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REPORT

ASSESSMENT OF FECAL SLUDGE DECANTING STATIONS IN TIRUCHIRAPPALLI

April 2018

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TN US SP
TAMIL NADU URBAN SANITATION SUPPORT PROGRAMME

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Assessment of Fecal Sludge Decanting Stations in Tiruchirappalli

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Abbreviations

CPHEEO	Centre for Public Health Environmental Engineering Organisation
FOG	Fats, Oil and Grease
FS	Fecal Sludge
FSM	Fecal Sludge Management
GoTN	Government of Tamil Nadu
MLD	Million Litres per Day
MoUD	Ministry of Urban Development
NNP	Narasimhanaicken-Palayam
ODF	Open Defecation Free
OSS	On-site Sanitation Systems
O&M	Operation and Maintenance
PNP	Periyanaicken-Palayam
PPE	Personal Protective Equipment
SPS	Sewage Pumpings Stations
STP	Sewage Treatment Plant
TCC	Tiruchirappalli City Corporation
TNWC	Tamil Nadu Warehousing Corporation
TSU	Technical Support Unit
UGSS	Underground Sewerage System
USEPA	United States Environment Protection Agency
WSP	Waste Stabilisation Pond

Executive Summary

Executive Summary

Tiruchirappalli (Trichy) is the fourth largest municipal corporation in Tamil Nadu. Spread over 167 square kilometres (sq km), on the southern banks of River Cauvery, the city is governed by the Tiruchirappalli City Corporation (TCC). Trichy, home to a population of 916,857, is divided into 65 wards.

The planning and implementation of the networked system in Trichy started around 1987 and is being carried out in a phased manner. A combination of networked and non-networked sanitation systems exists in the city. Nearly one-third of the city is covered by networked sanitation and of the 65 wards, 25 are networked, 25 are partially networked and 15 are non-networked.

The networked system consists of pipes carrying sewage either flowing with the help of gravity or pumped by Sewage Pumping Stations (SPSs) to a Sewage Treatment Plant (STP). The STP in Trichy uses a series of ponds called Waste Stabilisation Ponds (WSPs) to treat sewage and has a capacity of 58 million litres per day (MLD).

The non-networked system consists of on-site sanitation systems (OSSs) such as septic tanks and leach pits with arrangements for on-site disposal of liquid waste. But the Fecal Sludge (FS) which gets accumulated in these OSSs over time has to be emptied as and when needed and has to be safely disposed of.

Initially, the TCC allowed direct disposal of FS at the STP site. With the increase in the number of OSSs, and the introduction of mechanically operated desludging trucks in early the 2000s, the city felt the need for additional sites for FS disposal. As the STP was located on the outskirts of the city, travel distance for the desludging trucks and having to navigate city traffic was a concern for truck operators. To address these challenges, TCC started allowing FS to be disposed of in SPSs, thereby increasing the options for disposal.

At present there are 52 SPSs spread across the city, of which four receive FS. These are located in the four administrative zones : 1) Anna Stadium in Ponmalai Zone 2) Vayaloor Road in K Abhishekapuram Zone 3) Thanjavur Road, (Pookkollai) in Ariyamangalam Zone and 4) Vasudevan Street in Srirangam Zone. Currently, TCC does not allow direct disposal of FS at the STP, and the four SPSs are the only designated facilities to receive FS.

These designated facilities, also known as decanting stations, consist of a collection well, a preliminary treatment unit and a pumping well. The preliminary treatment consists of screen and grit removal systems. To receive the FS from the desludging trucks, a receiving point was made at these facilities. FS thus received in the collection well gets mixed with sewage, passes through the preliminary treatment and is pumped to the STP. The combined sewage and FS from the pumping stations is treated at the STP. The average number of trucks received at the Anna Stadium decanting station is about 40 during the dry season. The load increases during the rainy reason.

In order to understand the accessibility of the FS-carrying trucks to the facilities, the available infrastructure for transfer and pre-treatment of FS, operation and maintenance (O&M) practices, and health and safety of workers, a detailed assessment on these decanting station was carried out. The objective of the assessment was twofold: to check their adequacy and identify areas of improvement, and to develop a method for feasibility assessment for converting SPSs to FS-receiving facilities.

The assessment looked at the access and layout: type and width of approach road, space availability within the facility, existing design and infrastructure. Functional treatment units, their operational requirements and other factors like the safety of workers were also assessed with respect to the international standards on septage disposal by the United States Environmental Protection Agency (USEPA). Several other standards and practices were also reviewed.

This literature review assisted in framing a checklist for the field assessment of the decanting stations in terms of access, layout, design, infrastructure, and operational details. These checklists were further developed to assess the potential of SPSs and STPs for receiving FS. These checklists were designed so that they could help in a preliminary assessment of the SPSs and STPs across the State, as the State is planning to scale up co-treatment. Factors like residual capacity of the STP, dilution or equalisation of FS received, organic load received at the STP and the infrastructure available at the STP influences the performance of the STP when FS is added.

The present assessment reveals that the four decanting stations require improvements in different fields. Traffic varies among the stations. The most traffic received is at the Anna Stadium Decanting Station, followed by Pookkollai Decanting Station. The key areas of improvement to the decanting station are:

i) spatial and infrastructure improvements, as part of which it is suggested that an unloading ramp be constructed to contain and manage spillage and to renovate the existing screen and grit facilities
ii) ii) O&M recommendations such as conditioning the grit removal motors to working status, regularising the removal of grit, establishing a system to monitor FS quality, monitoring night operations, and making improvements in data and record-keeping
iii) iii) health and safety recommendations on the use of Personal Protective Equipment (PPE) such as gloves, masks, boots and sanitary requirements like washing facilities and toilet revamping.

Infrastructural changes such as installing an unloading ramp is proposed for the Anna Stadium Decanting Station, as the traffic there is heaviest, and spillage of FS is evident. The O&M and health and safety recommendations are equally important for all the four decanting stations. Data and record-keeping is to be improved and is to be standardised among all the decanting stations.

1 Introduction

1. Introduction

Tamil Nadu has been one of the few states that has prioritised investments in urban sanitation for the last two decades. The approach was to incrementally cover all the larger cities such as Chennai and the corporations with sewerage and STPs. By September 2017, there were 38 cities with sewerage systems, and there were 54 STPs in the state with a combined treatment capacity of 1,414.16 MLD. The Government of Tamil Nadu (GoTN) had signalled the state's commitment to an 'Open Defecation Free' (ODF) Tamil Nadu in 2011, when it announced the setting up of 'Namma Toilets' in key cities to increase the availability of public toilets.

Despite the state's commitment to prioritising sanitation, it also recognised that covering all of Tamil Nadu's urban settlements (or even the larger corporations and 124 municipalities) with sewerage systems would place a huge demand on financial resources and take many years to plan and implement. Besides, the local terrain and technical difficulties would prevent roll-out of sewerage to cover all parts of the larger cities. Therefore, the state adopted Fecal Sludge Management (FSM) as the second leg in implementing sanitation solutions – and one that could help secure the full cycle of sanitation quickly and in an economically efficient manner. Following the Operative Guidelines for Septage Management, 2014, Tamil Nadu's strategy has been to demonstrate improvements along the sanitation value chain with a focus on FSM. A Technical Support Unit (TSU)[1] for FSM was set up in 2015 to implement the Tamil Nadu Urban Sanitation Support Programme (TNUSSP). It adopted a two-pronged approach, which included:

i. Initiating state-level policies, actions and strengthening operational mechanisms to support rapid scaling-up of innovations in all urban areas of the State
ii. Selecting two urban sites – TCC and the two Town Panchayat (TP) clusters of Periyanaicken-Palayam (PNP) and Narasimhanaicken-Palayam (NNP) in Coimbatore district – as demonstration sites. The two locations represent different typologies in the state and the programme is implementing projects and interventions along the full cycle of sanitation in consultation with key stakeholders and working closely with the TCC and PNP-NNP TPs.

The city of Trichy is partially covered by the networked system and in the other areas, households rely on OSSs such as pits, septic tanks and public toilet/community toilet containment structures. In these areas, for the proper functioning of OSSs, the FS[2] should be emptied or desludged. After emptying, the treatment of FS plays a key part in the sanitation chain because the existing system of open dumping of FS is detrimental to public health as well as the environment.

FS can be treated in an exclusive treatment facility or co-treated with other wastes such as sewage, municipal solid waste etc. The Ministry of Urban Development (MoUD) Advisory Note on Septage Management in Urban India suggests that co-treatment of FS along with domestic sewage at an STP, if available, is the most desirable option (MoUD, 2013). The Operative Guidelines for Septage Management for Local Bodies of Tamil Nadu estimates that nearly 40 per cent of the total sewage treatment capacity is not utilised (GoTN, 2014). The Operative Guidelines, therefore advised creation of decanting facilities in the existing sewerage systems and identified clusters of local bodies which could dispose of FS in these decanting facilities. Both the MoUD advisory note and the GoTN Operative Guidelines have detailed the requirements for decanting facilities and the procedures for co-treating in STPs.

TCC (and other urban local bodies like the Greater Chennai City Corporation) realised the need for co-treatment in the STPs even before the Advisory Note/Operative Guidelines provided FS disposal

[1] *The Bill and Melinda Gates Foundation (BMGF) is supporting the GoTN in achieving the Sanitation Mission of Tamil Nadu by setting up a TSU within the Municipal Administration and Water Supply (MAWS) department*
[2] *usually a mixture of solids and water settled at the bottom of a septic tank or other OSSs; interchangeably used with "Septage"*

arrangements or decanting facilities in sewerage systems. Previously, TCC had made provisions for disposal of FS at the STP in Panjappur. Currently, TCC has been using SPSs with minor modifications as decanting facilities. Though the local bodies have started co-treatment of FS in STPs by providing decanting facilities, there is a need for a systematic assessment of the facilities in terms of layout, infrastructure, O&M, administrative control etc. and to look for areas of improvement. This is even more important given that the state is planning to scale up (replicate) co-treatment of FS with sewage in STPs. To understand the existing facilities and O&M practises focusing specifically on decanting stations, an assessment was carried out under the TNUSSP. The assessment is limited to the decanting facilities in TCC. This report summarises the assessment method and key recommendations for improvement.

1.1 Overview of Co-Treatment and Decanting Stations

Adding FS to the sewerage system is termed co-treatment of FS with sewage. Co-treating FS makes use of available STP capacity (and associated infrastructure and resources) while at the same time centralising waste treatment operations. However, accepting FS – which is a high strength waste stream – without understanding its characteristics and its impact on the STP, has the potential to upset the treatment processes. Co-treatment of FS may also result in increased O&M requirements and costs. The quantity of FS that can be treated is limited by the facility's available aeration and/or solids handling capacity. Both the available organic and hydraulic capacity at the STP must be evaluated to determine if and to what extent it is possible to co-treat FS at the STP.

1.1.1 Methods of Addition of Fecal Sludge to Sewage

FS can be added in one of the following methods the STP treatment train (U.S. Environmental Protection Agency, 1984; ISF and SNV, 2016):

1. Addition to the sewage stream (near the head works or upstream from the plant) (co-treatment with sewage)
2. Addition to the solids handling system (co-treatment with sludge)
3. A combination of the two

The details of these methods are in Annexure 1

1.1.2 Factors Influencing Co-Treatment and Decanting Station Requirements

Co-treatment of FS at an STP is an established solution. However, unless proper engineering, planning and design are incorporated in the FS disposal process, it may result in shock-loading or have other adverse impacts on STP processes and performance affecting effluent quality, which can be influenced by many factors (Board of State and Provincial Public Health and Environmental Managers, 2004). Some of these are:

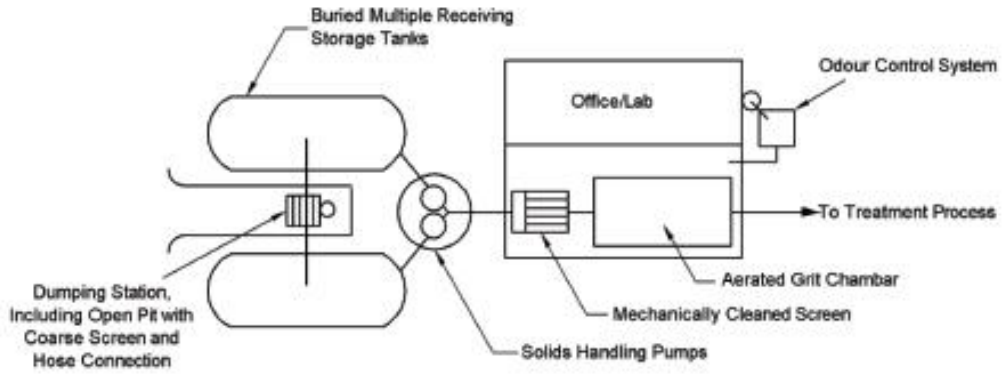
1. Capacity (cubic metre per day (m^3/d)) and type of treatment technology of the plant relative to the amount and rate of FS directed to the plant.
2. Unused plant capacity available (above current sewer collection system loadings) to treat FS loadings.
3. Sensitivity of the treatment plant process to daily fluctuations in loadings brought about by the addition of FS
4. Slug FS loadings of Biochemical Oxygen demand, ammonia, nitrogen, or phosphorus, which may upset the process, cause odours and foaming in the aeration tank/aerated digester or pass through to the effluent.
5. The point of introduction of the FS into the plant process. Feasible alternative points of feed to the treatment units shall be evaluated, including feed to the sludge processing units, provided the unit function will not be adversely affected.
6. The ability to control feed rates of FS to the plant for off-peak loading periods.

Co-treating FS in an existing STP requires a proper FS receiving facility, located either at the STP or at intermediate points in the city to connect to the sewer network so that FS is safely conveyed through the system and does not hinder, or overload the network or processes in the STP.

The FS receiving station or a decanting station (for consistency the term 'decanting station' will be used throughout this document) should provide arrangements for discharge of FS into the networked system. It also functions as an FS pre-treatment facility. As per the Centre for Public Health Environmental Engineering Organisation (CPHEEO) manual 2013 and GoTN Septage Management Guidelines, the key features of a decanting station (Figure 1.1) are:

(a) The capacity to transfer FS from desludging trucks.
(b) Provision of an equalisation tank for FS to ensure uniform addition of FS into the sewer network/STP.
(c) Provision of screening and grit removal facility to segregate the large debris and grit content and prevent it from entering the sewer network/pumps etc.
(d) Simple and reliable operation and the flexibility to accommodate varying loading conditions.

Figure 1.1**: Schematic of a Decanting Station**



Source: CPHEEO 2013, U.S. Environment Protection Agency 1984

1.2 Objectives, Scope and Methodology

The objectives of the study are:

1. To check the adequacy of the decanting station to receive FS and to identify the areas of improvement in the facility in terms of access, infrastructure, O&M and health and safety of workers
2. To develop a method for feasibility assessment for converting SPSs to decanting facilities.

The methodology followed assessed the existing decanting stations against the specification/guidelines of CPHEEO and international practises. Subsequent to this, a detailed checklist (Annexure 2 and 3) was prepared covering the following aspects:

- Location and access for the desludging trucks
- Space availability
- Existing infrastructure
- Staff

Though the related requirements in the TCC decanting facilities were captured in the checklist to the extent possible, the significance of the requirements could not be assessed or understood completely because of the following reasons:

1) The capacity of the STP is large relative to the quantity of FS received in these decanting stations at present;

2) It is safely assumed that there is adequate mixing and dilution of the FS before it reaches the STP as the FS is discharged into the decanting stations located a few kilometres away from the STP.

There may be situations when the flows, either from the sewer network or from desludging trucks, are closer to the STP capacity, or there is a higher ratio of FS volume to treatment capacity, or too many vehicles unload at the same time, which might shock-load the STP. Under such circumstances, additional infrastructure such as storage tanks and mechanisms for regulated dosing to the STP are needed for even distribution of the FS load to the STP. Therefore, when using the checklist under such situations, additional items may have to be included for the assessment.

1.3 Overview of FS Decanting Facilities in TCC

The planning and implementation of networked systems in Trichy started around 1987 and continues to be carried out in a phased manner. Some areas within the city are fully covered, while some are partially covered. Therefore, the city had and continues to have a combination of networked and (a significantly high percentage of) non-networked sanitation systems. The networked system has combination of SPSs and gravity-based conveyance, and a STP. The centralised STP located in Panjappur is a WSP with a series of anaerobic, facultative and maturation ponds. The networked system is also known as an Underground Sewerage System (UGSS). The non-networked systems typically consist of standard or non-standard OSSs such as septic tanks and leach pits. These are desludged when the need arises. With the increase in the number of OSSs and introduction of mechanically operated desludging trucks in early the 2000s, the city felt the need for designated sites or facilities for FS disposal. Initially the TCC allowed direct disposal of FS in the facultative ponds.

With a continued increase in the volumes of FS desludged, and a long travel distance for desludging trucks as the STP was located in the south-western outskirts of the city, there was a need for additional disposal sites. TCC increased the options for disposal by providing provisions for decanting FS in some of the SPSs. It is important to note that the TCC had made such provisions even before the introduction of the GoTN Septage Operative Guidelines in 2014. At present there are 52 pumping stations spread across the city of which four (Figure 1.2) located in the four different zones of TCC receive FS:

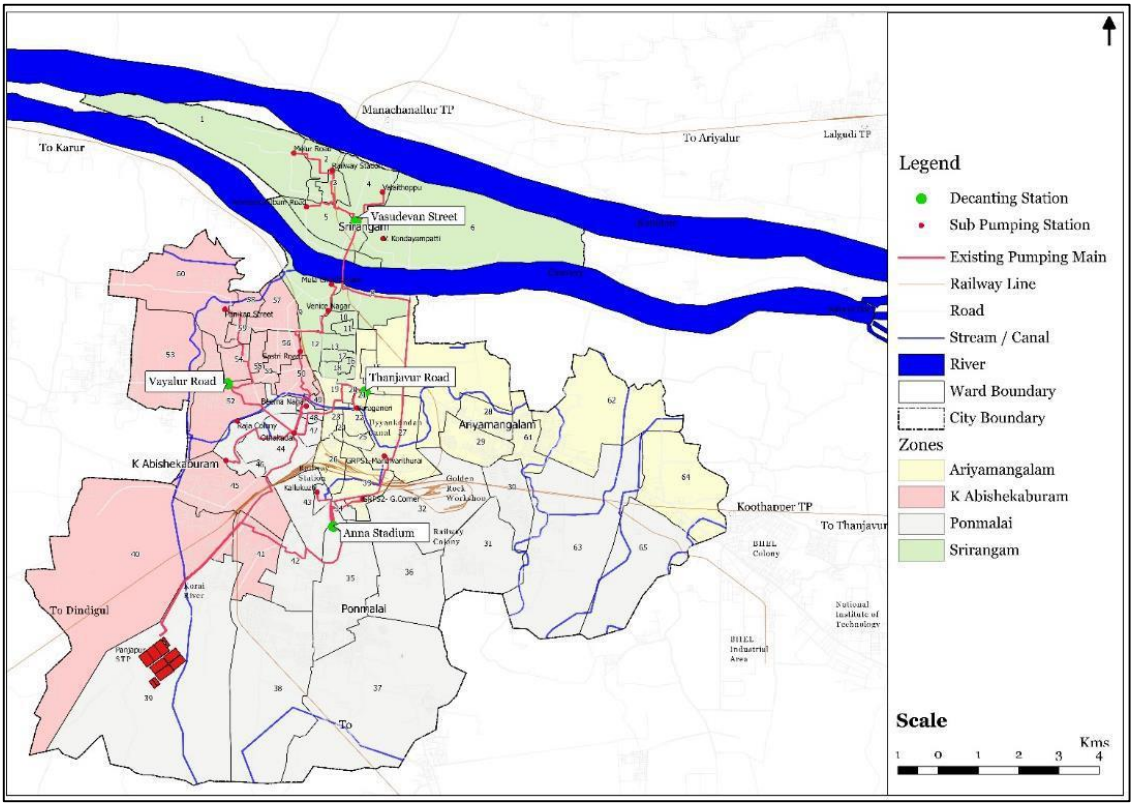
1) Anna Stadium, Ponmalai Zone
2) Vayaloor Road, K Abhishekapuram Zone
3) Thanjavur Road, (Pookkollai), Ariyamangalam Zone
4) Vasudevan Street, Srirangam Zone

Anna Stadium functions as a main decanting station while the others are sub decanting stations. At present TCC does not allow direct disposal of FS at the STP, and the above four stations are the only designated FS decanting facilities.

Vayaloor Road and Thanjavur Road decanting stations were constructed under the 1987 UGSS Scheme, whereas Anna Stadium and Vasudevan Street were constructed as a part of the 2008 UGSS Scheme. These decanting stations started operating in 2012-13, except for Vasudevan Street, which started operating from May 2017.

TCC also collects a tipping fee from the desludging truck operators for using the decanting facilities. In the initial stages, when disposal at the STP was allowed, TCC charged the operators Rs. 80 per truckload. The fee has been reduced to Rs. 30 at the new facilities.

Figure 1.2**: Locations of Decanting Stations in TCC**



Source: TCC, TNUSSP Analysis 2017

2

Description of Existing Facilities

2. Description of Existing Facilities

The location, access and space availability at the decanting stations are summarised in Table 2.1. The layout of the decanting stations and the details of the treatment units are presented in Annexure 4.

Table 2.1: **Location, Access and Space Availability at the Decanting Station**

Sl. No.	Details	Anna Stadium	Vayaloor Road	Thanjavur Road	Vasudevan Street
1	**Location**	On Race Course Road near Anna Stadium, Kajamalai, about 300 m south of Jamal Muhamed College	On Vayaloor Road, about 100 m to the west of Bishop Heber College	On Thanjavur Road, about 300 mwest of Tamil Nadu Warehousing Corporation	On NH 81, Vasudevan Street, about 400 m south from Thiruvanaikoil Temple west entrance.
2	**Access**	Bituminous road, 12 m (one-way)	Bituminous road, 7 m (two-way)	Bituminous road, 8 m (two-way)	Bituminous road, 8 m (two-way)
3	**Entry**	Two entry gates, 6 m wide (one facing the east – commonly used and one facing the south	One entry gate, 4 m wide, facing south	One entry gate, 5 m wide, facing south	One entry gate, 8m wide
4	**Approach roads (inside)/ Width**	Kachcha roads, 5 m	Flat square rubble stones paved, 4m	Rigid pavement, 4 m	Kacha roads, 5 m
5	**Space availability**	Enough space for 2 vehicles to park and empty at a time	Enough space for 2-3 vehicles to park at 20 m offset from the entry gate	Enough space for 2 number of vehicles to park and empty at a time	Enough space for 2 number of vehicles to park and empty at a time
6	**Sewage receiving areas**[3],	From SPSs in Vasudevan Street, Manavalan Thurai, G Corner and Kallukuzhi covering most of the areas in Srirangam Zone	From two lifting stations (Ammaiyappa nagar and nearby areas) and Block 3 SPS	From an SPS in Varaganeri and a lifting station (Vasantha nagar)	Receives entire sewage from the northern part of Srirangam Zone
7	**Additional changes made to the PS**	Provision for emptying FS is a small open chamber connected to the collection well via pipe	Provision for emptying FS is a small inlet connected to a holding tank which is connected to the collection well via pipe	Provision for emptying FS is a small collection well (of diameter 2 m)	None

[3] *Source: TCC Document on Golden Rock Sewage Treatment-details on UGSS*

Table 2.1: **Location, Access and Space Availability at the Decanting Station**					
Sl. No.	**Details**	**Anna Stadium**	**Vayaloor Road**	**Thanjavur Road**	**Vasudevan Street**
8	**Facilities to connect the vehicles**	6-inch PVC pipe (3 m long)	None	6-inch hose (about 6 m long)	None
9	**Major treatment units in order of gravity flow of FS**	1. Collection well 2. Screen chamber (coarse and fine) 3. Grit chamber (mechanical removal system) 4. Main pumping well	1. FS holding tank 2. Collection well 3. Screen chamber (coarse) 4. Grit chamber (mechanical removal system) 5. Main pumping well	1. Collection well/ Screen chamber (coarse) 2. Grit chamber 3. Main pumping well	1. Screen chamber (coarse and fine) 2. Grit chamber (mechanical removal system) 3. Main pumping well
Source: TNUSSP Analysis 2017					

2.1. Operational Details for the Decanting Stations

1. Access control at the decanting facilities: All facilities have a security guard at night. The staff timings are based on the pumping station operations, for the pump operator it is on a two-shift basis (6 am to 2 pm, 2 pm to 10 pm; at night hours there is very less generation of sewage, hence at present there is no requirement of operating the pumps) and for a main pumping station it is three shifts. The shift timings vary from this as per the operator at each of the decanting stations and are mentioned in Table 2.2. Recently, at Anna Stadium, occupants of a nearby college hostel and members of the public passing by have complained about the odour.

2. Tipping fees: A fee of Rs. 30 per truck is collected from the truck operator by handing out a receipt in acceptance of payment. TCC-owned vehicles do not pay for discharging FS.

3. O&M of decanting facilities: The O&M maintenance is the same as that for a pumping station. For all decanting stations, the O&M contract has been given out for motor and pump maintenance alone as an electrical contract. The duties and responsibilities fall under the supervisor and pump operator who are a part of the private electrical firm to which the contract has been awarded. The staffing arrangements depend on whether they are at the main pumping stations or sub pumping stations. The same or different private electrical firms might work at two pumping stations. At present, 52 pumping stations (lifting, sub pumping stations, main pumping stations) in the existing UGSS have been given out for O&M contracts among three private firms: Balajee Electricals, Power Electrical Works, and Sabari Electricals. Roles and responsibilities of the operator as detailed by TCC are listed in Annexure 5.

4. Record keeping: For decanting facilities, records are maintained in which date, truck details (vehicle and owner), tipping fees collected and receipt no. are recorded. A separate logbook is maintained for recording the pump run time.

5. Facility operators and staffing: The employee (helper, 10th standard pass) is arranged by TCC at Anna Stadium alone. At the rest of the decanting stations, since the vehicles are fewer in number, the pump operator themselves are given the additional responsibility for keeping records for the decanting station.

6. Discharge into the collection well: Each truck operator takes about 5-7 minutes to empty a full truckload of FS into the collection tank.

7. Safety and hygiene: There is no attention to electrical safety, personal safety and hygiene at the decanting facilities. While disposing of the FS from trucks, there is spillage at site. The truck operators may or may not be aware of this but do not care about the health risks associated with the direct contact with FS. They do not use any PPE such as gloves, boots or masks. The site does not have any proper toilet or hand washing facilities.

A comparison of existing facilities and operational details at the decanting station is given in Table 2.2.

Table 2.2: **Comparison of Existing Facilities and Operational Details of the Decanting Station**

Sl. No.	Description	Anna Stadium	Vayaloor Road	Thanjavur Road	Srirangam
1	Facilities for hand Washing	None	Municipal water supply is available. But no wash basin	At micro-composting yard. Municipal water supply is available	Tap with water supply
2	Toilet	Western type – not functional lacks water supply	None	None	Squat type
3	Facilities for cleaning the floor	None			
4	Collection of fee	Every day, the collected fee is submitted to the TCC, by the staff. After collecting the fee, around three in the evening, staff goes to Junior Engineer to get the signature. Then goes to the zonal office to submit the collected amount, afterwards gets the sign from the auditor			
5	Employee who collects the fee	TCC worker	Pump operator	Pump operator	Pump operator
6	O&M of pumping station	Power electric works	Balajee Electricals	Balajee Electricals	Power electric works (Sabari Electricals)
7	Availability of sampling port	None			
8	Flow Equalisation tank	No flow equalisation tank. FS is loaded randomly as the truck comes, when the level in the collection well reaches a pre-determined level, the operators switch on the pumps, and it is pumped to the STP			
9	Operational hours of decanting station	8 am to 8 pm	7 am to 7 pm	6 am to 7 pm	7 am to 10 pm
10	Shift timings of the Pump operator/ record keeper of Desludging truck details	8 am to 8 pm	7 am to 7 pm	6 am to 7 pm	7 am to 10 pm

Table 2.2: **Comparison of Existing Facilities and Operational Details of the Decanting Station**					
Sl. No.	**Description**	**Anna Stadium**	**Vayaloor Road**	**Thanjavur Road**	**Srirangam**
11	Number of truck loads per day	25 to 35	4 to 5	4 to 5	1 to 2
12	Disposal and cleaning of screenings and grit	Cleaning arranged by TCC once in a month (unclear)			
Source: TNUSSP Analysis 2017					

3 Issues and Recommendations

3. Issues and Recommendations

3.1 Summary of Issues

Although the design and O&M facilities at the decanting stations are good, there are some issues with both – more so with O&M. The decanting facilities are pumping stations but the design varies across the four, as explained in earlier section (Table 2.1). The infrastructure for the receipt of FS is also different in all the decanting stations.

3.1.1 Design

- Emptying of FS: There is no platform or receipt facility that is available for multiple trucks to dispose of the FS. The current practice is to dispose of the FS in the collection well by using a flexible hose. Emptying of FS by multiple trucks contributes to spillage and handling difficulties by the personnel, as there are no flexible hoses. In addition, at Vayaloor Road, only one port is available for emptying, making it difficult for other trucks waiting for disposal.

- Flow measurement: There are no flow measurement arrangements.

- Screens: Screen chambers in the decanting station are of two types: i) Rectangular chamber with coarse and fine screen. ii) Screen placed inside the collection well. In both the cases it is difficult to remove the screenings (trash). The collection well is very deep, making it difficult for regular removal of the trash. In the rectangular chamber the screens are placed vertically, which causes the trash to fall back into the chamber during removal.

- Grit chamber: In all the facilities, the grit chamber is designed based on gravity settling. Provision for grit removal is through grit pumps, which are not functioning properly.

Field observations and the status of the preliminary treatment units at each of the decanting facilities is summarised in Table 3.1.

Table 3.1: **Comparison of Status of the Preliminary Treatment Units in all Decanting Facilities**

Sl. No.	Decanting Station	Provision for Disposing FS	Screen Chamber	Grit Chamber
1	Anna Stadium	A small inlet chamber was constructed, but at present it is not functional. FS is directly disposed into the collection well	The screen functions poorly. One of the reasons for this is that they are placed vertically, which makes it difficult to clean manually	Grit chamber works on simple gravity separation. Grit removal system is not functional. Grit pumps are not working
2	Vayaloor Road	The inlet opening for disposing of FS from trucks and intermediate storage tank are both operational	The screen functions poorly. The spacing between the bars is not equal, some are too wide, it easy for floating debris to pass through. They are placed inside the screen well, making it difficult to remove the screenings	Grit chamber works on simple gravity separation. Grit removal system is not functional. Grit pumps are not working

Table 3.1: **Comparison of Status of the Preliminary Treatment Units in all Decanting Facilities**				
Sl. No.	**Decanting Station**	**Provision for Disposing FS**	**Screen Chamber**	**Grit Chamber**
3	Thanjavur Road	The provision was permanently closed because of complaints raised by the adjacent Tamil Nadu Electricity Board office and trucks were advised to discharge FS into the screen well directly	The screen functions poorly. It is placed inside the collection well itself, which makes it difficult to remove the screenings	None. Design has a grit chamber but has not been in use for a very long time. There are no grit pumps
4	Vasudevan Street	None	The screen is functional and maintained	Works on simple gravity separation. Grit pumps are not working.
Source: TNUSSP Analysis 2017				

3.1.2 Operation and Maintenance

- Removal of screenings and grit: Visual observation indicates infrequent screening and grit removal. The vegetation growing in the grit removal basin at Anna Stadium indicates that the system has not been used in several months. (Figure 3.1)

- Record-keeping: Although there is some of record-keeping of truck numbers and tipping fees, there is no control over or record of the origin of the FS. For example, grease and industrial effluents can be discharged to the collection well with no control. In addition, the volume of trucks and FS discharged is not recorded, making it difficult to accurately assess the volume of FS received.

- Testing: No procedure for sampling and analysis of suspect loads.

3.1.3 Health and Safety

- Health and hygiene. There are no proper handwash/toilet facilities for drivers, no Personal Protective Equipment (PPE) for workers (Figure 3.2).

- No procedure for sampling and analysis of suspect loads.

Figure 3.1: **Grit Pit and Screening Systems – Not Being Maintained in Anna Stadium**

Source: TNUSSP Analysis 2017

Figure 3.2: **FS Disposal with no PPE and Non-Domestic Source of Sewage being Discharged**

Source: TNUSSP Analysis 2017

3.2 Recommendations

3.2.1 Design Requirements

The design requirements of decanting stations are detailed in Annexure 6 referring to the Handbook for septage management and disposal by the U.S. Environmental Protection Agency (USEPA). The requirements shall also cover the following (Board of State and Provincial Public Health and Environmental Managers, 2004):

1. Spillage management:
    a. An unloading ramp for the desludging trucks, sloped to drain to allow ready cleaning of any spillage and washing of the tank, connector hoses, and fittings. The ramp drainage must lead to the decanting station treatment units and shall exclude excessive storm water.

    b. A flexible hose fitted with easy connect coupling to provide for direct connection from the desludging truck outlet to minimise spillage and help control odours.

    c. Water with ample pressure, hose, and spray nozzle for convenient cleaning of the receiving station and trucks. The use of chlorinated effluents may be considered for

this purpose. The typical arrangements and procedures for spillage management are detailed in Annexure 7.

2. Receipt of FS: An adequate off-line FS-receiving tank should be provided. Access shall be provided for collection of a representative sample from any truckload of FS accepted for discharge at the station. The receiving tank should be designed to provide complete draining and cleaning by means of a sloped bottom equipped with a drain sump. The design should consider adequate mixing for testing, uniformity of FS strength, and chemical addition, if necessary, for treatability and odour control. The operator shall have the authority to prevent and/or stop any disposal that is likely to cause a discharge violation.

3. Infrastructure*:* Equalisation tank, screening, grit, and grease removal as appropriate. (For design details of these units in decanting stations see Annexure 6. Equalisation: The FS is discharged into a large collection well of the pumping stations; these stations are located a few kilometres away from the STP. In this context, it is safe to assume that there is adequate mixing and dilution of the FS before it reaches the STP. This is reflected in the STP inlet characteristics measured which show very low levels of organics and solids concentration (TNUSSP, 2017). Technologies for odour control is detailed in Annexure 7.

4. Pumps provided for handling the FS should have a non-clogging design and be capable of passing 3-inch (75 mm) diameter solids. There should be valving and piping for operational flexibility to allow control of the flow rate and point of FS discharge to the plant.

5. Safety features and use of equipment to protect the operational personnel.

6. Laboratory and staffing capability to determine the FS strength and/or toxicity to the treatment processes (screening of FS loads).

Box 3.1: Establish alternative disposal location for commercial septage loads

Send all commercial loads that may contain high levels of fats, oil and grease (FOG) or toxic chemicals to a separate treatment pond. There, segregated loads could undergo batch treatment using hydrated lime without upsetting the rest of the plant.

Source: Stand-alone lime stabilisation basins for commercial septage loads – Oxfam Philippines 2016

3.2.2 Operation and Maintenance Requirements

The duties and responsibilities assigned to the operator as per the TCC are given in Annexure 5. The typical O&M requirements of a decanting station are provided in Table 3.2 (U.S. Environmental Protection Agency, 1994).

Table 3.2: **Typical O&M Requirements of a Decanting Station**

Sl. No.	Task	Responsibility	Frequency
1	Collect and store sample; inspect FS for odour and appearance	Operator	Every load
2	Wash down pad	Desludging truck driver/persons accompanying	Every load
3	Rake screenings from bar rack	Desludging truck driver/persons accompanying	Every load
4	Remove screenings and grit	Operator	By design
5	Lubricate mechanical screen, use grit removal equipment if applicable	Operator	
6	Rotate use of FS transfer pumps	Operator	Monthly
7	Repack pump seals and conduct preventive maintenance	Operator	As per Manufacturer
8	Wash down walls of holding tank	Operator	Daily
9	Check oil levels in pumps and blowers	Operator	As per Manufacturer
10	Conduct preventive maintenance on blowers and diffusers	Operator	As per Manufacturer

Source: U.S. Environmental Protection Agency 1994

3.2.3 Siting Requirements

1. There should be considerable distance from residential and commercial buildings to avoid complaints of odours and noise, but not so far as to require along time for travel from the septic tank to the decanting station (Alberta Environmental Standards, 2008). The minimum distance from specific areas are mentioned in Table 3.3.

Table 3.3: **Minimum Distance from Specific Features**

Sl. No.	Feature	Minimum Distance (m)	Preferred Distance (m)
1	Rivers, canals, creeks, intermittent drainage, courses, lakes	30	50
2	Water wells	50	50
3	Areas zoned residential or devoted to urban use	500	800
4	Occupies dwellings	60	100
5	Road allowances	10	20
6	Public building perimeter	10	30

7	Public buildings	60	100
8	School yard boundaries	200	500
9	Cemeteries, playgrounds, parks	200	500
10	Property boundary	60	100
Source: Alberta Environmental Standards 2008			

2. Access for desludging trucks should include adequate roadway width for large trucks; sufficient space for the truck to turn into and out of the station, and short distance from truck discharge into the receiving pit.

3. Depending on the quantity and mode of FS addition to sewerage system, proximity to large sewer mains (>30 inch diameter) is essential to handle large volumes of FS emptied at a time.

3.2.4 Record-Keeping and Reporting Requirements

Records of FS sources and volumes and routine sampling are parts of a comprehensive management program. Record keeping and sampling protocols prevent discharging incompatible materials, such as industrial wastes. In addition, this information can be helpful if an upset occurs in the treatment process (U.S. Environmental Protection Agency, 1984).

The requirements for record-keeping and manifest forms should become part of the comprehensive FS management program and codified into the rules and regulations developed by the local government unit and the records of service providers. Information for record-keeping may include, but are not limited to, the following (Philippine Department of Health and USAID, 2008):

1. Pumping activity and volume recorded in logbook
2. Filled out manifest forms
3. Notes about deficiencies with the septic tank. Cracks, missing pipes or fittings, improper manholes or access ports should be recorded as the homeowner will need this information for making any required upgrades
4. Inventory of tools
5. Desludging schedule

The service provider shall retain its records for a minimum of five years. Each service provider shall submit the quarterly report to the concerned authority. This completed document should be given to the local government for their records. The service providers (including collection and transport and the treatment and disposal facilities) are also required to retain copies of the manifest forms for a minimum of three years (Philippine Department of Health and USAID, 2008):

A sample of a manifest form is presented in Annexure 8.

3.2.5 Sanitary Requirements

Essential sanitation requirements for a decanting station are as follows (Philippine Department of Health and USAID, 2008):

1. Hand washing facility – 1
2. Toilet – 1
3. Bathroom – 1
4. Drinking water fountain/dispenser – 1
5. All plumbing fixtures must be in accordance with the standards
6. Soap and any approved hand-drying device/material

7. There must be adequate and separate changing rooms for both male and female users with individual lockers for clothes.

3.2.6 Safety Recommendations

FS is an infectious material. It can cause disease if ingested or when it is exposed to skin (Philippine Department of Health and USAID, 2008).

- Always wash hands immediately with soap after contacting FS or tools and equipment that may have contacted FS, and always before eating or drinking.
- The workers handling FS emptying, transportation and treatment should be immunised for tetanus, hepatitis A, and hepatitis B.
- Never smoke while handling FS. Septic tanks may generate methane, an explosive gas. Smoking also promotes the hand-to-mouth route of infection.
- Use caution around the septic tank. Never enter a septic tank. Every year people are killed because they enter tanks, which are confined spaces that may contain toxic gas or too little oxygen. Use caution when walking around septic tanks. Septic tanks may cave in or break when excessive weight is place on the lid or manhole cover.
- Always secure septic tank lids with screws or locks. Keep children safe by securing septic tank lids.
- Personal protective equipment (PPE) – All employees are responsible for maintaining their PPE in good condition. These include, among others,
  - ✓ Gloves
  - ✓ Boots
  - ✓ Hard hat and face mask
- For steps and measures taken for spillage management, see Annexure 6.

3.3 Summary of Best Practices

Table 3.4 summarises the best practices for FS management considering decanting stations and the relevant document sections.

Table 3.4: **Best Practices for FS Management Considering Decanting Stations**

Sl. No.	Best Practice	Trichy	Remarks
Truck Contents			
1	Best Practice is a manifest system recording source and location where FS is collected. Industrial waste should not be added.	No manifest system	Establish a manifest system as described in Annexure 8

Table 3.4: **Best Practices for FS Management Considering Decanting Stations**			
Sl. No.	**Best Practice**	**Trichy**	**Remarks**
2	Commercial waste with high content of Fat, Oil and Grease should not be added at the decanting station because it can clog sewer pipes.	No separation; all waste/FS delivered to the decanting station is accepted.	Establish • A monitoring system to assess the quality of FS being discharged at facility. • A framework guiding acceptance of FS from different sources and of varying quality. • Alternative disposal location for commercial waste loads.
Decanting Station			
1	Worker health, safety and hygiene	Minimal	See Section 3.2.6
2	Flow equalisation of FS	Absent	See Annexure 5
3	Pre-treatment of FS: Screening and grit	Not operating; needs maintenance	See Section 3.2.1
4	FS flow and quality measurement to ensure volume of load from FS does not exceed STP design loadings for BOD and TSS.	Pump capacity multiplied by operating hours measured by a wristwatch or mobile phone	Overtime, pump capacity changes so measure current capacity and install hour-run meters.
5	O&M of decanting station, presence of trained and qualified operators	See section 2.1	See Section 3.2.2
Source: TNUSSP Analysis 2017			

Bilbliography

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U.S. Environmental Protection Agency, 1994, Guide to Septage Treatment and Disposal.

U.S. Environmental Protection Agency, 1984, Handbook on Septage Treatment and Disposal

Annexures

Annexure 1: Methods of Addition of FS

A1.1 Methods of Addition of FS to Sewage

The following methods are usually adopted for adding FS to the STP treatment train (U.S. Environmental Protection Agency, 1980, U.S. Environmental Protection Agency, 1984).

1. Addition to the sewage stream (near the head works or upstream from the plant) (co-treatment with sewage).
2. Addition to the solids handling system (co-treatment with sludge).
3. A combination of the two

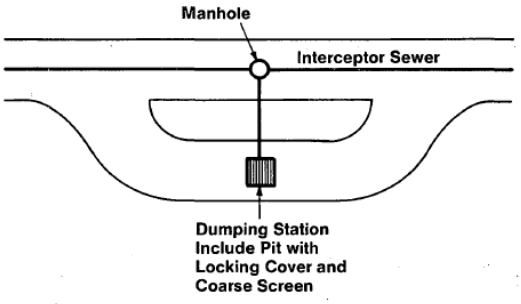
A1.1.1 Addition to Sewage Stream

There are three ways of adding FS upstream of STP (ISF and SNV, 2016; U.S. Environmental Protection Agency, 1980)

1. At an upstream lift/pumping station
2. At an upstream manhole (Figure A1.1)
3. At head works of the STP (Figure A1.2).

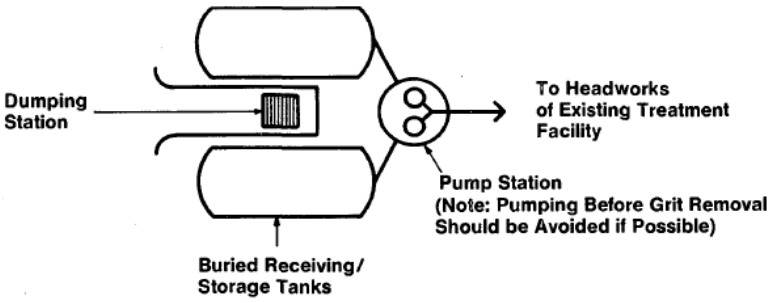
Table A1.1 summarises the details for each of the options above (U.S. Environmental Protection Agency, 1984).

Figure A1.1: **Interceptor Decanting Station**



Source: U.S. Environmental Protection Agency 1984

Figure A1.2: **Decanting Stations at STPs Where Existing Pre-Treatment Facilities Can be Used to Treat FS**

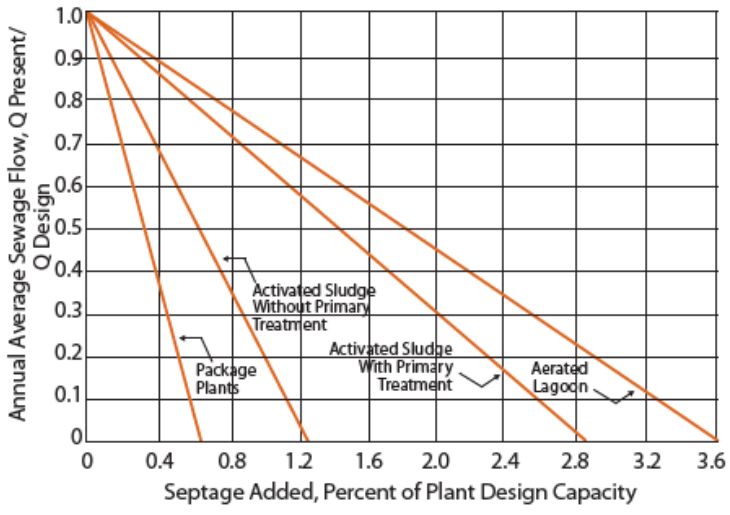


Source: U.S. Environmental Protection Agency 1984

Table A1.1: **Need for Equalisation and Pre-Treatment Based on the Mode of FS Addition to Sewage**				
Sl. No	**Mode of Addition**	**Requirement of Equalisation**	**Requirement of Pre-Treatment**	**Remarks**
1	At an upstream lift/ pumping station	Yes	Yes	Equalisation tanks facilitate FS addition to the sewage network at a relatively controlled rate, minimising the potential for short term overloading of downstream processes.
		No if the FS quantity discharged represents less than 1% of the sewage flow.	Yes	Distance to STP should permit complete mixing with the sewage prior to treatment. Only feasible with large sewers and treatment plants.
2	At an upstream manhole	No if the FS quantity discharged represents less than 1% of the sewage flow	No	Distance to STP should permit complete mixing with the sewage prior to treatment. Only feasible with large sewers and treatment plants. It is economical due to the very simple decanting station design. There is the potential for grit and debris to accumulate in the sewer and for odour problems.
3	At head works of the STP.	Yes	No	Following pre-treatment of STP should have enough capacity and proper O&M with addition of FS. It also allows the wastewater treatment staff to have control of the FS discharge.
Source: U.S. Environmental Protection Agency 1984				

Figure A1.3 provides estimates of allowable rates of FS addition based on different treatment technologies adopted at STP, assuming that an equalisation tank is provided, and FS is added to the sewage flow on a semi-continuous basis.

Figure A1.3: **Allowable FS Loading to STP from a Decanting Station Having Equalisation Tank**



Source: U.S. Environmental Protection Agency 1994

A1.1.2 Addition to Sludge Handling Process

FS can be handled and processed with sludge from the STP after pre-treatment in the decanting station. This method reduces the loading to liquid stream processes, and it eliminates the potential for affecting effluent quality. However, there could be an adverse effect on the sludge treatment processes, such as dewatering. Adding FS to the sludge handling process may cause clogging of the pipes and increase wear and tear of the pumps if the FS is not screened and de-gritted in the decanting station (U.S. Environmental Protection Agency, 1999; U.S. Environmental Protection Agency, 1984). Capacity of the sludge handling units also needs to be considered so that addition of FS does not interrupt the normal sludge treatment process in the STP.

A1.1.3 Addition to Both Liquid Stream and Sludge Handling Processes

FS can also be pre-treated to separate the liquid and solid fractions, which can then be treated along with the sewage and sludge streams respectively at an STP. This provides a more concentrated sludge for processing and reduces the organic loading on the liquid wastewater treatment scheme as well as the hydraulic loading on the sludge processes. Increased operations are required for FS pre-treatment at the decanting station (U.S. Environmental Protection Agency, 1999; U.S. Environmental Protection Agency, 1984).

Annexure 2: Checklist for Assessment of Pumping Stations to Use as Decanting Facilities

Background: Tamil Nadu has 624 cities and towns, of which 35 have at least a part of the city serviced by an underground sewerage system and STPs. While wastewater from the covered part of the city is conveyed and treated at the STP for safe disposal, the rest of the city is served by OSSs , and FS generated from the emptying and cleaning of these household and community septic tanks is often not treated and discharged in a safe manner. As part of its Tamil Nadu Urban Sanitation Mission, the GoTN, along with all urban local bodies in the state, is implementing a focused FSM programme aimed at the safe collection and treatment of FS in urban areas in the State. One of the key elements missing in the FSM value chain is the availability of treatment infrastructure for FS. One of the options available for the FS treatment is co-treatment at existing STPs, subject to availability of capacity at the STP and availability of required infrastructure for decanting/discharging FS into the network/STP. This assessment aims to study the feasibility of converting existing sewage pumping stations into decanting stations to allow FS addition to the sewer network. A separate assessment of STP capacity and performance is also being undertaken to understand the feasibility of co-treatment at each STP.

Assessment Target: Pumping stations of sewer networks in cities/towns across Tamil Nadu. One questionnaire should be used for each sewage pumping station in the city/town. If there is more than one pumping station per town, please use separate checklist for each of the pumping station.

Assessment Information: The assessment will be carried out by the Urban Local Body (ULB) officials, and findings from the same will be shared with Commissionerate of Municipal Administration (CMA) /Directorate of Town Panchayat (DTP).

I. CITY DETAILS		
1.	Name of corporation/municipality	
2.	District name	
3.	Name of assessor	
4.	Designation of assessor	
5.	Name of authorising officer	
6.	Designation and contact information of authorising officer	
7.	Mobile no.	
8.	Email id	
9.	Office address	
10.	Date of assessment	☐☐☐☐☐☐☐☐ DD MM YY

II. LOCATION AND ACCESS DETAILS		
1.	Name of the pumping station	
2.	Type of pumping station (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)	a) Main pumping station ☐ b) Sub-pumping station ☐ c) Lift Station ☐ d) Others (Specify) ☐ ----------
3.	Pumping station capacity	
4.	Geo-coordinates of the SPS	a) Lat: b) Long:

II. LOCATION AND ACCESS DETAILS		
5.	What are different types of influent mains/sewage lines discharging into the SPS?	
6.	Distance of the SPS from the STP? (in km)	☐☐
7.	Length of the sewer mains from the SPS to the STP? (in km)	☐☐☐
8.	What areas within the city are served by the SPS?	

9.	What type of neighbourhood is the SPS located in? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)	a) Largely residential ☐ b) Densely populated ☐ c) Near market area ☐ d) Outskirt/periphery areas ☐ e) Others (Specify) ☐ ----------
10.	What is the distance to the nearest residence from the SPS? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)	a) < 100 m ☐ b) 100 – 300 m ☐ c) 300 – 500 m ☐ d) >500 m ☐
11.	Does the access road pass through areas of habitation? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)	a) Yes ☐ (Continue) b) No ☐ (Go to Q.13)
12.	Will there be challenges in passage of vehicle through residential areas/markets etc? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)	a) Yes ☐ b) No ☐

II. LOCATION AND ACCESS DETAILS

13. Type of external access roads to the pumping station (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)

a) Type	**b) Width**	**c) Condition**
i. Single lane ☐	i. <3 m ☐	i. Paved and in good condition ☐
ii. Two lane-undivided ☐	ii. 3-4.5m ☐	ii. Paved but road condition requires improvement (eroded/potholes) ☐
iii. Two lane-divided ☐	iii. 4-7m ☐	iii. Unpaved road ☐
iv. Multi-lane ☐	iv. >7m ☐	iv. Others (Specify) ☐ ----------
v. Others (Specify) ☐ ----------		

III. AVAILABILITY OF SPACE AND EXISTING INFRASTRUCTURE		
1.	Does the SPS currently receive FS?	a) Yes ☐ b) No ☐
2.	If **YES**, since when (Year) has the SPS been receiving FS?	☐☐☐☐
3.	On an average, how many trucks empty FS in a day at the SPS?	☐☐
4.	What is the average capacity of the trucks that empty FS at the SPS? (in litres)	☐☐☐☐☐
5.	Average volume of FS received in a week (in MLD)	☐☐
6.	What are challenges faced by the SPS in receiving FS? For example, poor external and internal access, odour, lack of human resources, etc.	

III. AVAILABILITY OF SPACE AND EXISTING INFRASTRUCTURE			
7.	Is the internal access road to pumping station wide enough for the septage truck (3.5 m width, 9 m length, dimensions to be confirmed) movement? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)		a) Yes ☐ b) No ☐
8.	Is there enough space within the pumping station premises for a septage truck (3.5 m width, 9 m length, dimensions to be confirmed) to enter, turn around and exit? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)		a) Yes ☐ b) No ☐
9.	Is there a point such as collection well etc. in which the septage trucks can empty septage/FS/sewage from ground level (TICK IN THE BOX GIVEN AGAINST THE OPTIONS) – **Refer to photo provided in Annexure 1**	a) Yes b) No	☐ (Go to Q.11) ☐ (Continue)
10.	If the response '**NO'** to above question, can a simple ramp be constructed for the trucks to empty? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)	a) Yes b) No	☐ (Go to Q.12) ☐ (Go to Q.12)
11.	**(OPTIONAL)** If **YES**, approximate cost of the ramp in Rs. lakh:		

III. AVAILABILITY OF SPACE AND EXISTING INFRASTRUCTURE			
12.	Existing infrastructure for pre-treatment		
	A. Type	**B. Availability**	**C. If Yes in 'B', current working condition**
	i. Coarse screen	Yes ☐ No ☐	Working ☐ Needs major refurbishment ☐
	ii. Fine screen	Yes ☐ No ☐	Working ☐ Needs major refurbishment ☐
	iii. Grit removal	Yes ☐ No ☐	Working ☐ Needs major refurbishment ☐
	iv. Screening disposal arrangements	Yes ☐ No ☐	Working ☐ Needs major refurbishment ☐
	v. Others (Specify) ----------	Yes ☐ No ☐	Working ☐ Needs major refurbishment ☐
13.	What is the total area of the SPS? (in m^2)	☐☐	
14.	What is the total built area available at the SPS? (in m^2)	☐☐	
15.	What is the total unbuilt area available at the SPS? (in m^2)	i. Area covered by trees ☐☐ ii. Area covered by shrubs, grass ☐☐ iii. Parking space ☐☐ iv. Others (Specify) ☐☐ ----------	
16.	Attach plan of the pumping station. If plan is not available, hand sketch the layout approximately to scale (Layout of the site should include: boundary, dimension of existing structure, open space, width of entry/exit points, roads, operator room) **Refer plan provided in Annexure 2**		

III. AVAILABILITY OF SPACE AND EXISTING INFRASTRUCTURE			
17.	What is the size of the discharge mains from the SPS?	☐☐	
18.	Number of pumps at the SPS?	☐☐	
19.	Is there existing room/space for operators? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)	a) Yes b) No	☐ ☐
20.	Is there access to water supply at the pumping station? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)	a) Yes b) No	☐ ☐
21.	Is there access to toilet and washroom facilities at the pumping station? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)	a) Yes b) No	☐ ☐
22.	Feasibility for construction of additional infrastructure for pumping station		
	i. Is there space to construct an underground storage tank to receive FS? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)	a) Yes b) No	☐ ☐
	ii. If an operator room does not exist, Is there space to construct one? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)	a) Yes b) No	☐ ☐

IV. PUMPS				
1.	What type of pumps and pumping configuration are used at the pumping station?			
	A. Type (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)			**B. No.**
	i. Horizontal pumps in dry pit	☐		
	ii. Vertical pumps in dry pit	☐		
	iii. Vertical pumps in wet pit	☐		
	iv. Submersible sewage pumps in wet pit	☐		
2.	Flow meter present (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)	a) Yes b) No	☐ (GO TO SECTION VI) ☐ (Continue)	
3.	If yes, Flow Meter working (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)	a) Yes b) No	☐ ☐	

V. STAFF			
1.	Staff working at the pumping station		
	Designation	**Role**	
a.			
b.			
c.			
d.			
2.	Will there be concern of complaints from neighbourhood because of odour, movement of septage trucks etc. if the pumping station is converted to decanting station? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)	a) Yes ☐ (Continue) b) No ☐	
2a.	If **YES**, give details		

Signature of the Assessor:

_____

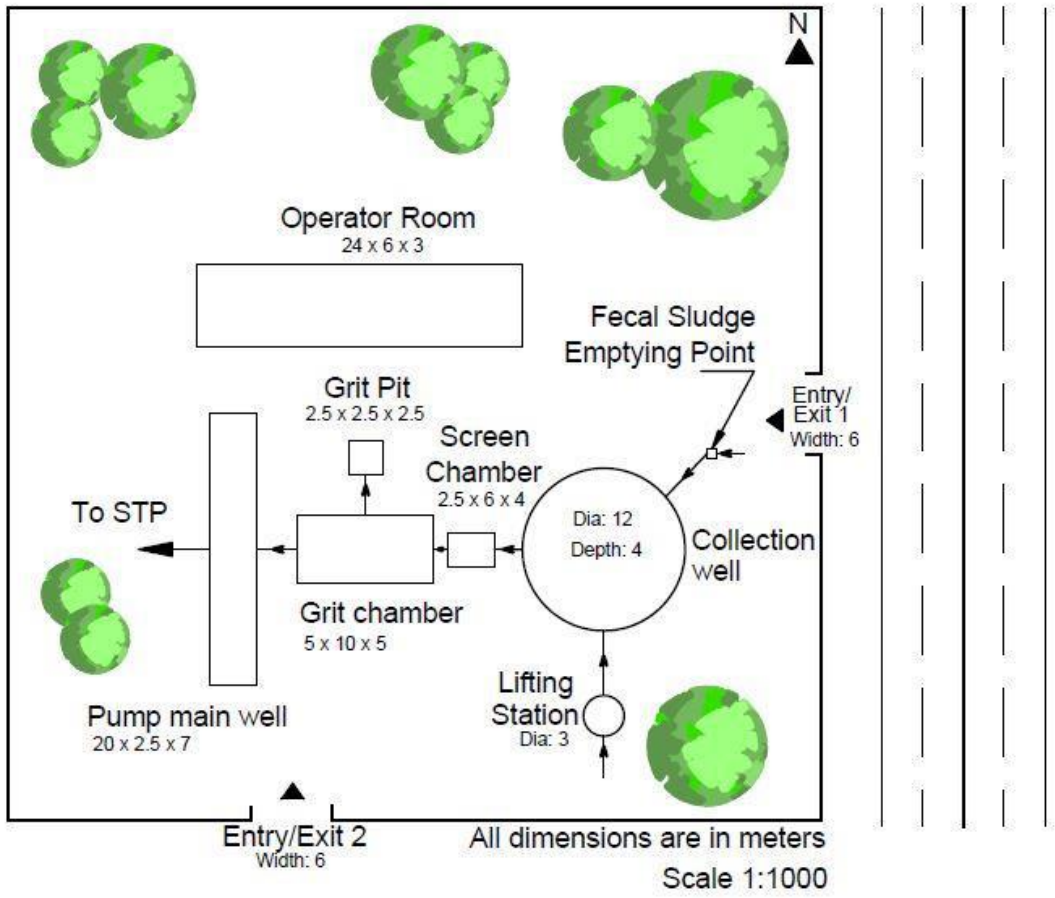
ANNEXURE A:

Figure A2.1: **Photos of emptying FS/septage into collection well**

Source: TNUSSP Analysis 2017

ANNEXURE B:

Figure A2.2: **Layout of pumping station with decanting facility at Anna Stadium Main Pumping Station, Trichy**



Source: TNUSSP Analysis 2017

Annexure 3: Checklist for Assessment of STPs for Co-Treatment of Fecal Sludge

Background: This checklist has been developed for the CMA and DTP to fulfill its objectives and facilitate safe disposal of FS generated across all cities and towns with existing sewer networks and STP.

Tamil Nadu has 624 cities and towns, of which 35 have at least a part of the city serviced by underground sewerage system and STPs. While wastewater from the covered part of the city is conveyed and treated at the STP for safe disposal, the rest of the city area is served by OSSs, and FS generated from the emptying and cleaning of these household and community septic tanks is often not treated and discharged in a safe manner.

As part of its Tamil Nadu Urban Sanitation Mission, the GoTN, along with all urban local bodies in the State, is implementing a focused FSM programme aimed at the safe collection and treatment of FS in urban areas in the State. One of the key elements missing in the FSM value chain is the availability of treatment infrastructure for FS. One of the options available for FS treatment is co-treatment at existing STPs, subject to availability of capacity at the STP and availability of required infrastructure for decanting/discharging FS into the network/STP. This assessment aims to determine the feasibility of using unused capacity at sewage treatment plants to treat FS along with sewage. A separate assessment of decanting facility capacity and performance is also being undertaken to understand the feasibility of co-treatment in each city.

Assessment Target: Municipal corporations/municipalities with STPs. If there is more than one STP per town, please use separate checklist for each of the STP.

Assessment Information: The assessment will be carried out by the ULB officers, and findings from the same should be shared with CMA/DTP officers.

I. CITY DETAILS		
1.	Name of corporation/municipality	
2.	District name	
3.	Name of assessor	
4.	Designation of assessor	
5.	Name of authorising officer	
6.	Designation and contact information of authorising officer	
7.	Mobile no.	
8.	Email id	
9.	Office address	
10.	Date of assessment	☐☐☐☐☐☐☐☐ Date Month Year

II. DESIGN OF SEWAGE TREATMENT PLANT		
1.	Name of the STP	
2.	Geo-coordinates of the STP	a) Lat: b) Long:
3.	Design capacity of the STP (in MLD)	☐☐
4.	Treatment technology used at the STP (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)	a) Conventional Activated Sludge ☐ b) Waste Stabilisation Pond ☐ c) UASB ☐ d) SBR ☐ e) Others (Specify) ☐ ----------

II. DESIGN OF SEWAGE TREATMENT PLANT		
5.	Design inlet BOD and TSS levels (in mg/l)	a) BOD: ☐☐ b) TSS: ☐☐
6.	Total area and estimated population served by the STP	a) Area: b) Population:
7.	No. of connections (HSCs) connected to the UGD network	☐☐☐☐☐☐
8.	Year of construction	☐☐☐☐
III. LOCATION AND ACCESS DETAILS		

1.	Distance of the STP from the SPS? (in km)	a) ☐☐ b) No pumping station ☐(Go to Q.3)
2.	What areas within the city are served by the STP?	
3.	What type of neighbourhood is the STP located in? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)	a) Largely residential ☐ b) Densely populated ☐ c) Near market area ☐ d) Outskirt/periphery areas ☐ e) Others (Specify) ☐ ----------

III. LOCATION AND ACCESS DETAILS		
4.	What is the distance to the nearest residence from the STP? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)	a) < 100 m ☐ b) 100 – 300 m ☐ c) 300 – 500 m ☐ d) >500 m ☐
5.	Does the access road pass through areas of habitation? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)	a) Yes ☐(Continue) b) No ☐(Go to Q.7)
6.	Will there be challenges in passage of vehicle through residential areas/ markets etc? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)	a) Yes ☐ b) No ☐

7.	Type of external access roads to the STP (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)		
	a) Type	**b) Width**	**c) Condition**
	i. Single lane ☐	i. <3 m ☐	i. Paved and in good condition ☐
	ii. Two lane-undivided ☐	ii. 3-4.5m ☐	ii. Paved but road condition requires improvement (eroded/potholes) ☐
	iii. Two lane-divided ☐	iii. 4-7m ☐	iii. Unpaved road ☐
	iv. Multi-lane ☐	iv. >7m ☐	iv. Others (Specify) ☐
	v. Others (Specify) ☐		---

IV. STP PERFORMANCE						
1.	Current average daily flow received at the STP? (in MLD)			☐☐.☐☐		
2.	Describe the treatment train (treatment units) at the STP (Individual units, and their capacities)					
	a) Individual Units	**b) Capacity**		**c) Remarks**		
	Unit 1					
	Unit 2					
	Unit 3					
3.	Actual sewage characteristics at inlet to the STP? (Measured after commissioning or during O&M of the STP) (in mg/l)			a) BOD: ☐☐ b) TSS: ☐☐ c) COD: ☐☐		
4.	If available, provide monthly average BOD & TSS at the inlet and outlet of each process unit in mg/l as analysed for the last 2 years:					
	Sewage characteristics	**Unit 1**	**Unit 2**	**Unit 3**	**Unit 4**	**Unit 5**
	a) BOD					
	b) TSS					

5.	Average effluent quality parameters at the STP? (in mg/l)	a) BOD: ☐☐ b) TSS: ☐☐ c) COD: ☐☐
6.	Type of receiving body/environment for disposal of the treated wastewater (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)	a) River ☐ b) Stream ☐ d) Land ☐ e) Irrigation ☐ f) Others (Specify) ☐ ----------

V. FINAL DISCHARGE/REUSE OF TREATED WATER			
1.	Process adopted for sludge treatment (drying beds/mechanical dewatering/any other method) with capacity details		
	a) Process		
	b) Capacity		
2.	Is treated water reused for any purpose? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)	a) Yes b) No	☐(Continue) ☐(Go to Q.6)
3.	If **YES**, please provide details	a) Irrigation b) Sale to industry c) Sale to commercial establishments d) Others (Specify) ☐ ----------	☐ ☐ ☐
4a.	Are there specific water quality criteria that are required to be met by the STP? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)	a) Yes b) No	☐(Continue) ☐(Go to Q.6)
4b.	If, **YES** please describe the same		

5.	List of non compliances if any reported by the Pollution Control Board/court if any:
6.	List out any structural damages & malfunctioning of process units/equipment.

V. FINAL DISCHARGE/REUSE OF TREATED WATER			
7a.	Is there concern of odour from the STP in its current state of operation? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)	a) Yes	☐ (Continue)
		b) No	☐ (GO TO SECTION VI)
7b.	If **YES**, please specify if specific units are a concern.		

SECTION VI SEEKS INFORMATION ON THE FOLLOWING:

- **Co-treatment at STP**
- **Availability of space within the STP including internal access**
- **Existing STP infrastructure**

VI. AVAILABILITY OF SPACE AND EXISTING INFRASTRUCTURE		
1.	Does the STP currently receive FS for co-treatment?	a) Yes ☐ (Continue) b) No ☐ (Go to Q.5)
2.	If **YES**, since when (Year) has the STP been receiving FS?	☐☐☐☐
3.	On an average, how many trucks empty FS in a day at the STP?	☐☐
4.	What is the average capacity of the trucks that empty FS at the STP? (in litres)	☐☐☐☐☐
5.	Average volume of FS received in a week (in MLD)	☐☐
6.	What are challenges faced by the STP in receiving FS? For example, poor external and internal access, odour, lack of human resourses, etc	

7.	Is the internal access road to STP wide enough for the septage truck (3.5 m width, 9 m length, dimensions to be confirmed) movement? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)		a) Yes ☐ b) No ☐
VI. AVAILABILITY OF SPACE AND EXISTING INFRASTRUCTURE			
8.	Is there enough space within the STP premises for a septage truck (3.5 m width, 9 m length, dimensions to be confirmed) to enter, turn around and exit? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)		a) Yes ☐ b) No ☐
9.	Is there a point such as collection well etc. in which the septage trucks can empty septage/FS/ sewage from ground level (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)		a) Yes ☐ (Go to Q.11) b) No ☐ (Continue)
10.	If the response '**NO'** to above question, can a simple ramp be constructed for the trucks to empty? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)		a) Yes ☐ (Go to Q.12) b) No ☐ (Go to Q.12)
11.	**(OPTIONAL)** If **YES**, approximate cost of the ramp in Rs.lakh:		
12.	Existing infrastructure for pre-treatment		
	A. Type	**B. Availability**	**C. If Yes in 'B', current working condition**
	i. Coarse screen	Yes ☐ No ☐	Working ☐ Needs major refurbishment ☐
	ii. Fine screen	Yes ☐ No ☐	Working ☐ Needs major refurbishment ☐
	iii. Grit removal	Yes ☐ No ☐	Working ☐ Needs major refurbishment ☐
	iv. Screening disposal arrangements	Yes ☐ No ☐	Working ☐ Needs major refurbishment ☐
	v. Others (Specify) ----------	Yes ☐ No ☐	Working ☐

			Needs major refurbishment ☐
13.	What is the total built area available at the STP? (in m^2)		☐☐

VI. AVAILABILITY OF SPACE AND EXISTING INFRASTRUCTURE			
14.	What is the total unbuilt area available at the STP? (in m^2)		i. Area covered by trees ☐☐ ii. Area covered by shrubs, grass ☐☐ iii. Parking space ☐☐ iv. Others (Specify) ☐☐ ----------
15.	What is the size of the discharge mains from the STP?		☐☐
16.	Is there existing room/space for operators? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)		a) Yes ☐ b) No ☐
17.	Is there access to water supply at the STP? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)		a) Yes ☐ b) No ☐
18.	Is there access to toilet and washroom facilities at the STP? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)		a) Yes ☐ b) No ☐
19.	Feasibility for construction of additional infrastructure for STP		
	ii. Is there space to construct an underground storage tank to receive FS? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)		a) Yes ☐ b) No ☐
	iv. If an operator room does not exist, is there space to construct one? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)		a) Yes ☐ b) No ☐

VII. CO-TREATMENT RECEIVING INFRASTRUCTURE			
1.	Access roads to the STPs (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)		
	a) Type	**b) Width**	**c) Condition**

	i. Single lane ☐ ii. Two lane-undivided ☐ iii. Two lane-divided ☐ iv. Multi-lane ☐ v. Others (Specify) ☐ ----------	i. <3 m ☐ ii. 3-4.5m ☐ iii. 4-7m ☐ iv. >7m ☐	i. Paved and in good condition ☐ ii. Paved but road condition requires improvement (eroded/potholes) ☐ iii. Unpaved road ☐ iv. Others (Specify) ☐ ----------

VIII. STAFF		
1.	Are there dedicated staff for receiving FS at the STP? (TICK IN THE BOX GIVEN AGAINST THE OPTIONS)	a) Yes ☐(Continue) b) No ☐(Go to Q.1b)
1a.	If **YES**, give details of their designation and role	
	Designation	**Role**
a.		
b.		
c.		
1b.	If **NO**, from the existing staff who additionally handles the FS that is received at the STP? MENTION THE DESIGNATION AND THEIR ROLE	
	Designation	**Role**
a.		
b.		
c.		

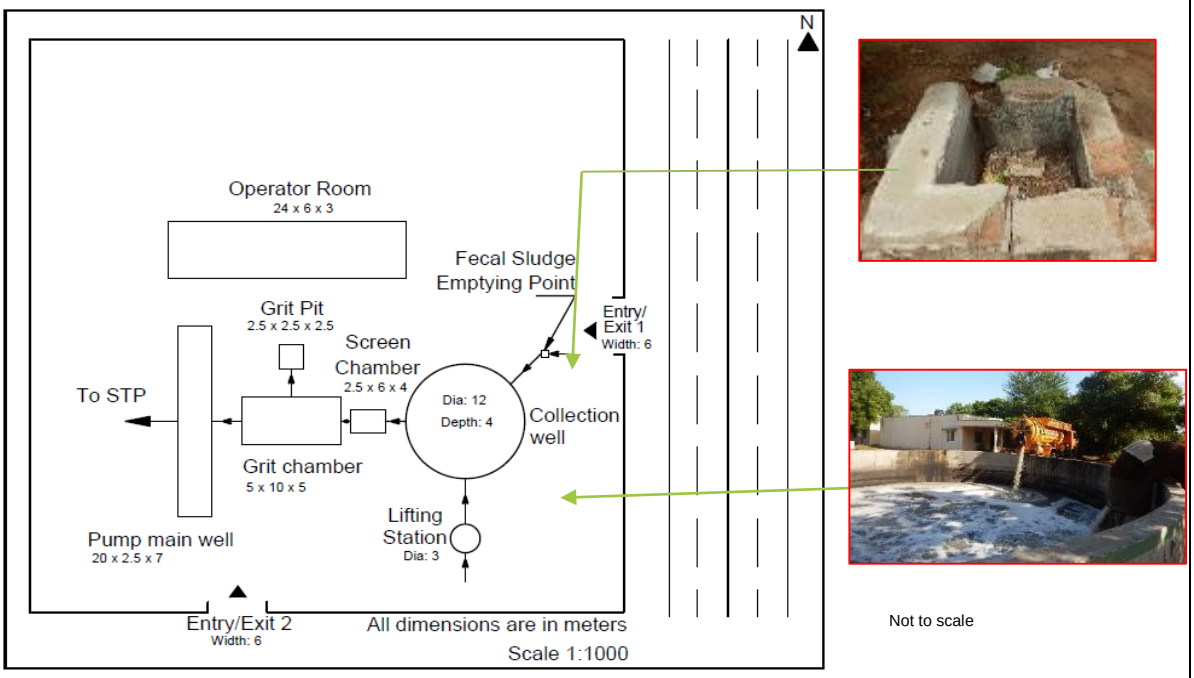
Signature of the Assessor:

_____

Annexure 4: Layout and Details of Treatment Units in the Decanting Station

A4.1 Anna Stadium

Figure A4.1: **Layout of Anna Stadium Decanting Station**



Source: TCC, TNUSSP Analysis 2017

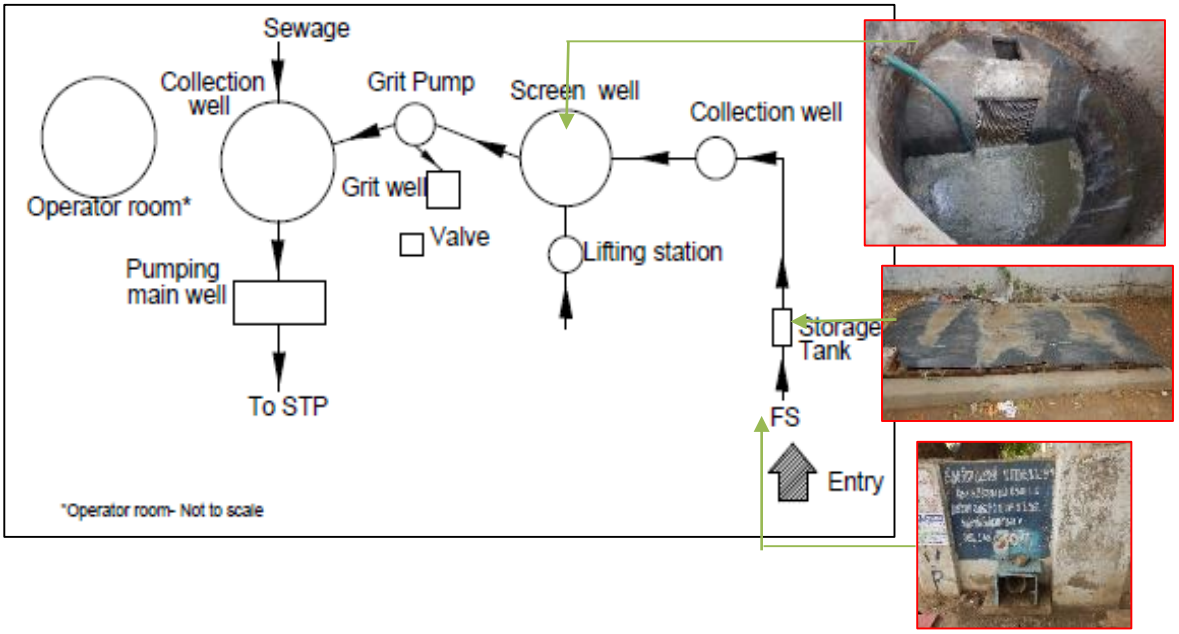
Table A4.1: **Details of the Treatment Units at the Anna Stadium Decanting Station**

Sl. No.	Unit	Size/Capacity	Remarks
1	Collection well (circular)	13 m diameter x 4 m deep	1.2 m above G.L
2	Screen chamber (rectangular)	2.5 m x 6 m x 4 m	Coarse screens: Bar spacing of 2 to 2.5 cm Fine screens: Bar spacing of 1.5 to 2 cm
3	Grit chamber (rectangular)	5 m x 10 m x 5 m	Field observation - Grit Pit of size 2.5 m x 2.5 m
4	Main pumping well (rectangular 2 numbers)	10 m x 3.5 m x 7 m	Field observation indicates that the well is rectangular as opposed to circular mentioned in the source.
5	Lifting station	2 no s 12 HP (47 LPS)	
6	DG set	315 KVA	
7	Pump details	5 no s of 80 HP (257 LPS)	
8	Grit pump details	2 no s of 7 HP	

Source: Tiruchirappalli City Corporation, TNUSSP Analysis 2017

A4.2 Vayaloor Road

Figure A4.2: **Layout of Vayaloor Road Decanting Station**



Source: TCC, TNUSSP Analysis 2017

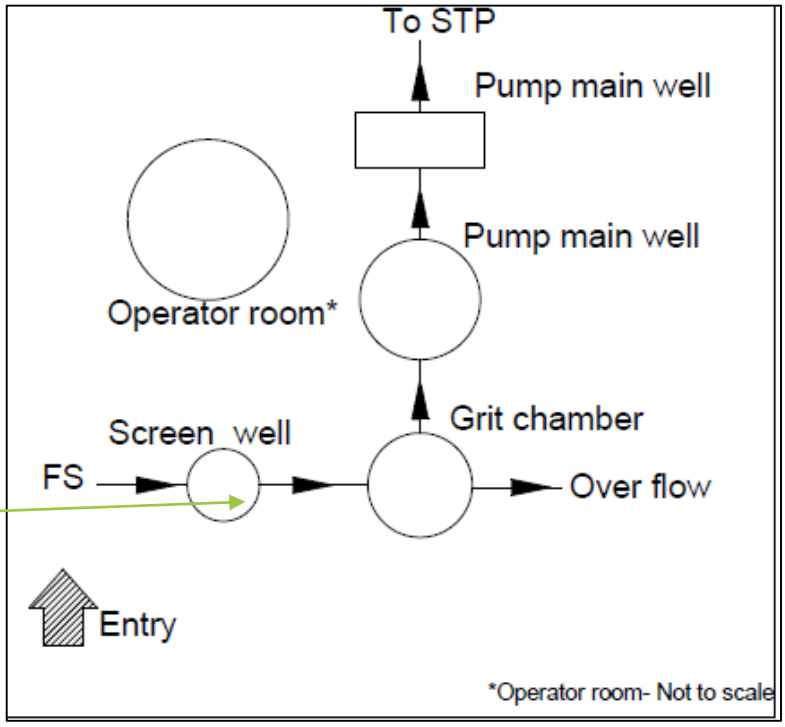
Table A4.2: **Details of the Treatment Units at the Vayaloor Road Decanting Station**

Sl. No.	Unit	Size	Remarks
1	Collection well (circular)	1.9 m diameter x 5.95 m deep	
2	Screen Chamber (circular)	4.5 m diameter x 6.15m deep	Field observation: Coarse Screens-Bar spacing of 2 to 2.5 cm
3	Grit Chamber (circular)	3.5 m diameter x 7.95 m deep	Grit Pit of size 2.5 m x 2.5 m x 2m
4	Main pumping well (rectangular 2 numbers)	7 m d diameter x 9.45 m deep	
5	Lifting station inside station	2 no.s 20 HP (40 LPS)	
6	Lifting station at Ammaiyappa nagar	2 no.s 4 HP (20 LPS)	
7	FS storage tank	3m x 1.5 m x 1.5 m	Field observation
8	Pump Details	2 no.s of 60 HP and 1 no. of 80 HP (257 LPS)	
9	Grit pump details	2 no.s of 7 HP	

Source: TCC, TNUSSP Analysis 2017

A4.3 Thanjavur Road

Figure A4.3: **Layout of Decanting Station at Thanjavur Road**



Source: TCC, TNUSSP Analysis 2017

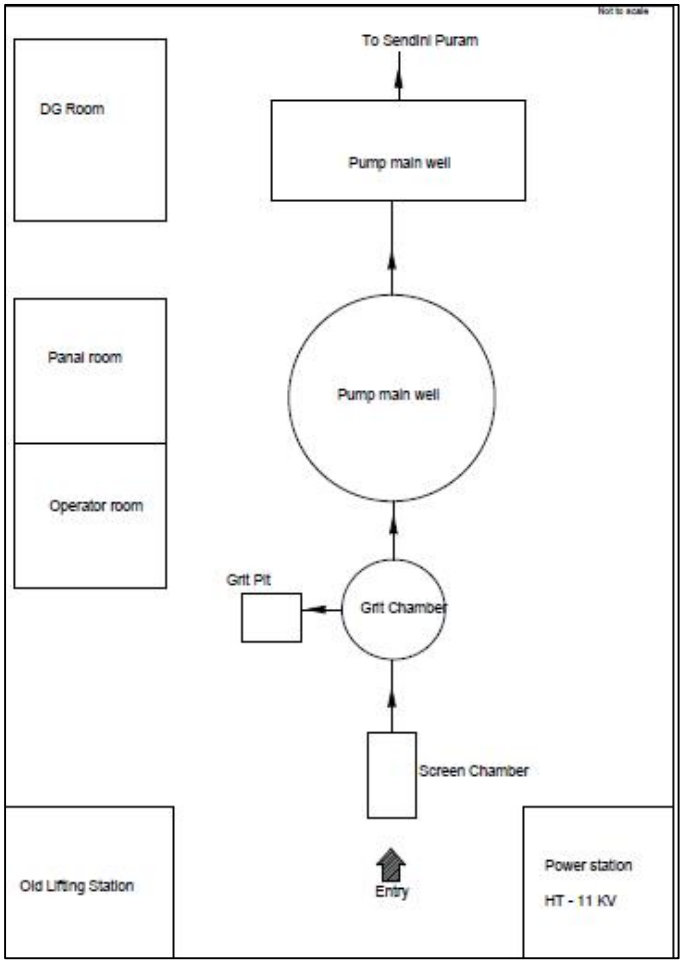
Table A4.3: **Details of the Treatment Units at the Decanting Station at Thanjavur Road**

Sl. No.	Unit	Size	Remarks
1	Collection well (circular)	2 m diameter x 6.05 m deep	
2	Screen Chamber (circular)	5 m diameter x 6.45 m deep	Coarse screens: Bar spacing of 1.5 to 2 cm
3	Grit Chamber (circular)	6 m diameter x 10.75 m deep	
4	Main pumping well	7 m diameter x 11.35 m deep	
5	Lifting station at Vasantha nagar	2 no.s 3 HP (10 LPS)	
6	Pump details	3 no.s of 150 HP (224 LPS)	
7	Grit pump	None	

Source: TCC, TNUSSP Analysis 2017

A4.4 Vasudevan Street

Figure A4.4**: Layout of Decanting Station at Vasudevan Street**



Source: TCC, TNUSSP Analysis 2017

Table A4.4**: Details of the Treatment Units at the Decanting Station at Vasudevan Street**

Sl. No.	Unit	Size	Remarks
1	Screen chamber	10 m x 3 m x 3.5 m	Two sets of coarse screens: Bar spacing of 2 to 3.5cm
2	Grit chamber (circular)	6 m diameter	
3	Main pumping well	10 m diameter	Valve chamber: 8m x 5m
4	Lifting station at Vasantha Nagar	2 no.s 3 HP (10 LPS)	
5	Pump details	Two numbers of 180 HP with capacity of 213 LPS	
6	Grit pump details	Two numbers 7 HP	
7	DG set motor	40 kVA	

Source: TCC, TNUSSP Analysis 2017

Annexure 5: Duties and Responsibilities of Employees at Pumping Station[4]

MANDATORY DUTIES OF THE CONTRACTOR

I. GENERAL

1. The entire sewage generated in the area of jurisdiction through the house service connection has to be collected and conveyed through the collection system to the sewage pumping station, pumping the sewage by operating the existing non-clog submersible sewage pumping machinery to the existing treatment plant at Panjappur owned by TCC.
2. The screens of the wells are to be cleaned in every shift at regular intervals to ensure free flow to prevent back flow and accumulation of sewage in upstream side and to prevent pump failure.
3. Lifting and lowering of submersible pump sets once every fortnight for proper operation and seating.
4. De-silting of wells in the sewage pumping station is to be done periodically by the contractor.
5. Operation of specified shifts/day and ensuring that back up teams would be available to take over during Sundays, holidays and in the event of regular operator/labour absence including watch and ward.
6. Making sure that the levels are maintained between safe and low levels, as specified at all times ensuring that the level is always below the incoming sewer lines.
7. Ensuring that the wells are de-silted a minimum of once a day to handle morning peak flow.
8. Operate and maintain equipment with technical staff so as to safeguard the equipment against single phasing, earth fault, phase reverse etc. in power supply
9. Maintaining all equipment within the station as recommended by the manufacturers, with proper logs and records of the work carried out, as prescribed the City Corporation.
10. Operate and maintain capacitor and allied switch gear so as to maintain a power factor of not less than 0.90 lagging prescribed by TNEB.
11. If any penalty is levied by the TNEB for low power factor, the penalty sum will be recovered from the contractor.
12. The power factor will not decrease or increase suddenly and if the contractor observes daily and finds any decrease in the power factor, it should be informed to the Department Engineer in charge. The Department Engineers will take immediate steps in rectifying this.
13. Test run of DG sets should be carried out for a minimum of 30 minutes per week in idle condition directed by the officials concerned. The required lubrication oil and diesel will be supplied by the corporation and the contractor should make necessary arrangement for carting the same and maintaining necessary logbooks and other required documents by the department with the due approval and signature of the concerned officials.
14. Keeping all wells, kiosk sheds free from dirt and dust.
15. Ensuring that premises are kept clean and tidy.
16. Maintain the inspection register at the station always
15. Mandatory regulations prescribed by CIEG and inspector of factories shall be followed without any lapse.
16. Carrying out all operations at intervals specified shown on attached sheets for each station.
17. Any repair and replacement works of the HT station should be carried out by the authorised persons as prescribed by CIEG.
18. Each station should be provided with complete set of tools and equipment required for maintaining the station.
19. The following regular equipment maintenance and general maintenance have to be carried out along with those as per the preventive maintenance schedule.

[4] *Source: Trichy City Corporation*

a. De-weeding and cleaning the transformer yard.
b. Drying and refilling of silica gel in the breather of the transformer.
c. Regular watering of the earth pits in the transformer yard and maintaining proper earth resistance.
d. Checking for any oil leak in the transformer and top-up of oil (transformer oil will be supplied departmentally).
e. All electric connections have to be checked.
f. Cleaning of motors, H.T. panel etc. a minimum of once a week using an air blower
g. Watering of plants and trees
h. Check for charging battery including the acidity in cells once a week so as to start and operate the DG sets in any emergency requirements.
i. Replacement of the HG fuse if required.
j. Replacement of fused out bulbs, chokes, starters etc.

20. The contractor should furnish his local office and residential address along with telephone numbers.
21. Attendance should be maintained in all locations maintained by the contractor and the employee sign it in every shift.
22. Spare (reliever) operator/labourers should be employed to work in particular station when the person in that station goes on leave, as a substitute.
23. The contractor has to fix leave regulation for the employees and submit a copy to the City Corporation.
24. In case of absence of the operator as envisaged the specified amount for that particular shift will be recovered in the monthly bill as per Annexure-II.
25. The contractor has to provide a decent uniform with name badge to their staff and if they fail to wear the uniform, penalty at the rate indicated in Annexure II will be recovered from the monthly bill.
26. The contractor has to operate the machineries according to the operating schedule fixed for that particular station and to maintain a low level in the sewer. The level should not be more or less than that of the operating level fixed during the time of inspection of officials prescribed in the operating schedule. However, tolerance of 5% (plus or minus) can be allowed. If there is a vast difference, unless specific reasons are not given, wages for that particular shift will be recovered as per Annexure-II. Also, wages will be recovered, if the reason given by the contractor is not acceptable by the inspecting authority.
27. Maintenance of plant and machineries should be as per the chart given.
28. Whenever an employee of the contractor leaves the job and new person with same qualification is employed or transferred between stations maintained by the contractor, it should be communicated in writing and with the approval of Engineer and also seen to that the new persons so employed also have insurance cover.
29. The maintenance gang should possess a register to record their activity in a particular station on a particular day, which should be certified by the corporation officials in charge of that particular station in that book.
30. The contractors are required to operate and maintain the sewage pumping stations continuously during the rainy season by providing additional shifts and manpower for the pumping stations operated as per the instruction of the Engineer in charge of the station.
31. The contractor should maintain a complaint register in the stations of each zone and also at the corporation main office and rectify complaints immediately within 24 hours of their receipt from the public as well as officials.
32. The contractor should make necessary mobile phone arrangements at his own cost for communication purposes.
33. **To adhere to government policy, the contractor should strictly not engage manual labour to remove silt and clog the manhole**.
34. The following laws shall be adhered to by the contractor wherever applicable
    a. Workmen Compensation Act, 1923

b. Payment of Wages, 1936
c. Industries Disputes Act, 1947
d. Minimum Wages Act, 1948
e. Factories Act, 1948
f. Employees PF and Miscellaneous Act, 1952
g. Payment of Bonus Act, 1966
h. Payment of Gratuity Act, 1972
i. Equal Remuneration Act, 1979
j. Maternity Benefit Act, 1951
k. Contract Labour (Regulation and Abolition Act), 1970
l. Industrial Employment (Standing Orders) Act, 1946
m. Trade Unions Act, 1926
n. Child Labour (Prohibition and Regulation) Act, 1986
o. Inter-State Migrant Workmen's (Regulation of Employment and Conditions of Service) Act, 1979
p. The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and The Cess Act of 1996
q. Employees' State Insurance Act, 1948
r. The Tamil Nadu Manual Workers (Regulations of Employment and Conditions of Work) Act, 1982
s. The Bonded Labour System (Abolition) Act, 1976
t. The Employer's Liability Act, 1938

II. PROCEDURE FOR CARRYING OUT MINOR REPAIRS

Minor repairs noticed in the equipment should be reported in writing to the official in charge of the station without any time lapse. The rectification works have to be carried out immediately as per the direction of the official in charge of the station. Payment of repair works will be made on actual. Necessary entry for the repairs carried out has to be made in the log book.

III. NON- COMPLIANCE TO SCHEDULE OF WORK/MANDATORY DUTIES

If the contractor fails to carryout any work or part of work/mandatory duties, the city corporation shall have the power to carry out such parts of work by engaging private agency and recover such amount including 5 per cent of the amount incurred from the progressive bills.

Photo identification cards have to be issued to the personnel and one set of these cards should be furnished to the city corporation and one set displayed in the pumping station.

It is the contractor's responsibility to take out an insurance policy under the Workmen's Compensation Act 1923 for each labourer and a copy of the insurance policy should be furnished to the city corporation. This policy should be kept alive till completion of the contract period.

The name and qualification of the personnel engaged in each Sewage Pumping Station should be prominently displayed in the Pumping Station.

IV DUTIES AND RESPONSIBILITIES OF THE SUPERVISOR OF PUMPING STATION

1. He should be present between 8.30 am and 5.30 pm in the HT station with one hour lunch intervals.
2. He shall hold fully responsibility of maintaining sewer levels as prescribed by the City Corporation.
3. Daily report on flow chart should be sent to office with all activities of the previous day.

4. Inform minor/major/repairs immediately and should be present at site until repair works are completed.
5. He shall have full responsibility for maintaining maintenance schedule such as daily, weekly and monthly programmes.
6. He should organise the silt removal programme and to follow safety rules.
7. He shall keep safety belt, gas mask, gas monitor, and first aid box in his custody and utilise whenever requires.
8. He shall be responsible for overall cleaning and keeping the station neat and tidy.
9. To approach TNEB authority when power fails in the TNEB structure/City Corporation structure and 6-pole structure and do what is necessary for early resumption of supply.
10. He shall do a check-up of the power factor every day and maintain it at a minimum of 0.90 lagging as prescribed by TNEB.
11. The in-charge shall be solely responsible for carrying out mandatory duties of the contractor in the individual pumping station and to organise the maintenance gang for routine maintenance work.
12. Maintenance of the pumping station equipment such as air blowing motors, control panels, gland packing, changing engine oil and maintenance of battery.
13. Care has to be taken for workers to avoid double/triple shifts as per the Workmen Compensation Act and arrange to renew the insurance policy.
14. Arrangements shall be made for renewal of insurance policies in time.

V. DUTIES AND RESPONSIBILITIES OF THE OPERATOR OF THE PUMPING STATION

1. Operating the pump set as per the operating rules and maintaining low levels.
2. Recording in the logbook every hour and including the starting/stopping time of pump sets.
3. Checking the temperature of running units and the control panel.
4. Recording daily shift activities in the logbook.
5. Following the instruction, if any, by officials in charge of the station or the Junior Engineer/Assistant Engineer of the Lifting station regarding lifting
6. Go through previous shift activities and explain the shift activities to the reliever
7. Arrange for removal of rubbish in the screen well once every shift, with safety precautions.
8. Drawing flow charts as per the logbook in his shift.
9. Operating the DG set when power fails.

VI. GENERAL MAINTENANCE TO BE DONE

1. De-silting of wells.
2. Lifting and lowering of submersible pump sets
3. Drying and refilling of silicon, oil in the breather of the transformer
4. Checking for any oil leak in the transformer and top up oil if necessary
5. Greasing of bearings and lubricating all moving parts once in a week
6. Cleaning of motors and lubricating all moving parts once in a week by using air blower
7. Regular watering of the earth pit in the transformer yard and maintaining proper earth resistance
8. All electrical connections have to be checked
9. Lubricating and test operating of the penstock valves for proper seating every week
10. Check conditions at cabling, motor, and pumps etc
11. De-weeding and cleaning the transformer yard
12. Check for tightness of coupling, bolts and nuts and all other fasteners
13. Overall cleaning and keeping the pumping station neat and tidy

Annexure 6: Design and Operation and Management Details of Decanting Station

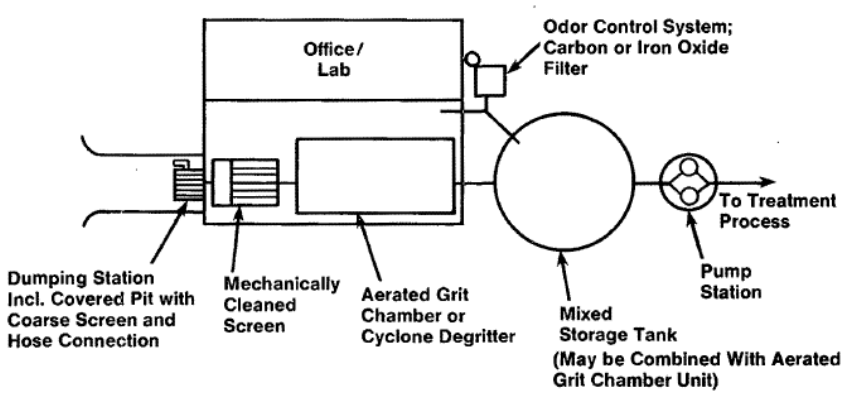
A6.1 Design Details of Decanting Station[5]

The decanting station design varies with the amount of FS to be received, design of the desludging trucks, type of preliminary treatment to be provided, downstream treatment at STP, disposal arrangements, and odour control considerations or requirements. There are however, certain design elements that are fundamental in most decanting stations. These are listed below (U.S. Environmental Protection Agency, 1984):

1. Dumping station/receiving tank
2. Screening
3. Grit removal
4. Storage or equalisation
5. Odour control

Figure A6.1 and Figure A6.2 illustrate two variations of the basic recommended design incorporating screening, grit removal and equalisation. Design of each of the components is detailed in the Handbook on septage treatment and disposal USEPA. The specific provisions for FS dumping and odour control should be noted, as these are important elements of a decanting station design.

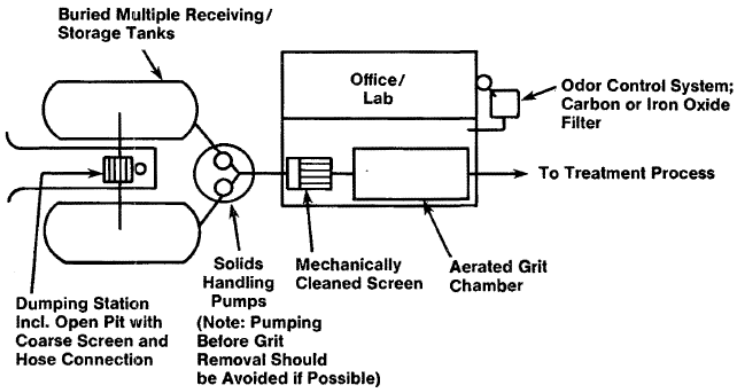
Figure A6.1: **Decanting Station with Pre-Treatment Prior to Equalisation – Batch Pre-Treatment**



Source: U.S. Environmental Protection Agency 1984

[5]*Reference: Handbook for septage treatment and disposal, USEPA, can be found from the following link:*
Click here for the 'Handbook on Septage Treatment and Disposal' by USEPA

Figure A6.2 **Decanting Station with Equalisation Prior to Pre-tTeatment – Controlled Rate Pre-Treatment**



Source: U.S. Environmental Protection Agency 1984

Annexure 7: Odour and Spillage Management

A7.1 Spillage Management

Spillage is common while emptying, collecting and transporting FS. Precautions to avoid and mitigate the spillage involve careful measures to be taken in each stage of emptying, collection, transportation and treatment of FS.

A7.1.1 Disinfecting and Spill Control Equipment

1. The collection vehicle used for the transport of FS and domestic sludge shall have a leak-proof body and lock to secure the sludge and FS (New Hampshire Department of Environmental Services, 2007).

2. Emptying hoses should be of high-vacuum black rubber or synthetic material, with a minimum diameter of 3 in. (8 cm). Hoses should also be capable of being drained and capped to minimise spillage (U.S. Environmental Protection Agency, 1994).

3. Discharge valves on the desludging trucks should be drip tight, and a discharge nipple should accommodate a quick-disconnect coupling (U.S. Environmental Protection Agency, 1994).

4. Operators should be trained to identify spills and proper methods of disinfecting pavement and equipment in the event of a spill. Spills occur while desludging septic tanks in homes, special care to clean and disinfect surfaces is important in maintaining good customer relations and avoiding complaints. Examples of disinfecting methods and safety measures are (Philippine Department of Health and USAID, 2008):
    - Bleach solution – Typically one cup of bleach to 2 litres of water is a good solution for disinfecting surfaces.
    - Lime – Only use outside. Sprinkle over spilled area, wait 15 minutes, then wash with water
    - Safety cones – Set up safety cones around spilled areas until properly disinfected

When using the lime stabilisation method for treating FS, follow the recommendations below:

- Avoid contact with skin or eyes to avoid severe burns.
- Keep bags of hydrated lime dry. A wet bag can start a fire.
- Do not put water on a fire involving hydrate lime. The water will react with the hydrated lime and cause it to release more heat.

The following safety equipment should be used when handling quicklime:

- Safety goggles;
- Half-mask respirator with cartridge;
- Shoulder-length, fully coated neoprene gloves;
- Emergency eyewash, in case lime gets on the face or in the eyes; and
- Carbon dioxide fire extinguisher, in the event of a fire.

A7.1.2 Emptying

The following shall be advised while emptying the FS (Philippine Department of Health and USAID, 2008;U.S. Environmental Protection Agency, 1994).

1. An absorbent and suction wand attachment should be carried to help clean up any spills.

2. Lime should also be available to apply to areas where FS has been spilled.

3. In the event of a spill, FS should be immediately cleaned up. Hydrated lime should be sprinkled over the area of the spill, and a squeegee (absorbent-sponge) and a suction wand attached to the end of the vacuum hose are useful tools for clean-up. For large spills, a second pumper truck may be necessary; companies with one truck should reach an agreement with another company to assist in emergency spill clean-up.

4. After the desludging operation, the operator should clean and disinfect any spills with a bleach solution or by spreading lime on the spillage. It is the collection operator's responsibility to verify that sufficient disinfectant (bleach or lime) is on the truck before it goes to a collection site.

5. Desludging workers must wear appropriate personal protective equipment, including rubber gloves, rubber boots, a facemask, and eye protection. After pumping, operators must wash their hands with soap.

A7.1.3 Collection and Transportation

The driver and service providers are responsible for safe operation of the vehicle and equipment at all times. For spillage management, requirements are (Philippine Department of Health and USAID, 2008):

1. Inspect all trucks prior to transport on public roads to ensure that FS will not leak, spill, or run out of the tank.

2. All vehicles used to transport FS shall be equipped, at all times, with spill control or absorbent materials and disinfectant materials, such as lime or chlorine bleach.

3. All inlet and outlet connections should be constructed and maintained such that no material will leak, spill, or run out of the tank during transfer or transportation.

4. Discharge outlets should be designed to control the flow of discharge without spraying or flooding the receiving area.

A7.1.4 Accidental Spillage

In the event of an accidental spillage of sludge/FS, the operator shall (Philippine Department of Health and USAID, 2008; U.S. Environmental Protection Agency, 1994):

1. Immediately take action to contain the sludge/FS, minimise the environmental impact, and begin clean-up procedures.

2. The operator must notify the landowner, local health officer or Board of Health (where the accident occurred) within 24 hours, using the Accidental Spillage Notification Form (see Annexure 3: Sample of Accidental Spillage Notification Form) within 24 hours of the release. In addition, the approximate distance from the spill to any surface waters wetlands and storm drains shall be noted.

3. In the event that a private service provider fails to perform clean-up operations, the ULB should perform the clean-up and charge all related expenses incurred to the service provider.

The clean-up procedures are briefed below (Philippine Department of Health and USAID, 2008; New Hampshire Department of Environmental services, 2007)

A7.1.5 Clean-Up Procedures.

1. Determine the limits of the spill. To the extent possible, the operator should contain the spill by using a shovel to dig a containment trench or build berms, of sand or earth. Then disinfect by using powdered lime or bleach solution over the entire spill area as soon as possible to control odours and mitigate pathogens. Then, with a rake, broom or shovel, the operator should pick up solids and dispose as solid waste. Any spill containment devices and structures including berms and fabric shall be installed immediately following the spill.

2. Native materials underlying the area of the spill shall be excavated to a depth sufficient to remove spilled and leached materials.

3. All material removed from a spill site shall be properly disposed of.

4. Clean material shall be used to replace any material excavated and the site shall be restored as close as possible to its condition prior to the spill.

5. Smooth, hard surfaces such as asphalt or concrete should be treated with lime or a bleach/water solution (consisting of one part household bleach to nine parts water) after all material is removed from the spill site.

6. The person(s) responsible for the spill shall document site remediation efforts with a summary report and shall submit a copy of the report to the land owner, the local health officer or board of health within 30 days of completing the on-site work.

A7.2 Odour Management

Controlling odours is critical to the success of any waste handling operation. FS has an offensive odour, and FS processing can release odours and subsequently cause complaints from local residents. Good management practices can often reduce odour emissions; positive steps such as odour containment and treatment, however, may be necessary to control downwind impacts. (U.S. Environmental Protection Agency, 1994).

A7.1.1 Minimising Odour Emissions

There are several approaches to minimising the release of odours from FS. Such approaches generally fall into two categories:

1. Reducing the exposure of FS to the atmosphere
2. Minimising turbulence or agitation

Table A7.1 summarises some "rules-of-thumb'' for minimising odour releases at an FS receiving facility.

Table A7.1: **Guidelines for Minimising Odour Emissions at an FS Receiving Facility**

Sl. No.	
1	Use quick disconnect fittings between truck and receiving station to minimise exposure of FS to the atmosphere
2	Provide wash-down facilities to clean up any spills, with drainage into holding tanks
3	Avoid 'free fall' of FS by extending receiving pipes below water surface
4	At wastewater treatment plants, introduce FS at slow controlled rates
5	For a holding tank with mechanical or air mixing, ventilate the tank and direct odorous air to a bio filter or other odour control
Source: U.S. Environmental Protection Agency 1994	

Although using such techniques is always good practice, alone they may be inadequate to control odours; one of the odour control technologies described in Section 13.2 may be necessary. Additional details on odour control technologies are provided in the Chapter 12, Guide to septage management and disposal, U.S. Environmental Protection Agency, 1994.[6]

Table A7.2 provides a summary of technologies used for the treatment of odorous air. A brief description of these options is provided below. Some of these alternatives may not be appropriate for small FS

[6] https://nepis.epa.gov/Exe/ZyPDF.cgi/30004NKA.PDF?Dockey=30004NKA.PDF

handling facilities due to their high capital and operating costs (U.S. Environmental Protection Agency, 1994).

Table A7.2: **Summary of Odour Treatment Alternatives**

Sl. No.	Technique	Application	Cost Factors	Advantages	Disadvantages
1	Packed tower wet scrubbers	Moderate to high strength odours; medium to large facilities	Moderate capital and O&M cost	Effective and reliable; long track record	Spent chemical must be disposed of; high chemical consumption
2	Fine mist wet scrubbers	Moderate to high strength odours; medium to large facilities	High capital cost than packed towers	Lower chemical consumption	Water softening required for scrubber water; larger scrubber vessel
3	Activated carbon adsorbers	Low to moderate strength odours; small to large facilities	Cost effectiveness depends on frequency of carbon replacement or regeneration	Simple; few moving parts	Only applicable for relatively dilute air streams; longevity of carbon difficult to predict
4	Bio filters	Low to moderate strength odours; small to large facilities	Low capital and O&M costs	Simple; minimal O&M	Design criteria not well established; may not be appropriate for very strong
5	Thermal oxidisers	High strength odours; large facilities	Very high capital and O&M (energy) costs	Effective for odours and volatile organic compounds	Only economical for high strength, difficult to treat air streams at large facilities
6	Diffusion into activated sludge basins	Low to moderate strength odours; small to large facilities	Economical if existing blowers and diffusers can be used	Simple; low O&M; effective	Blower corrosion possible; may not be appropriate for very strong odours
7	Odour counteractants	Low to moderate strength odours; small to large facilities	Cost dependent on chemical usage	Low capital costs	Limited odour reduction efficiency (<50%)

Source: U.S. Environmental Protection Agency 1994

Annexure 8: Manifest System to Track Loads

Implementation of a manifest system (Figure A8.1) would provide better accounting for the FS. For FS transportation, the manifest form should include the following information:

- Date and time of collection at source.
- Address where FS was collected.
- The source: Residential, commercial, institutional.
- If commercial or institutional – describe type of operation of the entity.
- Volume of waste collected.
- Name and signature of occupant/owner of building where waste was collected.
- Name and signature of driver.
- Location where waste is to be delivered.
- Date and time waste delivered to decanting
- Name and signature of operator at decanting station.

Figure A8.1**: Septage (or Fecal Sludge) Manifest form**

Part 1: Proposed form-Collection; Part 2: Proposed form-Delivery

TCC SEPTAGE COLLECTION & DELIVERY FORM

COLLECTION

1	DATE		TIME	
2	SEPTAGE SOURCE	RESIDENTIAL		DETAILS
		COMMERCIAL		
		INSTITUTIONAL		
3	ADDRESS			
4	NAME OF PERSON AT ADDRESS [Owner, Manager, Employee]			
5	VOLUME COLLECTED (cubic meters)			
6	COLLECTED BY			

DELIVERY

7	DELIVERED TO			
8	RECEIVED BY			
9	DATE		TIME	
10	OBSERVATIONS	color		
		odour		
		appearance		
11	REMARKS			

Source: TNUSSP Analysis 2017

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