



Policy & Guidelines for Septage Management in Punjab

March, 2017



Disclaimer

This report is compiled from various government reports and guidelines. It draws from the Ministry of Urban Development, Government of India's Advisory Note on Septage Management in Urban India-2013, National Policy on Faecal Sludge and Septage Management-2017 released by MoUD, Guidelines for Septage Management in Maharashtra, Operative Guidelines for Septage Management for Urban & Rural local bodies in Tamil Nadu, Manuals of Central Public Health Engineering

The report is to be used solely as a reference guide by various stakeholders. Urban local bodies are advised to seek guidance and technical approval from appropriate authorities before implementation. The PMIDC is not responsible for the content or the consequences of any action taken on the basis of the information provided in this report.

Guidelines for Septage Management in Punjab.

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Guidelines for Septage Management in Punjab

1 Septage Management and its importance

Introduction:

“Septage” is the liquid and solid material that is pumped from a septic tank, cesspool, or other treatment facility after it has accumulated over a period of time. A septic tank will usually retain 60 to 70% of the solids, oil, and grease that enter it. The scum accumulates on top and the sludge settles at the bottom, comprising 20 to 50% of the total septic tank volume when pumped. Septage has an offensive odor and appearance and contains significant levels of grease, grit, hair, and debris. It is a host for many disease-causing organisms.

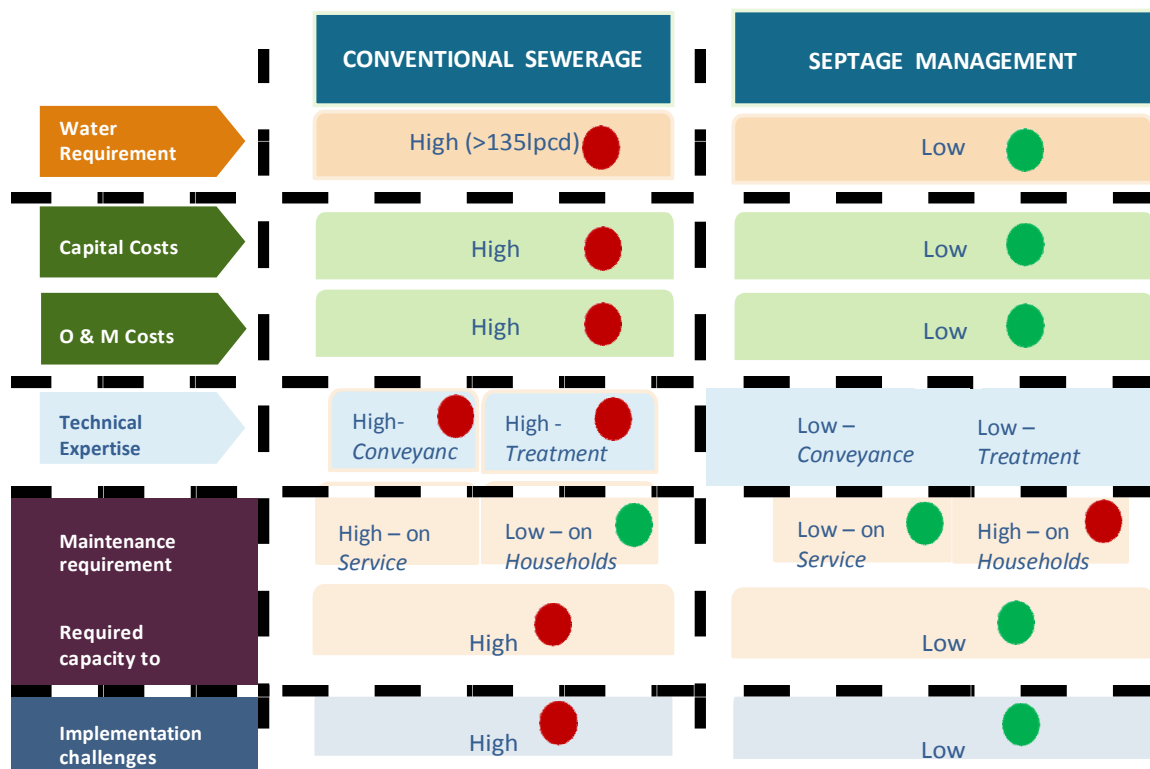
Septage management Plan covers the entire service chain starting from design of septic tank, collection, conveyance, safe treatment and reuse or safe disposal of Septage.

Proper treatment and management of faecal sludge is integral to safe sanitation practices. According to the Census 2011 around 30 million urban households, are not connected to any sewer system. Even if the cities create more underground sewerage infrastructure, the septic tank often remains an integral component of the sewerage scheme. A rapid assessment of septage management in Asia carried out by USAID in 2010 revealed that in India about 148 million people in urban areas depend on septic tanks. This was recognized by the National Urban Sanitation Policy (NUSP), 2008, which emphasizes the need for proper collection, treatment and disposal of sludge from on-site installations. In this context, more attention needs to be paid to proper construction of toilets and septic tanks, their maintenance and safe collection, conveyance and disposal of faecal sludge from these systems.

In addition to this, most urban local bodies (ULBs) in India do not effectively monitor the regular cleaning and maintenance of septic tanks. Some ULBs provide septic tank cleaning as a municipal service. This is generally treated as a

Complaint Redressal activity. So when the septic tank/pit overflows a complaint is registered with the ULB. However, many ULBs do not have adequate number of emptying trucks and are unable to provide prompt service. In many cities private players have filled this gap by providing these services. However, their fees are quite high and their services are not regulated. Disposal of collected Septage/faecal sludge is not regulated, and sludge is dumped in open drains or in water bodies, or near garbage dumps. Such practices pose considerable health and environmental risks.

The benefits of Septage management over the conventional sewerage systems are as follows:



Recognizing the growing importance of safe faecal sludge management practices, there is an emerging need for framing an operative guideline for Septage management for ULBs

Current Scenario in Punjab

Punjab is one of the most urbanized states in India with around 37.49 % (Census 2011) of the population living in urban areas. In terms of Septage Management, Punjab has accorded highest priority (Vision 2023) to the implementation of Underground Sewerage scheme and waste water treatment plants across local bodies in order to provide better sanitation facilities.

There are 10 Corporations, 27 class- I, 45 class-II, 26-class III and 57 Panchayat functioning in the state. . So far, only 64% of Punjab urban population is covered by UGSS. As per Census 2011, Punjab, around 93.36% of households have individual toilets within the premises of which 63.74 % are connected to sewer network, 20 % to septic tanks and around 7% to pits and other systems. The toilets that are connected to septic tanks/ pits often discharge the effluent into road side open drains. The ULB wise capacity of the STPs and the present flow Capacity of STPs commissioned is given in the table below.

A. Sewage Treatment Plants (Completed and Commissioned)

Sr. No.	Town	Name of scheme	Capacity (MLD)		Sr. No.	STP	Name of Scheme	Cap. (MLD)
(A) PWSSB								
1	Abohar	PMIDC funded	25		39	Patiala	UIDSS MT	10
2	Baretta	GOP	3		40	Phagwar a (North)	SAP	20
3	Banga*	Under NRCP	3		41	Phagwar a (South)	NRCP	8
4	Bathinda	GOP	52		42	Phagwar a (North) *	Under NRCP	8
5	Begowal	State Govt. funds	2.5		43	Phillaur	SAP	2.5

A. Sewage Treatment Plants (Completed and Commissioned)

Sr. No.	Town	Name of scheme	Capacity (MLD)	Sr. No.	STP	Name of Scheme	Cap. (MLD)
6	Bhikhi	GOP	3	44	Phillaur (South) *	Under NRCP	3
7	Bhucho	GOP	3	45	Pathankot *	UIDSS MT	27
8	Bhulath	NRCP	4	46	Rampur a Phul	GOP	7.5
9	Banur	State Govt. funds	4	47	Ropar	GOP	10
10	Dasuya	NRCP	4	48	Ropar	GOP	2.5
11	Dera Baba Nanak	GOP	1.5	49	Ropar	GOP	2
12	Fazilka	GOP	8	50	Samana	IDUI	10
13	Goniana	GOP	3	51	Sangat*	GOP	1.5
14	Hoshiarpur*	Under NRCP	30	52	Sardulgarh	GOP	4
15	Jalandhar	SAP	100	53	Sham Churasi	GOP	1
16	Jalandhar (Pholriwal-I)	UIDSSMT	25	54	Sri Hargobindpur	State Govt. funds	1
17	Jalandhar (Pir Dad)	NRCP	50	55	Sultanpur Lodhi	BAP	2.6
18	Jalandhar (Pholriwal-II)	NRCP	25	56	Talwandi Sabo	GOP	3
19	Jalandhar (Jaitewali)*	UIDSSMT	25	57	Zira	ACA & GOP	8
20	Jalandhar (Bambianwali)	NRCP	10	58	Zirakpur	UIDSS MT	17
21	Kapurthala	BAP	25	59	Budhlada	State Govt. funds	6.5
22	Khanna (Primary treatment only)	GOP	10	60	Jagraon	State Govt. funds	16
23	Kotfatta	GOP	1.5	61	Chamkaur Sahib	State Govt.	1.7

A. Sewage Treatment Plants (Completed and Commissioned)

Sr. No.	Town	Name of scheme	Capacity (MLD)		Sr. No.	STP	Name of Scheme	Cap. (MLD)
							funds	
24	Ludhiana (Balloke)	SAP	152		62	Mukerian	NRCP	5
25	Ludhiana (Balloke)	JNNURM	105		Total (A)			1184.3
26	Ludhiana (Bhattian)	SAP	111					
27	Ludhiana (Bhattian)	JNNURM	50		(B) Water Supply & Sanitation Department			
28	Ludhiana (Jamalpur)	SAP	48		1	Anandpur Sahib	WSSD	8
29	Machhiwara*	ACA & State	4		2	Jalalabad	WSSD	8
30	Malout*	GOP	3		3	S.A.S. Nagar	WSSD	45.4
31	Mansa	State Govt. Funds	14		4	Muktsar	WSSD	8.7
32	Maur	State Govt. funds	4		5	Muktsar	WSSD	5.7
33	Moga	NRCP	27		6	Muktsar	WSSD	3.5
34	Nakodar*	PMIDC funded	6		Total (B)			79.3
35	Nangal	MC	8		(C) GLADA			
36	Nangal*	MC	5		1	Maloud	Under GLADA	1
37	Nawan Shahar	Under NRCP	6					
38	Patiala	UIDSSMT	46		2	Mullanpur Dakha	Under GLADA	3
					Total (C)			4
Note-* STP completed and under stabilization					(D) GMADA			
					1	Kurali	Under GMAD	5

A. **Sewage Treatment Plants (Completed and Commissioned)**

Sr. No.	Town	Name of scheme	Capacity (MLD)		Sr. No.	STP	Name of Scheme	Cap. (MLD)
							A	
						Grand Total (A) + (B) + (C) + (D)		1272.60

UIDSSMT- Urban Infrastructure Development Scheme for Small & Medium Towns

JNNURM - Jawaharlal Nehru National Urban
Renewal Mission

MC - Municipal Council/Corporation

PMIDC - Punjab Municipal Infrastructure
Development Company

ACA- Additional Central Assistance

SAP - Satluj Action Plan

BAP - Being Action Plan

Sewage Treatment Plants (Work allotted & started)

As on 12.01.16 Rs. in lacs						
S. No	Town	Name of funding scheme	Cap. (MLd)	Allotted Cost	Physical progress (%age)	Target date of completion
(A) PWSSB						
1	Amritsar (North)	JICA	95	8470.00	74 % civil work completed	28.02.17
2	Amritsar (South)	JICA	95	8030.00	94% civil work completed	28.01.17
3	Amritsar (South East Zone)	JNNURM /GOP	27.5	3223.00	Boundary wall work started.	30.09.17
4	Arniwala	UM	2	353.70	Work allotted, Bearing capacity tested.	14.05.18
5	Barnala	AMRUT	19	2414.38	Work started.	15.06.18
6	Boha	PIDB (UM)	2	247.00	Work allotted recently, drawings & design are under preparation.	09.08.17
7	Bassi Pathana	PIDB (UM)	3	387.87	Work allotted, Planning and designing being done	16.12.17
8	Bhawanigarh	PIDB(UM)	4	555.00	Work Started.	20.02.18
9	Dharamkot	State Govt. funds	4	332.88	95% Work completed.	31.01.17
10	Ferozepur	State Govt. funds	18	1498.00	55% civil work completed	30.06.17
11	Gidderbaha	State Govt. funds	7	494.97	70% (work resumed by agency)	30.06.17
12	Gobindgarh Mandi	MC	25	1725.00	96% of civil works completed, Electric connection applied	28.02.17
13	Guru Har Sahai	UM	4	545.17	Work allotted, Bearing capacity tested, Drawing under preparation	14.05.18
14	Guru Har Sahai	UM	1	212.22	Work allotted, Bearing capacity tested, Drawing under preparation	14.05.18
15	Jagraon	GLADA	12	921.36	90% work completed	31.01.17
16	Jaito	PIDB(UM)	6	562.38	Boundary wall started, Design and drawing under process	31.12.17

17	Khanauri	Under NRCP	3	463.90	5% work completed	30.06.17
18	Kharar	State Govt. funds	11	834.35	88% work completed	28.02.17
19	Kotkapura	PIDB (UM)	8	762.00	Boundary wall started,	31.12.17
20	Kotkapura	PIDB (UM)	6	547.44	Boundary wall started	31.12.17
21	Lehragagga	Under NRCP	4	530.44	50% work completed	31.03.17
22	Makhu	State Govt. funds	4	550.00	95% work completed.	31.01.17
23	Malout	UIDSSMT	10	647.00	97% work completed.	31.03.17
24	Moonak	Under NRCP	3	572.01	70% work completed	28.02.17
25	Morinda	PIDB(UM)	5.5	640.00	Work allotted, Bearing capacity tested & survey started	24.12.17
26	Nakodar	PMIDC Funded	6		93% Work Completed	31.12.2016
27	Patran	Under NRCP	4	538.20	85% work completed	28.02.17
28	Rajpura	PIDB	10	798.70	55 % work completed. Liquidated damages have been imposed against the agency under Clause 2 of Agreement	30.06.17
29	Rajpura	PIDB	7	647.78	95% work has been completed.	30.04.17
30	Sahnewal	GoP	7	835.00	65% work completed	31.01.17
31	Sunam	PIDB	8	1040.00	85% work completed.	31.01.17
32	Shahkot	PIDB	3	449.97	35% work completed	31.3.17
33	Sirhind	PIDB(UM)	5	525.00	Land Available, planning, designing being done	16.12.17
34	Sirhind	PIDB(UM)	4	476.00	Land Available, planning, designing being done	16.12.17
35	Sirhind	PIDB(UM)	2	329.80	Land Available, planning, designing being done	16.12.17
36	Talwandi Bhai	State Govt. funds	4	550.00	90% work completed.	31.01.17
37	Tanda	NRCP	4	260.00	99%Work completed, electric connection awaited.	31.01.17
38	Tarn Taran	UM	4	541.00	Boundary Wall being	15.08.17

					constructed	
39	Tarn Taran	PIDB	9	943.00	Boundary Wall being constructed	15.08.17
Total 450						
(B) GMADA						
1	Lalru	Under GMADA	3		3.0 MLD STP work completed and ready for commissioning	--
2	Derabassi	Under GMADA	3.5		3.5 MLD STP 70% work completed. Mechanical and electrical work under progress	30.06.17
		Total (B)	6.5			
(C) GLADA						
1	Doraha	Under GLADA	4		Civil work Completed. Electric Connection applied but yet to be released.	--
2	Nurmahal	Under GLADA	3			--
3	Payal	Under GLADA	1			--
Total			8			
(D) WSSD						
1	Bagha Purana	PIDB	3.8		3.8 MLD STP Completed & under Commissioning	
Grand Total(A) +(B) +(C)+(D)			468.3			

Notes-

GOP- Government of Punjab

UM-Urban Mission

NRCP- National River Conservation Plan

UIDSSMT- Urban Infrastructure Development Scheme for Small & Medium Towns

JNNURM- Jawaharlal Nehru National Urban Renewal Mission

MC- Municipal Council/Corporation

PMIDC- Punjab Municipal Infrastructure Development Company

ACA- Additional Central Assistance

GMADA- Greater Mohali Area Development Authority

JICA- Japan International Cooperation Agency

1. The Need for Decentralized Septage Management system in Punjab

Even as cities create more underground sewerage infrastructure, the septic tank often remains an integral component of the sewerage scheme. So far, **only 64% of Punjab** urban population is covered by UGSS. 70 ULBs has been covered with 100% sewerage systems out of 165 ULBs. Hence, the reliance on on-site sanitation systems is very low in state of Punjab. However, few cities (14 in numbers) where sewerage system not exists depend on on-site technologies such as single pit, and twin-pit or septic tank based toilets. Many local bodies do not have the capacity to create and manage assets for treatment of liquid waste as these involve large investment and long gestation periods. On the other side, there are reports of underutilization of existing STPs, and disposal of untreated waste into fresh water bodies. As per CPHEEO norms septic tanks need to be cleaned periodically at an interval of 2-3 years. However surveys conducted in a few cities Punjab suggest that septic tanks/pits are emptied only once in 8 to 10 years and only when they overflow. Hence sewage does not get treated effectively resulting in fecal contamination.

As per the Prohibition of Employment as Manual Scavengers (and their rehabilitation) Act, 2013, manual cleaning/emptying of pit toilets and septic tanks is prohibited. All ULBs are required to adopt mechanical processes for cleaning of pits/septic tank. Most Municipal Corporations in Punjab provide mechanized cleaning. However, since the tanks are emptied only once in 8 to 10 years, the sludge that is solidified at the bottom of the pit/septic tank is hard to remove with the small powered emptier that is typically used. As a result, the pits/tanks are not emptied properly.

In areas un-served by sewer systems, there is dumping of sewage collected in underground tanks into water bodies in and around cities. Tankers employed for disposing the sewage may dump the sewage at the closest point from where it was collected.

There is a felt need for framing guidelines for regulation of collection, provision for treatment and safe disposal of Septage. The objective of this guideline is to facilitate all ULBs in Punjab to prepare an integrated faecal sludge management plan and implement a full Septage management service in their cities. This document details out these guidelines.

2. Guideline for ULBs for effective implementation of Septage Management Plan

a. Step by step approach: Operationalize of Septage management plan

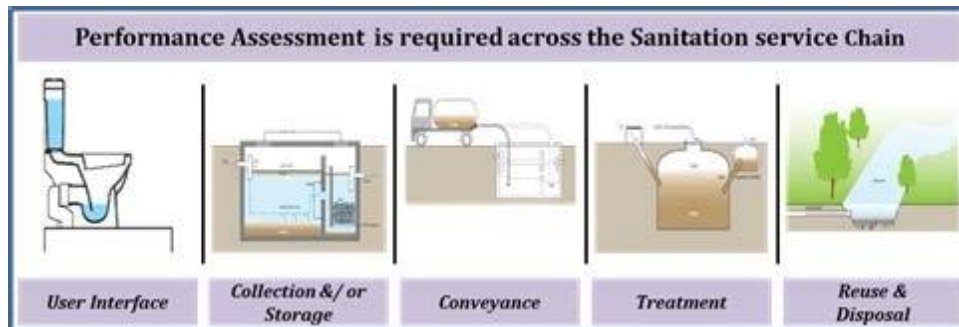
The following is the step by step guide for effective implementation of Septage management plan:

A. Preparation of plan for Septage management

1. Existing situation assessment across sanitation service chain

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

The sanitation service 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:

a) Access & Collection:

- **Access** describes the type of toilet and captures if the HH uses individual, shared or community facility. The choice of User Interface will depend on the availability of water. At city level it also measures the availability of public toilets. For sullage disposal, it captures access to bathroom facilities and drainage outlets.
- **Collection** and Storage/Treatment describes the ways of collecting, storing, and sometimes treating the excreta, grey water generated at the User Interface. The toilet may be connected to sewerage system; onsite systems like septic tank with soak pits, pits or may be functioning as Eco-san / composting toilets. Similarly for grey water disposal, the HHs may be connected to sewerage system or drains of any kind (Open/covered).

Steps for assessment of existing toilets and septic tanks and creation of database

- a. City level assessment of coverage of toilet and on-site sanitation facility using the existing database (like property tax module, Census 2011 etc.) or based on recent survey carried out under SBM.
- b. If the ULB do not have database, then ULB shall create database of toilets and septic tanks based on questionnaire given in **Annexure 2**. All ULB shall link the key result related to toilet availability, type of toilet and its connection with waste water outlet with property tax database on e-governance platform.
- c. ULB shall keep updated database related to toilet availability and on-site sanitation through property tax assessment survey carried out at every four years of interval.
- d. Evaluate existing septic tank designs 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 septic tanks do not meet the standard septic tank design.
- f. Identify insanitary toilets¹ and convert them to sanitary latrines for safe Collection and disposal of waste as per norms set out in **Annexure 1**.For

this incentive available under SBM should be used maximum.

g. All existing septic tanks 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. The new septic tanks need to be designed and constructed as per the norms suggested in 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**.

b) Conveyance

Conveyance describes the transport of products across the service chain. ULB should plan for scheduled septic tank emptying services for effective implementation of Septage management plan. Prior to plan for the same, ULB shall first assess its role and capacity for implementation of Septage management plan. ULB should assess various aspects of septic tank emptying like how many septic tanks required to be emptied annually as per CPHEEO norm versus how many are emptied in a year, how many vacuum emptying trucks/ capacity of trucks are required if number of septic tank emptied as per CPHEEO norm versus how many trucks are available/working with capacities of emptier trucks, assessing the cost per emptying visit, method of maintaining the register for septic tank emptying services database etc.

If private player is involved in septic tank emptying business in the city, then, ULB shall also review the role of private septic tank emptier and assess their capacity in lines with the number of septic tank emptying annually charges/fees for emptying services, location of disposal, registration/licensing with ULB or not etc

¹ Insanitary toilet / latrines in households are those where night soil is removed by human, serviced by animals or/and night soil is disposed into open drain or pit into which the excreta is discharged or flushed out, before the excreta fully decomposes. As mentioned in Swachh Bharat mission guidelines, single pit toilets will also be considered as an insanitary toilet/latrine.

Steps for Scheduled septic tank emptying services

- a. ULBs should initiate pre-determined scheduled septic tank emptying services and develop a route plan for the same.
- b. Mobilize or procure adequate number of suction emptier trucks to maintain a three year rotating cycle. Number and type of vehicles to be purchased based on the sizes of septic tanks or Septage generation rate² for the city, distance from the location of septic tanks to the Septage treatment facility, cleaning frequency of septic tanks and available road width for the suction truck operations.
- c. ULBs should either provide the emptying services themselves or only certified and licensed Septage Transporters to de-sludge and transport waste to the designated STP. In case of licensed Septage Transporters, ULBs should certify and license private Septage transporters to de-sludge and transport waste to the designated treatment facility. The license/Septage transporter permit is detailed out in ***Annexure 3.1***.
- d. All Septage transporters need to maintain a collection and transport receipt such as the one detailed out in ***Annexure 3.2***. This needs to be filled duly by the private / ULB service provider and submitted to ULB office.

Measures to be taken during Desludging of septic tanks

- a. While desludging the following norms should be followed:
 - 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 gears should be used by the operator while desludging / emptying the septic tanks.

² Septage generation rates vary widely from place to place depending on practices of septic tank use, number of users, water used for flushing, and the frequency of cleaning the septage. Adopting the (U.S. EPA, 1984) estimate of Septage generation of 230 liters/year and an average household size of four, the Septage generation/ household would be 920 litres/year. So for a three year cycle the septage generation rate would be 2760 litres or 2.76 cum. alternatively, assuming an average septic tank volume of 3 m³ and emptying of septage when one-third of the septic tank is filled with settled solids, the volume of Septage emptied would be 1 m³.

- b.** Septage transportation vehicle operators (whether from ULB or private sector) should be well trained and equipped with protective safety gears, uniforms, tools and proper vacuum trucks, to ensure safe handling of sewage/septage. 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. The operating procedure for cleaning of septic tanks is detailed out in **Annexure 3.3**.

c) Treatment and disposal

Treatment: ULB must not dispose the Septage collected from septic tank without any treatment and ULB must comply with CPCB and MPCB norms before disposal of Septage. ULB should assess the load of Septage and assess the requirement of capacity for treatment plant. ULB should first try and assess the possibility of setting up Septage treatment facility at the solid waste treatment/disposal site and at the STPs within the city or in nearby city.

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 enriched or as filling material at construction sites. ULB should carry out primary assessment for availability of market and demand for reuse.

Steps for Planning of Septage treatment facility

- a.** Septage collected from the septic tanks or pits should not be disposed without any treatment.
- b.** ULB should first assess the possibility of Septage treatment at existing STP in the city or STP of nearby city through appropriate agreements with STP operators and receiving ULBs. 16 clusters of Local Bodies have been identified based on the existing location of STPs. The local bodies have been grouped in such a way that all collections points are situated at around 18-20 kms of radius of the chosen STP. The clusters have been given in the **Annexure 4**. These clusters can be revised as new STPs made under the ongoing Underground Sewerage Schemes are taken into service.

- c. If STP is not available in the city or nearby that can receive the sludge, then ULB should plan for new Septage treatment facility. Various treatment options are given in **Annexure 5**. Such a new Septage treatment facility should be designed to cater to expected volumes of septage generated in urban local body and if faecal waste is expected from nearby urban local bodies.
- 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 commercial or industrial waste is unloaded in these facilities.

Measures to be taken while planning for Septage treatment facility

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

Distance of treatment site: Distance from emptying to delivering and accessibility of the treatment site are major issues. The transport of relatively small fecal sludge volumes (5-10m³ per truck) 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.

Neighborhood: A treatment site may generate nuisance, especially bad odors. For this reason it should be located at an appropriate distance from the residential areas.

Land availability: Projects are often delayed because of non-availability or high price of land. ULB should identify the land bank for treatment facility. ULB should also explore the possibility of developing Septage treatment facility at solid waste dumping or treatment site.

Geological Parameters: Assessment of existing geological conditions on site like groundwater table, type of soil, prone to flooding is always recommended as it may directly affect selection of technology option.

Indicative Decision making framework for Evaluation of Septage treatment site

Sr. No.	Particulars	Unit	Treatment location 1	Treatment location 2	Treatment location 3	Treatment location 4
Identification of treatment sites						
1	Distance of existing septage disposal site	km				
2	Distance of SWM treatment or disposal facility	Km				
3	Type of SWM treatment facility					
4	Average distance and duration of emptying trip	Km & min				
5	Electricity availability					
6	Neighborhood (Residential/ institutional/commercial/ irrigation/farming areas)					
Land availability						
7	Government or private land					
8	Available/ Non-available for developing site					
Geological parameters						
9	Water table	mt				
10	Type of soil					
11	Prone to flooding	Yes/N				

2. Explore private sector participation for Septage management activities :

For effective Operationalize of scheduled septic tank emptying service and treatment facilities, ULB 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. Awareness generation and capacity building activities

Awareness generation activities need to be taken up for successful implementation of faecal sludge management plan and community acceptance and adherence to regulations and service plan set up by the ULBs. 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 made sensitized periodically regarding the need for a sound 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 6**. 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/ Chief Officers, Engineers, Sanitary Inspectors, Health Officers, 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. Capacity Funds available under SBM Should be used for this purpose.

- 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.
- 4. *Record-keeping, reporting (MIS), monitoring and feedback systems***
- a. **Recordkeeping and manifest forms** should be an integral part of a comprehensive Septage management program. Record keeping requirements should be codified into the law governing the program. A sample manifest form is detailed out in ***Annexure 3.2***
 - b. 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. A possible monitoring framework for septic tank emptying services is detailed out in ***Annexure 7***
 - c. An **MIS system** such as the one discussed in access and collection will need to be developed and maintained.
 - 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.

B. Financial resource mobilization

1. Sources of revenues for Septage management

- a. Fees for De-Sludging to be collected from residents by the certified / licensed tanker operators
- b. Transport charges should be determined based on market rates while ensuring that residents are not exploited by the tanker operators.
- c. For treatment, certified tanker operators shall be charged at the rates as notified by the ULBs.
- d. To the extent possible, revenues should be generated from sale of treated septage for agriculture or other purposes.

2. Mobilize financial resources to implement septage management plan

- a. ULB may utilize the funds from 14th FC & SBM 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 shall be utilized for various awareness generation activities undertaken for implementing septage management plan includes capacity building activities for ULB staff, septage transporters, treatment plant operators and residents of city.
- c. Convergence with existing schemes/activity: If any ULB is going to undertake the water audit survey or survey under SBM or property tax assessment etc, then ULB should integrate the sanitation survey with the respective activity.

Annexures

1. Conventional septic tank design as per CPHEEO, 2013⁴

Conventional septic tank

A septic tank is a combined sedimentation and digestion tank where the sewage is held for one to two days. During this period, the suspended solids settle down to the bottom. This is accompanied by anaerobic digestion of settled solids (sludge) and liquid, resulting in reasonable reduction in the volume of sludge, reduction in biodegradable organic matter and release of gases like carbon dioxide, methane and hydrogen sulphide. The effluent although clarified to a large extent, will still contain appreciable amount of dissolved and suspended putrescible organic solids and pathogens.

Therefore, the septic tank effluent disposal merits careful consideration. Due to unsatisfactory quality of the effluent and also the difficulty in providing a proper effluent disposal system, septic tanks are recommended only for individual homes and small communities and institutions, whose contributory population does not exceed 300. For larger communities, septic tanks may be adopted with appropriate effluent treatment and disposal facilities. However, in both cases the sewage from the septic tank should be discharged into a lined channel constructed along with storm water drain as an interim measure till a proper sewerage system is laid. The outfall from such drains should be connected to a decentralized or centralized sewage collection system.

Design

Several experiments and performance evaluation studies have established that only about 30% of the settled solids are anaerobically digested in a septic tank. In case of frequent desludging, which is necessary for satisfactory effluent quality, still lower digestion rates have been reported. All these studies have proved that when the septic tank is not deslugged for a longer period i.e., more

⁴ Source: Central Public Health and Environmental Engineering Organization (CPHEEO) and Japan International Cooperation Agency. (2013). Manual on Sewerage and Sewage Treatment Systems, Part A – Engineering Chapter 9 – Onsite Sanitation, Page no: 9-15 to 9-21.

than the design period, substantial portion of solids escape with the effluent. Therefore, for the septic tank to be an efficient suspended solids remover, it should be of sufficient capacity with proper inlet and outlet arrangements. It should be designed in such a way that the sludge can settle at the bottom and scum accumulates at the surface, while enough space is left in between, for the sewage to flow through without dislocating either the scum or the settled sludge. Normally, sufficient capacity is provided to the extent that the accumulated sludge and scum occupy only half or maximum two-thirds the tank capacity, at the end of the design storage period. Experience has shown that in order to provide sufficiently quiescent conditions for effective sedimentation of the suspended solids, the minimum liquid retention time should be 24 hours. Therefore, considering the volume required for sludge and scum accumulation, the septic tank may be designed for 1 to 2 days of sewage retention.

The septic tanks are normally rectangular in shape and can either be a single tank or a double tank. In case of double tank, the effluent solids concentration is considerably lower and the first compartment is usually twice the size of the second. The liquid depth is 1-2 m and the length to breadth ratio is 2-3 to 1. Recommended sizes of septic tanks for individual households (up to 20 users) and for housing colonies (up to 300 users) are given below in table below

Table 1: Recommended size of septic tank up to 300 users (Source CPHEEO)

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

No. of Users	Length(M)	Breadth(M)	Liquid Depth (Cleaning interval of)	
			2 Years	3 Years
200	12.00	3.30	1.00	1.24
300	15.00	4.00	1.00	1.24

Note 1: The capacities are recommended on the assumption that discharge from only WC will be treated in the septic tank

Note 2: A provision of 300 mm should be made for free board.

Note 3: For population over 100, the tank may be divided into independent parallel chambers of maintenance and cleaning.

Note 4: The sizes of septic tank are based on certain assumption on peak discharges, as estimated in IS: 2470 (part 1) and while choosing the size of septic tank exact calculations shall be made

Construction details

The inlet and outlet should not be located at such levels where the sludge or scum is formed as otherwise; the force of water entering or leaving the tank will unduly disturb the sludge or scum. Further, to avoid short-circuiting, the inlet and outlet should be located as far away as possible from each other and at different levels. Baffles are generally provided at both inlet and outlet and should dip 25 cm to 30 cm into and project 15 cm above the liquid. The baffles should be placed at a distance of one-fifth of the tank length from the mouth of the straight inlet pipe. The invert of the outlet pipe should be placed at a level 5 to 7 cm below the invert level of inlet pipe. Baffled inlet will distribute the flow more evenly along the width of the tank and similarly a baffled outlet pipe will serve better than a tee-pipe.

For larger capacities, a two-compartment tank constructed with the partition wall at a distance of about two-thirds the length from the inlet gives a better performance than a single compartment tank. The two compartments should be interconnected above the sludge storage level by means of pipes or square openings of diameter or side length respectively of not less than 75 mm. Every septic tank should be provided with ventilation pipes, the top being covered with a suitable mosquito proof wire mesh. The height of the pipe should extend at least 2 m above the top of the highest building within a radius of 20 m. Septic tanks may either be constructed in brick work, stone masonry or concrete cast



ALL DIMENSIONS IN mm

Annexure 2. Questionnaire for Septage management database creation⁵

Q No	Question		Options
1	Form id		
2	Locality type	1	Slum
		2	Non-Slum
3	What is the name of the locality?		Locality Name _____
4	Ward no:	1	Number _____
5	Property number as per Council property tax records:	1	Number _____
6	Status of property during the survey	1	Open
		2	Locked
		3	Vacant
7	Type of Property	1	Residential
		2	Institutional
		3	Commercial
		4	Mixed
8	Mark the house typology (only if 7 = Residential)	1	Bungalow
		2	Apartment
		3	Row House
		4	Wada
		5	Chawl
		6	Hut
		7	Others, specify _____
9	Select the type of Institution (only if 7 = Institutional)	1	Hospital
		2	Dispensary
		3	School/College
		4	Religious Institutions
		5	Government Office
		6	Others, specify _____
10	Select the type of commercial	1	Industry

⁵ Source: Questionnaire developed by CEPT University / AILSG

Q No	Question		Options
	(only if 7 = Commercial)	2	Shop
		3	Hotel / Lodge
		4	Others, specify_____
11	Name of Apartment/Building:		
12	Number of Blocks		Number
13	Name of the respondent/ building secretary:	1	First name_____Middle name _____ Last name_____
14	Contact no. of building secretary:	1	Number _____
15	How many flats are there in this apartment?	1	Number _____
		2	Don't know
16	How many toilets are there in this property?	1	Number _____
		2	Don't Know
17	Number of flats that are occupied	1	
18	How many households are there on this property?		Number _____
19	Name of the respondent/Head of the Household	1	First name_____Middle name _____ Last name_____
20	Pl provide a mobile Contact no. of head of the household	1	Number _____
21	What is the tenure status of this property?	1	Owner occupied
		2	Tenant occupied
22	Pl provide the name of the owner of this property:	1	Name_____
	-	2	Don't Know
23	Pl provide a mobile contact no. of owner	1	Number _____
		2	Don't Know
24	How many persons are there in this household? (for Commercial, approx numbers of toilet users)		children (less than 6 year):____, Other Male:____Other female: _____
25	Do you have your own toilet on your premises?	1	Yes
		2	No
26	What is your own toilet	1	Sewer Network

Q No	Question		Options
	connected to for disposal?	2	Septic tank with soak pit
		3	Septic tank connected to open/closed drain
		4	Single Pit
		5	Double pit
		6	Directly to open/closed drains
		7	Others, specify_____
27	No. of septic tanks in the property	1	1
		2	2
		3	3
		4	Don't Know
28	Type of septic tank: 1. Individual 2. Shared	1	Individual
		2	Shared
29	This property shares septic tank with: _____		
30	What is the shape of your septic tank	1	Rectangular
		2	Circular
		3	Don't Know
31	Provide dimensions:	1	Don't know
	<i>("L" relevant only if rectangular)</i>	2	Length (ft.) _____
	-	3	Breadth/Diameter (ft.) _____
	-	4	Depth (ft.) _____
32	Septic tank outfall is connected to	1	Soak pit
		2	Open drain
		3	Covered drain
		4	Open land
		5	Others, specify
		6	Don't Know
33	When was the septic tank emptied the last time?	1	Last 6 months
		2	From 6 to 12 months
		3	12-24 months
		4	24-36 months
		5	More than 36 months
		6	Neveremptied

Q No	Question		Options
		7	Don't know/Remember
34	Why was the septic tank emptied?	1	Blocked toilet
		2	Overflow from access hole/manhole
		3	Smell
		4	Others, specify
		5	Don't know/remember
35	Were there any problems during emptying of septic tanks?	1	Access or distance for suction truck to house
		2	Break floor tiles to access septic tank
		3	Break concrete manhole to access septic tank
		4	Difficult to locate the septic tank
		5	Smell during emptying
		6	Made a mess
		7	No problem found
		8	Others, specify
		9	Don't know
36	Is the septic tank accessible from road for cleaning by using a suction emptier truck?	1	Yes
		2	No
37	Is there proper access with manholes/covers for any of the chamber of septic tank which can be easily opened	1	Yes
		2	No
B	GPS Location ID		
C	Photographs		

Annexure 3: Scheduled septic tank emptying services

3.1. Septage transporter permit (License)⁶

Septage Transporter Permit for _____ Municipality		
In accordance with all the terms and conditions of the current _____ Municipality's Rates, Rules and Regulations, the special permit conditions accompanying this permit, and all applicable rules, laws or regulations of Government of Maharashtra, permission is hereby granted to:		
NAME	OF	PERMITTEE:

ADDRESS: _____		

For the disposal of septage from domestic septic tank or commercial holding tank at the _____ treatment facility.		
This Permit is based on information provided in the Septage Transporter Permit application which constitutes the Septage Management Hauled Permit.		
This Permit is effective for the period set forth below, may be suspended or revoked for Permit Condition Non Compliance and is not transferable. The original permit shall be kept on file in the Permittee's office. A copy of this Permit shall be carried in every registered vehicle used by the permittee.		
EFFECTIVE DATE:		
EXPIRATION DATE:		
_____ CHECK IF RENEWED PERMIT		
Permit is liable to be cancelled in case of violations of any Acts, Rules and Regulations relating to the operation of Septage System or in cases of safety protocols not being adhered to or in case of non-permitted disposal.		

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

3.2. Collection and transport records form / manifest forms⁷

Sample Form to be filled by Operator / Transporter of Septage

i. Identification of Waste:

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

ii. Details of Waste Generator

- a) Name: _____
- b) Phone Number: _____
- c) Address: _____
- d) Pin: _____
- e) Property tax no.: _____
- f) Any kind of deficiencies, missing pipes or fittings, improper manholes or access covers, any other cracks or damage observed: _____

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

Date: _____ Signature: _____

iii. Details of Transporter / Operator

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

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

- e) Signature of authorized agent and title: _____

iv. Acceptance by _____ Municipality's authorized STP

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

Disposal date: _____ Amount Collected from Transporter (if any): _____

Signature of authorized signatory and title: _____

⁷Adapted from operative guidelines for septage management for urban and rural local bodies in Tamil Nadu.(2014)

3.3. Operating procedure for cleaning of septic tanks⁸

Daily Preparation for the ULB / private emptying and transport service

- Receive work orders for the day
- Check the functioning of vacuum emptier and equipment
- Check personal protective equipment – All employees should be responsible for maintaining their own personal protective equipment (such as gloves, boots, hat, face mask, Davy's lamp) in good condition
- Check disinfecting and spill control equipment – Operators should be trained on identifying spills and proper methods of disinfecting. Sprinkle lime over spilled area, wait 15 minutes, then wash with water
- Check Hoses – inspect hoses for cracks and wear– discard or repair worn and broken hoses.

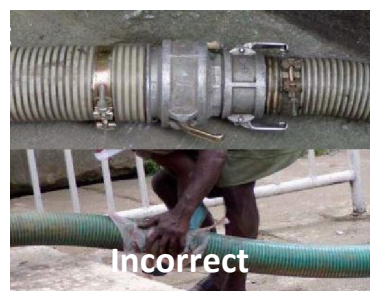


Figure 2: Connecting Hoses

Connecting the Hose in the correct manner using the clamp style fitting ensures a tight and leak proof connection. Use of twine and plastic for making connections causes leaks and require cleanup.

Operating the vacuum emptier

Operators should become familiar with the proper operation of the equipment in use for each operation. This includes the physical operation of the truck, and all valves, piping, power take-offs and ancillary equipment for the vacuum emptier (including the tank, valves, hoses, and fittings). The following steps can be followed for operating the vacuum emptier:

- Reach the first site and meet the building owner.

⁸ Source: Guidelines for 'Open defecation Free Towns' under Mahatma Gandhi Swachhata Mission, Government of Gujarat.(2015)

- Before pumping, check the tank to look for obvious damage to the structure and to verify proper piping is in place.
- Check the water level to get clues as to tank condition: high levels (above outlet level) indicate a clogged outlet; low levels (below outlet level) indicate a leaking tank (or tank not in use).
- Check for back flow into tank during pumping and when pumping is complete. Flow back may indicate a problem with plumbing in the house or clogged disposal.
- Open the access covers, inspect the interior and exterior of the tank. If more than one, locate and remove lids from all compartments.
- Each compartment will require pumping after ventilating. Probe the tank with the last length of hose. This will provide an indication on the volume of sludge to pump.
- Start the pump or vacuum equipment. The operator will make sure there is suction and that the pump is operating.
- Volume in the tank should start decreasing rapidly. Use hose to break up sludge and scum to the extent possible.

After pumping is complete, check the tank for remaining sludge. If there are accumulated solids remaining, initiate the pump-back procedure, which is to send the pumped faecal sludge under pressure back into the tank and direct this flow toward the sludge mass. This will break up the mass, making it possible to pump out. When pump-back is complete, pump out the tank again (suction). When pumping is complete, wash the hoses and replace the tank lids. Leave back small amount of sludge of around 1 to 2 inches in the tank so that it microorganisms can act upon the new incoming faecal waste. Clean up any spills and disinfect with lime or bleach solution. Chemicals such as lime can also be added into the suction trucks to neutralize the septage, to render the septage more treatable and to reduce odours.

Annexure 4: Clusters for use of STPs

S.No	Distt	Name of Town	Nearby Town having STP	Distance (In Kms)
1	Amritsar	Majitha	Amritsar	19
		Rajasansi	Amritsar	12.6
		Jandiala Guru	Amritsar	17.9
		Ramdas	Dera Baba Nanak	14.5
2	Fatehgarh Sahib	Khamano	Morinda	15.5
		Amloh	Gobindgarh	11
3	Hoshiarpur	Hariana	Hoshiarpur	18.7
		Gardhiwala	Dasuya	12
4	Jalandhar	Alwalpur	Jalandhar	18.2
		Bhogpur	Tanda	13
		Lohian	Sultanpur Lodhi	7.28
		Mahitpur	Nakodar	10.4
		Adampur	Jalandhar	19
		Goraya	Phillaur	12.6
		Kartarpur	Jalandhar	14
5	Mansa	Joga	Mansa	20.6
6	Moga	Kot Isse Khan	Moga	17.2
7	Muktsar	Barriwala	Muktsar	16.7
8	Nawanshahar	Rahon	Nawanshahar	10.6

S.No	Distt	Name of Town	Nearby Town having STP	Distance (In Kms)
9	Patiala	Ghagga	Samana	20
		Sanaur	Patiala	10.3
10	Pathankot	Sujanpur	Pathankot	11.3
11	Barnala	Dhanula	Barnala	13.5
		Handiaya	Barnala	10.4
12	Bathinda	Raman	Talwandi Sabo	16
13	Faridkot	Faridkot	Kotkapura	15.6
		Jaito	Kotkapura	17.9
14	Kapurthala	Dhilwan	Bhulath	18
15	Ludhiana	Samrara	Khanna	18
16	Sangrur	Cheema	Sunam	16
		Longowal	Sunam	18.3

1. Deliverables for the Local Bodies in the next six months effective from April 2017

Key Elements of Septage Management	Objectives and Outcomes	Activity to be undertaken by Local Bodies	Timeframe	Means of Verification
1.. Pumping and De-Sludging	Periodic and safe collection of all sewage generated in the Local Body by residential and commercial establishments	<ul style="list-style-type: none"> • ULB shall create database of toilets and septic tanks based on questionnaire • Create facility to collect sullage water 	3 month	Survey sheet as per Annexure 2 to be maintained along with progress report.
2. Septage Transportation	Safe transportation of sewage by licensed septage transporters in vacuum trucks and safety gears for all staff	<ul style="list-style-type: none"> • Call for Expression of Interest • Grant licenses (valid for 6 months at a time) for transporting sewage on rate contract basis based on permit licenses given in the Annexure 3.1 & 3.2 • Payments to be made directly to the Transporter. • Regional Transport Offices may be contacted for gaining information 	3 months	Tender details, details of selected septage transporters
		<ul style="list-style-type: none"> • Ensure proper vacuum trucks are transporting sewage with staff adequately equipped with safety gears and other protective equipment required to safely collect and transport sewage 	3 months	Vehicle details to be kept with the local bodies

Key Elements of Septage Management	Objectives and Outcomes	Activity to be undertaken by Local Bodies	Timeframe	Means of Verification
		<ul style="list-style-type: none"> Ensure collection efficiency is increased by 10% of the collectable sullage in every 6 months compared to latest figures reported by Local Bodies. 	Every 6 months	Maintain records for proof of increase
		<ul style="list-style-type: none"> As per the clusters given in Annexure 4, organize efficient routes to the designated STPs or Septage Receiving Facility 	3 months	<ul style="list-style-type: none"> Records of routes
3. Treatment and Final Disposal	Ensure construction of Sewage Receiving Facility at all the STPs. Ensure Safe Treatment of Sewage. Ensure Increase in Capacity Utilized.	<ul style="list-style-type: none"> Design Facility should be from the approved list as per CPHEEO norms. 	3 months	Maintain record of each facility and indicate clearly whether it meets
		<ul style="list-style-type: none"> Input quality of sewage to be tested to ensure source of collected sewage is residential or commercial establishment and not industrial sources. Tests may be carried out at the Laboratories maintained within the STP. 	Every 3 months	Submit test reports periodically.
		<ul style="list-style-type: none"> Increase utilization of STP by 10% every 6 months until the STP is utilized to its full capacity. 	Every 6 months	Maintain records for increase

Elements of Septage Management	Objectives and Outcomes	Activity to be undertaken by Local Bodies	Timeframe	Means of Verification
4. IEC Activity	All stakeholders in the septage management system including residents, civic bodies, personnel handling sewage, municipal officials to be given periodical training on safe and best practices in septage management. The importance of safe collection, treatment and disposal of sewage and the health hazards resulting from improper sewage treatment should be explained clearly to all.	<ul style="list-style-type: none"> • Ensure one training session every 3 months to Local Body staff on safe collection, treatment and disposal. Information regarding standard septic tank design, design of a decant facility, tender details for engaging licensed septage transporters, etc. should be disseminated widely to achieve a safe septage management system. CMA to arrange for the 	2 Months	SBM funds can be used for this.
		<ul style="list-style-type: none"> • Ensure monthly engagement with Residents including Resident Welfare Associations, community organizers, self-help groups. • The general public should be sensitized regarding the need for a sound septage management system. The health 	2 Months	Photographs and Video of the campaign.
		<ul style="list-style-type: none"> • Local Bodies to organize orientation session for Septage Transporters / Private Vendors: Local Bodies should ensure all safety norms are clearly explained to the transporters. Private Operators should be well trained in safe collection and transportation of sewage including vehicle design, process of de-sludging, safety gears and safe disposal at the nearest STP. 	2 months	Photograph and video of the orientation sessions. ULBs may perform this activity. Standard templates / Videos may be produced for this activity.

5. Record Keeping		<ul style="list-style-type: none"> Local Bodies to have proper records and registers of licensed transporters, septic tank locations, De-Sludging activities, household level details, etc. 	1 month	Records and registers
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Annexure 5: Faecal sludge / Septage treatment options

Septage is the settled solid matter in semi-solid condition usually a mixture of solids and water settled at the bottom of septic tank. It has an offensive odour, appearance and is high in organics and pathogenic microorganisms, whereas septic tank effluent is the liquid part which flows out from septic tank (since solids are trapped in septic tank). Septage has a much higher concentration of pollutants than the septic tank effluent. Biological Oxygen Demand (BOD) and Total Suspended Solids (TSS) are two common measurements of the strength of Septage. As per U.S. EPA, 1984 Septage in tropical countries may have BOD concentrations between 440 to 78,600 mg/l and TSS values in range of 310 to 93,378 mg/l, where septic tank effluent has values averaging around 200 mg/l BOD and 300 mg/l TSS. As septic tanks fill with Septage, the effluent begins to resemble faecal sludge with higher pollution values. Therefore, regular desludging provides dramatic improvements in effluent quality. Detailed septage characterization (BOD, TSS & other microbial characteristics) as well as its dewatering characteristics (specific resistance etc.) Should be done prior to the design of any faecal sludge management facility. Treatment of septage / faecal sludge can be of two types, treatment at sewage treatment plants and at independent septage treatment plants. The details of these two types of treatment are given in the section below:

Treatment of septage/faecal sludge at sewage treatment plants:

Co-treatment of septage along with domestic sewage at a sewage treatment plant (STP), if available, is the most desirable option. Though septage is more concentrated in its strength than domestic sewage, its constituents are similar to municipal wastewater. But care should be taken that the STP should have adequate capacity to accept the septage without hampering the functioning of the sewage treatment plant. The municipality should monitor the incoming wastewater load to the STP and accept the septage, if the design norms are not violated with the increased load (on account of the septage). A list of ULBs with their capacity of the STPs and the present flow received at STPs provided in this document. The treatment plants that are under-utilized can serve as treatment plants for septage from nearby ULBs and if the STPs are working close

to the design capacity, additional loads due to disposal of septage will necessitate expansion or up-gradation of the STP capacity. The clusters have been given in the **Annexure 4**.

The Septage could be added at various locations for treating it along with STP wastewater:

1. **Septage addition at the nearest sewer manhole:** Septage could be added to a sewer upstream of the STP, and substantial dilution of Septage occurs prior to it reaching the STP, depending on the volume of sewage flowing in the sewer
2. **Septage addition at the STP:** Septage could be added to sewage immediately upstream of the screening and grit removal processes
3. **Septage addition to sludge digesters/sludge drying beds:** Septage could be processed with the sludge processing units of STP.

If Septage / faecal sludge are to be co-treated with sewage, it will be necessary to construct a Septage /faecal sludge receiving chamber. Chemicals such as lime or chlorine can also be added to the faecal sludge in the storage tank to neutralize it, to render it more treatable, or to reduce odors.

Treatment of Septage/faecal sludge at independent Septage treatment plants

When an STP does not exist for a city, or the distance or the capacity of the available plant becomes a limiting factor, it is not a feasible option to transport and treat the septage at the sewage treatment facilities. Hence, a treatment plant especially meant for septage treatment becomes the option to consider. Independent septage treatment plants are designed specifically for septage treatment and usually have separate unit processes to handle both the liquid and solid portions of septage. These include:

- Lime stabilization – odor control, conditioning and stabilization of the sludge.
- Dewatering – sludge drying beds or mechanical dewatering.
- Anaerobic / aerobic wastewater treatment – liquid from the sludge drying beds and mechanical dewatering systems.

- Co-composting with organic solid waste

The choice of mechanical dewatering or sludge drying beds would be dependent on the land availability, with mechanical dewatering systems being preferred where land is scarce and sludge drying beds being adopted where land availability is not a constraint. The benefit of using these treatment plants is that they could provide a regional solution to septage management. Many septage

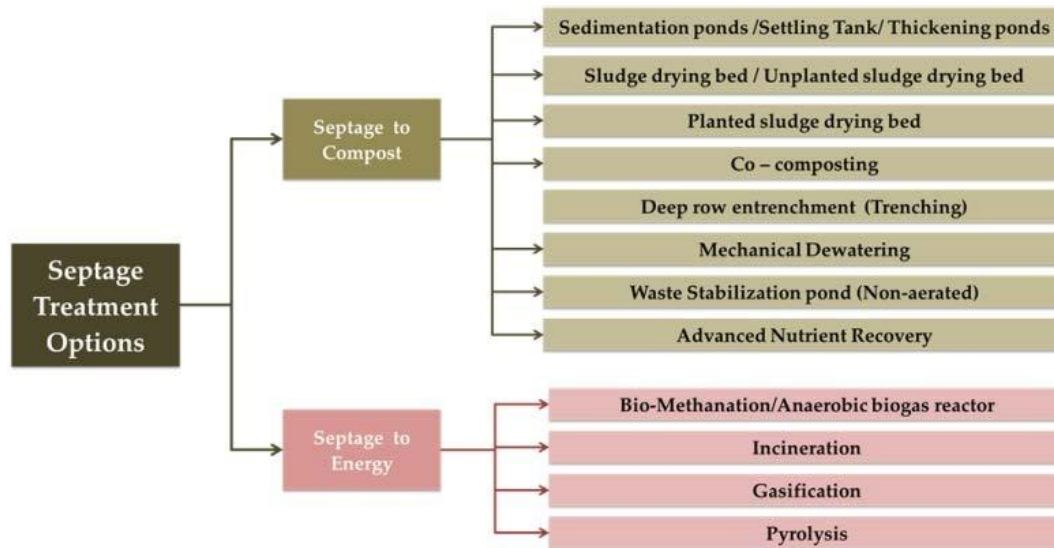


Figure 3: Septage treatment

treatment plants use lime to provide both conditioning and stabilization before the septage is dewatered, and this dewatered sludge can be used as organic fertilizer after drying and composting. Additionally, lime stabilization also helps to reduce/ minimize odour. The common practice is to add lime to raise the pH to 12 and hold it for a period of 30 minutes. The filtrate from the dewatering units needs to be further treated through treatment process such as waste stabilization ponds, anaerobic baffled reactor, constructed wetland or aerobic treatment systems before discharging into the environment.

However, the choice of an appropriate Septage management system is dependent on land availability, local site conditions, level of treatment required,

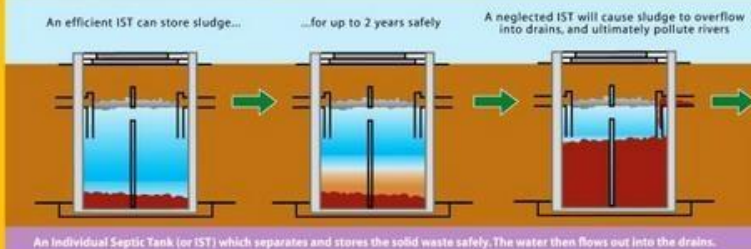
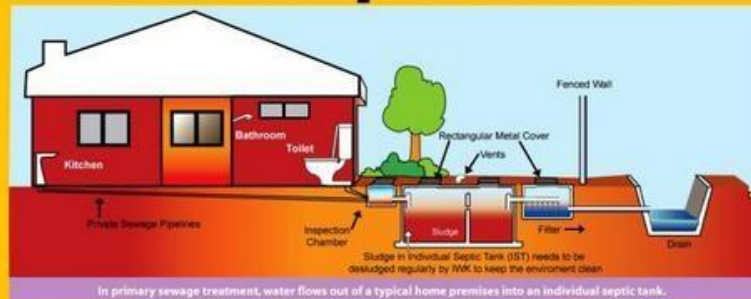
hauling distance, technical requirements, costing , requirement of expertise for construction and operation, availability of skilled labour, legal and regulatory requirements. The management option selected should be in conformity with local, state, and central regulations. From review of various options for the Septage treatment, it was observed that treatment options could broadly be divided into two types. One form of technology is to convert faecal sludge/Septage to compost and another is to convert Septage to energy. These technologies can be grouped as shown in the figure. Details of feasibility should be study before implementation of any technology.

Annexure 6 Sample IEC materials

Proper Design and Cleaning of your Septic Tank!	
	<p>Home Nagar Palika Pumping Truck</p> <p>Services provided by _____ Nagar Parishad</p>
Proper Design	Cleaning your Septic Tank
<ul style="list-style-type: none"> • Septic tank base should always be sealed and it should have proper vent pipes • Proper access manhole should be provided for easy emptying 	<ul style="list-style-type: none"> • Clean your septic tanks regularly once in 3 years • Do not wait for it to overflow. This will adversely affect your health and your environment

Source: IEC material used for awareness generation activities in Wai and Sinnar by CEPT University / AIILSG

Look After Your Septic Tank



Today, more than ever, safeguarding our environment from pollution is paramount. This means looking after your septic tank. Do you know its purpose? A septic tank separates liquids from solids and provides some breakdown of organic matter in wastewater.

Solids and wastewater from premises' toilets, bathrooms and kitchens that flow into septic tank are usually separated. Some solids, such as soap scum or fat, will float to the top of the tank to form a scum layer. Heavier solids, such as human waste (sewage) and kitchen waste, settle to the bottom as 'sludge'.

Self-forming bacteria in the tank 'digest' these solids. The remaining liquid flows out of the tank into drains and rivers. 'Baffles' built into the tank hold back the floating scum from moving past the outlet of the tank. It is most critical that sludge in septic tanks are pumped out (desludged) regularly to prevent sludge or sewage overflow and pollute the waterways.

Accumulated solids not removed periodically can also clog the outlet pipes and affect the treatment process.

If you have one, please do your part in having your septic tank desludged at least once every two years.

Sewerage Fact #1

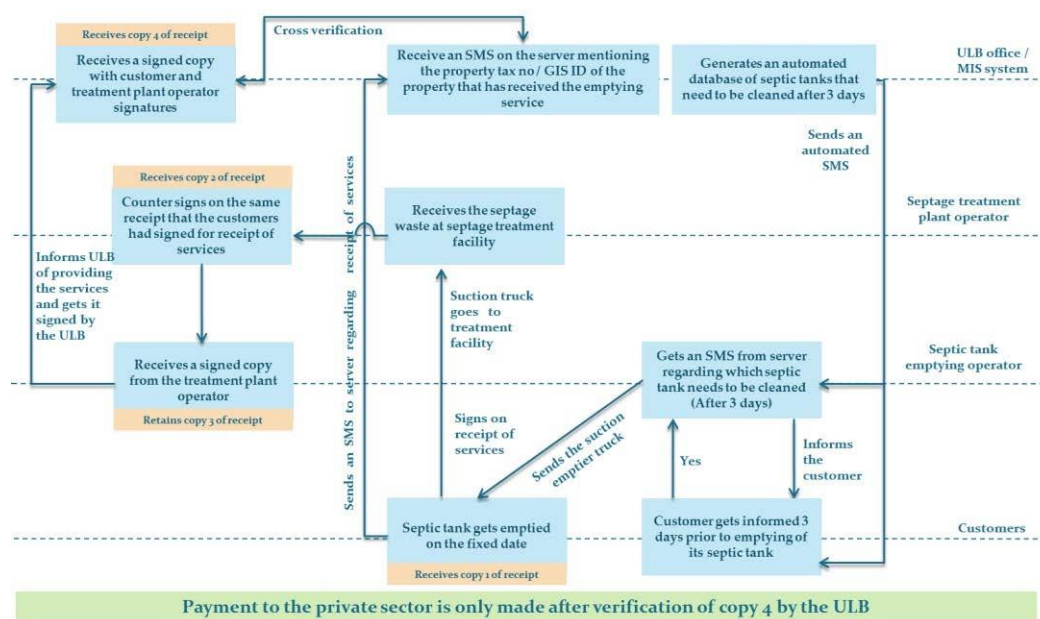
There are over one million premises in Peninsular Malaysia with septic tanks but only 30% are regularly desludged. Over 700,000 may be polluting the environment and our water resources.

Sewerage Fact #2

The requirements and design of septic tanks are provided under the Malaysian Standard 1228: 1991 Code of Practice for Design and

Annexure 7 Monitoring framework for IFSM activities¹¹

Monitoring framework for IFSM activities



¹¹ Source: Monitoring framework to be used for monitoring Septage management activities in Wai and Sinnar by CEPT University / AILSG / Urban Local Body

References

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- 4.** 2015, “Guidelines for ‘Open defecation Free Towns’ under Mahatma Gandhi Swachhta Mission”, Government of Gujarat
- 5.** 2013, “Manual on Sewerage and Sewage Treatment Systems”, Central Public Health and Environmental Engineering Organization (CPHEEO) and Japan International Cooperation Agency
- 6.** 2014, “Operative guidelines for Septage management for urban and rural local bodies in Tamil Nadu” Government of Tamil Nadu
- 7.** Operative Guidelines for Septage Management for Urban & Rural local bodies in Tamil Nadu.

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