

Guidelines for establishing Faecal Sludge Treatment Plants in Kerala

Suchitwa Mission is the nodal agency of the Government of Kerala under the Department of Local Self Government to provide technical and financial assistance to the LSGIs in the sanitation and waste management sector utilizing assistance from Central and State Governments.

In compliance with the orders issued by the Honorable National Green Tribunal (NGT) in the case O.A 606/2018, there is a requirement to establish sufficient solid waste management facilities throughout the state. Consequently, the state is fully committed to showcase the progress in the implementation of Liquid Waste Management (LWM) projects. The state relies on onsite sanitation systems and experiences high population density, the state intends to establish Faecal Sludge Treatment Plants (FSTPs) across its territory for managing the faecal waste accumulated in the onsite sanitation systems.

One of the major challenges faced by Kerala in setting up FSTPs is the availability of suitable land. Therefore, the state has proactively taken initiatives to address this matter. Suchitwa Mission has developed district-level plans for Faecal Sludge and Septage Management (FSSM) in all districts, resulting in the formation of 88 clusters of Local Bodies. These clusters encompass various types of lands, including those owned by local bodies, revenue lands, other Government-owned lands, and abandoned Government or private quarry lands. Immediate implementation of around 40 FSTP projects in clusters with readily available local body-owned or hindrance-free lands is planned, while the process of obtaining No Objection Certificates (NOC) and acquiring lands for the remaining projects is underway.

Under the Swachh Bharat Mission 2.0 (Grameen), an allocation of 426 Crores has been made for Liquid Waste Management. Using these funds, 80 FSTP projects have been proposed under the SBM (Grameen). The local bodies will have the flexibility to utilize their Urban Agglomeration and 15th Finance Commission funds for these projects, thereby making financial constraints inconsequential.

Recognizing that the existing methodology for establishing FSTPs through LSGs often involves a significant amount of time and so, a new model is proposed. This model aims to enhance competitiveness, ensure timely implementation, and enforce necessary checks and measures. Under this new model, predetermined technologies for constructing FSTPs will be utilized, and only these technologies will be employed by selected agencies responsible for designing, constructing, operating, and maintaining the treatment plants. The model also includes the engagement of a Third Party Agency for Quality Assurance and Quality Control, as well as the implementation of a statewide monitoring system using a single dashboard. The objective is to ensure uniformity in executing FSTPs once the land is identified and to complete the implementation within six months of land acquisition.

Guidelines

- 1) Agency/Contractor refers to the firm or organization which had been given the work of the Faecal Sludge Treatment Plant.
- 2) LSG/Authority refers to the local self government or a cluster of local self governments for whom the work of FSTP is being executed.

- 3) Local Self Government (LSG) using Faecal Sludge Treatment shall manage their greywater by establishing greywater management facilities in their LSG to manage their liquid completely.
- 4) The agency for executing the work has to be selected through a transparent but limited bidding process among the agencies empanelled as per the (Proceedings of SM). Suchitwa Mission, may after due evaluation consider other agencies also eligible for empanelment in due course and all such agencies empanelled by Suchitwa Mission for the purpose becomes eligible for participating in the tender.
- 5) The LSGs will be using the empanelment as a prequalification for getting an offer for establishing the FSTPs. Under no circumstances, work will be awarded directly to any empanelled agency by the LSGs. Work will be awarded only to the lowest bidder through a limited tender among the empanelled agencies.
- 6) The treatment capacity of FSTP shall be based on the following sample calculation. The treatment capacity shall be ascertained by the LSG concerned.

Population of the LSG	=	50,000
Percentage of households using septic tanks	=	80%
Percentage of households with single pits	=	20%
Volume of digested sludge from septic tank	=	0.00021 m ³ /person/day (IS 2470)
Volume of digested sludge from single pit	=	0.00018 m ³ /person/day (IS 12314)
Septage generation from septic tank	=	50000 x 0.8 x 0.00021
	=	8.4 m ³ /day
Septage generation from single pit	=	50000 x 0.2 x 0.00018
	=	1.8 m ³ /day
Total septage generation	=	8.4 + 1.8
	=	10.2 m ³ /day or 10.2 KLD
Capacity of FSTP	=	10 KLD

- 7) The design services in respect of the FSTP shall include design of all allied works, including treatment process, hydraulic, structural, electrical, instrumentation, mechanical and piping design. The scope also includes ancillary infrastructure designs such as roads, buildings, landscape, storm water drainage, borewell or other source of water for drinking and washing purposes, compound wall with gate(s), security room, operator room, treatment products storage shed, tools and spare parts storage shed and amenities/utilities such as telephone, street and indoor lighting, electricity supply at the FSTP. The scope further includes designs for any temporary works required during the construction phase. Design and engineering of the sewage/septage treatment unit to be operator friendly considering the operator's safety, health, and hygiene.
- 8) The agency shall execute the basic and detailed design of the FSTP in compliance with the technical specifications mentioned in the bid document. Wherever the codes, standards and

manual do not provide for the design and execution of some component, i.e. required to be designed and executed, the agency shall follow the standard engineering practices.

- 9) The design should enable ease of O&M management including low dependence on skilled manpower, consumables, process complexity, easy revival in case of break up and disruption, etc.
- 10) The FSTP should be designed for all-weather operation and be able to handle variable input loads of varying characteristics. Arrangements for buffer-storage and/or pretreatment should be provided in the design, as necessary.
- 11) The agency shall prepare the following documents as a part of the design process and obtain approval from the LSG for their implementation. Such approval shall not be unreasonably withheld by the LSG:
 - i. A construction timeline with detailed plans for progress of construction and implementation.
 - ii. A site regulations and safety plan including a comprehensive Occupational Safety and Health Administration program.
 - iii. A construction quality assurance plan;
 - iv. A site work progress log;
 - v. A commissioning and trial operations plan; including timeline of achieving prescribed performance standards at the FSTP;
 - vi. A Standard Operating Procedures (SOP) manual for the FSTP (covers all the components of the treatment flow from the septage receiving station till the storage of biosolids with authentication from agency representative and plant operator);
 - vii. A training manual that helps new workers learn plant operations. The manual should be designed to facilitate smooth transfer of O&M responsibilities upon completion of the contract period.
- 12) In case of delay than the specified timeline, the agency may request for extension and after evaluating the request the LSG may grant extension up to 25% of the original completion time. If the agency has not completed within the stipulated time or there is an unreasonable delay, the agency shall be liable to give compensation to the employer/ULB of an amount at the fixed rate subject to maximum amounting to 10% of the contract value.
- 13) The agency shall provide all of the demolition, excavation, building, co-ordination, repair, warranty, review, inspection, testing, quality assurance and control, monitoring, scheduling, clean-up etc. for construction of the Plant as contemplated by Design Documents.
- 14) The Authority may request further tests at its discretion and will bear the extra costs incurred and take into consideration any time delays that may occur due to the same. Certified copies of quality assurance reports and test results shall be shared with the Authority upon request. If any plant and equipment or any part of the FSTP fails any test or inspection, the agency shall either rectify or replace such plant and equipment or part of the FSTP and shall repeat the test or inspection.
- 15) The agency shall submit Construction Progress Reports to the Authority within 7 (seven) days of the completion of a month. The Design-Build Services monthly reports shall include the following information:
 - i. Photographs and detailed descriptions of progress, including each stage of design, procurement, manufacture, delivery to the FSTP site, construction, erection, testing and commissioning;

- ii. Copies of quality assurance documents, test results and certificates;
 - iii. Safety statistics, including details of any hazardous incidents and activities relating to environmental aspects and public relations;
 - iv. Percentage completion achieved compared with the planned percentage completion for each activity; and
 - v. Where any activity is behind in the scheduled completion, comments and likely consequences and a description of the corrective action being taken.
- 16) The completion period for the installation and starting of the trial run shall be six months from the date of work order.
 - 17) The agency shall employ competent and requisite staff for the O&M of the FSTP. Such staff will be provided photo-identity cards and uniforms with PPE during their employment at the plant. The instructions given to the staff shall be considered as the instruction given to the agency itself.
 - 18) The agency shall construct compound wall for the FSTP premises to prevent unauthorized entry to the plant and a record shall be kept for the personnel entering and exiting the plant premises.
 - 19) The agency shall install a CCTV and a toilet in the FSTP premises.
 - 20) The agency shall separate any wastes and rejects from the treatment process (treated liquid and biosolids). The agency shall have right to sell or right to give the treated septage (liquid portion), sludge, biosolids and water for reuse by potential buyers for the purpose of agriculture/commercial/industrial use. The FSTP by-products given to others shall be complying to CPHEEO norms for liquid portion and USEPA class A for biosolids. The agency is prohibited from disposing any wastes indiscriminately.
 - 21) The contract should include a trial run period of 30 days, a performance evaluation period of 90 days after which the plant will be declared as commissioned. After commissioning there will be 360 days of defect liability period. Upto the completion of the defect liability period, all the defects has to be made good by the agency and the plant shall be kept running with the specified standard of effluent discharge, without any additional payment by LSGI. The regular O&M of the plant shall start from the next date of completion of the defect liability period. The proposed treatment plant shall be operated and maintained by the agency for a period of 60 months after the defect liability period as per the mutually agreed terms and conditions.
 - 22) Regular inspection and audit of the plant's construction and operation by an independent third party will be carried out. The results of these inspections and audits should be made available to the relevant authorities.
 - 23) In case, it is evident that the plant has not been designed properly and is not giving the desired output consistently or (not able to treat the entire waste water load, not able to meet the effluent parameters, causing noise/air pollution etc) during the operation itself or has been remarked during the inspection or audit, then it will be the responsibility of the agency to make good the defects and make the plant working as envisaged. In case if the agency is unable to meet this objective, all the pending payments will be deferred, extending

to blacklisting of the agency and the expenditure for making the plant working as per standards will be recovered from the agency.

- 24) The agency shall follow the good practices and any fraudulent practices will attract legal action against the agency.
- 25) LSG shall ensure the proper road and energy infrastructure to the FSTP, for receive the septage and operate the FSTP.
- 26) The licensing or regulation of the emptier operating in the LSG with the pricing for emptying operations should be done by the respective LSG by passing a septage management byelaw for the LSG in the LSG council.
- 27) LSG shall penalise the parties who do not comply the septage management byelaw adopted by the LSG council.
- 28) LSG shall issue notice to the establishments discharging their septic tank effluent to the open drains and guide the establishments to install a proper soak pits.
- 29) LSG shall procure the sufficient number of emptying vehicles for desludging of the containment systems.
- 30) LSG shall undertake IEC and BCC activities on FSTP, licensed emptier and fixation of prices for emptying.
- 31) TOD type energy meter shall be installed exclusively for STP. Water meter shall be fixed to record consumption of water.
- 32) The agency shall ensure proper running of the plant to give the desired effluent quality (liquid part of septage and biosolids) for safe discharge / reuse, in cases as prescribed by the Kerala State Pollution Control Board from time to time. The current discharge standard is shown below.

Parameters	Unit	Discharge standards	
		For soak pit discharge	Reuse
pH	-	6.5 to 9.0	6.5 to 8.5
BOD	mg/l	30	3
COD	mg/l	250	50
Suspended solids	mg/l	100	10
Oil & Grease	mg/l	10	1

- 33) The agency shall also ensure for the safe disposal of sludge generated by the sewage treatment process in consultation with the LSG concerned. The process flow shall be designed in such a way that the quality of the sludge generated is as per the standards prescribed for end use of the sludge. For deciding on the recycling application of the sludge the standards and guidelines prescribed by CPHEEO and CPCB has to be followed. For the use of the sludge as soil conditioner/agricultural applications either directly or as compost the standards as prescribed in EPA: 40 CFR- Part 503- Standards for Biosolids Class A or Class B or the Fertiliser Control Order norms as the case may be adhered to.
- 34) The agency shall not accept septage from unlicensed septage emptier. Also, the commercial or industrial sludge shall not be accepted in the FSTP.
- 35) The agency shall assess the geological conditions like groundwater table, type of soil, and flood occurrences in the site to fix the septage treatment technology.

- 36) If the agency fails to complete the work within the stipulated completion date for the work, he shall pay penalty for delay at 0.2% (Zero point two percent) of contract value per day of delay in completion and handing over the work or part thereof as the case may be to the agreement authority. The amount of penalty for delay shall, however, be subjected to a maximum of 10% (ten percent) of the contract value. In such cases the period of completion will be extended upto a maximum period of 90 days. Delays in excess of one hundred days will be a cause for termination of the contract and forfeiture of all security for performance. The balance work to be completed shall be arranged at the risk and cost of the original contractor.
- 37) The specification of materials used for repairs shall be the same as that have been used in the original work/during plant execution.
- 38) Any operational issue brought to the attention of the agency may be rectified within 24 hrs of reporting failing with proportionate deduction in O&M payment along with suitable fine may be levied from the agency till the plant is putback to operation. Continued failure to attend to the complaint for more than a week from date of reporting of complaint may lead to cancellation of contract and arrangement of work under the risk and cost of the agency.
- 39) Three months before the end of the contract period, the Authority will inspect and assess the state of the plant and equipment to determine the repairs to be undertaken before transfer of assets. Such repairs will not address normal wear and tear due to regular operations. The agency is bound to make all such recommended repairs in a time-bound manner and ensure smooth transition.
- 40) The Plant will be taken over by the LSG on satisfactory completion of the Contract Period of the plant provided that:
- i. The plant/equipment are in good, smooth running condition;
 - ii. The result of the treated effluent, sludge quality for last 3 (three) months of operation of the plant is within the limits specified;
 - iii. In case of major repairs/replacement of equipment, the performance guarantee for such unit/equipment is extended by 6 (six) months from the date of satisfactory operation of such unit/equipment;
 - iv. All records of operation and maintenance are handed over to the Authority in proper condition;
 - v. The agency should repaint the Plant, including all civil structures, mechanical, electrical equipment/units/structures;
 - vi. In case taking over is delayed on account of the Contractor's failure, the operations period will be extended further till it meets the requirement without any extra cost to the Authority.
- 41) The Authority has the right to conduct a technical audit of the Plant and to perform any analysis or inspection deemed necessary. The agency shall, at their cost, provide all assistance to the Authority required to complete these inspections. Such audits may cover all or any of the obligations of the Contractor.
- 42) The agency shall be responsible and accountable for FSTP related initiatives and safety of the workers inside the premises of the FSTP.
- 43) The working of the plant along with the influent and effluent flow shall be made available in a dashboard utilising IoT based monitoring tools. Any sensors installed for measuring the parameters shall conform to the respective Indian Standards and the sensor type and communication protocol shall be as prescribed by CPCB.

- 44) The agency shall prepare any submissions required for the purpose, for construction and regular operations of the FSTP and any investigations, such as baseline environmental studies, required for preparing supporting documents for obtaining such clearances. The agency is responsible for obtaining all clearances, approvals, building permits, licenses and NOC from the statutory / government agencies as necessary. All related fees shall be borne by the LSG.
- 45) During the operation and maintenance period electricity charges will be borne by the LSGI. The electricity charges will be paid directly to Kerala State Electricity Board (KSEB) by the local body on an actual basis as per electricity bill raised by the KSEB. All other consumables, materials and required staff for Operation & Maintenance will be provided by the contractor. The operation & maintenance cost approved by the Employer shall be payable on monthly basis on completion of every month on submission of bill by the contractor. The agency shall maintain the attendance record of the staff employed by him, which can be checked by the employer any time. The contractor will also submit a copy of all the data sheets every month for evaluation.