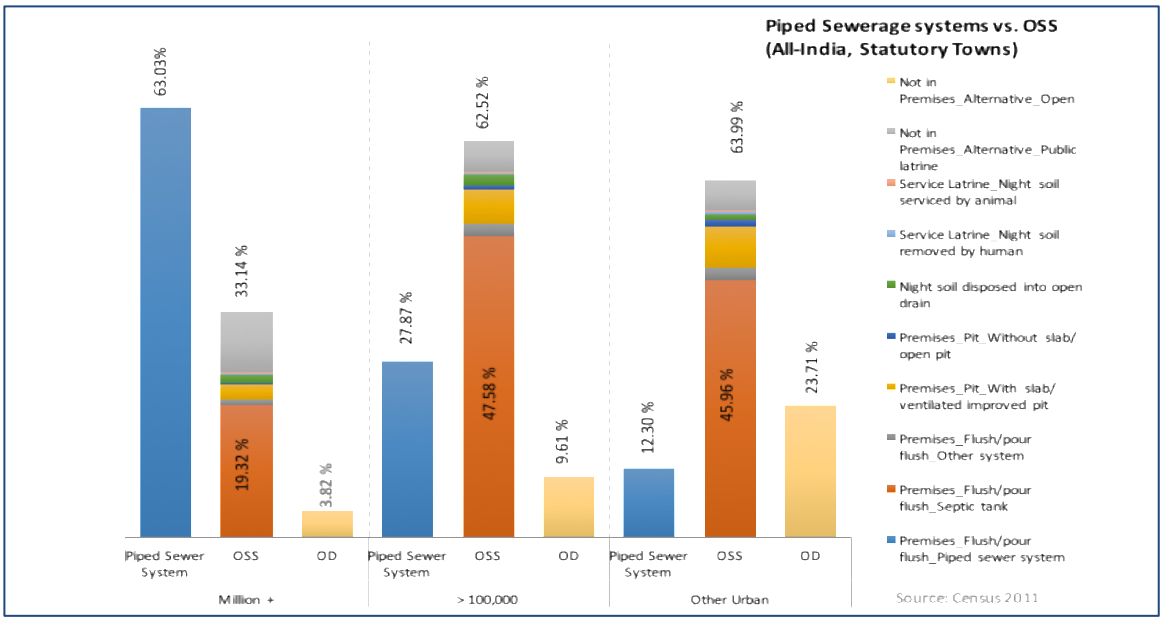


Figure 2: With Decrease in City Size, Dependence on OSS Increases (Source: Census 2011)

In the absence of adequate safe and sustainable sanitation, many Indian cities are already suffering the consequences, in the form of health ailments and serious pollution of water resources. In contrast with the large proportion of on-site sanitation (OSS) systems, limited attention has been accorded to proper construction, maintenance management and safe disposal of septage from septic tanks and pit latrines. While construction standards have been codified by Indian Standards Organization (ISO), the actual construction was largely left to households to manage – in practice, the installations are subject to local practices and considerable variations are observed. In many instances for example, soak-away outlets are not provided.

Limited capacities and resources with Urban Local Bodies (ULBs) also resulted in little regulation of maintenance and cleaning of septic tanks and pits – in many cases, households do not report cleaning for a number of years. Some ULBs have desludging equipment or there are private players providing cleaning services but the supply of desludging services is far from adequate. In many instances septage is dumped in drains and open areas posing considerable health and environmental risks. Sanitary workers also work in hazardous conditions having to manually clean OSS pits and tanks without adequate protective gear and equipment. In fact, in most Indian cities, there is very limited disaggregated information on the types and numbers of OSS toilets and septage disposal systems and practices.

Besides this, the problem of Faecal sludge and septage / sewerage must be addressed in a holistic manner, with a strategy that provides for minimum needs and is appropriate and affordable for all areas, considering the local situation. It must also address the

enablers in the form of suitable regulation and institutional framework, capacity building and education and awareness among all stakeholders.

1.2 Gaps and Issues in urban sanitation in terms of FSSM

While onsite sanitation is prevalent in cities, there are major gaps in its implementation across the sanitation service chain. While the gaps and consequences of lack of access to toilets are well reported, those relating to septage collection, conveyance and treatment remain largely unknown and unaddressed by most, if not all, municipal bodies and most state governments. Even in the general discourse, this major health hazard is not well understood or talked about!

Access: Issues in access to toilets arise due to households having financial issues and space crunch for constructing individual toilets. This leads to members of households without toilets practicing open defecation[2]. There are also significant cultural and social barriers (issues around perceptions of pollution and caste; and a general social acceptance of open defecation that prevents households from investing in safe sanitation and its universal and consistent use – in both urban and rural areas. This behavioural aspect is one of the significant reasons why India has such high rates of open defecation compared to other even poorer and less developed countries in Africa and in Asia.

Septage collection and conveyance**:** Regular cleaning of septic tanks through a systematic extraction and collection procedure is essential. The frequency of cleaning is determined by the desired performance of the OSS system for the local conditions. For example, if the septic tank is soaking away into the ground, with no ground water issues, frequency of emptying can be less. On the other hand, if effluent is overflowing to surface drain, more regular emptying may be required to prevent sludge overflow. Notably, the following issues create barriers to regular tank cleaning, and septage collection:

- ***Manual scavenging.*** Though a specific act has been passed against Manual Scavenging, (The Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013), social and cultural acceptance of the practice leads to widespread deployment of manual scavengers. Their availability further serves as a disincentive to households to access formal and systematic methods of cleaning tanks.

- ***Limited access to tanks.*** Septic tanks are often placed under toilets, or are sealed, or cemented over, making it difficult to access them for cleaning/ emptying which dis-incentivizes their frequent cleaning at the household level.

- ***Inappropriate tank sizing.*** Septic tanks connected to individual toilets are often oversized due to lack of awareness among construction contractors about the

[2] Swacchta Status Report - NSSO

design norms. These tanks do not meet the standards prescribed in the IS codes and the CPHEEO[3] manual. As a result, households typically notice the need for cleaning once the tanks fill up, and call for emptying services when the tank overflows.

In many cases, where households do not understand the utility of a septic tank as a requisite pre-treatment unit, the septic tank merely acts as a very large containment tank, with overflow to the drains. Masons who construct this, often oversize the septic tanks the request of the households. This leads to extraction and emptying done at very infrequent levels (once in 10-15 years). The overflow is often just connected to available open drains.

Lack of infrastructure, and a regulated schedule for cleaning. ULBs are often faced with financial and personnel constraints in providing recommended service levels to households. For example, insufficient suction emptier trucks, trained human resource, safety equipment, etc. to ensure regular cleaning/ emptying of septic tanks.

Lack of formal private players. The sector is dominated by informal small-scale contractors that lead to difficulty in monitoring of the process that they follow for emptying and disposal. Domination by informal players also makes it harder to institutionalize best practices and regulations, which prevents establishment of norms around scheduled and safe cleaning.

Treatment and Disposal: Typically, most small-medium towns and cities lack adequate centralized/ decentralized facilities and designated sites for wastewater and for septage treatment and disposal. As a result, all wastewater is dumped without treatment into the rivers, while untreated sludge and septage is disposed of in a dumping ground/ any water bodies available, and often these sites are some distance away from the main city.

Poor Awareness: Faecal Sludge and septage management has been accorded low priority and there is poor awareness about its inherent linkages with public health.

Fragmented Institutional Roles and Responsibilities: There are considerable gaps and overlaps in institutional roles and responsibilities at the national, state, and city levels.

Lack of an Integrated City-wide Approach: Faecal Sludge and septage management investments are currently planned in a piece-meal manner and do not take into account the full cycle of safe confinement, treatment and safe disposal.

[3] The Central Public Health and Environmental Engineering Organization (CPHEEO) is the technical wing of the MoUD and deals with matters related to urban water supply and sanitation
http://cpheeo.nic.in/Onsite%20Sanitation/suk/cha/Chap1-6.pdf

Limited Technology Choices: Technologies have been focussed and the disposal techniques are not environmental friendly no cost-effective, and sustainable investments for safe management and disposal has been thought off on a large scale

1.3 National declaration on FSSM

MoUD recognizes that the end objectives and corresponding benefits of SBM cannot be achieved without proper management of faecal sludge and septage across the sanitation service chain. Further, it is well understood that sewerage coverage will not meet the complete sanitation needs in all areas, and a strategy which is a combination of OSS and off-site (decentralised and centralised) must co-exist in all cities and must be given equal attention. Over time the relative proportions of coverage by OSS and off-site systems may change but both will need to be managed well. However, the current policies are not explicit enough and also do not provide an outcome-focused direction on this issue. As a first step, MoUD and a host of research and civil society organisations jointly drafted and signed a National Declaration on Faecal sludge and Septage management (FSSM) on 9th September, 2016. Pursuant to the Declaration, this FSSM Policy is being promulgated to address the gaps and provide the necessary directions to diverse stakeholders engaged in provision of FSSM services.

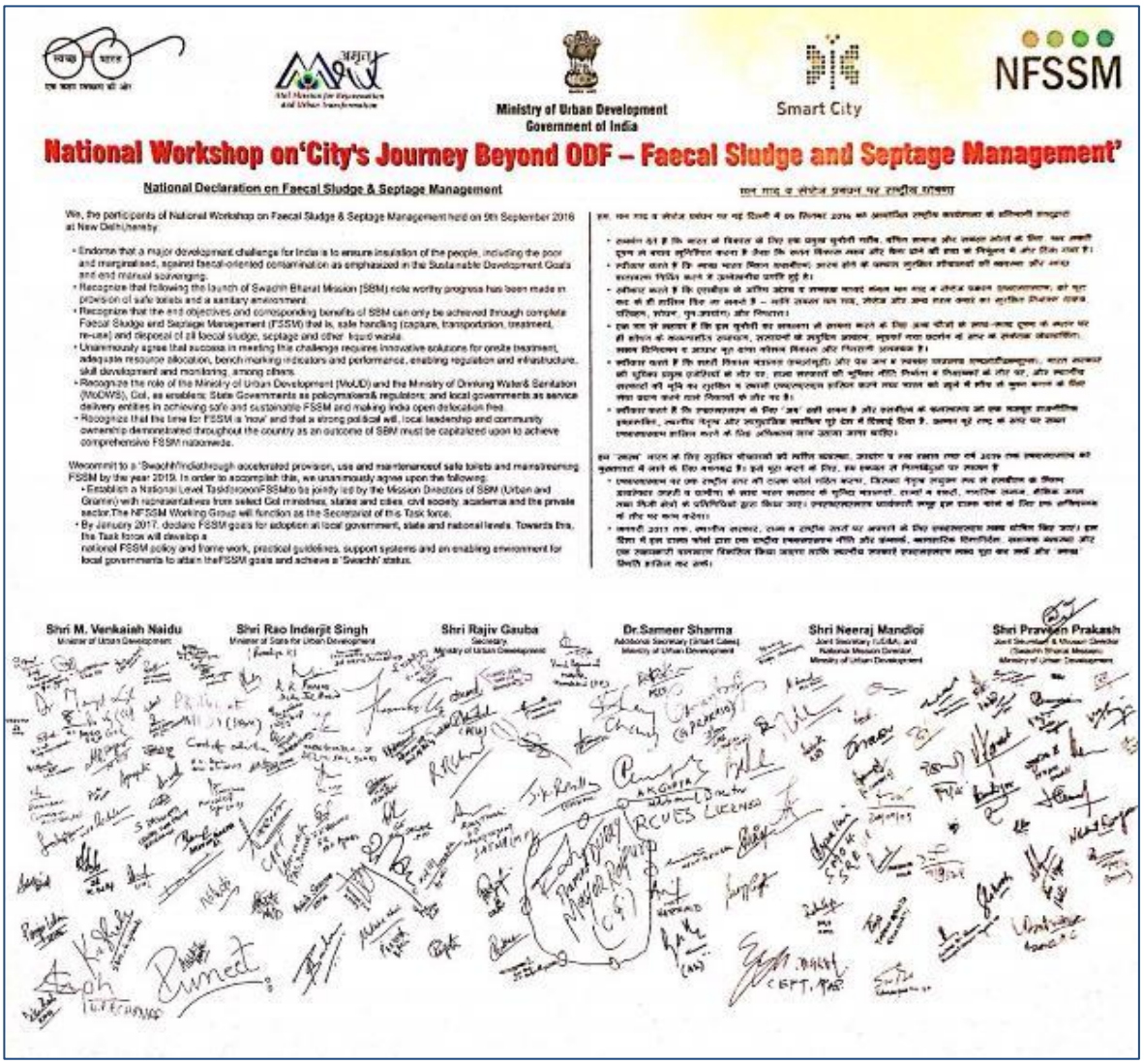


Figure 3: Copy of National Declaration on FSSM, September 2016

2 Objectives and Scope

2.1 Vision

The vision for Faecal Sludge and Septage Management in urban India is:

All Indian cities and towns become totally sanitized, healthy and liveable and ensure insulation of the people, including the poor and marginalised, against faecal-oriented contamination as emphasized in the UN Sustainable Development Goals, while also protecting water resources from pollution.

2.2 Thrust of the Policy

The thrust of this Policy is on the following to achieve maximum impact in the most effective manner:

i. Striving to ensure minimum standards of sanitation for all

ii. Public health, water resource protection as primary goals with environmental protection, nuisance free living space, resource recovery from wastes as secondary goals

iii. Appropriate strategy based on local conditions and needs, addressing critical concerns and gradually progressing towards achievement of full goals

iv. Clear driver and role definition and empowerment, and coordination and engagement of all ministries, agencies, private sector and stakeholders

v. Enabling legislative and institutional framework

vi. Training, Capacity building, Education and awareness

2.3 Objectives

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. More specifically, the Policy will:

i. Move India on the path of mainstreaming FSSM in urban India by the year 2019, and ensure that all benefits of wide access to safe sanitation accrue to all citizens across the sanitation value chain from containment, extraction, transportation, treatment, and disposal / re-use of all faecal sludge, septage and other liquid waste and their by-products and end-products.

ii. Suggest and identify ways and means, including the methods and resources, towards creation of an enabling environment for realising safe and sustainable FSSM in India

iii. Define the roles and responsibilities of various government entities and agencies, and of other key stakeholders such as the private sector, civil society organisations and citizens for effective implementation of FSSM services throughout the country.

iv. Enable and support synergies among relevant Central Government programs such as SBM, AMRUT and the Smart Cities Mission to realise safe and sustainable sanitation for all at the earliest, possibly by the year 2019.

v. While not compromising the eventual compliance to the strict environmental discharge standards already set, recognising the constraints in achieving these standards, adopt an appropriate, affordable and incremental approach towards achieving these standards.

Only OSS facilities and areas served by such facilities would fall under the purview of this FSSM Policy. While it does not seek to cover network or conventional sewerage system (including treatment plants) of wastewater/sewage management the synergy between FSSM and sewerage systems or municipal solid waste (MSW) management, e.g., co-treatment of faecal sludge and septage at sewage treatment plants or co-treatment and

management of faecal sludge and septage, and municipal solid waste is recognised, and these aspects will be covered.

Unless otherwise specified, the scope of this Policy extends to all the projects, programs and schemes of the Central Government that facilitate and support sanitation services, urban development and improved delivery of services in urban and peri-urban areas of India and any other approved program or scheme by the private sector. It also covers the initiatives undertaken and/or supported by all Central Government Ministries, Departments, Agencies, Authorities and Public Sector Undertakings that have a bearing on sanitation services in urban and peri-urban areas. Further, the Policy applies to every urban local body, outgrowths in urban agglomerations, census towns as declared by the Registrar General and Census Commissioner of India, notified areas, notified industrial townships, areas under the control of Indian Railways, airports, airbases, Ports and harbours, defence establishments, special economic zones, State and Central government organisations, places of pilgrims, religious and historical importance as may be notified by respective State government from time to time.

It is also strongly recommended that the State Governments, ULBs, and relevant public and private utilities take the necessary steps to ensure that this Policy covers all the projects, programs and schemes related to provision of sanitation services in their respective jurisdictions, irrespective of the source(s) of funding for these projects, programs and schemes.

2.4 Expected Outcomes

As this Policy is implemented across the country, it is expected to yield significant benefits in terms of improved public health indicators, considerable reduced pollution of water bodies and groundwater from human waste, and resource recovery leading to reuse of treated waste and other end products. Some key projected outcomes are:

- Containment of all human waste in 100% of the towns and cities
- Safe collection and conveyance of this human waste to treatment and disposal sites
- Scheduled emptying of septic tanks or other containment systems at an interval of 2-3 years as recommended by CPHEEO Manual, MoUD advisory on Septage management (2013)
- Safe disposal of all collected waste at designated sites (sewage treatment plants, Faecal sludge treatment facilities, lined pits for safe and scientific disposal, etc.)
- Continuous improvements in efficiency and effectiveness in the entire FSSM chain: containment, collection, conveyance, treatment and disposal
- Contamination of water bodies and groundwater from human waste (faecal matter) reduced to zero levels in all the towns and cities across India
- Nuisance from human waste reduced to minimum levels, resulting in nuisance-free living space in urban India

- Maximum reuse of treated sludge as fertilizer in farmlands, parks, gardens and other such venues, reuse of treated wastewater, as source of energy where feasible, and any other productive uses.

3 Legislative and Regulatory Context

3.1 Central Laws and Rules

The legal context for FSSM includes environment laws, laws for the legal prohibition of "manual scavenging" and institutional laws that provide for the establishment, powers and functions of local authorities. The first category, which includes the Environment (Protection) Act, 1986 and the Water (Prevention and Control of Pollution) Act, 1974 provide a framework for control of effluent, wastewater and septage discharge. Further, the Municipal Solid Waste (MSW) Rules, 2016 under the Environment (Protection) Act apply to the final and safe disposal of post-processed residual faecal sludge and septage to prevent contamination of ground water, surface water and ambient air. Further, the MSW Rules 2016 will apply to the final and safe disposal of post-processed residual faecal sludge and septage to prevent contamination of ground water, surface water and ambient air. Further, the MSW Rules 2016 will also apply for disposal and treatment of faecal sludge and septage, before or after processing, at landfills and for use as compost.

The Employment of Manual Scavengers and Construction of Dry Latrines (Prohibition) Act, 1993 put a ban on dry latrines, i.e., latrines with no water-seal or flushing mechanism, and the employment of persons for manually carrying human excreta. This was supplemented in 2013 with the Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013 by which "hazardous cleaning" in relation to sewers and septic tanks was also banned. The law now provides that manual cleaning of sewers and septic tanks, if necessary, may be carried out only in very controlled situations, with adequate safety precautions, and in accordance with specific rules and protocols for the purpose.

3.2 Formation of State level Rules and Regulations

Various state institutions, including urban local bodies, water and sewerage boards and other agencies are tasked with responsibilities in relation to faecal sludge and septage management. These institutions are established under specific state legislation, which provide for their composition, powers and functions. Most states do not however have detailed provisions in relation to faecal sludge and septage management, and as a result,

local institutions do not have clear responsibilities or powers in this respect. As a matter of fact, faecal sludge and septage management services are provided by a mix of formal public service providers, contractual operators and informal local service providers, but with very little supervision and control to ensure compliance with environment, health and safety and manual scavenging laws.

Therefore, it is recommended that State Governments and ULBs formulate rules and regulations, as well as operative guidelines for faecal sludge and septage management. This should be supplemented with a review the building regulations to ensure proper construction of adequate onsite facilities for anticipated loads, and for ensuring safe disposal. These will need to be disseminated to the construction industry and households through periodically scheduled interactions like workshops. Sites selected for sludge application by the ULB and by other parties (like residential layouts) would need prior consent to operate from the competent authority [like the Pollution Control Board (PCB)].

Rules, regulations and operative guidelines for faecal sludge and septage management should address:

- Delineation of private (individual houses, groups housing, institutions etc.) and public responsibilities (urban local bodies and other local authorities) in relation of faecal sludge and septage management
- Details of the planning and implementation process for carrying out safe and sustainable management of all faecal sludge and septage. This may be integrated with overall city land use planning, with the time based plan of holistically addressing waste water management via on-site, decentralised or centralised systems.
- Design of septic tanks, pits etc. (adapted to local conditions), including siting, and methods of approval of building plans, or retro-fitting existing installations to comply with rules
- Special provisions for medium and large format real estate developments
- Periodicity of desludging, and O&M of installations and the responsibilities of householders (owner/occupant)
- Operating procedures for desludging including safety procedures
- Licensing, record-keeping, monitoring and reporting arrangements for faecal sludge and septage service providers
- Methods and locations of transport (conveyance), treatment and safe disposal
- Tariffs or cess/tax etc. for septage management in the city
- Penalty clauses for untreated discharge for households as well as desludging agents
- Regular monitoring and evaluation of the entire process of FSSM
- Training, accreditation, education and awareness programs

All public and private sector staff should adhere to safety norms as provided in the Manual on Sewerage and Sewage Treatment published by the Ministry of Urban Development and such other safeguards under the Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013 and that the ULB may provide under its own rules. For disposal of septage, the ULB will need to follow the standards set out in the Environment (Protection) Act, 1986, and MSW Rules 2016 depending on the mode of disposal.

It is important that all ULBs make provision of land and other infrastructure facilities that are required for safe treatment and disposal /reuse of human waste generated in their areas. This should go hand in hand with strict enforcement of disposal by desludgers, as well as recognition and partnership with such providers of this critical service. Desludgers should be asked to register with the municipal bodies and there should be a strong partnership and dis-incentive to unsafe disposal, Households should also be encouraged to have a regular desludging schedule and this too, should be monitored by the municipal / urban local bodies through a systematic monitoring system. Some good examples are in setting up call centres, and formalizing associations of desludgers and ensuring that households are regularly desludged. A system of incentives (discounts on taxes) and disincentives (penalties) should be set up.

4 Roles and Responsibilities

The Ministry of Urban Development, Government of India (GoI) will be responsible for the overall guidance, coordination and interpretation of this Policy. It will disseminate the Policy among the State and ULB level decision-makers as well as dovetail it with the Ministry's urban development programmes and schemes. It will provide the necessary technical and planning support to the States and ULBs and will also design, lead and implement a national awareness campaign on this issue.

GoI recognizes that sanitation is a state subject and on-ground implementation and sustenance of public health and environmental outcomes requires strong city level institutions and stakeholders. Although there are some common elements across urban areas of India, there are a number of factors, constraints and opportunities that are peculiar to specific situation of states and cities with respect to sanitation, climate, physiographic factors, economic, social and political parameters, and institutional variables. Therefore each state and city needs to formulate its own FSSM strategy and integrate the same in their respective State and city sanitation plans in overall conformity to the National Policy. Several other stakeholders such as households, civil society organisations, the private sector (small, medium and large), research organisations, too have a critical role to play in achievement of safe and sustainable FSSM services for all.

Table 1: Summary of Roles and Responsibilities

Institution	Lead Role	Supportive Role
Ministry of Urban Development	Enactment of FSSM related laws, policies and guidelines National level monitoring and evaluation; Technical and planning support to States and ULBs Training and capacity building of State level officials and those from select ULBs Funding through specific schemes and plans National level awareness and behaviour change campaign Support Research and Capacity Building in the sector	Formulation of State and City level FSSM strategies and implementation plans
Ministry of Environment, Forest and Climate Change	Formulate standards, guidance and technical advisory appropriate for FSSM Enforce compliance of the relevant environmental laws and rules during the collection, transport, treatment and disposal of faecal sludge and septage	Support and build capacity of State Pollution Control towards enforcement of relevant laws and rules
Ministry of Social Justice and Empowerment	Schemes and Plans towards elimination of manual scavenging and rehabilitation of manual scavengers Monitor and evaluate progress at the National Level National level awareness campaign	Help States and ULBs eliminate manual scavenging and rehabilitate manual scavengers
Other Central Government Ministries	Integrate the provisions of the FSSM Policy into their plans, schemes and activities Reuse of resultant compost from treatment of faecal sludge and septage	Coordinate with MoUD, States and ULBs to achieve the objectives of the FSSM Policy
State Governments	Develop State level FSSM Strategy and Implementation Plan Develop Operative Guidelines on FSSM Training and capacity building of ULB officials and others engaged in provision of FSSM services State level monitoring and evaluation State level awareness and behaviour change campaign Create enabling environment for participation of the private sector in provision of FSSM services including to	Technical, financial and administrative support to ULBs Encourage coordination and cooperation among ULBs Regulate and help ULBs set up systems to ensure financial sustainability in provision of FSSM services

Institution	Lead Role	Supportive Role
	the poor and marginalized households and areas Funding through specific schemes and plans Support Research and Capacity Building in the sector	
Urban Local Bodies	Design, develop, plan and implement ULB level FSSM strategy Set up and ensure operation of systems for 100% safe and sustainable collection, transport, treatment and disposal of faecal sludge & septage Develop expertise, in-house and outsourced, to provide safe and effective FSSM services Awareness and behaviour change campaign to engage diverse stakeholders Develop training programmes for masons to build requisite skills in construction of quality septic tanks as per ISO norms Set up systems to ensure financial sustainability in provision of FSSM services Achieve objectives of FSSM Policy in a time-bound manner Design and implement plans to eliminate manual scavenging and rehabilitate manual scavengers Funding through specific schemes and plans Monitor and evaluate FSSM strategy and implementation plan	Create enabling environment for NGOs and private initiatives to achieve safe and sustainable FSSM
Private Sector	Participate in provision of safe and sustainable FSSM services Acquire requisite skills through training and capacity building at all levels	Work with States and ULBs to develop sustainable business models for safe provision of FSSM services
Research and Civil Society Organisations	Undertake primary research to further safe and sustainable FSSM in India Develop models for safe and sustainable delivery of FSSM services to all Support implementation of FSSM activities at ground level Raise awareness and sensitization on the importance of FSSM among the general population	Knowledge and implementation support to MoUD, States and ULBs

Institution	Lead Role	Supportive Role
	Provide monitoring support to the ULB on any unsafe practices that impact effective FSSM Set up regular interactions with the ULB to discuss operational issues and be part of the solution	
Multilateral, Bilateral and other International Institutions	Integrate provision of FSSM Policy into the programs, projects and activities	Knowledge, financial and implementation support to MoUD, States and ULBs
Masons	Acquire requisite skills through training and capacity building to construct quality septic tanks as per ISO norms	Engage with HHs to convince them of the value of constructing quality septic tanks
Households	Timely and regular cleaning of septic tanks through approved entities Regular maintenance and monitoring of septic tanks Timely payment of user fee and/or charges, if any, towards FSSM services	Engage with decision-makers at State and ULB level to ensure that they receive good quality FSSM services

5 Implementation Approach

It is envisaged that state-specific FSSM Policy, Strategy and Guidelines conforming to the National Policy will be developed by each State.

5.1 State-level implementation strategy

Each State is expected to develop and issue FSSM Implementation Strategy and Plan Guidelines. To be developed based on the State Policy and Plan, the Guidelines should provide an overall state-level framework, objectives, timelines and implementation plans to the ULBs. States such as Maharashtra, Odisha and Tamil Nadu have already put in place such guidelines. They could be modified, if required, in the context of this Policy. Also, existing state-level guidelines provide good examples for other states that will prepare their own set of guidelines.

5.2 ULB level implementation plan

Each ULB is expected to develop a detailed FSSM plan in conformity to the National FSSM policy and respective state guidelines on FSSM. Citywide assessment of FSSM is the key step for FSSM process planning. Cities need to undertake assessment of the current situation of FSSM around the five areas detailed out as per Annexure-1 for developing a FSSM plan. Such plan should be technically appropriate and financially feasible. Assessment in each area entails review of available information at city level, identifying information gaps, and conducting field studies where necessary.

In addition, adequate attention and focus has to be paid to public outreach and behaviour change communications to ensure timely and necessary participation of all the key stakeholders. The range of stakeholders may include on-site sanitation system users, NGOs, municipal employees, relevant private sector firms, elected representative and the media.

Each FSSM plan will have a specific monitoring and evaluation framework to continuously gauge implementation progress and document lessons for constant improvement. It is very important that cities work systematically with each group of stakeholder to ensure alignment of goals and buy-in. The ownership for all activity relating to FSSM must be driven by the Municipal /ULB head.

FSSM plan need to be backed by enabling regulatory and institutional framework. Enforcement of all regulations should be strict, to ensure compliance and also provide the right dis-incentives. At the same time, timely rewards and incentives should be given to both communities and service providers to encourage positive behaviour.

6 Financing Plan

The Government of India will providing assistance for funding projects proposed as part of FSM Plans through its ongoing schemes like AMRUT, SBM, 10% Lump Sum for NE States, Satellite Township Scheme, etc. However, the emphasis will be on improving the efficiency of existing sanitation infrastructure and service delivery.

State government may use of 14th Finance Commission funds to implement the FSSM plan at city level. State government should promote engagement of private sector participation across sanitation service chain. State government should encourage ULBs to start levying sanitation tax/ user charges to meet the O&M cost for effective FSSM operation at city level.

7 Monitoring & Evaluation

At the national level, the Government of India is adopting San-Benchmark framework for revised service level benchmark for sanitation that assess performance of citywide sanitation, which also captures on-site sanitation systems and sewage management. San-Benchmark framework for revised Service Level Benchmark for Sanitation is attached as Annexure 2.

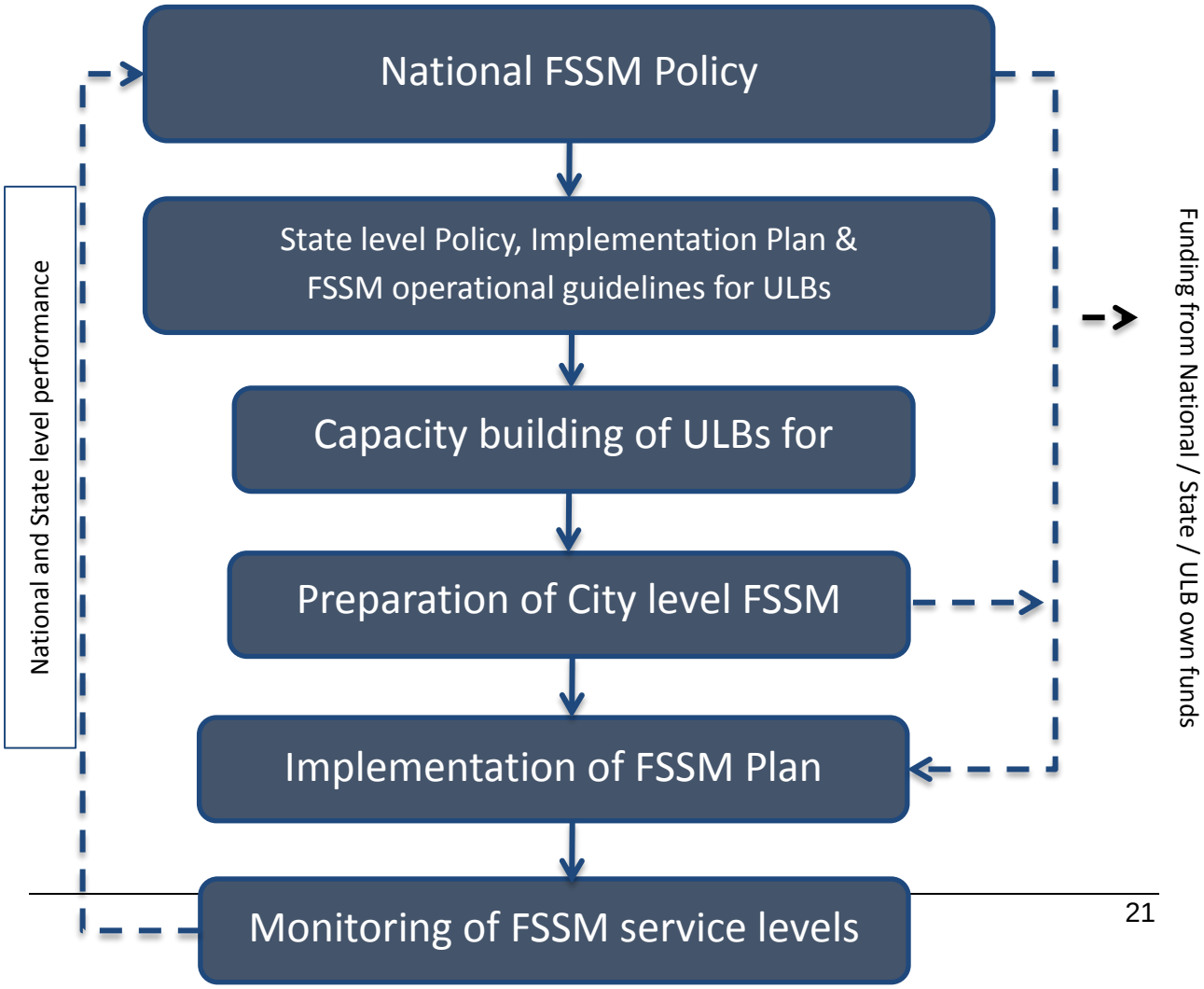
State government will be responsible for M&E of its cities' performance, and hence needs to devise data collection and reporting systems using indicator framework developed for San-Benchmark. This needs to be aligned with the 14th Finance Commission condition of publishing the service level benchmark to avail performance grant. ULBs in turn need to develop database related to on-site sanitation system, robust reporting format to track compliance of households (establishments, etc.) with outcomes and process standards.

8 Capacity Building & Training

Government of India will help formulate a strategy on capacity building and training on FSSM to support states and cities to build their personnel capacities and organizational systems for delivery of sanitation services. Government of India will make effort to integrate the FSSM components in ongoing capacity building programme under AMRUT, SMART Cities and SBM.

The state government needs to identify agencies that will train its state level, ULB personnel and orientation of elected representatives on aspects related to FSSM. These agencies could be specialist agencies of the state government, academic institutions and private sector organizations. This will also need to focus on capacity building, i.e. not just training but also development of systems and capacities of ULBs in sanitation, in line with the Urban Sector Reforms that the state may be implementing under AMRUT, SMART cities and SBM. ULBs will need to provide training on sanitation to their own staff – using the specialized agency selected by state government. They will need to utilize ongoing Govt. of India and State Government Schemes for training and capacity building in order to achieve this. Training will also need to be imparted to private sector players and NGOs to help them engage and deliver effectively in the provision of FSSM services.

9 Implementation Process



Annexure 1: Framework for preparation of city level FSSM Plan

City-level Assessment

Citywide assessment of FSSM is the key step for FSSM process planning. This is organized around five key areas. The cities shall undertake assessment of the current situation of FSSM around the five areas detailed out below for developing a FSSM plan that would be 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.

A. Assessing service performance across the full service chain

Assessing performance across the sanitation service chain through a city level assessment is the first step that cities will undertake. It is an important exercise, which provides an initial sense of the state of FSSM in the city, help in understanding the context and identifying gaps in key services. Annexure 2 provides an example of a tool (*San-Benchmarks*[4]) to assess service performance though there may be other such tools and approaches that could be employed by the cities.

[4] The revised SLB framework is being rolled out in Gujarat, Maharashtra, Chhattisgarh, Telangana and Assam under the aegis of PAS project, CEPT University

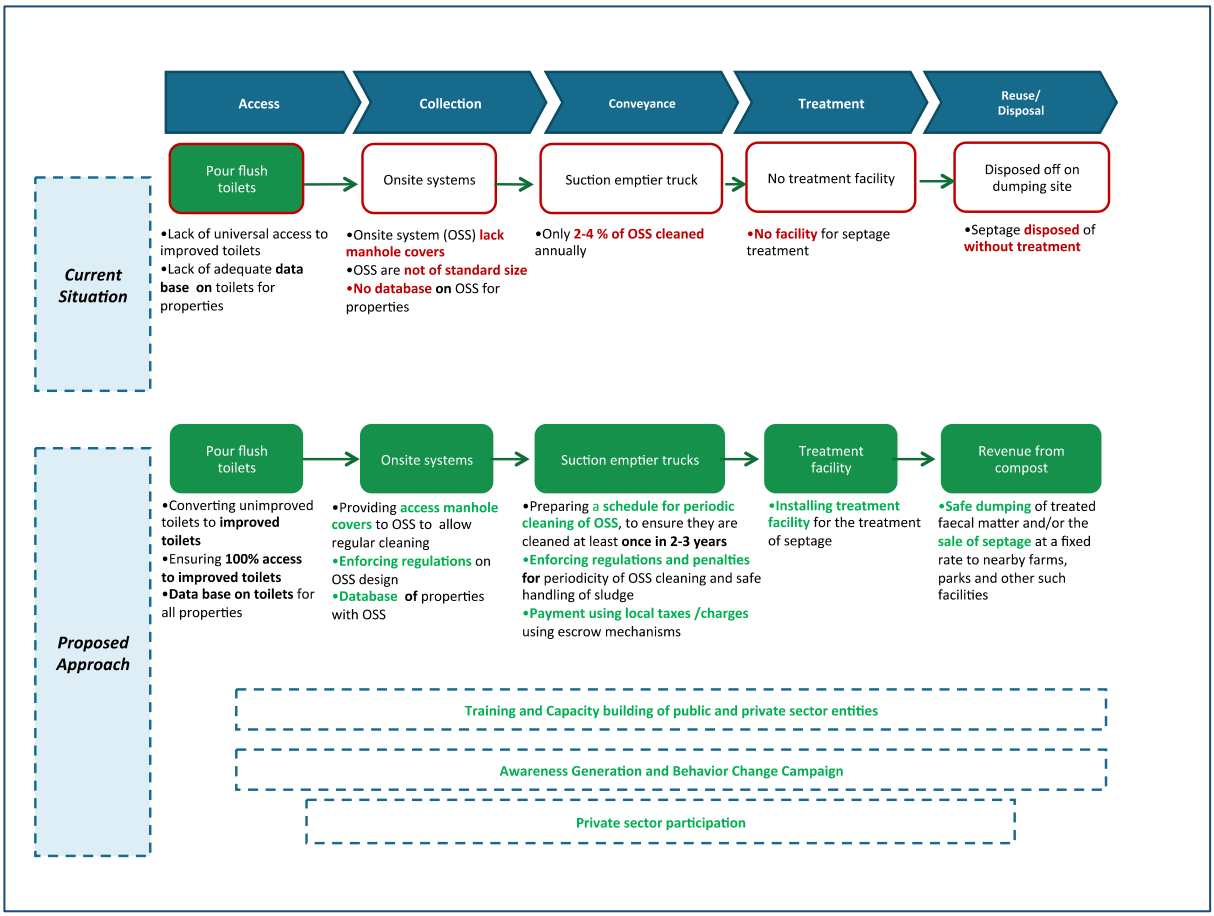


Figure 4: FSSM Service Chain[5]

Figure 3 depicts the existing situation assessment of on-site sanitation status across service chain in majority urban local bodies of India and a possible framework for action to achieve the vision of improved sanitation through FSSM.

B. Enabling Environment: Policy, Regulation and Institutions

Sanitation is increasingly seen as a key issue in environmental protection. Improper disposal of human waste can pollute water bodies, groundwater, and land surfaces. This affects the quality of life for those living in the urban area. In this context, it is important that cities understand and assess the prevailing enabling and regulatory environment as well as capacity of local stakeholders to manage the citywide FSSM services. This should be aligned with the State/national policies and guidelines on FSSM, and the regulatory framework for treatment, disposal, and reuse of faecal matter.

Cities should also work in active partnership with service providers to design a robust set of interventions, based on ground realities and operational issues. There should also be a system of disincentives and regulation that is strictly enforced; with a set of incentives and market opportunities for those with good compliance (e.g. discounts on tolls, registration and better branding).

[5] Guidelines for septage management in Maharashtra, Swachh Maharashtra Mission, Urban Development Department, Govt. of Maharashtra.

C. Technology options for FSSM Services

In planning citywide FSSM service, it is important that cities assess technology options for each link in the service chain. This ranges from appropriate toilets and onsite systems such as septic tanks and conveyance to treatment and reuse. For toilets and septic tanks, assessment of these systems is necessary. For emptying services, options such as scheduled emptying of pits/septic tanks and assessing infrastructure requirements need to be assessed. Finally, many technologies are available for septage treatment. These will need to be assessed using a framework for choosing an appropriate option for treatment of septage at a city level, including looking at existing installed treatment capacity at sewage treatment plants in potential proximity. The possibility of reuse will also need to be assessed.

D. Role of private sector role across the service chain

While the city government generally has the mandate to ensure service provision, often there is an active private sector that provides FSSM services in the city. It is necessary that cities 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 FSSM strategy is developed and development of performance based contracts. It is also important to have well designed service level agreements, with both incentives for good performance and disincentives/penalties for failing to deliver at agreed upon quality standards. Women entrepreneurs should be especially encouraged, either directly or through the cooperative and SHG vehicles. These can be for both operating community / public toilets and also desludging operations, and other sanitation services.

E. Financial assessment

To ensure financial sustainability of FSSM services, it is important that cities assess capacity for financing of 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 along with subsequent tariff restructuring to make the system sustainable.

This assessment should also provide guidance to cities on potential sources of finance for meeting these expenditures including through external grants, private sector investments, user contributions, and external debt or through local government internal resources.

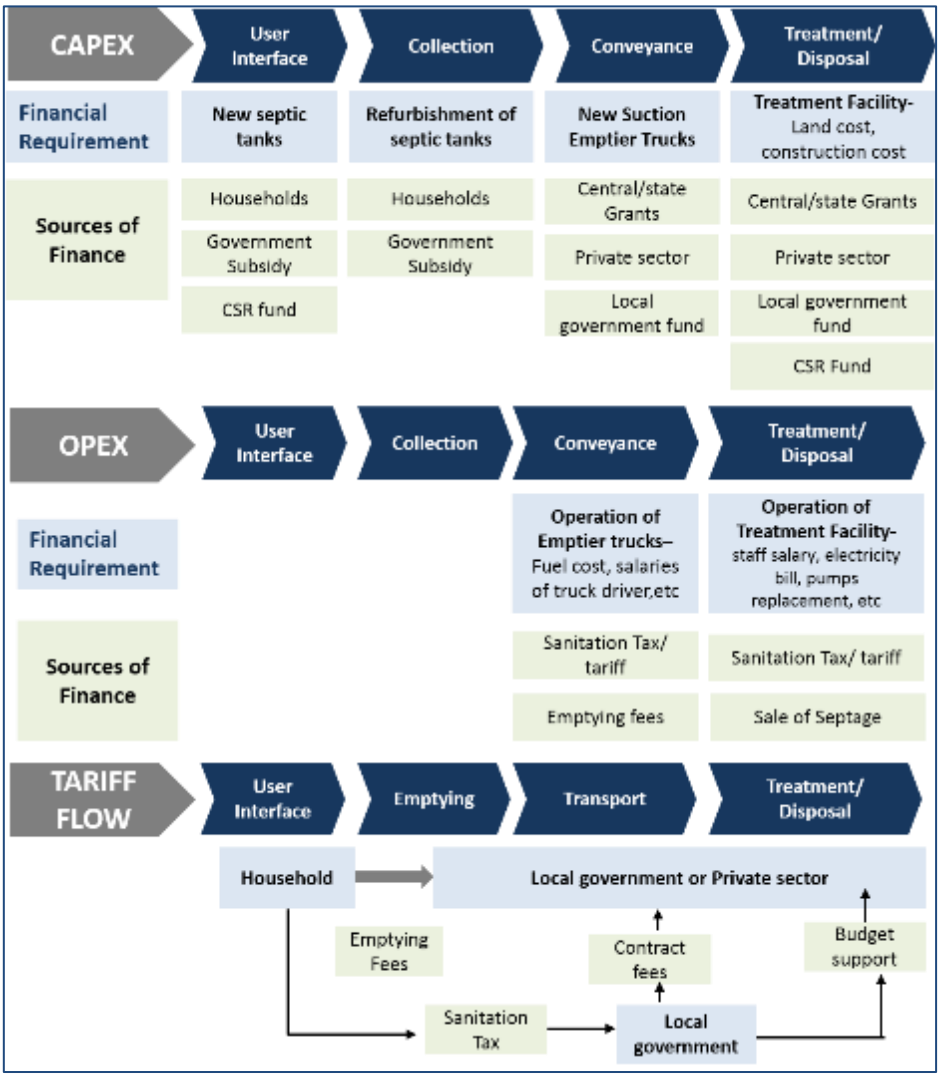


Figure 5: Flow and Sources of Funds[6]

More details regarding this framework is available on www.ifsmtoolkit.pas.org.in

[6] Primer on Faecal Sludge and Septage management, Ministry of Urban Development, Government of India

Annexure 2: Draft San-Benchmark framework for revised Service Level Benchmark for Sanitation

Current SLB indicators (Sewerage System)	Proposed San Benchmark (Sewerage + Onsite systems)
1. Coverage of sewerage network services	**1. Coverage of adequate sanitation system**
Total number of properties with individual connections to sewerage network as a percentage of total number of properties in the city.	Percentage of households with individual or group toilets connected with adequate sanitation systems (sewer network/ septic tank / double pit system) to total households in the city.
2. Collection efficiency of sewerage network	**2. Collection efficiency of sanitation system**
Quantum of wastewater collected at the intake of the treatment plant to the quantity of wastewater generated (as per CPHEEO, 80% of water consumed is generated as wastewater).	Weighted average of collection efficiency of each sanitation system, weighted by share of households dependent on each sanitation system.
3. Adequacy of sewage treatment capacity	**3. Adequacy of treatment capacity of Sanitation System**
Adequacy is expressed as secondary treatment capacity available as a percentage of normative wastewater generation.	Weighted average of adequacy of treatment plant capacity available for each sanitation system, weighted by share of households dependent on each sanitation system.
4. Quality of sewage treatment	**4. Quality of treatment of sanitation system**
Quality of treatment is measured as a percentage of WW samples that pass the specified secondary treatment standards, that is, treated water samples from the outlet of STPs are equal to or better than the standards lay down by the GoI agencies for secondary treatment of sewage.	Weighted average of quality of treatment of each sanitation system, weighted by share of households dependent on each sanitation system.
5. Extent of reuse and recycling of sewage	**5. Extent of reuse and recycling in sanitation system**
Quantity of wastewater that is recycled or reused after secondary treatment as a percentage of quantity of wastewater received at the treatment plant.	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

Current SLB indicators (Sewerage System)	Proposed San Benchmark (Sewerage + Onsite systems)
	household dependent on each sanitation system.

Source: SAN Benchmarks: Citywide assessment of sanitation service delivery – including onsite sanitation, PAS Project, CEPT University; short URL - goo.gl/Uv7vLW available on website: www.pas.org.in

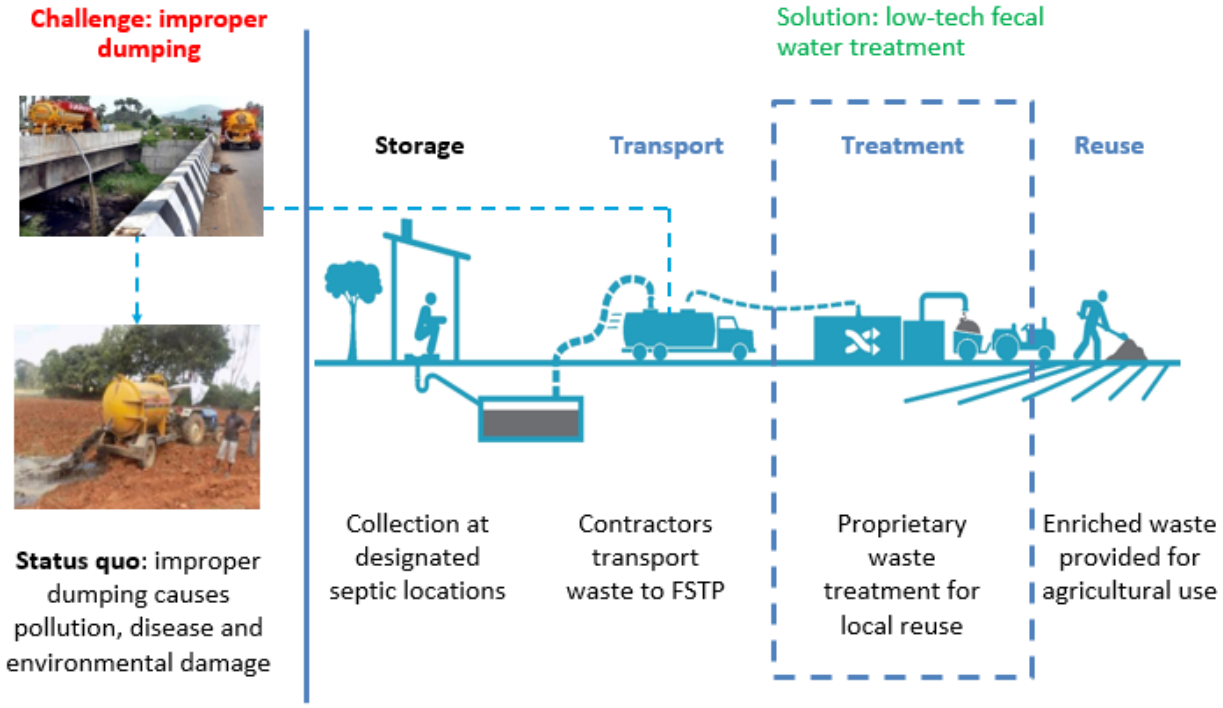
Annexure – 3: Successful case studies on decentralised FSSM setup

Devanhalli Case Study

Devanahalli TMC did not have an underground drainage (UGD) system; most of the households depended on septic tanks for sewerage disposal. Of the 6400 household, about 5110 households were provided with individual sanitation facility i.e. septic tank and the rest were using existing public toilets or were resorting to open air defecation. In addition, there were only 4 public conveniences. In some cases the sewer outlet was disposed directly into the drain. Most of the night soil was washed out through the existing drains causing nuisance and health hazards to the entire area.

Leveraging on the Fecal Sludge and Septage Management approach, the percentage of sewage effluent that was treated increased manifold and the sewage treatment plant demonstrated its own revenue generation potential through production of manure.

Some highlights:



Bansberia Case Study

Bansberia is a town and a municipality in Hooghly district in the state of West Bengal, India. Total population within municipality is dependent on onsite sanitation systems. The containment systems in Bansberia mainly comprise of septic tanks and pits. There are 4 main types of containment systems found in Bansberia.

- Septic tank connected to soak pit (20% population)

- Septic tank connected to open drain (5% population)
- Fully lined tank connected with no outlet (4% population)
- Lined pit with semi permeable walls and open bottom with no outlet (71% population)

It has been found that FS of 43% population is not contained and emptied and FS of 50% population is not contained and not emptied.

All the septage that is generated within the municipality area and also from outside, is fed into a treatment plant. This Treatment plant has been installed on a PPP basis between Bansberia Municipality and a bio-compost and animal study company. This project has resulted in composting of 100% of the faecal waste generated in the country. 100% of the septage is emptied each day is disposed in treatment plant. Supernatent (SN) from septic tank to open drains is discouraged, and it is enforced by an official notification from municipality which penalizes in case of non-compliance.

Figure 6: Disposal of Septage at FSTP facility

No separate liquid treatment is undertaken. The liquid gets evaporated while there may be some seepage coming out from the sludge drying beds which finds its way into the Hooghly river.

GOVERNMENT OF ANDHRA PRADESH
A B S T R A C T

Municipal Administration & Urban Development – Faecal Sludge and Septage Management as a part of implementation of reforms under the AMRUT for the year 2016-2017 – Approved – Orders – Issued.

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MUNICIPAL ADMINISTRATION & URBAN DEVELOPMENT (UBS) DEPARTMENT

G.O.Ms.No.134 Dated:31-03-2017

Read:-

From the Director of Municipal Administration, Guntur
Letter Roc No. 1638/2017- M3 dated 14.03.2017.

*** ***

O R D E R:

In the circumstances reported by the Director, Municipal Administration, Guntur in the reference read above, Government hereby approve " Faecal Sludge and Septage Management" Policy together with Operative Guidelines for Urban Local Bodies in Andhra Pradesh as annexed to this order.

The Director, Municipal Administration, Guntur shall take necessary further action in the matter.

(BY ORDER AND IN THE NAME OF THE GOVERNOR OF ANDHRA PRADESH)

R.KARIKAL VALAVEN
PRINCIPAL SECRETARY TO GOVERNMENT

To
The Director, Municipal Administration, Gorantla, Guntur.
Sf/Sc

//FORWARDED BY ORDER//

ASSISTNT DIRECTOR

FAECAL SLUDGE AND SEPTAGE MANAGEMENT:

POLICY AND OPERATIVE GUIDELINES FOR URBAN LOCAL BODIES IN ANDHRA PRADESH

Table of Contents

1. Introduction

Urban Andhra Pradesh was declared Open Defecation Free by the Honourable Chief Minister, Shri Chandrababu Naidu, on October 2, 2016. Achieving this has been a major success in terms of infrastructure building, human development, sanitation, and public health. It was the crucial first step in creating an Andhra Pradesh whose citizens can enjoy clean and sanitary cities; however, it is not the only requirement. Over ninety percent of urban households in Andhra Pradesh use on-site sanitation systems, such as septic tanks, pit latrines, and soak pits.

As these containment facilities are not connected to any larger system, they need to be emptied periodically. When emptied, the refuse from these tanks, called "faecal sludge" and "septage," is usually thrown directly into the environment without any processing or treatment – this sludge goes directly from septic tanks into rivers or onto fields, often within municipal boundaries. "Faecal Sludge" includes the liquids, solids, as well as the fats, oils and grease (scum) that accumulate in containment units over time, while "Septage" usually refers to the refuse of septic tanks in particular. As a variety of containment typologies exist in Andhra Pradesh, these regulations will primarily refer to faecal sludge and septage, though the two terms are used here interchangeably. This refuse, called either faecal sludge or septage, is harmful and contains many pathogens hazardous to human health. Accordingly, the unregulated dumping of faecal sludge into the environment is an ongoing public health and environmental crisis both in Andhra Pradesh and across the country.

The central government has taken notice. Accordingly, when the Ministry of Urban Development (MoUD), Government of India formulated the National Urban Sanitation Policy (NUSP) in 2008 in order to provide urban Indians with clean, healthy, liveable, and sanitary community-driven cities and towns, a set of recommendations regarding septage (also known as faecal sludge) was included. The NUSP recommends that septage be collected, transported, and disposed of properly at well-maintained purpose-built treatment facilities.

There are two major sources of standards and guidelines for septage management in India: The National Building Code, last revised in 2005 by the Bureau of Indian Standards (BIS); and The Manual on Sewerage and Sewage Treatment, prepared by the Central Public Health and Environmental Engineering Organization (CPHEEO) in 2012.

While the CPHEEO Manual assigned responsibility for checking sludge accumulation on a daily basis and determining emptying times to households, the CPHEEO Manual also recommended that state and municipal governments draw up action plans and implementation budgets for extracting, treating, and disposing of the sludge generated in on-site facilities in accordance with the "Septage Management Guidelines" (MOUD, 2013). Further, the Ministry of Urban Development in 2016 published set of guidelines on Faecal Sludge and Septage Management (FSSM) which can provide further support to ULBs.

Faecal sludge and septage management (FSSM) includes the entire process of design, collection, safe treatment& disposal of faecal sludge /septage based on generation of waste. A comprehensive program that regulates periodic cleaning of on-site containment, , as well as septage transport, treatment, re-use, and disposal is important in the context of our rapidly urbanizing state.

1.1 Current Scenario in Andhra Pradesh

Andhra Pradesh is a rapidly urbanizing state; 146 lakh people, or 29.6% (Census 2011) of the state's population live in urban areas, and urban populations are growing at an accelerating pace. In accordance with the Honourable Chief Minister's push to create an Andhra Pradesh blessed by total sanitation, Faecal Sludge and Septage Management, is being accorded highest priority by the Government of Andhra Pradesh.

There are 14 Municipal Corporations and 96 smaller Municipalities in the state. Of these combined 110 Urban Local Bodies only five local bodies possess partial sewage treatment plants (STPs), DPRs are currently being developed to construct underground sewerage systems (UGSSs) and STPs in some AMRUT towns. None of Andhra Pradesh's ULBs will enjoy even 50% sewerage coverage upon the completion of this infrastructure in the short to medium term.

ULB-wise capacities of existing STPs is therefore given following table on the next page.

Table 1 - ULB Wise Capacity of STP's (2015)[1]

#	City/Town	STP Location	Status	Capacity (MLD)
1	Rajahmundry	Rajamundry, ED District	Operational	30
2	Tirupati	Tukivakam	Operational	25
3	Vijayawada	Azithsinghnagar	Operational	27.27
4		Azithsinghnagar	Under Construction	40
5		Auto Nagar	Operational	10
6		Ramalingeswara Nagar	Operational	10
7		Poornanadampet	Operational	14
8	Vishakhapatnam	Appughar	Operational	25

9		Muvasalava	Under Construction	13
10		Old Town	Under Construction	38
11		Port Area	Operational	10
12	Vizianagaram	Pedda Chuvu	Operational	5

[1] Central Pollution Control Board, Inventorization of Sewage Treatment Plants, 2015

1.2 The Need for Faecal Sludge and Septage Management system in Andhra Pradesh

Although Andhra Pradesh is currently in the process of developing and extending underground sewerage systems, they currently serve less than ten percent of urban households. While this number mayrise in the coming years, it is not projected to reach fifty percent even in major towns and cities over the next decade. Furthermore, the majority of municipalities, those not designated as AMRUT towns, will continue using on- site sanitation (OSS) for the foreseeable future. Across the world, governments are realizing that conventional sewerage systems, while advantageous in certain situations, are not a sanitation panacea as they require huge capital expenditures, consume significant amounts of water, need extensive operations and maintenance throughout their existence and high skill set at municipal level to maintain.

As a result of these factors, Faecal Sludge and Septage Management is a necessary component of the efforts to ensure Andhra Pradesh's towns and cities are clean and sanitary. These efforts will require developing detailed rules and regulations, refurbishing existing septic tanks and latrines and developing desludging, transportation and treatment infrastructure.

While municipalities plan for faecal sludge treatment infrastructure, , they should pursue short-term incremental improvements simultaneously through operationalizing steps outlined in this document. . These incremental improvements may be prioritized for the first year after these guidelines become operative, after which point focusing on longer-term solutions will take priority.

These guidelines will regulate collection, treatment, and disposal of faecal sludge and septage in urban areas in Andhra Pradesh. This following sections details out these guidelines.

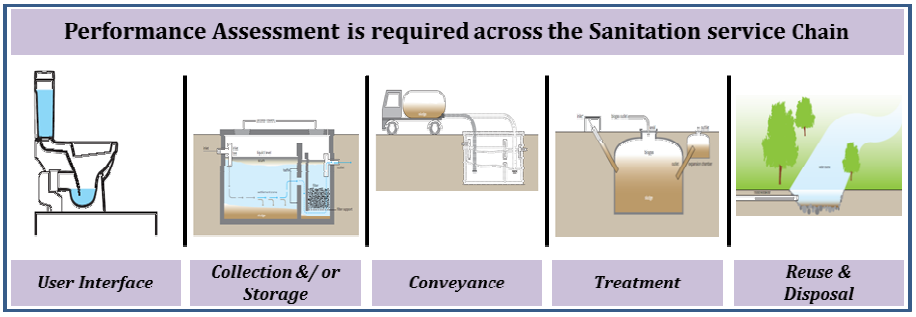
2. Operative Guidelines for Urban Local Bodies

Faecal Sludge and Septage Management (FSSM) for the local bodies includes both residential and non- residential/commercial waste (though not industrial waste). These Operative Guidelines for FSSM seek to empower municipalities with knowledge, procedures and facilities for planning and implementing FSSM . In particular, City Sanitation Task Forces (CSTFs) should take up an active planning and advisory role in cooperation with municipal councils in order to dedicate appropriate resources and attention to the challenges of faecal sludge management.

Step by step approach: Operationalizing Faecal Sludge and Septage Management

Assessing service performance across the sanitation value chain through a town level assessment is the first step in planning process. It is an important exercise, which provides an initial sense of the state of FSSM facility in the town, help in understanding the context and identifying gaps in key services.

The sanitation value chain considers the following 5 stages:



Detailed assessment of services will need to be done across each link in the chain through appropriate field assessments. As policies and regulations already exist for ensuring toilet access, these operative guidelines focus on the last four stages of the value chain: collection and/or storage, transportation, treatment, and disposal or reuse.

2.1 Collection & Storage

Collection and **Storage** describes the ways of collecting, storing, and sometimes initially treating the excreta and grey water generated by toilets. The toilet may be connected to sewerage system; on-site systems like septic tanks with soak pits, leach pits, or may be functioning as Ecosan/composting toilets. Similarly, for grey water disposal, the households may be connected to sewerage system or drains of any kind.

The first step that all municipalities must take is to assess all existing toilets and containment facilities in order to create a comprehensive database. Steps are listed below:

a) Town level assessment of coverage of toilet and on-site sanitation facility using the existing database (like property tax module) or based on recent survey carried out under Swachh Bharat Mission (SBM).

b) If the ULB do not have a database, then ULB shall create database of toilets and containment units. All ULBs shall collected information related to toilet availability, type of toilet, containment typology (septic tank, pit latrine, soak pit, etc.), and its connection with waste water outlet. This information should be linked with property tax databases on e-governance platform. While this evaluation may require an extended timeline, municipalities should develop a plan and timeline to be shared with and monitored by the state government.

c) ULB shall keep updated database related to toilet availability and on-site sanitation through property tax assessment survey carried out from time to time. .

d) Municipalities shall evaluate existing containment units and other storage/treatment systems and modify (in case of variation) based on design mentioned in Annexure 1.

e) Notices should be issued to all property owners whose containment facilities do not meet the standard septic tank design. National/state aid may be sought in order to financially support the conversation of improper containment units into sanitary toilets. .

f) Identify insanitary toilets and convert them to sanitary latrines for safe collection and disposal of waste as per norms set out in Annexure 2.

g) All existing containment facilities should have access covers for each chamber, so that they can be easily opened during emptying process. Where such covers are not available, it should be made compulsory for all property owners to provide proper covers.

h) Pursuant to the previous four steps, municipalities must take efforts to build the capacity of masons and builders to teach them how to construct proper toilets and refurbish improper already-built containment units. Details regarding the codes that must be followed are included in the next item.

i) When new containment facilities need to be built, they should be built as septic tanks designed and constructed as per instructed in the National Building Code, 2005 and CPHEEO Manual, 2013 which takes reference of design norms from IS: 2470 on 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). The design norms CPHEEO Manual, 2013 is compiled in Annexure 1.

2.2 Transport

Transport describes the movement of sludge across the service chain from individual septic tanks and latrines to municipal or regional treatment facilities. Currently, these services are largely unregulated across Andhra Pradesh, particularly in smaller cities and towns. Municipalities must take on two tasks: **first**, they must regulate operators by establishing a system of licensing, which will facilitate the enforcement of health and safety standards and the prevention of open dumping; **second**, they must design a plan to conduct a system of scheduled emptying in which every containment facility is emptied at least every three years (with more frequent emptying for public accommodations, community/public toilets, and the like). This scheduled emptying will be contingent on having completed a detailed survey of individual containment facilities (as referred to in Section 2.1), and so may not be operationalized immediately; nevertheless, ULBs shall develop plans to do so.

ULBs must take the following steps (some are also required in section 2.1, but at listed here for clarity)

a) Determine how many households use on-site containment systems and ascertain how much sludge they can contain in order to determine the amount of sludge that will be emptied every year (presuming a three-year emptying cycle for individual households and more accelerated cycles on an as-assessed basis for public and commercial facilities).

b) Determine how many septic tanks /pits are emptied annually and what volume of sludge is disposed of at present by looking at actual on-ground practices.

c) Determine the average price per emptying (and accounting for how it may differ based on volume and containment facility location) that operators are charging.

d) Use the above data to determine as to how many trucks would be needed if septic tanks were emptied on a three-year basis and design a database for maintaining a register of containment facilities that are emptied.

e) Create a registration system for private truck operators which permit them to legally empty septic tanks within the ULB. However, these permits will require that they adhere to safety and hygiene standards both in emptying and disposal (detailed below), establish certain regulated tariffs for emptying septic tanks and latrines, and require the use of receipts to track emptying and disposal. The permits and receipts required for this system are included in annexures 3, 4, and 5. Pursuant to this, ULBs should establish a system for penalizing trucks that operate without valid permits/licenses.

f) ULBs should mobilize enough vehicles, either through public or private means, to support a three- year emptying system. This should be done in line with the growth in demand for emptying services, so that trucks are not left underutilized.

As section "e," mentioned previously, truck operators must take the following measures while desludging:

- The septic tanks should not be fully emptied; small amount of sludge of around 1 to 2 inches should be left in the septic tank to facilitate decomposing of incoming faecal waste.
- No fire or flame should be used near the septic tanks as there may be inflammable gases inside septic tanks.
- Proper safety gear (including uniform, tools, and well-maintained vehicles) must be used by the operator while desludging/emptying the septic tanks/Pits. The rules under the Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013 provide for a comprehensive list of safety gear that should be used while providing these services.
- Operators should clean their surroundings before leaving and after desludging; residents should not find their homes or surroundings dirtier.

2.1.3 Treatment, Disposal, and Reuse

Treatment: ULBs must not dispose the faecal sludge /septage collected from septic tank/pits without any treatment and ULBs must comply with CPCB and APPCB norms before disposal of septage. ULBs should assess the load of septage and assess the requirement of capacity for treatment plant. ULBs should first try and assess the possibility of setting up faecal sludge treatment facilities at the solid waste treatment/disposal site or at sewage treatment plants within the city or utilizing co-treatment, pending the advice and recommendations of the appropriate engineering authorities. In particular, the state recommends co-locating purpose-built infrastructure, i.e. building faecal sludge treatment plants next to either sewage treatment plants or solid waste management plants, in order to gain advantage from synergies in operation and maintenance (effluent from FSTP can go to STP, or output of FSTP can be co-composted with solid waste, etc.).

Reuse/disposal refers to the methods in which products are ultimately returned to the environment, as either useful resources or reduced-risk materials. The treated septage can be used as a soil enricher or as filling material at construction sites. ULB should carry out primary assessment for availability of market and demand for reuse.

ULBs shall take the following steps in order to properly treat faecal sludge.

a) Operators shall be forbidden by regulation to dispose offsludge collected from the septic tanks or pits into fields, rivers, nalas, forests, etc. These regulations shall be enforced and violation shall be subject to advertised financial and/or legal penalties. These penalties should come into force as soon as there is a sanitary location for dumping faecal sludge.
b) ULB should first assess the possibility of sludge treatment at existing STP in the city or STP of nearby city through appropriate agreements with STP operators and receiving ULBs. A list of cities that have STPs is given in Table 1. Some STPs are under construction in different cities. Proper tests and assessment should be carried out by STP operators before receiving Faecal sludge/septage.
c) If STP is not available in the city or nearby that can receive the sludge, then ULB should plan for new faecal sludge treatment facility. Such a new faecal sludge treatment plant should be designed to cater to expected volumes of septage generated in urban local body and if faecal waste is expected from nearby rural areas or ULBs.
d) Input quality of the collected septage should be tested at the treatment facility for checking presence of any metal or traces of industrial waste.

e) The faecal sludge treatment plant should be operational during working hours only and a responsible person should be appointed in the facility to ensure that no industrial waste is unloaded in these facilities.

f) Septage should be reused/disposed of only after it meets the parameters in Annexure 6.

Measures to be taken while planning for Faecal Sludge Treatment Plant

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

- **Distance of treatment site**: Distance from emptying to delivering and accessibility of the treatment site are major issues. The transport of relatively small faecal sludge volumes on congested roads over long distances in large urban areas is financially unfeasible. A site that is too far away implies fewer trips per day, less revenue and more fuel costs to private operators.
- **Reliability of electricity**: It is also important to assess the availability and reliability of electricity if treatment technology has mechanical operated parts; as in case of fluctuations it will increase treatment time and will affect optimal utilization of treatment capacity.
- **Neighbourhood**: A treatment site may generate objectionable odours. For this reason, it should be located at an appropriate distance from the residential areas and communities should be consulted during the process of designating land for a treatment plant.
- **Land availability**: Projects are often delayed because of non-availability or high price of land. ULBs should identify the land bank for treatment facility. ULBs should also explore the possibility of developing faecal sludege and septage treatment facilities near solid waste dumping sites or already existing sewage treatment plants in order to streamline disposal processes: effluent from FSTPs may be treated at an STP, and the treated sludge may be co-composted with solid waste
- **Geological Parameters**: Assessment of existing geological conditions on site including groundwater table, type of soil, flooding risk is always recommended to ensure that the structure can be safely constructed and sludge will not enter the environment through either porous soil or frequent floods.

2.1.4 Awareness generation and capacity building activities

Awareness generation activities need to be taken up for successful implementation of faecal sludge management plan. Wherever possible, these activities should be led by City Sanitation Task Forces, or a sub- committee including members of CSTFs and other interested parties. Where CSTFs do not exist, ULBs should take efforts to establish CSTFs with particular sub-committees on FSM.

These awareness-building activities are crucial, as ULBs do not have the coercive capacity to force citizens to comply with FSM regulations; they must be accepted by citizens. Associated training and capacity building of municipal staff as well as private sector contractors also needs to be taken up.

a) **Awareness generation for residents**: Members of Resident Welfare Associations, community organizers, self-help groups and the general public should be sensitized periodically regarding the need for a safe faecal sludge management system including a 3-year cycle. The 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. Sample material for awareness generation is in Annexure 5. Awareness generation activities should be carried out at the beginning of introducing a scheduled service in all wards and then repeated periodically over the three-year cycle.

b) **Capacity building for municipal staff**: Municipal Commissioners, Engineers, Health Officers, Sanitary Inspectors, and Sanitary Workers should be well trained in safe septage management and its best practices. This involves regular training sessions on safe collection, treatment and disposal. Information regarding standard septic tank design, the need for periodic inspection and desludging of septage, design of a treatment facility, tender details for engaging licensed transporters, etc. should be disseminated widely to achieve a safe faecal sludge management system. Training should also be provided on safety standards.

c) **Capacity building for septage transporters/private vendors**: Local Bodies should ensure all safety norms are clearly explained to the septage transporters. Private Operators and Transporters should be well trained in safe collection and transportation of sewage including vehicle design, process of desludging, safety gears and safe disposal at the nearest treatment facility.

d) **Gender Inclusivity:** It is crucial that municipalities look at faecal sludge management through a lens considering gender, particularly concerning the empowerment of women and girls. Women should be equitably involved in the planning of feacal sludge management activities or the formation of local regulations, and any CSTF or sub-committee that discusses faecal sludge management should have a membership consisting of at least one-third women, at minimum.

2.1.5 Record-keeping, Reporting, Monitoring and Feedback Systems (MIS)

Record keeping and manifest forms should be an integral part of a comprehensive septage management program. Recordkeeping requirements should be codified into the law governing the program. A sample manifest form is detailed out in Annexure 5.

a) The completed document or documents with signatures of the household/property, suction truck operator, and treatment plant operator should be submitted to the local government for their records. These documents would validate that the sludge collected from households is disposed of at proper treatment facilities.
b) A database system such as the one discussed in access and collection will need to be developed and maintained.
c) Where possible, GIS should be used to be plan the route of suction emptier trucks and track emptying trucks for regular record keeping.
d) Consumer grievance redressal system for faecal sludge management should also be set up as a part of urban local body record keeping systems and helpline numbers to be shared with residents as a part of monitoring and record keeping systems for faecal sludge management.

2.1.6 Private Sector Participation for Septage Management Activities

For effective operationalize of scheduled septic tank emptying service and treatment facilities, ULBs may also explore the option for private sector participation. Following points to be taken into consideration by ULB:

a) Explore private sector participation for various activities like procurement, operations and maintenance of the suction emptier trucks, construction and operations of septage treatment facility and possible re-users of treated septage within the city as well as in nearby cities.
b) Develop performance based contracts such that payment is linked to the performance of private sector for providing the services.

3. Financial Resources and Considerations in Faecal Sludge and Septage Management

While Faecal Sludge and Septage Management treatment options are significantly most cost effective than conventional sewerage options, they still require capital costs that some municipalities cannot bear. Most of the initial source of funding across the sanitation value chain will have to be provided by the joint effort of the central and state government through allied programme funding like Smart City, AMRUT etc.

Private Funding Options

1. Desludging fee paid by user to the desludging service provider
2. Fine for faulty containment system construction and illegal disposal of faecal sludge.
3. Sale of end products (For Eg. Dried faecal sludge, water).
4. Property tax designated for FSM.

State and Municipal Funding Options

a) As per the Andhra Pradesh Municipal Corporation Act, 1955 – conservancy tax can be levied on all the properties by the Corporation where city undertakes the collection, removal and disposal of excrementitiously and polluted matter from privies, urinals and cesspools.

b) Periodic revisions for the taxes/ charges to be effected based on revisions in costs involved.

c) To the extent possible, revenues should be generated from sale of treated septage for agriculture or other purposes.

Additional Funding Options

a) ULB may utilize the funds from **14th Finance Commission** to implement the various components related to septage management plan. Creation of database for toilets and septic tanks, procurement of suction emptier trucks and construction of septage treatment facilities are the permissible components to utilize the 14th FC funds. The funds would also be provided as preparatory activity like preparing detailed project report and prefeasibility report for septage management.

b) **IEC & Capacity building funds**: IEC funds under SBM can be utilized for various awareness generating activities. This applies to ULBs using funds to implementing septage management plan, and can include funding capacity building activities for ULB staff, septage transporters, treatment plant operators, and ULB residents.

c) **Convergence with existing schemes/activity**: ULBs can ask for funds under the existing state and national schemes such as Smart City Mission AMRUT

d) **Corporate Social Responsibility**: ULBs can also raise funding through Corporate Social Responsibility.

4. Technology Options for Septage Management

Treatment options for faecal sludge /septage are based on four treatment objectives. These four mechanism enable sludge to be handled, disposed of, and/or re-used safely.

1. **Solid liquid separation:** Solid-liquid separation is the first step for successful treatment of feacal sludge, as refuse must be brought to some sort of uniform consistency.
2. **Dewatering**: Before treatment, faecal sludge is over 80-90% water by volume; de-watering is necessary to reduce volume/weight and destroy the habitat that allows dangerous pathogens to grow.
3. **Stabilization**: Stabilization refers to several biological and chemical processes through which ongoing biological-chemical reactions run their course and nutrients are consumed by bacteria.
4. **Reuse applications**: Once the previous three steps have been accomplished, sludge can be re-used for productive purposes or sent on for further treatment (such as co-composting with solid waste) depending on its chemical/biological profile.

Septage containment and treatment technology options are included according to Swachh Bharat Mission Guidelines in the following table. In any given context, the technology choice for conveyance system generally depends on the following factors:

- Type and quantity of products to be transported
- Distance from containment facilities
- Accessibility
- Topography
- Soil and groundwater characteristics
- Financial resources
- Availability of a service provider
- Management considerations

Technologies for Faecal Sludge management based on the above objectives can be adopted as mentioned in Table 2.

Urban Local Bodies can choose from a range of treatment options available in the market, depending upon their needs and available finances.

Table 2 – Technical Options Across the Faecal Sludge Value Chain

Containment	Transport	Treatment			Reuse
		Solid/Liquid	Dewatering	Further Treatment	
Septic Tank (preferred)	Small Vacuum Truck (1,500 – 3,000 litres)	Imhoff Tanks	Mechanical	Co-composting	Soil conditioner
Twin Pit System	Large vacuum truck (3,000	Settling /Thickening Tanks	Unplanted drying beds	Deep row entrenchment	Irrigation
Aerobic bio-digester			Thermal Drying	Sludge incineration /pyrolysis	Building Material
Anaerobic bio-digester			Solar Drying	Anaerobic digestion	Biofuel
			Planted Drying beds	Black soldier flies /vermicomposting	Proteins
				Lime/Ammonia	
				Co-treatment with wastewater up to 3% FS of current STP load	

*Adopted from IWA publication *Faecal Sludge Management Systems Approach for Implementation and Operation, IWA Publications, 2014.*

Annexure 1: Septic Tank Specifications, Guidelines, and Designs

Depending on the geography, soil condition, water seepage capacity of the soil the design can be prepared and approved by the Local Bodies. Proper septic tank design considers the following factors:

- Sized properly with appropriate sludge detention time, volume and hydraulic
- retention time
- Proper inlet and outlet structures
- At least one baffle separating the tank into multiple compartments
- Water tight
- Access port for each compartment that allows for inspection and pumping

Table1: recommended Sizes of Septic Tanks as per Number of Users

Number of Users	Length (M)	Breadth (M)	Liquid Depth for a Cleaning Interval of 3 Years (M)
5	1.50	0.75	1.05
10	2.00	0.90	1.40
15	2.00	0.90	2.00
20	2.30	1.10	1.80
50	5.00	2.00	1.24
100	7.50	2.65	1.24
150	10.00	3.00	1.24
200	12.00	3.30	1.24
300	15.00	4.00	1.24

(Note; The CPHEEO Manual and NBC code IS 2470 Part I 1985 may be referred for exact calculations)

Table 2: Existing guide lines for design and construction of septic tanks

Parameters	Existing Guidelines	Source Of Guideline	General Observations
Location	Septic tanks are recommended only for individual homes, small communities and institutions whose contributory population size doesn't exceed 300 A sub soil dispersion system shall not be closer than 18 meters from any source of drinking water, such as well, to mitigate the possibility of bacterial pollution of water supply	**CPHEEO Manual** **NBC, Part 3: Development Control Rules and General Building Requirements**	*While all existing guidelines state that the location of septic tank should be given due consideration, in reality, the location of the septic tanks are practically based on the land availability within the household vicinity*
Design and Construction	Septic tank should be located at a place open to sky, as far away as possible from the exterior of the wall of building and should not be located in swampy areas or areas prone to flooding. Septic tanks should have a minimum width of 750 mm, depth of 1 meter below water level and a minimum water capacity of 1 cubic meter. The length of the tank shall be 2 to 4 times the width. The minimum nominal diameter of the pipe shall be 100 mm. Further at junctions of pipes in manholes, direction of flow from a branch connection shall not make an angle exceeding 45 degrees with the direction of flow in main pipe Every septic tank shall be provided with a ventilation pipe of at least 50 mm diameter The liquid depth should be 2-3 m and the length to depth ratio should be 2-3 to 1. The liquid depth of the septic tank should be calculated depending on the cleaning interval of the septic tank (For detail length, breadth and liquid depth for various number of users please refer the Manual); A provision of 300 mm should be made for free board When served for a population above 100, the septic tank may be divided into independent parallel chambers for operation and maintenance Baffles are provided at inlet and outlet and should dip 25 to 30 cm into and project 15 cm above the liquid. The invert of the outlet	**IS 2470, Part-1** **NBC, Part 3: Development Control Rules and General Building Requirements** *septic tanks* **;** **IS 2470, Part -1** *governing the design and construction* **CPHEEO;** **IS 2470, Part-1**	*Local masons unaware of the existing design/construction guidelines for construction of septic tanks. The criterion broadly is the land availability and the funds available with the house owner / property builders* pipe should be provided at 5 to 7 cm

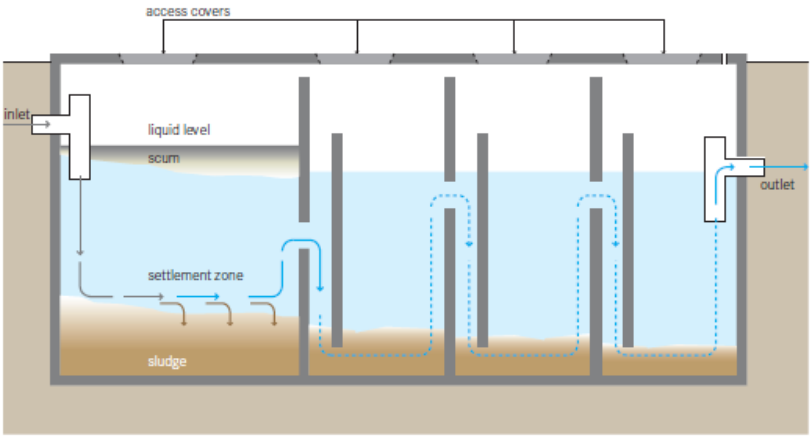
below the invert level of inlet pipe.

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

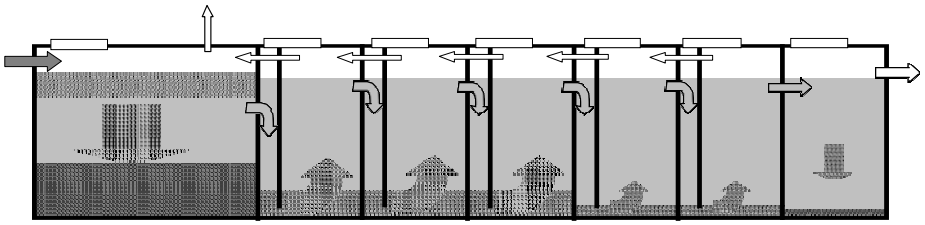
Improved Septic Tank" - the walls of the conventional septic tank can be replaced with baffle walls to have a multi chambered baffled septic tank. The paper states "This movement of wastewater inside the tank helps in creating the turbulent flow which causes enhanced mixing of the raw sewage with already existing activated sludge and accelerates the decomposition of the solids because of intensive contact between the activated sludge and fresh influent".	**CSE Policy Paper on septage management in India**

Design for improved septic tank- three chamber with anaerobic baffled reactor

Design for improved septic tank- three chamber with anaerobic baffled reactor



Anaerobic decentralized waste water treatment systems (DEWATs



Annexure 2: Guidelines for Conversion of Insanitary Latrines into Sanitary Toilets

Table: Existing guide lines for leach pits

Parameters	Existing Guidelines	Source
Size(five members)	Dia – 1000 mm preferred but 750 mm also permitted where space is a constraint Depth – 1300 mm	CPHEEO
Emptying	Single pit – 6 years, Twin pit – 3 years each	CPHEEO
Shape	Circular preferred; but rectangular, oval and square also allowed where space is a constraint	CPHEEO
Location	Pits should be placed symmetrically at the back side of the pan. Can be located within premises, under foot pat/road/narrow lane The distance between foundation and pit should be between 0.2 to 1.3 m A minimum distance of 3 to 10 m from water sources such as tube wells and 3 to 10 m from water mains Water pipe should not cut across the pit	CPHEEO
Design and construction	The pits should be lined to avoid collapsing. Bricks joined in 1:6 mortar commonly used for lining. Stones or laterite bricks of cement concrete rings could also be used. Lining brick work 115 mm thick (half brick) with honey combing up to the invert level of incoming pipe or drain. Size of holes 50 mm wide up to the height of brick course Pit bottom should be left in natural condition RCC slab is used for pit cover Toilet pan is connected to the pit through a 75 mm brick channel of U shape	CPHEEO

Annexure 3: Form for Application for the License the Collection, Transportation and Disposal of Septage in Andhra Pradesh

Paste Self-Attested Recent Passport Size Photograph

1. Name of the applicant: Shri/Ms_____
2. Nationality: Indian_____Other_____
3. Address: Regd. Office:_____Head office: _____
4. Telephone No.: (O)_____Mobile No._____Email ID_____
5. Registration No. of Vehicle :_____
6. Pollution certificate of the vehicle valid up to:_____
7. Insurance of the vehicle valid up to:_____
8. Fitness of the vehicle valid up to:_____
9. Vehicle, whether fitted with GPS:_____
10. Details of the vehicles indicating model, type, capacity, leak proof, odour and spill proof having propervacuum/ suction and discharging arrangement (Document proof of any may be enclosed).
11. Processing fee for license Rs. 1000/- (Non-refundable)
    D.D. No._____Date_____Bank_____

I/We certify that information given by me/us in column 1 to 11 are true to the best of my knowledge and belief. I also certify that I have read and understood the attached terms and conditions 1 to 13 and agree to abide by them. I agree that if any information given by me is found wrong the application for license will be liable for cancellation at any time.

Signature(s) of applicant(s)

No. of document attached:_____ Date: _____

Annexure 4: License for Collection and Transportation of Septage

In accordance with all the terms and conditions of the By-laws/ Regulations, Municipal Corporation Act rules, the special license conditions accompanying this license and applicable rules and laws of Government of Andhra Pradesh, the permission is hereby granted to:

NAME OF

LICENSEE……..

ADDRESS……

…

For the disposal of septage from septic tanks in TOWN HERE

This license is based on information provided in the Septage Collection and Transportation License Application. This license is effective for a period of five years from date of issue, set forth below.

EFFECTIVE DATE EXPIRATION DATE

The license may be suspended or revoked for Condition of Non Compliance and is not transferable. The original license shall be kept on file in the Licensee's office. A copy of this license shall be carried in every registered vehicle used by theLicensee.

Annexure 5: Collection and Transport Records

Sample Form to be filled by Operator/Transporter of Feacal Sludge

i. Identification of Waste:

a) Volume: _____

b) C:_____Septic Tank ____Others (Please Specify):

c) Source: _____ Residential____Commercial____Restaurant ____Portable Toilet ____Others

ii. Details of Waste Generator

a) Name

b) Phone Number

c) Address

d) Pin

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

Date:_____Signature:_____Proposed Date for Next Desludging (Year): ___

iii. Details of Transporter / Operator

a) Company Name:

b) Permit #

c) Vehicle License #

d) Pump out date

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

e) Signature of authorized agent and title: _____

iv. Acceptance by_____Municipality's authorized FSTP/STP

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

Disposal date:_____Amount Collected from Transporter:_____

Signature of authorized signatory and title: _____

NOTE: SUBJECT TO THE TERMS AND CONDITIONS OF_____MUNICIPALITY

Annexure 6: Safe Reuse and Disposal of Treated Septage[2]

Table 1: Compost Quality as per MSW Rules, 2000

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

For dewatered septage/sludge can be used as fertilizer in agriculture application, it should satisfy the following criteria of Class A Bio-solids of US EPA: A faecal coliform density of less than 1000 MPN/g total dry solids, Salmonella sp. density of less than 3 MPN per 4 g of total dry solids. WHO (2006) suggests Helminth egg concentration of < 1/g total solids and E coli of 1000/g total solids in treated septage for use in agriculture

MSW Rules (2000) recommended the quality for compost as referred to Table below.

In the absence of any standards, it is recommended that these be adopted until such time standards are notified by the Central Pollution Control Board.

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. Septage sludge, as a result of lime stabilization has pH buffering capacity that is beneficial for the reclamation of acidic soils. Treated septage contains nutrients in considerable amounts, which supports the growth of a number of plants.

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

Aquaculture can be practiced for settled septage effluent when freshwater is available to achieve dilution to ensure dissolved oxygen is above 4 mg / l. Fish species of tilapia and carp are preferred since they tolerate low dissolved oxygen. Both drip irrigation and aquaculture need land and are feasible at city outskirts.

[2] Source: Advisory note: Septage Management in Urban India, Ministry of Urban Development, Government of India. (2013) and Guidelines for septage management in Maharashtra. (2016)