GOVERNMENT OF KERALA

Abstract

Local Self Government Department - Policy on Faecal Sludge and Septage Management for Kerala & Operation and Maintenance policy for Liquid Waste Management facilities in Kerala - Approved - Orders issued

LOCAL SELF GOVERNMENT (WM) DEPARTMENT

G.O.(P)No.16/2026/LSGD Dated,Thiruvananthapuram, 21-02-2026

Read Letter no. 1318/A/2024/SM dated 29.01.2025 and 19.02.26 from the Executive Director, Suchitwa Mission Kerala

ORDER

Government are pleased to approve the State Policy on Faecal Sludge and Septage Management for Kerala and Operation and Maintenance policy for Liquid Waste Management facilities in Kerala, appended to this Order.

(By order of the Governor)
ANUPAMA T V I A S
SECRETARY

Deputy Secretary, Ministry of Jal Shakti, Department of Drinking Water and Sanitation Swachh Bharat Mission, Government of India (with Covering Letter)

Principal Director, Local Self Government Department Kerala.

All District Collectors

Executive Director, Suchitwa Mission Kerala.

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Section Officer

Policy on Faecal Sludge and Septage Management for Kerala

January 2025

Thiruvananthapuram

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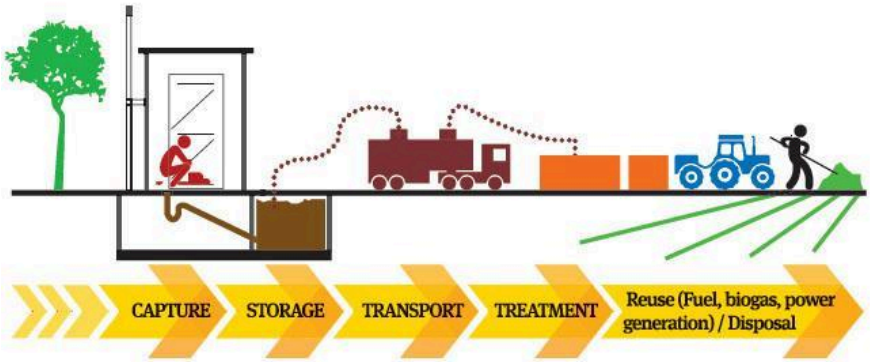
1.Introduction to Faecal Sludge and Septage Management

Faecal Sludge or Septage accumulates in onsite sanitation systems like septic tanks, pit latrines or dry toilet systems. It is solid, semi-solid or a fluid like material, which is partially digested in the onsite sanitation systems and requires further treatment to remove or kill the harmful pathogens present. Faecal Sludge and Septage Management includes storage, emptying, transport and safe end-use or disposal. Poor management of septage causes severe environmental and public health risks.



1.1 FSSM service chain or Sanitation Value chain

Storage (Toilet & Containment)

Faecal sludge and septage is stored in a safe onsite system for designated years, usually 2 to 3 years depending on the type of the system.

Emptying and Transport

It is safe emptying of septage from the onsite sanitation systems. Emptying and transport of septage vary based on the type of location, sanitation system and emptying mechanism available. Emptying trucks, trolleys or other vehicles are used to empty the septage from establishments in Kerala. The emptying sector is mostly unregulated and managed by the private agencies in Kerala.

Treatment

Septage can be treated in a standalone faecal sludge treatment plant or sewage treatment plant through co-treatment. The treatment method is dependent on quality, quantity, geography and land availability. The septage treatment is generally initiated through solid liquid separation. The treatment can be nature based or electro mechanical.

Safe reuse or disposal

The processed septage can be safely reused as soil conditioner (after removing pathogens), fuel, or biochar. The reuse of septage is subject to the type of septage treatment executed.

1.3 Scenario of FSSM in Kerala

Kerala achieved Open Defecation Free (ODF) status in the year 2016, but the state is faced with a second-generation challenge of faecal contamination of water bodies. The water sources of the state are contaminated by the pollutants entering the water bodies and the environment through indiscriminate disposal of septage and lack of treatment infrastructure resulting in public and environmental health risks. The state is predominantly served by the onsite sanitation systems (OSS) and the networked sanitation coverage is minimal in the state.

Presently, faecal waste is treated in Thiruvananthapuram through co-treatment at Sewage Treatment Plant (STP), Kochi through two FSTPs, Kalpetta and Wayanad through FSTPs. Roughly less than 10% of faecal sludge generated is being treated or safely managed in the state.

1.4 Scope of the Policy

This FSSM policy will focus on onsite sanitation systems and the areas served by them, excluding networked or conventional sewerage systems (including wastewater/sewage treatment plants). However, the policy recognizes the importance of synergies between septage management and sewerage systems, as well as municipal solid waste (MSW) management, such as co-treatment of septage at sewage treatment plants or alongside MSW management. These integrated approaches will be encouraged. The policy covers the entire service chain, including the transportation, treatment, and reuse or disposal of faecal sludge and septage.

1.5 Objectives of the Policy

The objectives of the FSSM policy are

(i) Adoption of Sustainable FSSM Services: Ensure the adoption of sustainable Faecal Sludge and Septage Management (FSSM) services that are inclusive and equitable for all citizens.

(ii) Pollution-Free Environment: Promote an environment free from pollution and health hazards for all citizens.

(iii) Public and Private Sector Support: Facilitate collaboration between the public and private sectors under the guidance of a sector regulator for effective implementation.

(iv) Prioritization of Marginalized Communities: Address the needs of marginalized communities, particularly those who wish to continue using on-site sanitation systems, ensuring equity in service provision.

(v) Reduction of Pollution in the Ecosystem: Focus on reducing pollution in the surrounding ecosystem by effectively managing faecal sludge generated in the state.

(vi) Clear Roles and Responsibilities: Define the roles and responsibilities of various stakeholders involved in FSSM implementation.

(vii) Promotion of FSSM Technologies: Provide a variety of FSSM technologies for implementation, ensuring adaptability to different contexts and needs.

2. Roles and Responsibilities of stakeholders on FSSM implementation

Local Self Governments

1) The internal and external roads, power supply, water connection and telephone connection for the FSTP are to be arranged by LSGs
2) Allocation of funds for CAPEX through SBM-G or Urban funds or 15th FC funds and OPEX funds through own fund sources.
3) Licensing or regulating the desludging operator with places of emptying the collected septage and regulated the emptying fee collected by them
4) Owning the FSTP infrastructure from establishment till the sustainable operation
5) Ensuring the construction of proper septic tank through capacity building of all the stakeholders involved
6) Maintaining all the public toilets through private agencies with service agreements
7) Provision of regulatory mechanism to administer the FSSM services in the LSG through FSSM byelaws.
8) IEC for holistic FSSM services from toilet to treatment or reuse, including regular emptying of the containment systems.
9) Timely release of the funds to the operation and maintenance agencies who operate the public toilets, desludging and the FSTPs
10) Coordinate among the cluster LSGs regarding the waste transport and treatment in their LSGs.

Suchitwa Mission

1) Empanelment of service providers and technologies for establishment of FSTPs
2) Provide Technical Sanctions (TS) for the FSTP projects formulated by the LSGs after the verification of the proposals.
3) Provision of technical advisory support to the LSGs regarding FSSM strategy, rules, funding and guidelines.
4) Facilitating the capacity building programs for sustainable implementation of FSSM initiatives by the LSGs
5) Engaging the private and non-governmental stakeholders for the technical advisory support and IEC support for campaigning on the importance of FSSM services.
6) Provision of capacity building materials based on different target groups for the FSSM implementation and provision of human resources support for capacity building activities.
7) Preparation of standard operating procedure for FSSM covering households, desludging operators and treatment plant operators.

Kerala State Pollution Control Board

1) Ensure compliance of FSSM operations through regular inspections and environmental monitoring.
2) Assist in formulation of relevant advisories, guidelines, manuals, etc. to ensure environmental compliance for FSSM operations
3) Provision of inputs to Suchitwa mission in their technical advisory support.

Desludging operators or Septage emptiers

1) Timely collection of the Faecal waste from the households upon receiving the request and disposing the collected waste at the designated place or FSTP.
2) Regular maintenance of the vehicles and desludging equipment
3) Maintenance of log book of the waste collection, manifest and reports
4) Adherence to all the applicable regulations fixated by the LSG or the government
5) Regular use of PPE and following all safety protocols while emptying the containment systems

Masons

1) To undertake the training for the construction of proper septic tanks and toilets.
2) Discouraging the cost cutting measures and the improper containment system or toilets in their areas of operation

FSTP operators

1) Maintenance of log books, record of the influent and effluent characteristics and sludge quantity generated in the FSTP.
2) Adherence to the standard operating procedures issued by the LSGs and the governmental bodies.

Special case

1) The containment system shall be contextualized to the localities and the common containment system may not function in all contexst. Examples: Conventional septic tanks may not work efficiently in high ground water table areas in Alappuzha district and coastal zones and in those places above ground plastic or reinforced tanks shall only work.

3. Clustering of LSG for FSTP

Establishing individual FSTPs for every LSG is not only uneconomical but also not feasible. Cluster based approach will be ideal for the establishing FSTPs. A maximum travel distance of 15 km may be fixed for the desludging vehicle for carrying the load from the point of extraction to the treatment plant. Clusters are to be formed based on the distance criteria from the identified treatment unit site.

4. Technology options for Faecal Sludge and Septage Management

Treatment options for faecal sludge/septage are based on four treatment objectives.

These four mechanisms enable sludge to be handled, disposed of, and/or re-used safely.

a) Solid liquid separation: Solid liquid separation is the first step for successful treatment of faecal sludge, as refuse must be brought to some sort of uniform consistency.

b) Dewatering: Before treatment, faecal sludge is over 80-90% water by volume; de-watering is necessary to reduce volume/weight and destroy the habitat that allows dangerous pathogens to grow.

c) Stabilization: Stabilization refers to several biological and chemical processes through which ongoing biological-chemical reactions run their course and nutrients are consumed by bacteria.

d) Reuse applications: Once the previous three steps have been accomplished, sludge can be re-used for productive purposes or sent on for further treatment (such as co-composting with solid waste) depending on its chemical/biological profile.

Some of the technologies for the Faecal Sludge Treatment are given in the list below.

(1) Upflow Anaerobic Sludge Blanket reactor (UASB) + MBBR/Wastewater treatment

(2) Anaerobic Baffled Reactor/Digester/Settler+Planted Gravel Filter (PGF)

(3) Pyrolysis + MBBR/Wastewater treatment

(4) Vermifiltration

(5) Mobile Septage Treatment Unit (MTU)

(6) Mechanical Dewatering + MBBR/Wastewater treatment

LSGs can choose from a range of treatment options available in the market, depending upon their needs and available finances. Inclusion of Construction wetlands may help in treating the wastewater during the monsoon seasons.

4.1 Co-treatment of septage in STP

Co-treatment is a process of treating faecal sludge and septage along with sewage in a sewage treatment facility. Most STPs are designed for longer durations and have a spare capacity available. The characteristics of the septage vary from sewage as septage has constituents in high concentrations and so, a small infrastructure change in an STP can enable it to treat the faecal sludge. SBM (Urban) 2.0 proposes to equip all the sewage treatment plants with co-treatment facilities to cater the treatment needs of the non-sewered areas.

The co-treatment of septage in the STP can be commissioned in two ways (a) Direct addition of FS and (b) Solid liquid Separation method

5. Awareness Generation and Capacity Building activities

Awareness for residents: Residents, including members of Resident Welfare Associations, community organizers, self-help groups, and the general public, should be regularly informed about the need for a safe faecal sludge management system, especially regarding the three-year cycle for containment emptying and emptying based on the context for high groundwater table & coastal areas. They should also be educated about the health risks of improper waste management and the environmental dangers posed by untreated sewage entering water bodies and storm drains.

Capacity building for LSG staff: LSG personnel, including Secretaries, Engineers, Health Officers, Sanitary Inspectors, and Sanitary Workers, should receive comprehensive training in best practices for safe septage management. This training should cover safe collection, treatment, and disposal methods, along with the standard septic tank design, the importance of regular inspections and

desludging, the design of treatment facilities, and how to engage licensed transporters. Information on safety standards should also be included.

Capacity building for septage transporters/private vendors: LSG authorities must ensure that septage transporters and private operators are well-informed about safety protocols. These transporters should receive training on the safe collection, transportation, and disposal of sewage, including vehicle specifications, desludging procedures, safety equipment, and proper disposal at treatment facilities.

Gender inclusivity: LSGs should approach faecal sludge management from a gender perspective, focusing on the empowerment of women and girls. Women must be included in the planning of FSM activities and the development of local regulations. All FSM discussions should ensure that at least one-third of its members are women.

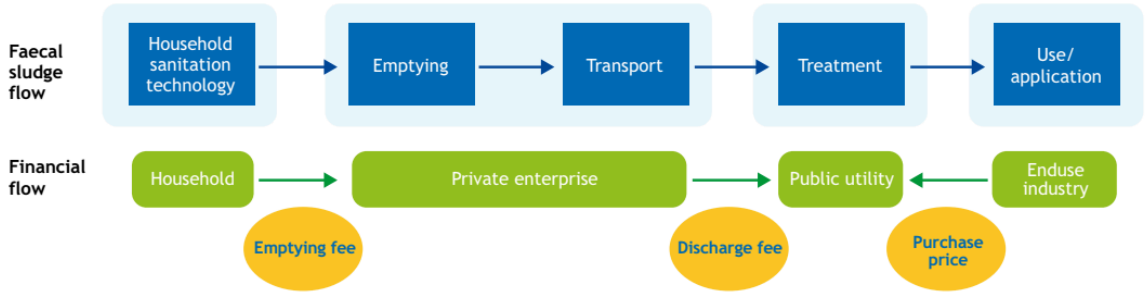
Climate change awareness: Awareness and capacity-building initiatives should also address climate change adaptation strategies in FSM plans, ensuring that systems are resilient to these environmental changes. LSGs should incorporate climate-resilient practices in their waste management strategies to minimize the impact of extreme weather events and ensure long-term sustainability. Examples are installing tanks above flood levels, prevention of pipe damage due to heat etc.,

6. Revenue Models for FSSM

Discrete collection & Treatment Model

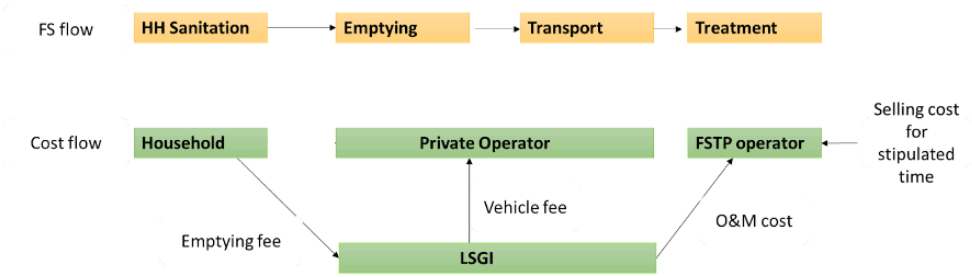
In this model, each of the stakeholder is responsible for a single component in the service chain and money flow takes place at each component that is each time the responsibility is transferred. The household pays the emptying fee to the emptying and transport service provider to empty the sludge from their containment and transport the sludge to the treatment facility. The emptying and transport service provider pays the public utility with the discharge fee to discharge their collected sludge, who treats the sludge and produces soil conditioners to sell it to industries for a price.

Figure 2.11: Faecal & Financial flow of Discrete Collection & Treatment Model



An alternate revenue model of this discrete collection and treatment model is used in Kerala, which seems to be profitable. In the model, households pay the emptying fee to the LSG and the LSG takes the treatment charge and pays the private operator with vehicle fee. The assigned emptier by LSG receives the vehicle fee from the LSG and empties the containment of the household. With the treatment charge the LSG provides the O&M charge to the private operator for operating and maintaining the FSTP. The Household will not be paying the emptier as the payment will be provided by the LSG and the FSTP operator can take the revenue from the sale of FSTP by-products like co-compost, manure or treated water with the consent of the LSG.

Faecal & Financial flow of Modified Discrete Collection and treatment model



There are diverse financial models and the models can be customized based on the LSG. The models can be found in Faecal Sludge and Septage Management (FSSM) business model by NITI Aayog and National Faecal Sludge and Septage Management (NFSSM).

7. Funding for FSTP

The LSG is eligible to get 50% of FSTP capital cost in urban regions as per SBM (Urban) and greywater management facilities must be present in the LSG which adopt the FSTP. In rural areas, Rs.236 per capita living in the area and also, funding can be taken from 15th Central Finance Committee funds. Political representative funds or State government funds or corporate social responsibility funds may also be used for the establishment of FSTP in the state. Also, LSG may impose sanitation tax integrated with water tax to fund the O&M and other expenses of the FSM services.

8. Grievance Redressal Mechanism

Grievance redressal mechanism ensures that consumer complaints regarding sewage leaks, treatment plant malfunctioning or odour are addressed promptly. All the complaints shall be addressed by LSG owning the facility. If the grievance is not addressed by the LSG, then it shall be escalated to the district level officer of LSG (Joint Director) and final escalation authority in the district is the District Collector.

Operation and Maintenance policy for Liquid Waste Management facilities in Kerala

January 2025

Thiruvananthapuram

Glossary

Liquid Waste Management (LWM)	Management of liquid waste, including greywater and faecal sludge, to minimize environmental and health risks.
Public Toilets	Sanitation facilities located in public spaces such as bus stands and parks for use by the general population.
Greywater	Wastewater from domestic activities such as dishwashing, bathing, and laundry, excluding sewage.
Community Greywater Treatment Facility (GWTF)	A system for treating greywater from households in communities that lack space for individual management systems.
Faecal Sludge Treatment Plant (FSTP)	A facility designed to treat sewage and faecal sludge from septic tanks and other sanitation systems.
Sewage Treatment Plant (STP)	A facility for treating sewage from households and commercial establishments to meet environmental and health standards.
Preventive Maintenance	Scheduled maintenance activities to prevent breakdowns or failures in infrastructure and equipment.
Circular Economy	An economic system aimed at minimizing waste and making the most of resources by reusing and recycling.
Capacity Building	Initiatives to enhance the knowledge and skills of stakeholders for improved operation and maintenance of LWM facilities.

Abbreviations

BOD	Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
CSR	Corporate Social Responsibility
FSTP	Faecal Sludge Treatment Plant
GWTF	Greywater Treatment Facility
KSPCB	Kerala State Pollution Control Board
LSG	Local Self Government
LWM	Liquid Waste management
O&M	Operation & Maintenance
PFAS	Perfluoroalkyl Substances
STP	Sewage Treatment Plant
TSS	Total Suspended Solids

1. Introduction

Effective liquid waste management is pivotal for addressing Kerala's pressing environmental challenges and safeguarding public health. With its high population density, varied topography, and intricate hydrological systems, Kerala faces unique hurdles in managing liquid waste effectively. While the state has made significant progress in establishing centralized and decentralized treatment facilities for sewage and faecal sludge, greywater mismanagement remains a persistent issue. Greywater, generated from domestic activities like dishwashing, bathing, and laundry, contributes significantly to water pollution, public health risks, and ecosystem degradation when inadequately treated.

The development of a comprehensive Operation and Maintenance (O&M) policy is essential to ensure that Liquid Waste Management (LWM) facilities function effectively and sustainably. This policy aims to bridge operational gaps, address infrastructure deficits, and mitigate environmental risks by standardizing procedures and promoting accountability. By doing so, Kerala can optimize its sanitation value chain, promote resource efficiency, and foster a healthier environment for its residents.

1.1 Need for the Policy

The absence of a dedicated O&M framework has led to inefficiencies in the management and upkeep of LWM facilities across Kerala. Key challenges include:

1. Lack of ownership by LSGs: There are usually gaps in the maintenance, which is from allocation of finances for O&M to regular monitoring of the infrastructure or having updated data on the infrastructure after the commissioning
2. Operational Inefficiencies: Inconsistent maintenance, insufficient technical expertise, and lack of capacity-building initiatives contribute to the suboptimal performance of existing systems.
3. Environmental Risks: Inefficient liquid waste treatment and discharge practices exacerbate water pollution, public health hazards, and ecological degradation.
4. Resource Constraints and gaps in monitoring: Financial and technical limitations often hinder timely repairs, upgrades, and expansions of existing facilities. The absence of standardized monitoring protocols and enforcement mechanisms leads to non-compliance with treatment and discharge standards.

To address these challenges, the O&M policy will provide a structured framework to ensure the sustainable and reliable functioning of LWM facilities, enabling Kerala to achieve its sanitation and environmental goals effectively.

1.2 Objectives of the Policy

The primary objectives of the O&M policy are:

1. Ensuring Infrastructure Sustainability: Establish guidelines for routine maintenance, periodic inspections, and timely repairs to enhance the longevity and reliability of LWM facilities.
2. Enhancing Operational Efficiency: Introduce capacity-building programs, adopt innovative technologies, and promote efficient resource utilization to improve facility performance.
3. Mitigating Environmental Risks: Ensure compliance with treatment and discharge standards to minimize pollution and protect natural ecosystems.
4. Promoting Accountability and Transparency: Establish clear roles and responsibilities for stakeholders involved in the operation and maintenance of LWM facilities.
5. Facilitating Resource Optimization: Encourage the reuse of treated greywater and faecal sludge, contributing to water conservation and circular economy principles.

2. Facility Specific O&M requirements

2.1 Public Toilets

Public toilets are the convenience facilities available in the villages, public spaces like bus stands, parks or streets. These sanitation facilities are used majorly by the floating population of a town or LSG as well as travellers.

2.1.1 Responsibility

The responsibility of the public toilet shall be under the Local Self Body where it is located. The operation and maintenance can be carried out by the Local Body/Private Agency/ Kudumbashree Unit.

2.2.2 Maintenance standards

Cleanliness and Hygiene

Frequency of Cleaning: Public toilets must be cleaned a minimum of [insert frequency, e.g., every 4 hours], including weekends and holidays. The display of the cleaning cycle as notice board shall be done in all the public toilets.
Cleaning Procedure: Routine cleaning should involve the scrubbing of floors, walls, basins, toilets, urinals, and mirrors. Disinfectants must be used to reduce the spread of bacteria, viruses, and odors.
Sanitization of High-touch Areas: High-touch surfaces such as door handles, faucets, toilet flushers, and handrails must be sanitized regularly.
Restocking of Toiletries: Toilet paper, hand soap, hand sanitizers, and disposable towels (if applicable) should be checked and restocked regularly, ensuring continuous availability.
Waste Disposal: Waste should be removed from waste bins at regular intervals (at least twice daily) to prevent overflow and unpleasant odors.

2.2.3 Funding for O&M

Preventive maintenance: A preventive maintenance schedule should be created for all plumbing, electrical, and ventilation systems. This includes regular checks for leaks, blockages, and electrical malfunctions.

Emergency Repairs: Procedures for handling urgent repairs (e.g., toilet malfunctions, plumbing issues) should be defined, ensuring that such issues are addressed promptly to minimize disruption to public service.

- All the funding related to minor and major repairs like change of taps, lights or exhaust fans and change of plumbing lines are to be undertaken by the operation & maintenance contractor or agency. All bills related to repairs are to be submitted to the owner of the public toilets.

- LSGs owning the toilets shall allocate a specific amount for O&M of the toilets in their area. The data on the lease and agreement with all the public toilets under the LSGs shall be maintained by the Sanitary Inspector and the same shall be extended before the date of expiry of the agreement.
- The operation and maintenance agency shall ensure the disposal of faecal waste from the septic tank through the licensed agency of the LSG and the emptying fee shall be undertaken by the LSG. This shall be initiated by the Sanitary Inspector or the competent authority fixed by the Secretary of the LSG.
- In sensitive areas, the climate resilient aspect and preventive measures like stopping use of toilets in case of floods.

2.2 Community Greywater Management Facility (GWTF)

Community Greywater Management facilities are generally constructed by the LSG with state or central government funds to households who lack space for greywater management or for households discharging the greywater into the drains. Generally, community greywater management facilities are percolation based systems or nature based systems like soak pits or leach pits or DEWATS systems for 5 to 20 households.

2.2.1 Responsibilities

- The beneficiary households shall be responsible for the operation and maintenance of the community GWTF. This beneficiary household group may be created for ease of functioning and allotment of responsibilities
- The contractor shall capacitate the community to use the GWTF properly and efficiently without hampering the function of the system.

2.2.2 Maintenance aspects

- **Frequency of Inspection**: The soak pit should be inspected regularly—at least once every 6 months—by trained personnel or a community member assigned as the caretaker.
- **Visual Inspection**: Check for visible signs of overflow, slow absorption of water, or any unpleasant odors. Ensure the surrounding area is not becoming overly saturated with water.
- **Water Level Monitoring**: Check for signs of high water levels within the soak pit that may indicate blockage or inefficient percolation.
- **Sediment Removal**: Over time, silt, grease, and other particles can accumulate in the soak pit, which may clog the system. It is essential to clean out any built-up sediment at least once a year, or more frequently depending on usage.
- **Inlet and Outlet Pipes**: Ensure that the pipes leading into and out of the soak pit are clear of debris, blockages, and damage. Clean the pipes at least once every 6 months.
- **Gravel and Sand Maintenance**: The effectiveness of the soak pit depends on the proper filtration of greywater through layers of gravel and sand. These layers should be inspected for degradation, and replenishment may be required if the filter becomes less effective.
- **Capacitation of the beneficiaries:** LSGs shall capacitate the beneficiaries on the do's and don'ts for the efficient and proper functioning of GW TF
- The pit covers shall be designed to prevent entry of debris, rodents, and other contaminants while ensuring adequate ventilation to prevent harmful gas buildup.
- O&M funds for the GWTF shall be mobilized by the community itself and in case if they require the support of LSG, LSG may employ a cleaner at the cost of the community or the cost may be sponsored through CSR funds or funds of the LSG.
- In case of non-cooperation by a community member who is discharging the greywater without any treatment or reuse, penalization may be undertaken by the LSG on the non-cooperative members.
- In the event of a system failure or overflow by heavy rain, ensure the community has a plan to divert excess greywater safely. This may involve temporary storage or rerouting the water to prevent contamination of the local environment. During periods of heavy rainfall, monitor the soak pit for signs of over-saturation or overflow. Ensure drainage systems are in place to handle excess water.

2.3 Faecal Sludge Treatment Plants

Faecal Sludge Treatment Plants (FSTP) are a facility that treats sewage and faecal sludge from toilets, septic tanks, and other sanitation systems. The treatment involves solid-liquid separation followed by treatment of solids and liquids in a separate stream through physico-chemical or nature based systems depending on the end-use of treated solids and liquid portions.

2.3.1 Responsibilities

- LSG shall give the O&M of the FSTP to a private operator, particularly to the agency who commissioned the FSTP for at least 5 years or the LSG engage other agencies for O&M through a transparent bidding process.
- All the cost of O&M shall be borne by the LSG through its own funds or CFC funds or any other available fund. Funds shall be allocated for O&M of all the available UWM infrastructure to ensure its proper functioning.
- In case of any major repairs or maintenance works, the O&M agency may undertake it instantly and funds for the works shall be cleared by the LSG within 20 working days or mutually agreed time.
- The human resource cost for workers in FSTP shall be paid by the agency itself. The training cost for personnel in the FSTP shall also be borne by the operator.

2.3.2 Maintenance aspects

- Operational Parameters Monitoring:
    - Sludge Inflow: Monitor the volume and characteristics of incoming fecal sludge to ensure the plant is receiving sludge within the designed specifications (e.g., solids content, pH levels).
    - Treatment Efficiency: Regularly check the treatment stages for optimal performance. This includes checking chemical dosing, aeration, biological treatment efficiency (if applicable), and sedimentation efficiency.
    - Sludge Quality: Ensure that treated sludge meets environmental and health standards before disposal or reuse. Parameters like moisture content, pathogen levels, and chemical composition should be regularly monitored.
    - Effluent Quality: Check the quality of the treated effluent to ensure it meets discharge or reuse standards, including parameters like BOD, COD, pH, turbidity, and coliform levels. The treated effluent shall comply with the KSPCB treated effluent standards.
    - Operational safety and environmental health: All the protocols issued by the concerned department shall be complied to ensure the operational safety and health of the personnel working in the FSTP.

Routine Inspection and Maintenance of Equipment

- Mechanical and Electrical Systems:

    - Pumps and Motors: Check pumps used for sludge transfer, water supply, or aeration to ensure they are functioning efficiently. Routine lubrication, cleaning, and electrical inspection are essential.
    - Aeration System: If the FSTP includes an aerobic treatment component, inspect and maintain aerators (e.g., blowers, diffusers) to ensure proper oxygenation levels.

    - Conveyor Belts/Chutes: For systems that use mechanical conveyance, inspect belts or chutes for wear and tear, and ensure they are free from blockages.
    - Valves and Pipes: Inspect and clean valves and pipes regularly to ensure smooth flow and prevent blockages. Damaged or leaking pipes should be replaced promptly.
    - Electrical Panels: Regular inspection and maintenance of electrical control panels, ensuring all switches, fuses, and breakers are functional and safe.
- Sludge Drying Beds (if applicable):

    - Inspect drying beds for adequate drainage and airflow. Clean and remove any dried sludge, ensuring that the beds remain functional.
    - Monitor the quality of the dried sludge to ensure it is safe for disposal or reuse.

Sedimentation Tanks and Digestion Units

- Cleaning and Desludging:

    - Clean and desludge sedimentation tanks and anaerobic digesters as per the recommended guidelines to prevent the accumulation of solids that could impair treatment efficiency.
    - Desludging Frequency: Desludging frequencies should be based on the flow rates and solids retention time of the tanks. Typically, sedimentation tanks may need to be desludged every 6 to 12 months.
    - Check for any signs of gas buildup or odor, which could indicate improper functioning of the digestion process or potential blockages.
- Tank Inspections: Inspect the interior of the tanks periodically for structural integrity. Look for cracks, corrosion, or erosion, particularly in anaerobic digesters and settling tanks.

- Odor Management: Ensure adequate venting of anaerobic tanks to minimize odors. If odors persist, assess the performance of the odor control systems, such as bio-filters or scrubbers, and perform necessary maintenance.

Sludge Dewatering and Disposal Systems

- Dewatering Equipment:

    - Maintain mechanical dewatering units such as centrifuges, belt filter presses, or drying beds, depending on the technology used. Regular checks for clogging, wear and tear, and routine lubrication should be performed.
    - Sludge Cake Quality: Monitor the quality of the dewatered sludge to ensure it is ready for safe disposal or beneficial reuse, such as composting, land application, or landfill.

- Disposal Systems: Ensure the final disposal systems (e.g., transport vehicles, incineration, or landfills) are functioning properly, and that the end-product complies with local environmental standards.

2.4 Sewage Treatment Plants (STPs)

Sewage Treatment Plants are treatment facilities that treat the used water or sewage from households and commercial establishments conveyed through sewers and pumping stations. STPs are operated by the respective institutions or LSGs or the utility of the state.

2.4.1 Responsibilities

- LSG shall give the O&M of the STP to a private operator, particularly to the agency who commissioned the STP for at least 5 years or mutually agreed period by the two parties.
- All the cost of O&M shall be borne by the LSG through its own funds or CFC funds. Funds shall be allocated for O&M of all the available UWM infrastructure to ensure its proper functioning.
- In case of any major repairs or maintenance works, the O&M agency may undertake it instantly and funds for the works shall be cleared by the LSG within 20 working days or mutually agreed time.
- The human resource cost for workers in STP shall be paid by the agency itself. The training cost for personnel in the STP shall also be borne by the operator.

2.4.2 Maintenance Standards

Routine Operational Monitoring

- Monitoring of Influent and Effluent Quality:
    - Influent Quality: Regularly monitor the quality and quantity of incoming sewage (influent), including parameters such as BOD (Biochemical Oxygen Demand), COD (Chemical Oxygen Demand), TSS (Total Suspended Solids), pH, and ammonia levels.
    - Effluent Quality: Ensure that the treated effluent meets the required discharge or reuse standards. Regular testing should include parameters such as BOD, COD, TSS, fecal coliform, pH, and heavy metals, if applicable.
- Performance Efficiency: Monitor and document the operational efficiency of each treatment unit, including screening, sedimentation, biological treatment, and disinfection (if applicable). This includes verifying the correct functioning of pumps, aerators, clarifiers, and other mechanical systems.
- Chemical Dosage and Sludge Management: Ensure proper chemical dosing for coagulation, flocculation, disinfection, or pH control as per system requirements. Monitor and manage sludge generated during treatment processes, ensuring proper handling, dewatering, and disposal.
- The antibiotics and PFAS presence in the treated effluent shall be checked by building collaboration with the research organizations

Routine Inspection and Maintenance of Equipment

- Mechanical and Electrical Systems:
    - Pumps and Motors: Regular inspection of all pumps and motors to ensure proper functionality, cleaning, and lubrication. Identify signs of wear and tear, overheating, or malfunction.
    - Aeration Systems: Inspect aerators (diffusers, blowers, compressors) for proper airflow and oxygenation levels. Clean and maintain these components regularly to avoid clogging or inefficiency.
    - Valves, Pipes, and Flow Meters: Check and maintain valves, flow meters, pipes, and fittings to ensure there are no leaks, blockages, or malfunctions. Ensure proper calibration of flow meters for accurate monitoring.
- Clarifiers and Sedimentation Tanks:
    - Sedimentation Efficiency: Inspect primary and secondary clarifiers for accumulation of sludge, proper scum removal, and efficient settling of solids. Ensure sludge levels are within acceptable limits.
    - Cleaning and Desludging: Perform desludging of sedimentation tanks and clarifiers periodically, based on operational needs, to maintain efficiency.
- Filtration and Disinfection:
    - Filters: For tertiary treatment, regularly inspect and clean filtration units (e.g., sand filters, membrane filters) to prevent clogging and maintain filtration efficiency.
    - Disinfection Units: If the STP includes disinfection (chlorination, UV treatment, ozonation), ensure that these systems are functioning correctly, with proper chemical dosing and monitoring of disinfection effectiveness.
- Digital monitoring shall be undertaken in the treatment plants with capacity above 1 MLD (flow, vibration, and energy) to ensure the consistent working of the treatment facility.

Sludge Management and Dewatering Systems

- Sludge Dewatering: Regularly monitor sludge dewatering equipment (e.g., centrifuges, belt filter presses) to ensure proper functioning. Ensure proper disposal of dewatered sludge in an environmentally safe manner, whether through landfilling, incineration, or beneficial reuse (e.g., composting, biogas production).

- Sludge Treatment: If sludge digestion is part of the process, inspect anaerobic digesters for gas production, temperature control, and sludge mixing. Ensure the safe storage of digested sludge until it is removed for disposal or reuse.

Incentives for Climate resilient infrastructure

- The energy neutral treatment facilities which work with solar power or other renewable energy sources and built in a climate resilient manner shall be given incentives to encourage the carbon neutral systems.

- Electrical systems in all the treatment infrastructure from toilets to all kinds of treatment facilities shall be elevated to the level of 100 year flood level.

3. Grievance Redressal Mechanism

Grievance redressal mechanism ensures that consumer complaints regarding sewage leaks, treatment plant malfunctioning or odour are addressed promptly. All the complaints shall be addressed by LSG owning the facility. If the grievance is not addressed by the LSG, then it shall be escalated to the district level officer of LSG (Joint Director) and final escalation authority in the district is the District Collector.

4. Conclusion

Implementing this policy framework for STP operation and maintenance will ensure that sewage treatment plants function efficiently, meet regulatory standards, and contribute positively to public health and environmental sustainability. With the right strategies for training, performance monitoring, technology integration, and stakeholder collaboration, STPs can be maintained effectively for the long term, while also embracing innovation and sustainability.