Surat Municipal Corporation

Faecal Sludge & Septage Management (FSSM)

Action Plan 2019

Key Terminology

Effluent: the wastewater that flows out of a treatment system or supernatant liquid discharged from the septic tank.

Sludge: It is the settled solid matter in semi-solid condition. It is usually a mixture of solids and water that settles at the bottom of septic tanks, ponds, etc. The term sewage sludge is generally used to describe residuals from centralized wastewater treatment, while the term septage is used to describe the residuals from septic tanks.

Faecal sludge: Faecal sludge is the solid or settled contents of pit latrines and septic tanks. Faecal sludge differs from sludge produced in municipal wastewater treatment plants. Faecal sludge characteristics can differ widely from household to household, from city to city, and from country to country. The physical, chemical and biological qualities of faecal sludge are influenced by the duration of storage, temperature, intrusion of groundwater or surface water in septic tanks or pits, performance of septic tanks, and tank emptying technology and pattern.

Septage: Septage is the contents of septic tanks. It includes the liquids, solids (sludge), as well as the fats, oils and grease (scum) that accumulate in septic tanks over a period of time.

Greywater or Sullage: Domestic dirty water not containing human excreta. Sullage is also called grey water. It may be the waste water from housecleaning, kitchens and bath rooms.

Scum: It is extraneous or impure matter like oil, hair, grease and other light material that floats at the surface of the liquid in the septic tank, while the digested sludge is stored at the bottom of the septic tank.

Sewage or Black water: Wastewater generated from toilets containing human excreta and faecal matter is called sewage or black water.

Pit Latrine: latrine with a pit for collection and decomposition of human excreta and from which liquid infiltrates into the surrounding soil.

Pour-flush Latrine: Latrine that depends on its operation of small quantities of water, poured from a container by hand, to flush away feces from the receiving pan.

Septic Tank: An underground tank that treats wastewater by a combination of solids settling and anaerobic digestion. The United States Environmental Protection Agency (US EPA) defines a septic tank as an on-site treatment system of domestic sewage, consisting of two or more compartments, in which the sanitary flow is detained to permit concurrent sedimentation and sludge digestion.

Desludging: The operation of removing sludge from septic/digestion tanks, pit latrines or any other primary treatment units is called de-sludging. Usually this is done by mechanical means (by vacuum suction pump) but manual de-sludging is sometimes used despite it being banned in India.

Faecal Sludge Treatment Plants (FSTPs): An independent faecal sludge and septage treatment facility for remediating the solid and liquid components to prescribed standards for safe disposal and reuse.

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1.0 Introduction

What is FSSM?

Faecal Sludge and Septage Management is the process of safe collection, conveyance, treatment and disposal/ reuse of Faecal sludge and septage from on-site sanitation systems such as pit latrines, septic tanks, etc., i.e. the management of the faecal waste which is not conveyed by a centralized sewerage system. A typical FSSM system involves mechanized desludging of a septic tank/pit latrine using a suction emptier machine, which then stores the collected waste in a sealed container and transports it to a treatment facility. In some cases there is a transfer station for temporary storage of faecal sludge before being transported to a treatment facility by a different vehicle. At the treatment facility (either a dedicated FSTP or co-treatment in STP), the Faecal sludge/septage undergoes pre-treatment, followed by primary and secondary treatment (even tertiary treatment and polishing). Some efficient treatment facilities also incorporate resource recovery (methane, reuse of treated wastewater, manure/ soil conditioner, etc.) in the treatment process. The final residual product from the treatment plant is either recycled/reused or disposed safely in the surrounding environment that would comply with all pollution and quality standards.

There can be multiple deviations of this process at various stages across the sanitation value chain depending on site situation, techno-economic feasibility and capacities of the operators & regulators. The challenge is to streamline all these processes. This entails various concomitant interventions including institutional and regulatory measures, such as formulating bye-laws/regulations related to on-site sanitation, creating database on on-site

sanitation arrangements in the city, explore possibilities for private sector involvement in FSSM & levy tax / charges to finance FSSM activities, monitoring and evaluation framework and public awareness/ stakeholder engagement activities.

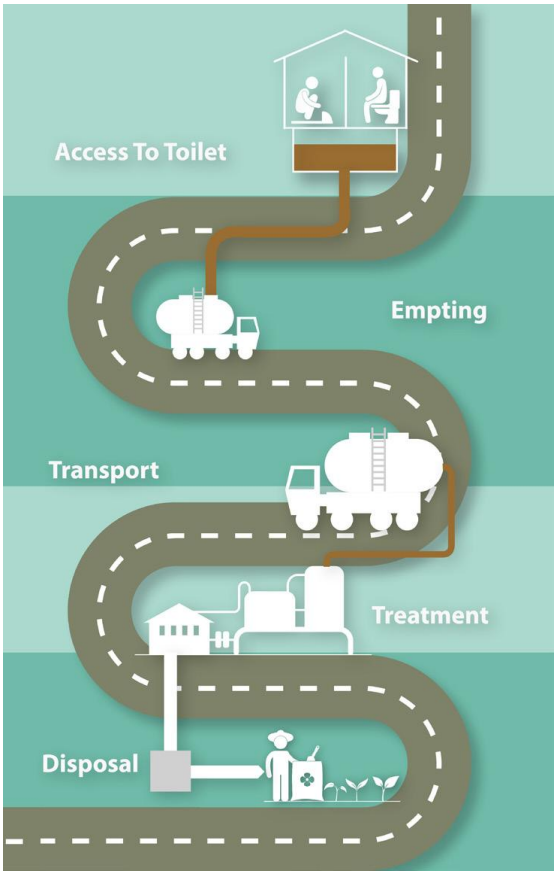
Figure 1: Schematic Diagram of FSSM Operation

ACCESS TO TOILET
Access to Hygienic Toilet to all households

EMPTYING & TRANSPORT
Desludging of septic tanks by suction machines and transportation to Treatment Plant

TREATMENT
Treatment at centralized or decentralized treatment plants

DISPOSAL/REUSE
Reuse of treated effluents for agricultural or other uses, or disposal at designated site



Efficient FSSM operation entails streamlining all processes and components along the 'sanitation value chain for on-site sanitation systems' during planning, design, implementation, operation and monitoring. Successful FSSM operations need active coordination and participation among relevant stakeholders – ULBs, service providers, operators, ward councillors, residents/community groups, state government, funding

agencies, etc.

While FSSM may not be complete stand alone sanitation solution (as it deals primarily with faecal waste and management of liquid waste is secondary), it is one of the fastest, economical and least intrusive approach in achieving immediate health and environmental improvement, especially considering budgetary and human resource constraints of smaller urban settlements. It also provides flexibility to incrementally improve the system to achieve complete sanitation coverage in consonance with settlement growth and investment flow.

2.0 Background - Surat.

Surat is a city located on the western part of India in the state of Gujarat. It is one of the most dynamic city of India with one of the fastest growth rate due to immigration from various part of Gujarat and other states of India.

Surat is one of the cleanest cities of India and is also known by several other names like "THE SILK CITY", "THE DIAMOND CITY", "THE GREEN CITY", etc. It has the most vibrant present and an equally varied heritage of the past. It is the city where the British first land in India. The Dutch and the Portuguese also established there business centers in Surat, the remnants of which are still preserved in the modern day Surat. In past this was a glorious port with ships of more than 84 countries anchored in its harbour at any time.

Still today, Surat continues the same tradition as people from all around the country flock in for business and jobs. Surat has practically zero percent unemployment rate and jobs are easier to get here due to very fast development of various industries in and around Surat City.

About Sanitation:

To provide a better quality of life and to make Surat a self reliant and sustainable city with all basic amenities, our commitment is for 100% coverage in terms of geographical areas and population for the year 2021, by providing a comprehensive sewerage system by the end of December 2021.

Surat Municipal Corporation has prepared a master plan for comprehensive sewerage system (more than 1873 Km of sewers and 11 sewage treatment works) to serve not only the domestic and commercial but also the industrial developments for the year

2021. Wastewater generated from all this developments is collected by a network of underground sewers and pumping stations and conveyed to sewage treatment works for physical and biological treatment to meet the parameters prescribed by the Gujarat Pollution Control Board before discharge into nearest water course.

Till 2019, out of the total city area of 177.50 sq.km. 87 % area and 99.50 % of the present population have been covered with underground drain with comprehensive sewerage systems.

- Coverage 177.50 sq.km. (i.e. 87.00 % of present area habitable area of @ 204 sq.km.)
- Total nos of Household/ Commercial/ CT/PT Connections: 18, 53,639.
- Total nos of Household/ Commercial/ CT/PT Connection in sewer system is 18, 46,848. **(Table 1B)**
- Total nos of Septic tank in Surat city is 224 nos. (Connected 6791 nos. of House hold connection)
- Surat Municipal Corporation planned to connect 6791 nos. of House Hold connection in sewer network.
- Length of sewer network: >1873 km.(Excluding Society lines)
- Existing Sewage Pumping Stations - 57 Nos
- Existing sewage treatment plants - 11 nos.
- Capacity of sewage treatment plants - 1074 nos. **(Table 1A)**

Surat Municipal Corporation have 11 Nos of Sewage Treatment Plants Capacity of 1072 MLD.

Table 1 (A)

1	Anjana Sewage Treatment Plant	122 MLD capacity
2	Bhesan Sewage Treatment Plant	100.0 MLD capacity
3	Bhatar Sewage Treatment Plant	162.0 MLD capacity
4	Karanj Sewage Treatment Plant	140.0 MLD capacity
5	Singanpore SewageTreatment Plant	155.0 MLD capacity
6	Bamroli Sewage Treatment Plant	100.0 MLD capacity
7	Asarma Sewage Treatment Plant	15.0 MLD capacity
8	Khajod Sewage Treatment Plant	25.0 MLD capacity
9	Variav Sewage Treatment Plant	134.0 MLD capacity
10	Gavier Sewage Treatment Plant	53.0 MLD capacity
11	Dindoli Sewage Treatment Plant	66.0 MLD capacity
	Total	1072.0 MLD capacity

House Hold and Commercial Connection scenario in Sewer Network of Surat City

Table 1 (B)

Sr No	Election Ward No	Election Ward Name	No. of Households Connection in Sewer Network	No. of Commercial Connection in Sewer Network	Household Connected to Septic Tank
1	1	Rander-Jahangirpura-Variyav	52068	16405	637
2	2	Kosad-Amroli	49896	15831	697
3	3	Varachha-Sarthana-Simada	51057	16102	-
4	4	Kapadra	48853	15338	-
5	5	Fulpada-Ashvanikumar	51671	16283	-
6	6	Katargam	46060	14463	-
7	7	Katargam-Ved	44885	14116	-
8	8	Dabholi-Siganpor	45300	14225	667
9	9	Adajan-Pal-Palanpur	51759	16311	637
10	10	Adajan - Gorat	52582	15072	-
11	11	Muglisara-Saiyedpura-	51492	16155	-
12	12	Salabatpura-Navapura-	46945	14730	-
13	13	Umarwada-Matawadi	51997	16365	-
14	14	Karanj-Magob	47758	15016	-
15	15	Puna (East)	49632	15614	-

House Hold and Commercial Connection scenario in Sewer Network of Surat City

Sr No	Election Ward No	Election Ward Name	No. of Households Connection in Sewer Network	No. of Commercial Connection in Sewer Network	Household Connected to Septic Tank
16	16	Puna (West)	49112	15461	-
17	17	Dumbhal-Parvat	47279	14845	-
18	18	Anjana-Khatodara	45584	14293	-
19	19	Sagarampura-Rustampura-Udhna	22784	14298	-
20	20	Sonifalia-Nanpura-Athwa	47725	14975	-
21	21	Ichhanath - Dumas	43617	13750	2062
22	22	Althan-Bhatar	45903	14425	-
23	23	Udhna (South)-Udhyognagar	49650	15568	-
24	24	Limbayat-Udhnayard	49031	15384	-
25	25	Godadara-Didoli (North)	50007	15690	-
26	26	Didoli (South)	50258	15768	-
27	27	Pandesara-Bhastan	44382	13938	352
28	28	Bamroli	52082	16350	770
29	29	Vadod-Jiaav-Una	49136	15437	970
		Total	**1411288**	**442208**	**6791**

3.0 Key issues and Challenges

Surat is a city located on the western part of India in the state of Gujarat. It is one of the most dynamic city of India with one of the fastest growth rate due to immigration from various part of Gujarat and other states of India.

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Surat city is situated on the banks of the Tapi river. After City expansion in year 2006 most parts of newly areas covered in surat city have also been provided with regular drainage schemes. Very few outer city area have soak pit or septic tank and average 0.097 MLD of septage is produced daily from them. However all such areas shall also be covered by sewerage to minimize discharge. Much of the faecal sludge and wastewater produced in these areas are being collected and disposed in Faecal Sludge and Septage Collection Chamber located nearby Sewage pumping Station or Sewage Tretment Plant in safe manner. It is a well-established fact that unsafe sanitation practices lead to negative health outcomes, which disproportionately affect women and girls by imposing health and healthcare burdens.

Containment: Most of the septic tanks of newly added areas are not constructed as per standard specifications, leading to varying sizes, partial lining, frequent failures, leakages/contamination of water bodies or soil etc. Further, they are not provided with

secondary effluent disposal units in the form of piped sewer network, leach pits or leach fields, thus directly discharging septic effluent into drains. Similarly other containment options like single and twin pits, Kuin also have issues in terms of faulty construction and susceptibility of ground water contamination.

Collection and Conveyance:

For collection and transportation from these septic tanks/soak pit Surat Municipal Corporation equipped with 42 nos. of modern machineries (such as soak emptiers (Khal Kuva tank), Suction machine & Super Sucker Machine) with all safety practices.

As most parts of city have been catered with regular sewerage network, very few de-sludging system needs to be managed, which is managed by SMC itself with above said vehicles, There is no private desludging operators are involved with SMC. Almost households in the city of Surat do have access to desludging services.

Disposal & Treatment:

Once the waste is collected by the SMC, it is disposed in Faecal Sludge and Septage Collection Chamber located nearby Sewage Pumping Station or Sewage treatment Plant for treatment arbitrarily.

There are dedicated treatment facilities for treatment and disposal of septage and faecal sludge in Surat city. The sewage from Faecal Sludge and Septage Collection Chamber is directly transfer to the sewage treatment plant for further treatment through sewage pumping station. At present, ULB have sufficient financial and human resource capacities to monitor these informal operations, while also having the expertise (besides resources) for planning and managing a treatment plant or implementing a scheduled

desludging service on their own.

The residue that accumulates in sewage treatment plants is called sludge (or biosolids). Sewage sludge is the solid, semisolid, or slurry residual material that is produced as a by-product of wastewater treatment processes. This residue is commonly classified as primary and secondary sludge. Some sewage plants also receive septage or septic tank solids from household on-site wastewater treatment systems. Quite often the sludges are combined together for further treatment and disposal.

The final destination of treated sewage sludge usually is the land. Dewatered sludge can be buried underground in a sanitary landfill. It also may be spread on agricultural land in order to make use of its value as a soil conditioner and fertilizer. SMC have a solid waste disposal site situated on border of city. Treated sewage sludge is disposed at there with using latest technology for land fill.

4.0 Policy vision

This policy has been made to ban the illegal dumping of liquid waste to any of water body. Hence, the area where proper drainage system is not available the unit holder shall provide septic tank/soak pit, which can be emptied by unit holder through registering complaint in Surat Municipal Corporation. Surat Municipal Corporation is having sufficient machinery to address this issue. However, Surat Municipal Corporation has set a goal to provide comprehensive sewerage system to this unit by the end of 2021.

5.0 Policy goal

The primary aim of this policy is to establish FSSM as a central component in delivery of safe sanitation service in Surat city by creating a favourable environment. The Policy will strive for,

PRIMARY GOALS

- Ensuring timely and Safe collection and transport of faecal sludge and septage: To eliminate septic tanks, pit latrines, etc. by providing a regular sewerage network in remaining parts of Surat city by 2021.
- The process ensures complete containment of waste with no direct human contact with the waste under any circumstance. However, the innovative mechanism or technology can be also explored to increase the average desludging period of containment.
- Complete treatment of all collected waste: All collected Faecal sludge should reach the treatment facility (without arbitrary and illegal disposal) and treated as per standards for safe disposal/reuse. System of incentives and vis-à-vis imposition of penalties will be tool to monitor desludging operators and to ensure disposal at designated locations. There will be greater use of technologies that consume very less power and use biological processes.
- Gender Equity and Social Inclusion: Due emphasis to be given to Gender equity and social inclusion where women are seen as active change agents and participants and not merely recipients of interventions. This will help to mitigate gender based sanitation insecurity arising due to lack of safe sanitation facilities and practices by reducing health, nutrition and care giving burdens.

SECONDARY GOALS

- Ensuring resource recovery: The treatment facility would maximize reuse of treated wastewater and sludge for various public and commercial purposes. This will contribute in part towards cost recovery and even profit generation
- Standardized Infrastructure and Professionalized Operations: Standards and norms are documented and adequately disseminated for design, construction and O&M of FSSM infrastructure such as On-Site Sanitation Facilities (Septic Tanks, Soak pits/Soak fields, Lined Pit Latrines, Digestion Tanks, etc.), Suction Emptier trucks & equipment, Treatment technologies (Sludge Drying Beds, integrated FSTPs, Co-Treatment with STPs, etc.) and criteria for end-product disposal/reuse. Moreover, the services provided by SMC be professionalized with standard operating procedures, operating and monitoring guidelines, etc. through appropriate training and capacity building of SMC staff.
- Setting up an Urban Sanitation Fund: This will be a dedicated fund for sanitation and FSSM, which would consolidate resources and funds from multiple sources – various central schemes and programs, state government grants, ULB funds & loans; and through innovative instruments such as Social & Development Impact Bonds.
- Innovation in service delivery and management: Improving service delivery, management and monitoring by introducing technological interventions such as I.T. enabled single window system, GIS/GPS aided planning and operations, custom MIS modules, etc. and greater emphasis on private participation in service delivery.
- Greater Awareness and Participation: The residents, especially the females of the households, would become active participants in the planning, implementation and monitoring process, while all stakeholders would be sensitized and sufficiently

made aware of the processes, procedures, components, etc. of FSSM. Multiple channels (digital, broadcast, print, physical, etc.) for communication, learning and stakeholder engagement would be used. Promoting mechanism to bring about and sustain behavioural changes aimed at adoption of healthy sanitation designs and practices, including the responsibility to ensure safe containment and management of faecal sludge and septage by urban households including liquid effluent.

- A strong partnership network: Multi-sector partnership of SMC with other public/private organisations, groups and institutions for collaborating on knowledge improvement, funding, improved services, business opportunities, research & innovation, stakeholder engagement, peer learning, etc. Formal and Informal platforms would be established for networking among various SMC service providers, associations, etc. for learning, knowledge sharing and partnership building.

6.0 Strategic Policy Action

The strategic points on Policy Actions would outline the broad provision to address the aforementioned issues and lay out a roadmap for effective implementation of FSSM in city. The provisions of the policy are broad- based and detailed State FSSM Guidelines shall be formulated that will elaborate upon the provisions of this policy and aid relevant stakeholders in planning, design, implementation, management, monitoring and capacity building of various components under FSSM. The Strategic Policy Actions have been classified under the following categories:

6.1 IEC & Stakeholder Participation

A rigorous awareness campaign should be undertaken to educate various stakeholders about Faecal Sludge and Septage Management.

Awareness spreading among residents about government schemes, benefits of scheduled desludging, various incentives for the same, good sanitation practices and monitoring of FSSM operations. This would be done with the involvement of ward councillors, community leaders, CBOs, women collectives, etc.

Special campaigns can be undertaken for making communities and households aware about the importance of safe sanitation practices including scheduled desludging and the incentives to be given for households that participate in the same. Various neighbourhood and city level institutions such as schools, colleges, CBOs, women collectives, etc. would be actively engaged as volunteers in these campaigns. Initiating behaviour change and awareness campaigns where women are expected to assume a central role as both audience and trainers.

Convergence with State and Central government campaigns for IEC and awareness generation for sanitation with related schemes and programs such as SBM, AMRUT etc. programs.

Multiple channels may be used for the same - such as media (social, print, broadcast, etc.), advertising, flyers/ brochures/ booklets, workshops, road shows, rallies, announcements, meetings, etc .

All IEC and awareness material must be in multiple languages, especially local dialects with more of graphical illustrations.

6.2 Institutional and Regulatory Framework

A dedicated team at local body to manage FSSM related initiatives such as projects, city FSSM plans, awareness campaigns, single-window systems, etc. Similarly, for inter-department coordination, required clearance (if any) and network and partnership building FSSM committed can be set up at state level. Committee formed under state sewerage and wastewater policy may be assigned additional mandate for FSSM as well. The composition of the committee and cell shall have adequate representation from women. Various external agencies and line department can be engaged for different initiatives and functions.

The Guidelines and Standard Operating Manual shall include –

- Format for City level Strategy and Contents for City FSSM plans
- Advisory on selection of suitable FSSM interventions – Number, Type and Capacity of Vehicles, Transfer Station, Treatment Option, Disposal/Reuse option, etc.
- Model Septic Tank design/construction/maintenance,

- Specifications for desludging vehicles, cleaning machines, equipment and
- safety gear,
- Options and broad specifications for Treatment technologies – Co-Treatment with STP, DEWATSTM, FSTP, etc.
- Steps for Capacity building at City level for officials,
- Operative manual for desludging and treatment plant operators,
- Model criteria for licensing of desludging operators,
- Steps for implementing scheduled desludging services at city level,
- Format for assessing financial requirements for FSSM by ULBs – Capital and O&M

All informal FSSM operations (by masons, desludging operators, cleaners, etc.) would be formalized and professionalized through appropriate channels, such as empanelment and licensing by ULBs, MIS – based reporting of operations, formal trainings, access to formal finance, etc.

For Licensing of desludging operators and other service providers by the ULBs, a model eligibility criteria shall be framed. It would allow licensed desludging operators to avail various incentives and benefits. All private desludging operators shall be required to obtain a licence from the respective ULB to operate in the city.

Roles of various stakeholders including ULBs, residents, service providers and private sector partners shall be clearly defined for reducing ambiguities and overlap of functions. The roles and responsibilities have been briefly provided in the subsequent section.

A system of incentives and penalties may be devised to encourage greater participation among residents, compliance by service providers (heavy penalties for illegal waste disposal, while monetary incentives for disposal at designated site), and better performance of ULBs.

Agency/Dept.Roles and Responsibilities

- DLB may engage professionals through empanelment to provide technical assistance to ULBs (if required) for realization of FSSM operations
- Coordinate with various state government departments and local level authorities to ensure convergence of FSSM Plans and Strategy with other ongoing and proposed projects.
- Invite public and private agencies to involve in FSSM operations at various levels of sanitation value chain and build partnership
- Establish framework and platform to encourage innovative funding mechanism such as CSR, PPP, Guarantee funds, Crowdsourcing, Social and Development impact bonds, ULB incentive fund, UPIF etc.
- Formulate a monitoring and evaluation mechanism to conduct annual review of the FSSM progress and gaps across all the ULBs
- Prepare a Training Calendar to conduct trainings and workshops across the state, customized to target various stakeholders such as ULB officials, service providers, NGOs, CBOs, Corporates and Public. Coordinate with the ULBs and engage Professionals to provide trainings on FSSM.
- Maintain records and prepare annual reports
- Undertake IEC activities/ public awareness campaigns at state level and also facilitate IEC material to the ULBs

- Address grievance related to environmental hazards due to FSSM operations
- Assist in formulation of relevant advisories, guidelines, manuals, etc. to ensure environmental compliance for FSSM operations
- Ensuring financially and environmentally sustainable operations
- Incorporation of model septic tank design, location, zoning, effluent disposal standards, toilet design, etc. into building byelaws
- Urban Local Bodies Coordinate training programmes for masons to build skills in construction of quality septic tanks as per ISO norms
- Devise a system of appropriate incentives and penalties for residents and service providers to induce desirable behaviour
- Ensuring capacity building and training – human resource, financial, equipment, exposure visits, etc.
- Overall Monitoring and Evaluation of FSSM operations – benchmarking, ensuring compliance, performance monitoring of desludging operators, etc.
- Undertake awareness generation and behaviour change campaigns and regular public engagement to ensure active participation by the residents, especially women and other vulnerable segments of the community
- Periodic monitoring of plant effluent discharge
- Ward Councillors Lead the Ward-level awareness generation and behavior change campaigns
- Encourage households towards scheduled desludging and active participation
- Represent ward-level/community level issues related to sanitation
- Households Periodic cleaning and desludging of Septic Tanks/pits as per Schedule
- Construction of proper On-Site Sanitation Facility as per building bye-

laws/National Standards

- Households Regular maintenance and monitoring of septic tanks
- Desludging Operators Timely collection of waste from households as per schedule and disposing waste at designated locations/treatment facilities only
- Strict adherence to code of conduct/standard operating procedure as per city/state guidelines
- Regular maintenance of equipment and vehicles
- Ensuring the functioning of GPS and providing relevant informa- tion to ULB on regular basis

6.3 Partnership Building

A strong network of partners in various sectors and of various backgrounds would be established, including renowned specialists/experts, Corporates, Research/Academic Institutions, Civil Society groups/CBOs/NGOs/SHGs/women collectives, private service providers, Donor agencies, Bilateral/Multilateral agencies, etc. for bolstering capacities and knowledge in the sector.

Dedicated Cell shall enable by ULB by facilitating the identification of professional consultants for preparation of plans, detailed project reports and tender documents, empanelment of suppliers and manufacturers of desludging equipment, private contractors and vendors for construction of treatment plants etc. on a cluster-based approach or for individual towns/ cities.

ULB may also engage technology partners for exposure of various treatment module innovations including developing GIS based containment user database, GPS enabled desludging operations and monitoring systems etc.

State shall encourage the private players by providing fiscal and non- fiscal incentives in terms of tax exemptions, health insurance, processing fee waiver etc. to actively participate in the FSSM planning and implementation process.

There is an increased need to encourage greater private participation in service delivery and financing of FSSM activities by creating an enabling regulatory environment and creating opportunities. Backward and Forward linkages shall be established with private players, other government departments, trade and farmer associations, etc. for optimum reuse of treated sludge and wastewater. Possibility shall be explored on whether treated and stabilized sludge can be used as organic fertilizer for farming and gardening, biogas recovered can be locally distributed for cooking or production of electricity, while treated wastewater could be reused by industries/power plants/irrigation, etc.

Necessary platforms shall be established such as periodic conferences, workshops, summits, meetings, events, formal groups/associations, and others for regular interaction among various stakeholders and partners for knowledge sharing, peer-learning, progress review, information dissemination, etc.

6.4 Funding and Financing

New and Innovative modalities for financing FSSM would be explored by ULB with involvement of knowledge and funding partners, which may include – PPP, MP, MLA, ULB Incentive Fund, UPIF, etc. A State Sanitation Fund should be set-up that will consolidate funds and resources from these aforementioned sources, in addition to central government schemes and programmes, Central & State Finance Commission, state funds, etc. It would be managed by the state government (through a designated nodal agency) and provided to ULBs/ service providers/ other relevant stakeholders based on a

transparent and flexible criteria, linked to performance and need.

Preference would be given to FSSM models that ensure maximum cost recovery and even profit generation in the O&M stage, partly through reuse of treated end product (wastewater and sludge) in the form of biogas, electricity, water reuse, fertilizer/manure, compost, etc.

Desludging and Treatment Plant operators shall use requisite safety gear during operations. There should be absolutely no direct human contact with the waste. For urban pockets where both sewerage system and desludging services are not possible, such as compact inner city areas and congested slums, appropriate on-site, decentralized wastewater and faecal sludge treatment solutions would be explored. A more detailed set of techno-economic criteria shall be developed and provided in the State FSSM Guidelines for the same. The discharge of treated end-product from the FSTP, i.e. both solid and liquid residue, shall comply with the prevailing CPCB/GPCB norms.

7.0 Expected Outcomes

While the goals set out broad aspirations and intention of the policy, the expected outcomes are tangible end results if the goals are achieved.

- Enhancement of sanitation coverage - No direct contact with waste - Safe handling and complete containment of Faecal Sludge and Septage during collection, conveyance, treatment and disposal.
- Timely Desludging - Greater Progress in transition from irregular on-call service to periodic and scheduled service, along with formalization of service providers (masons, operators, tankers, etc.)
- Environmental improvement - Significant reduction in contamination of soil and water (surface and underground) due to human waste
- Safe waste handling and Better Public Health - Safe handling and complete containment of Faecal Sludge and Septage during collection, conveyance, treatment and disposal. Noticeable improvement in public health indicators including morbidity and mortality rates across urban areas in the state reduced incidences of water-borne diseases is expected as an outcome.
- New opportunities – Avenues in sanitation and FSSM services emerge, based on technical innovation, user-driven cost recovery and profit generating business models through resource recovery and other innovative means.
- Skill & Employment Generation - Skilled manpower for FSSM through incremental capacity building programmes; also evolving opportunities under FSSM as mainstream career prospects for young professionals.
- Greater Institutional Capacities - Augmented capacities across institutions (State and city-level) that could possibly be replicated in other sectors.
- Enhanced community awareness and participation - Across the sanitation value chain during planning, service delivery and monitoring.

8.0 Process of FSSM:

The responsibility of septage management lies with the concerned Urban Local Bodies (ULBs). The following are the key components of a Septage Management Plan:

1. Collection & Transportation..

2. Treatment.

3. Reuse/ Recycle/ Dumping.

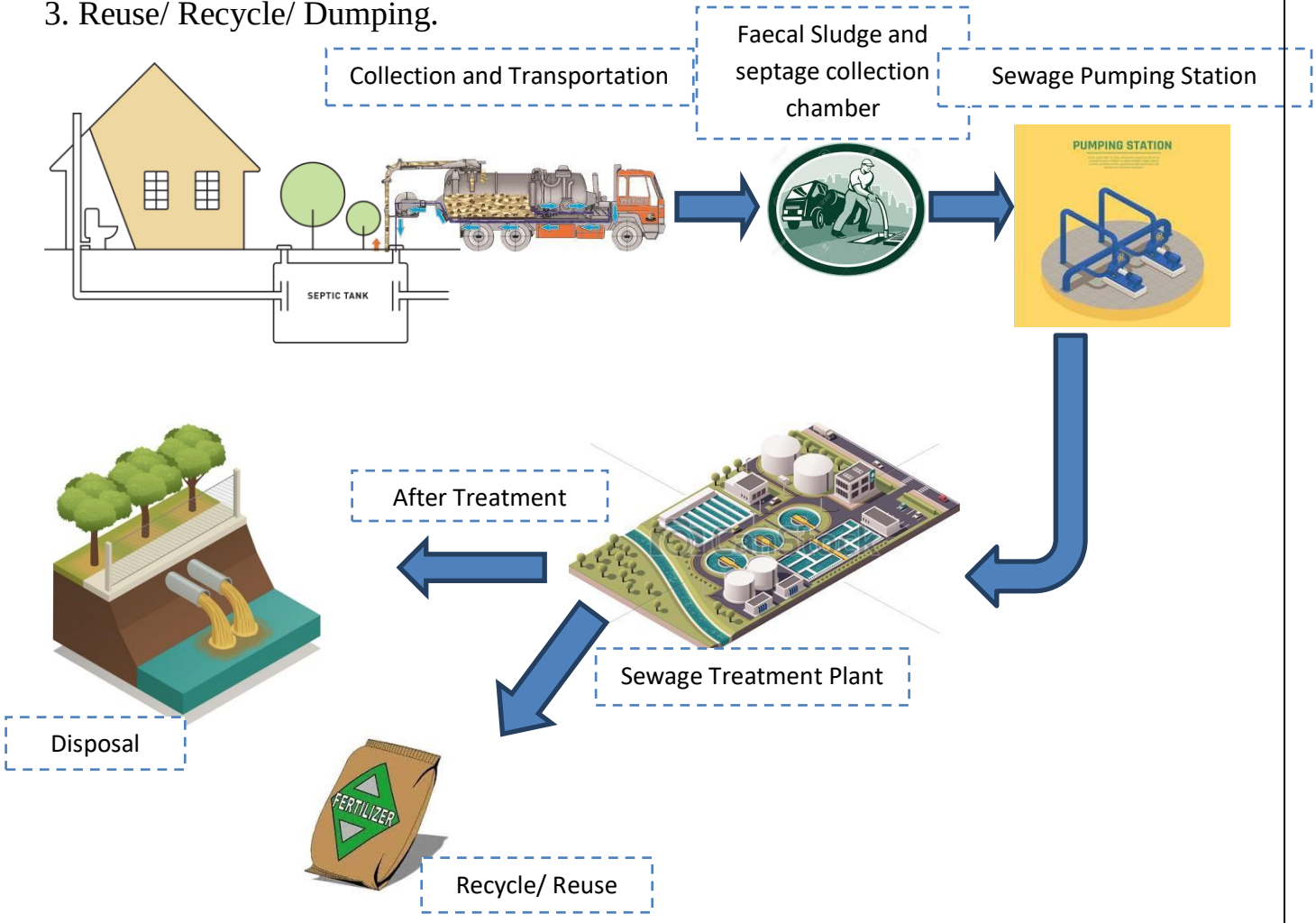

Figure: II (Process diagram of FSSM)

1. Collection & Transportation:

Proper collection and transportation of septage is one of the most important components of septage management.

As per the CPHEEO Manual on Sewerage and Sewage Treatment, 2013 “yearly desludging of septic tanks is desirable, but if it is not feasible or economical, then septic tanks should be cleaned at least once in two - three years, provided the tank is not overloaded due to use by more than the number of persons for which it is designed.”

Under the Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013 desludging / emptying of septic tanks is to be undertaken by mechanical devices like suction emptier trucks / vacuum tankers. These desludging trucks collect septage at the household level and transport it to treatment.

2. Treatment:

Once collected, the septage needs to be treated as per the CPCB and GPCB norms before disposal. Septage has constituents similar to municipal wastewater, which make the co-treatment of septage along with sewage feasible. If the Sewage Treatment Plants (STP) is not designed to deal with the septage, the plants can increase their aeration capacity and in some cases also expand their facility to cater to the excess waste. For septage to be treated at STPs, the following approaches can be adopted.

Septage addition to nearest sewer manhole

- Septage addition to STP
- Septage addition to sludge digesters/sludge drying beds

However, in the absence of an STP, ULB should plan a new septage treatment facility

taking the following parameters into consideration (UDD, 2016)- accessibility of the treatment site; availability and reliability of electricity; appropriate distance from residential areas; geological conditions.

3. Recycle/ Reuse/ Disposal:

Reusing refers to the act of returning the products 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. Properly treated sludge can be reused in the following ways.

- Soil Conditioner- It can be applied on parched land as a soil conditioner, or as a fertilizer in agriculture. Crops which could be safely grown are corn, fodder, cotton, trees including fruit trees, eucalyptus and poplar.
- Aquaculture- Settled septage effluent can be applied to freshwater where it is possible 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.

ULBs should carry out a primary assessment for the availability of markets for treated sludge and the demand for reuse. However, for dewatered septage to be used as a fertilizer it should satisfy the following criteria of Classification as per FCO norms.

9.0 FSSM ACTION PLAN:

Out of 57 nos of Sewage **Pumping Station of** Surat Municipal Corporation, 10 are designed for collecting faecal Sludge with help of various machineries of area having no regular Sewage network and faecal sludge from this designated point reaches to Nine STPs for further treatment. The detailed location of STPs and relevant SPS is as below.

Table 2.

Sr. No.	Sewage Pumping Station	Sewage Treatment Plant
1	Dindoli SPS	Dindoli
2	Anajana SPS	Anajana
3	Bharimata SPS	Singanpor
4	Karanj SPS	Karanj
5	Bhesan SPS	Bhesan
6	Umara South SPS	Bhatar
7	Nanpura SPS	
8	Bamroli SPS	Bamoli
9	Kosad SPS	Kosad
10	Gavier SPS	Gavier

Surat Municipal Corporation has 114 Nos of machinery for Desilting/ Cleaning of Sewer Manhole and line. Surat Municipal Corporation also provides machinery on Rental basis for sewer manhole and line cleaning in inside the city as well as outside of Surat city. The table below shows the various categories of machineries available with SMC.

Table 3.

Sr.No.	Zone	Sewer Jetting Machine (In Nos.)		GULPER Machine (In Nos.)	Desiltmen (In Nos.)	Super Sucket (In Nos.)	Total (In Nos.
		8000 Ltr. Capacity	3500 Ltr. Capacity				
1	NORTH ZONE	05	01	04	02	01	12
2	WEST ZONE	02	04	02	03	01	11
3	EAST ZONE (A &B)	04	03	03	03	01	13
4	SOUTH EAST ZONE	05	02	05	07	01	19
5	SOUTH ZONE	05	04	04	02	01	15
6	SOUTH WEST ZONE	03	04	04	02	01	13
7	CENTRAL ZONE	09	03	08	04	01	24
	Total	**33**	**21**	**30**	**23**	**07**	**114**

Within Surat City Limit: (as per General Board Resolution no. 01/2018 dtd.29/01/2018)

1. Rate of desludging septic tank with soak pit tanker in the Residential/ Commercial unit within Surat City limit.

Table 4

Sr.No.	Description	Calendar Year				
		2018-19	2019-20	2020-21	2021-22	2022-23
1	up to 5000 liter	300/-	330/-	363/-	400/-	440/-
2	5000 liter to 10000 liter	600/-	660/-	726/-	800/-	880/-

Outside Surat City Limit: (as per General Board Resolution no.490/2017, dtd.30/08/2017)

Table 5

Sr. No.	Calendar Year	Sewer Jetting & Suction Machine (for 12 hour shift to and fro site)	Super Sucker Machine (for 08 hour shift to and fro site)	Remarks
1	2017	Rs. 15,000/-	Rs. 33,840/-	1) Facility given for 50 Km. form Surat City. 2) Rs. 10,000/- deposit for this facility.
2	2018	Rs. 15,750/-	Rs. 35,540/-	
3	2019	Rs. 16,540/-	Rs. 37,320/-	
4	2020	Rs. 17,370/-	Rs. 41,190/-	
5	2021	Rs. 18,240/-	Rs. 43,250/-	
6	2022	Rs. 19,160/-	Rs. 45,420/-	

Note: For more information contact nearer ward office/ revenant zone office of SMC.

Surat Municipal Corporation provides above machineries as per requirement of Citizen on rental basis and as per rate approved by competent authority. To get facility, Citizen can approach nearer ward office or relevant zone office and submit the application to get the facility available. Competent officer get it approved at appropriate level and inform applicant to remit the deposit & rent and after completion of financial formalities machine being sent to site of the complaint of applicant.

To summarize,

1) Surat Municipal Corporation has made comprehensive master plan to cover the whole city by comprehensive sewage system. The timeline is year 2021.

2) Present coverage of population is above 99%.

3) The remaining area being covered through soaks pits and septic tanks.

4) Surat Municipal Corporation has enough machinery to lift the feacul sludge so collected in soak pits and septic tanks.

5) Designated spots at 10 SPS are located which are connected with 09 STPs where sewage being treated as per norms of Gujarat Pollution Control Board.

6) System is in place for Citizen to get this facility by applying to nearby ward office/relevant Zone office.

7) Rates have been approved by component authority to get this facility.

8) Surat Municipal Corporation having adequate treatment capacity against the generation of sewage from city of Surat.

Application Format for Demand Outside Surat City

(Annexure - I) (In Gujarati)

તા.....

પ્રતિ,

નાયબ આરોગ્ય અધિકારીશ્રી,

..... ઝોન

સુરત મહાનગરપાલિકા.

વિષયઃ ..... સ્થળે ડ્રેનેજ લાઈન/સેપ્ટીક ટેન્કની સફાઈની કામગીરી માટે સુપર સકર મશીન/ સુઅર જેટીંગ મશીન/ સકશન મશીન મોકલી આપવા બાબતે.

મહાશય,

ઉપરોકત વિષય અન્વયે જણાવવાનું કે, અમારા ..... વિસ્તાર સુરત મહાનગરપાલિકા હદ બહાર આવેલ છે. અમારા વિસ્તારની ડ્રેનેજ લાઈન/સેપ્ટીક ટેન્ક ભરાઈ ગયેલ છે. જેથી તેને સાફ કરવા માટે આપના સુપર સકર મશીન/ સુઅર જેટીંગ મશીન/ સકશન મશીન મોકલી આપવા વિનંતી છે. આ અંગે જે કોઈ ચાર્જ/ડીપોઝીટ ભરવાનો થશે તે અમો ભરવા સંમત છીએ.

લી.

આપનો વિશ્વાસુ

Application Format for Demand Outside Surat City

(Annexure - II) (In English)

Dtd:

To,

Deputy Medical Officer shri,

…….. Zone

Surat Municipal Corporation.

Subject : To provide Super Sucker Machine/ Sewer jetting Machine/ Suction Machine for cleaning of our drainage line / septic tank.

Respected sir,

We undersigned residing at…….., which is located out of Surat city limit. Request to provide Super Sucker Machine/ Sewer jetting Machine/ Suction Machine to solve the overflowing of septic tank/soak pit/ drainage line. We are ready to remit charges/deposit as per norms of Surat Municipal Corporation.

Your Faithfully

Application Format for Demand Inside Surat City

(Annexure - III) (In Gujarati)

તા.....

પ્રતિ,

નાયબ આરોગ્ય અધિકારીશ્રી,

..... ઝોન

સુરત મહાનગરપાલિકા.

વિષયઃ ..... સ્થળે સેપ્ટીક ટેન્ક ખાલી કરવા માટે ખાળકુવા ટેન્કર મોકલી આપવા બાબતે.

મહાશય,

ઉપરોકત વિષય અન્વયે જણાવવાનું કે, અમારી સોસાયટી/ઘરની ..... વિસ્તાર સુરત મહાનગરપાલિકામાં આવેલ છે. અમારા સોસાયટી/ઘરની સેપ્ટીક ટેન્ક ભરાઈ ગયેલ છે. જેથી તેને ખાલી કરવા માટે આપના ખાળકુવા ટેન્કર મોકલી આપવા વિનંતી છે. આ અંગે જે કોઈ ચાર્જ/ડીપોઝીટ ભરવાનો થશે તે અમો ભરવા સંમત છીએ.

લી.

આપનો વિશ્વાસુ

Application Format for Demand Inside Surat City

(Annexure - IV) (In English)

Dtd:

To,

Deputy Medical Officer shri,

…….. Zone

Surat Municipal Corporation.

Subject : To provide Soak pit Tanker/ Gully emptier for cleaning of our septic tank.

Respected sir,

We undersigned residing at…….., which is located within Surat city limit, Request to send Soak pit tanker to empty the soak pit/ septic tank of our house/society. We are ready to remit the charges/deposit as per norms of SMC.

Your Faithfully