

Recommendations for Strengthening Operation and Maintenance of Decanting Stations

Report | November 2025

iihs[®]
INDIAN INSTITUTE FOR
HUMAN SETTLEMENTS

CWIS
TRICHY



RECOMMENDATIONS FOR STRENGTHENING OPERATION AND MAINTENANCE OF DECANTING STATIONS

November 2025

Recommendations for Strengthening Operation and Maintenance of Decanting Stations

November 2025

DOI: <https://doi.org/10.24943/RSOMDS11.2025>

For Citation: CWIS -Trichy (2025). Recommendations for Strengthening Operation and Maintenance of Decanting Stations.

This document is produced as part of City-Wide Inclusive Sanitation programme, Tiruchirappalli (CWIS-Trichy), Tamil Nadu. This programme supports the Trichy City Corporation (TCC) to make the improvements along the full cycle of sanitation. In particular, this programme will enable inclusive sanitation by mainstreaming gender, seeking improvements in service for the urban poor, increasing occupational safety, welfare for the sanitary workers and improvements in infrastructure.

Document Team: Dhanik Narayanan, Monissha, Sriram, Dharmadurai, Yohananthan, Senthilkumar, Jeevanraj

Editing: Sakthi Sangeetha Devi and Sofia Juliet Rajan, IIHS Word Lab

Design and Layout: Divya Dhayalan

Production: Saritha AG, Krishna Priya P, Govardhan Seshachalam

Team Leader: Niladri Chakraborti

Project Director: Kavita Wankhade

1. CC license terms: This research and data has been published under the Creative Commons Attribution 4.0 license. Under the aforementioned license, you are free to:

Share — copy and redistribute the material in any medium or format

Adapt — remix, transform, and build upon the material for any purpose, even commercially.

This license is acceptable for Free Cultural Works. The licensor cannot revoke these freedoms as long as you follow the license terms.

Under the following terms:

Attribution — you must give appropriate credit, provide a link to the license, and indicate if changes were made.

You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.

No additional restrictions — you may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.

Notices:

1. You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation. No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material.
2. BMGF funding acknowledgement: This Research / Work was supported by Bill & Melinda Gates Foundation.
3. Logo use: "The IIHS logo, name and all graphics on the IIHS website are trademarks of IIHS. Use, reproduction, copying or redistribution of trademarks, without the written permission of IIHS is prohibited. All other trademarks marks or service marks appearing on this report are the marks of their respective owners."

www.tnussp.co.in | www.iihs.co.in

CONTENTS

Abbreviations	iii
Executive Summary	E1
1. Introduction	1
1.1 Overview of Sanitation in Trichy	3
1.2 Co-treatment	4
1.3 Co-treatment in Trichy	4
1.4 Objectives of the Study	5
2. Decanting Station Components and their Functions	7
2.1 Collection Well	9
2.2 Screen Chamber	9
2.2.1 Location of screens	10
2.2.2 Disposal of screenings	10
2.3 Grit Chamber	10
2.3.1 Grit collection pit	11
2.4 Pumping Well	11
3. Operation and Maintenance	13
3.1 Screen Chambe	15
3.2 Grit Chamber and Collection Pit	15
3.3 Pumping Station	16
4. Steps in De-sludging Operations	17
4.1 Gradual and Controlled Addition of Fecal Sludge to Sewage	19
4.2 Testing and Screening	19
4.3 Recordkeeping and Sampling	20
4.4 Manifest System	20
4.5 Decanting Station Operator Training	20

CONTENTS (contd..)

5. Health and Safety Measures	21
5.1 Collection Well	23
5.1.1 Safety measures	23
5.2 Screen Chamber	23
5.2.1 Safety measures	23
5.3 Grit Chamber	24
5.3.1 Safety measures	24
5.4 Pump Well	24
5.4.1 Safety measures	24
5.5 General Health and Safety Measures across all Components	25
6. Estimated O&M Cost for Decanting Stations	27
7. Conclusion	31
References	35
Annexures	A1

Figures

Figure 1.1: Functioning decanting stations at Trichy	4
Figure 2.1: Typical Decanting-cum-Pumping Station flow diagram	9
Figure 2.2: Screen chamber	9
Figure 2.3: Grit Chamber	10
Figure 2.4: Grit collection pit	11
Figure 2.5: Pumping well	12

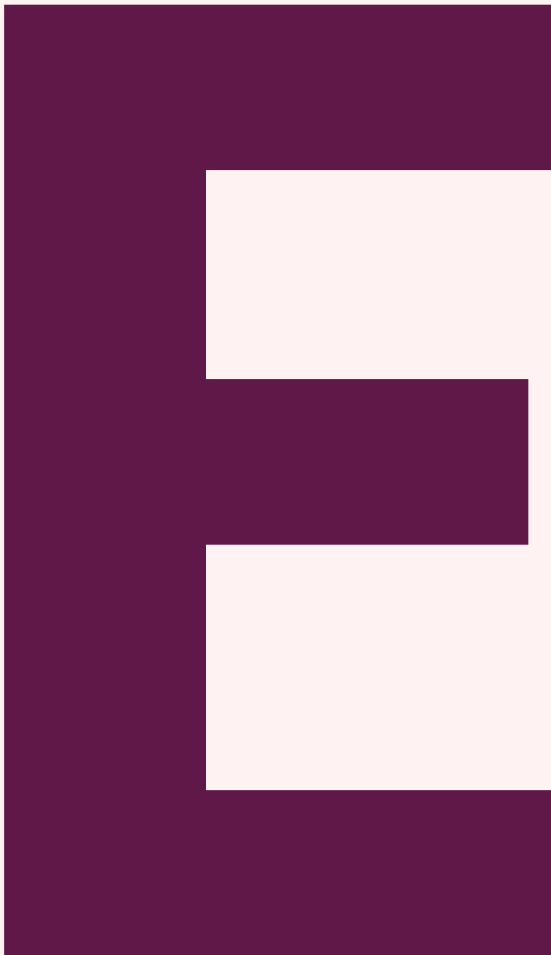
Tables

Table 4.1: Guidance for interpreting the test results	19
---	----

Abbreviations

CPHEEO	Central Public Health and Environmental Engineering Organisation
CWIS	Citywide Inclusive Sanitation
DSO	De-sludging Operator
EC	Electrical Conductivity
FS	Fecal Sludge
LOTO	Lock-out Tag-out
O&M	Operation and Maintenance
OSS	Onsite Sanitation System
PPE	Personal Protective Equipment
SCBA	Self-Contained Breathing Apparatus
STP	Sewage Treatment Plant
TCC	Tiruchirappalli City Corporation
TNUSSP	Tamil Nadu Urban Sanitation Support Programme
UGSS	Underground Sewerage System
ULB	Urban Local Body
WSP	Waste Stabilisation Pond

Executive Summary



Executive Summary

Trichy has been a pioneer in co-treatment of Fecal Sludge (FS) with sewage since 2012, allowing more than 50 licenced De-sludging Operators (DSOs) to discharge FS from Onsite Sanitation Systems (OSS) into designated decanting stations linked to the Panjapur Sewage Treatment Plant. It is essential to standardise Operation and Maintenance (O&M) practices to ensure efficiency, worker safety and environmental protection.

This report provides guidelines for the O&M of decanting stations, based on a study conducted as part of the Citywide Inclusive Sanitation (CWIS) programme in Trichy. The study aimed to improve the sustainability and effectiveness of O&M practices at these facilities.

Field assessment at the Anna Stadium decanting station identified challenges including grit accumulation, inconsistent maintenance schedules, absence of monitoring systems, and occupational safety risks for operators. The study reviewed each component— such as collection wells, screen and grit chambers, and pumping wells—and defined practical maintenance procedures for cleaning, inspection and mechanical checks.

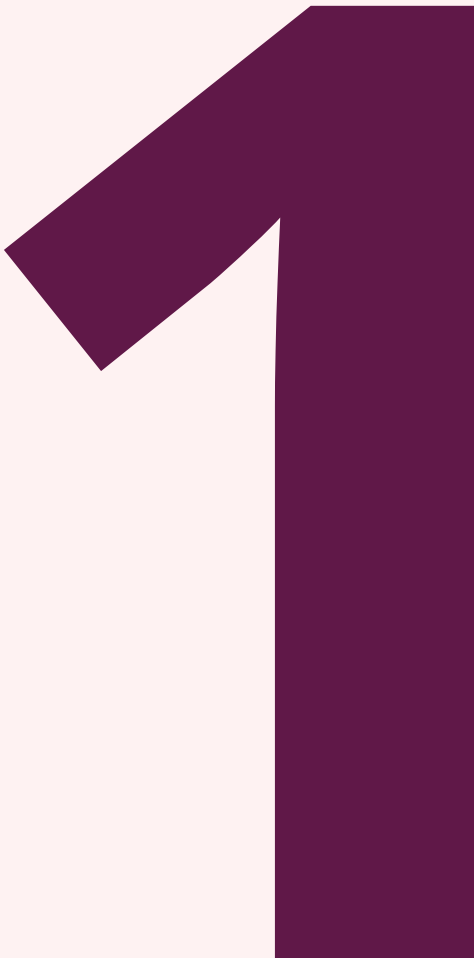
To promote accountability, the report recommends the introduction of a manifest system to record FS movement from households to treatment facilities. Each DSO trip should be logged with the source location, volume and disposal point. This system will support both operational transparency and environmental monitoring. The report also highlights key safety measures for DSOs, such as using proper protective gear, checking for gas before entry and following lock-out tag-out (LOTO) steps for electrical safety. All decanting sites should have clear safety signs, first aid kits, and emergency plans, while staff should receive training on these practices.

Financially, the report estimates an annual O&M expenditure of around INR 2.5 lakh per decanting station, covering staff salaries, maintenance materials, water and electricity costs, and laboratory testing.

By institutionalising these O&M practices, Tiruchirappalli City Corporation (TCC) can ensure reliable FS co-treatment and worker safety, while other Urban Local Bodies (ULBs) in Tamil Nadu can adapt these protocols to strengthen their own decanting facilities.

Introduction

1.1 Overview of Sanitation in Trichy	3
1.2 Co-treatment	4
1.3 Co-treatment in Trichy	4
1.4 Objectives of the Study	5



1. Introduction

Launched in 2016, the Citywide Inclusive Sanitation (CWIS) framework represented a fundamental shift in the way urban sanitation is conceived, planned, and delivered. Developed by a global coalition—including the Gates Foundation¹, World Bank, WaterAid, and Emory University—CWIS promotes equitable, safe, and sustainable sanitation for all urban residents, particularly the poor and marginalised. It advocates a systems approach that integrates sewered and non-sewered solutions, and addresses the entire sanitation chain—from containment to reuse or disposal.

In 2018, Tiruchirappalli (Trichy)—a city of over one million people in Tamil Nadu—was selected by the Gates Foundation as one of eight global cities to pilot the CWIS framework. This selection was built on Tamil Nadu's growing momentum in urban sanitation, shaped by the state's flagship mission, 'Muzhu Sugadhara Tamizhagam', and the work of the Tamil Nadu Urban Sanitation Support Programme (TNUSSP). From 2018 to 2024, the Indian Institute for Human Settlements (IIHS), in partnership with the Tiruchirappalli City Corporation (TCC) and a consortium of local partners, led the implementation of the CWIS Trichy Programme with the support of the Gates Foundation. The programme sought to demonstrate how inclusive, citywide sanitation could be delivered at scale through an integrated approach.

Its key objectives were to:

- Ensure safe management of Fecal Sludge (FS) across the entire sanitation chain
- Improve service delivery for the urban poor and other vulnerable populations
- Strengthen the capacity of local governments and communities
- Integrate gender equity across sanitation planning and service delivery
- Enhance the well-being and dignity of sanitation workers
- Position Trichy as a knowledge hub for inclusive sanitation

Collectively, these objectives reflect a commitment to system-wide transformation, bringing together infrastructure, governance, and community engagement to deliver inclusive and sustainable sanitation outcomes. This report is part of a broader series documenting the lessons, challenges, and insights from the CWIS Trichy experience.

1.1 Overview of Sanitation in Trichy

Trichy is a city situated on the banks of Cauvery River, and the fourth largest municipal corporation in Tamil Nadu. The city had an approximate population of 10.81 lakh in 2021 (TCC, 2024) and covers an area of 167.23 sq.km. Trichy has a well-established sewerage network, with 53 out of the 65 wards fully covered by the Underground Sewerage System (UGSS) (Madonna, 2024), with most of the remaining population reliant on Onsite Sanitation Systems (OSS), such as septic tanks and pits with slab (TNUSSP, 2018), which are periodically de-sludged.

The planning and implementation of networked systems in Trichy started around 1987 (TNUSSP, 2017) and continues to be carried out in a phased manner. The networked system has a combination of Sewage Pumping Stations (SPSs) and gravity-based conveyance, and a Sewage Treatment Plant

¹ The organisation was formerly known as Bill and Melinda Gates Foundation (BMGF).

(STP). The centralised STP located in Panjapur uses the Waste Stabilisation Pond (WSP) technology, with a series of anaerobic, facultative and maturation ponds.

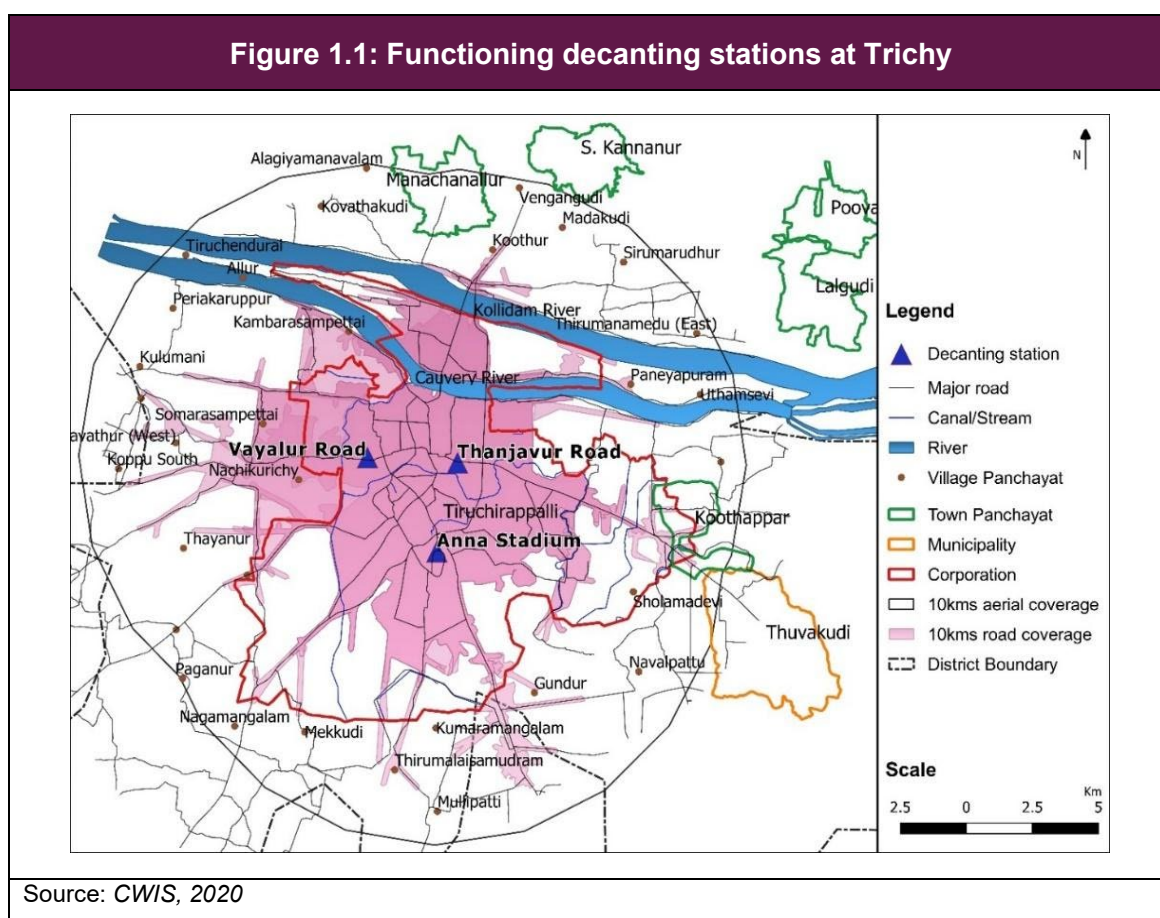
1.2 Co-treatment

Co-treatment of FS refers to the practice of integrating FS into existing sewage or wastewater treatment systems through UGSS, for combined treatment. Instead of managing FS separately, it is mixed with domestic or municipal wastewater at an STP, designated pumping stations or decanting stations, where de-sludging trucks discharge septage collected from OSS. This integrated approach optimises STP capacity utilisation and associated infrastructure, enabling centralised treatment of both FS and wastewater (CDD Society & TNUSSP, 2018).

1.3 Co-treatment in Trichy

In the early 2000s, TCC initiated co-treatment of fecal sludge at the Panjapur STP. Since 2012, over 50 licenced de-sludging vehicles have been operating daily, contributing to effective FS co-treatment. TCC has also implemented decentralised FS management measures to improve service coverage and operational efficiency. These include establishing FS disposal and pre-treatment facilities at key locations such as the Anna Stadium decanting station, as well as promoting small-scale decentralised treatment units in other parts of the city (TNUSSP, 2020). These measures have helped TCC improve overall safety, efficiency, and reach of FS management across the city.

Figure 1.1: Functioning decanting stations at Trichy



Three decanting stations operate in Trichy—Anna Stadium main pumping station (Ponmalai zone), Pookollai (Ariyamangalam zone), and Vayalur Road (K. Abhishekapuram). FS emptied at these decanting stations are conveyed to the STP at Panjapur for further treatment.

1.4 Objectives of the Study

A study was undertaken by the CWIS team in 2020 at the Anna Stadium decanting station to improve Operation and Maintenance (O&M) practices at decanting stations in Trichy. The need for improvement stemmed from several operational and safety gaps identified in the existing system. Frequent clogging of screen and grit chambers, inefficient monitoring of FS quality, lack of standardised protocols for adding FS to the sewage network, and poor recordkeeping practices were found to be affecting treatment efficiency at both centralised and decentralised facilities. In addition, occupational hazards faced by De-sludging Operators (DSOs), inconsistent maintenance schedules, and limited financial and institutional capacity hindered sustainable FS management.

The objectives of the study were to:

1. Establish safe, efficient, and sustainable FS management by developing operational protocols, optimising treatment integration, enhancing monitoring systems, and strengthening institutional and financial capacity.
2. Define clear guidelines for FS disposal and maintenance of screen and grit chambers, and pumping stations, while ensuring safety measures to minimise occupational hazards for DSOs.
3. Regulate the addition of FS to the sewage network to improve STP performance, and implement recordkeeping, sampling, and testing frameworks to monitor FS quality and treatment efficiency.
4. Introduce a manifest system to track FS movement, operator compliance, and decanting station performance, ensuring transparency and regulatory adherence.
5. Develop cost estimation and financial planning strategies for sustainable decanting station management, and conduct regular training for municipal staff and DSOs on best practices.

Decanting Station Components and their Functions

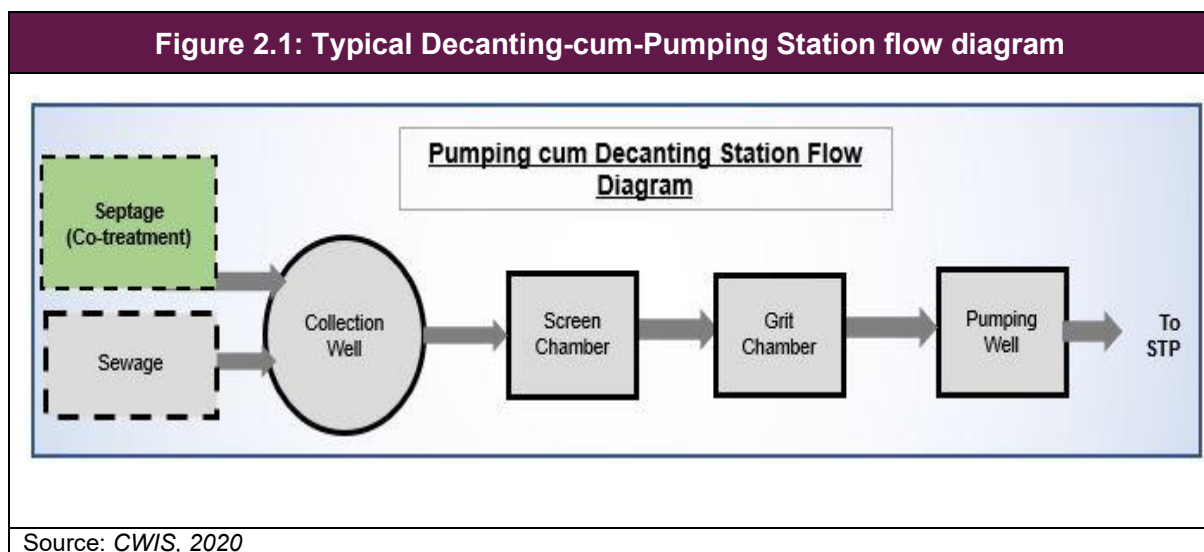
2.1 Collection Well	9
2.2 Screen Chamber	9
2.2.1 Location of screens	10
2.2.2 Disposal of screenings	10
2.3 Grit Chamber	10
2.3.1 Grit collection pit	11
2.4 Pumping Well	11



2. Decanting Station Components and their Functions

Decanting stations consist of the following components, as depicted in Figure 2.1.

- Collection well
- Screen chamber
- Grit chamber
- Pumping well or Treatment unit



2.1 Collection Well

The collection well in a sewage pumping station serves as a crucial intermediate storage unit, ensuring a regulated flow of sewage before it is pumped further. According to the Central Public Health and Environmental Engineering Organisation (CPHEEO) Manual (2013), proper O&M of collection wells is essential to prevent blockages, reduce sedimentation, and maintain efficient pumping operations.

2.2 Screen Chamber

Screening systems trap floating materials, like sachets, plastic milk packets and grocery bags, which can lump together in the impeller. Screen is the first unit in the treatment process and removes floating and large suspended waste in sewage. It has uniform openings, generally rectangular, made of parallel bars, rods, gratings, wire meshes or perforated plates.

Figure 2.2: Screen chamber



Source: CWIS, 2020

Coarse screens are usually bar screens composed of vertical or inclined bars spaced at equal intervals across a channel through which sewage flows. Coarse screens have relatively large openings of 25 mm (wider than fine screens). They are usually cleaned manually, but mechanical devices may be used.

2.2.1 Location of screens

Screening devices are located at easily accessible areas because the process requires frequent inspection and maintenance. For screens placed in deep pits or channels, it is necessary to provide ample working space and wide approaches from the top. Provision should be made for penstocks and bypass arrangements.

2.2.2 Disposal of screenings

Screenings from bar screens can be buried or composted. In small plants, they are buried in shallow trenches near the site. In larger stations, where land is limited, they are mixed with town waste for composting. To prevent insect problems, screenings should not be left uncovered or transported in open conveyors. If conveyor belts are used, they should be as short as possible.

2.3 Grit Chamber

Grit are solid materials that are heavier (higher specific gravity) than the organic biodegradable solids in the wastewater such as sand, gravel, and cinder. It also includes large organic particles such as eggshells, bone chips, seeds, coffee grounds, and other food waste. It should be removed at the sewage pumping stations to prevent wearing of the pump parts, and grit deposit in sewer line.

Figure 2.3: Grit Chamber



Source: CWIS, 2020

2.3.1 Grit collection pit

The grit collection pit is an independent well, upstream of the wet well (pumping well). Grit from the chamber is removed at equal intervals, typically once in a week, using a simple submersible pump. It collected in the collection pit near the chamber and safely conveyed to the disposal site after drying. Major screenings are plastic waste which will be disposed of into the municipal solid waste.

Figure 2.4: Grit collection pit



Source: CWIS, 2020

2.4 Pumping Well

Pumping well, also known as wet well, is a large tank that receives the screened and grit-free sewage. Centrifuge pumps are installed to shift the sewage to the treatment location.

Figure 2.5: Pumping well



Source: CWIS, 2020

Operation and Maintenance

3.1 Screen Chamber	15
3.2 Grit Chamber and Collection Pit	15
3.3 Pumping Station	16



3. Operation and Maintenance

Operation and Maintenance (O&M) encompass the activities required for efficient functioning, routine repair, and timely replacement of system components to ensure uninterrupted service and extend the asset's lifespan. According to the CPHEEO manual (2013), effective O&M practices are essential for sustaining wastewater management infrastructure, including decanting stations. The following sections discuss the specific O&M requirements at decanting stations, aligning with these standards.

3.1 Screen Chamber

Clogging and corrosion are the most common problems in screens, and routine cleaning and inspection will prevent these problems. O&M activities recommended for screen chamber are listed below.

- Greasing bearings with manufacturer-recommended lubricant at specified frequency, preferably once a month.
- Inspecting and lubricating drive motor and gear reducers regularly to ensure proper venting and leak-proof systems.
- Inspecting control equipment on the main panel and local stations for corrosion and loose wires.
- Testing and recording readings of voltage and amp draw from each motor and review against previous recordings.
- Inspecting and cleaning submerged components every time the channel is drained and replace components such as sprockets and bearings (if applicable) as needed.
- Inspecting level-sensing systems regularly, and clear debris off transducers and floats to improve performance.
- Lubricating the rack-and-pinion gear on single-arm bar and multiple rake screens.

3.2 Grit Chamber and Collection Pit

Considerable quantities of grit will be collected at the decanting station, and necessary arrangements should be made for its collection, storage and disposal. The recommended activities for the maintenance of grit chambers are listed below.

- Greasing bearings with manufacturer-recommended lubricant.
- Inspecting and lubricating drive motor and gear reducers regularly to ensure proper venting and leak-proof systems.
- Inspecting control equipment on main panel and local stations for corrosion and loose wires.
- Testing and recording readings of voltage and amp draw from each motor and review against previous recordings.
- Inspecting and cleaning submerged components every time the channel is drained and replace components such as sprockets and bearings (if applicable) as needed.
- Inspecting level sensing systems regularly and clear debris off transducers and floats to improve performance.

- Checking for any visual damage, corrosion or shape deformation in the screw conveyor or grit remover.

3.3 Pumping Station

The following O&M activities are carried out by most Urban Local Bodies (ULBs) in Tamil Nadu.

- Lubricating pumps and valves as per supplier recommendation.
- Checking for leakages in valve and valve chambers.
- Cleaning transformer yard regularly (except electrical related works).
- Cleaning the station premises and disposing of the vegetation at the Ariyamangalam dump yard.
- Inspecting and carrying out minor mechanical and electrical equipment repairs.
- Cleaning screen regularly and disposing of the screenings to designated locations.
- Maintaining records of pumping station operations.
- Removing grit as per the O&M contract and disposing of the same to designated locations.

Steps in De-sludging Operations

4.1 Gradual and Controlled Addition of Fecal Sludge to Sewage	19
4.2 Testing and Screening	19
4.3 Recordkeeping and Sampling	20
4.4 Manifest System	20
4.5 Decanting Station Operator Training	20



4. Steps in De-sludging Operations

The following are the key activities for monitoring decanting stations.

4.1 Gradual and Controlled Addition of Fecal Sludge to Sewage

Gradual addition of FS to sewage maintains the efficient performance of STP. Hence, DSOs should be trained in controlled decanting of FS in the stations. Direct sludge addition to sewers or pump stations must be avoided as it can clog sewer network and pumping systems.

4.2 Testing and Screening

Sampling and testing of FS is to be carried out at the pumping station to identify wastes that may adversely affect treatment operations such as industrial waste. Trained plant operators should collect and test samples from all the trucks before unloading in the receiving facility. The testing and screening procedures are attached in Annexure 1 which describes sample collection and testing procedures (Central Pollution Control Board, 2008).

The test results should be interpreted as provided in Table 4.1.

Table 4.1: Guidance for interpreting the test results		
Sl. No.	Parameter	Guidance
1	pH	pH in the range of pH 6 to 8 shall be accepted, and value outside this range shall be further investigated for the source of waste.
2	Electrical Conductivity (EC)	Typical values of EC for FS ranges from >0 to 6 mS. EC of FS shall be referred and compared with the EC of water used by the households. Typical values across Tamil Nadu ranges from 0 to 4 mS. It is suggested to check the source of waste for those samples with high EC (> 3mS) and cross-check with other tests or observations for further confirmation (pH, colour, odour).
3	Colour	Typical colour of fresh sludge is yellow, green or brown, while anaerobically digested sludge is black. The source of waste is to be verified if the sludge colour is unusual because wastes from dyeing industries, tanneries, metal plating industries may have other coloured sludge like red and blue.
4	Odour	Typical smell of domestic FS is that of rotten egg. The source of waste should be verified if the smell is different because the sludge may contain wastes from industrial solvents such as turpentine (paints), ethanol (perfumes) and ethyl acetate (glues).
5	Temperature	High temperature wastewater released from processing industry, coolant water from condensers and boiler blow-down should be rejected.

Table 4.1: Guidance for interpreting the test results

Sl. No.	Parameter	Guidance
Note: The data validation shall be carried out as per the site condition.		
Source: <i>Central Pollution Control Board, 2008</i>		

4.3 Recordkeeping and Sampling

The plant operator should carefully record and maintain the plant operations, including sample labelling at the collection point, and data entry of the field measurements. A sample recording form for the field measurements and observations is provided in Annexure 2.

4.4 Manifest System

A manifest system provides a detailed account of FS movement. It includes information about the source, volume and characteristics of FS. The first part of the form (collection form) is completed at the source from where FS is collected, and the second part (delivery form) is filled and signed by an authorised person at the decanting station when FS is emptied. A sample of the manifest form is presented in Annexure 3.

4.5 Decanting Station Operator Training

The important responsibilities of decanting station operators are listed below.

- Adhering to screening protocol of FS entering the station (including sampling and interpretation of test result).
- Recording septage entries.
- Monitoring illegal disposal through a reliable system.
- Maintaining records of registered de-sludging vehicles and submitting them to the zonal and main office when required.
- Highlighting issues in O&M to TCC officials.

Health and Safety Measures

5.1 Collection Well	23
5.1.1 Safety measures	23
5.2 Screen Chamber	23
5.2.1 Safety measures	23
5.3 Grit Chamber	24
5.3.1 Safety measures	24
5.4 Pump Well	24
5.4.1 Safety measures	24
5.5 General Health and Safety Measures across all Components	25



5. Health and Safety Measures

Decanting stations handle hazardous waste, requiring strict safety measures for each component: **collection well, screen chamber, grit chamber, and pump well**. Below are the specific health and safety considerations for their O&M based on standard safety practices prescribed in CPHEEO Manual (2013), Prohibition of Employment as Manual Scavengers and their Rehabilitation Act (2013), National Policy on Faecal Sludge and Septage Management (2017) and OHS Needs of de-sludging workers (TNUSSP, 2019).

5.1 Collection Well

The collection well receives FS, posing risks of toxic gas exposure, biological hazards, and falls.

5.1.1 Safety measures

- **Personal Protective Equipment (PPE) usage:** Workers must wear gloves, boots, face shields, and respiratory masks to prevent exposure to pathogens and harmful gases.
- **Gas monitoring:** Regular monitoring for **hydrogen sulphide (H₂S)**, **methane (CH₄)**, and **ammonia (NH₃)** must be done to prevent inhalation hazards.
- **Confined space entry protocols:**
 - Ventilation must be ensured before entry.
 - Workers should use **Self-Contained Breathing Apparatus (SCBA)** when oxygen levels are low.
 - A trained standby worker must be present outside when someone enters.
- **Fall protection:** Guardrails or safety chains should be installed around open wells to prevent falls.
- **Emergency protocols:** Safety ropes, lifebuoys, and an emergency response plan should be in place.

5.2 Screen Chamber

Screens trap solid waste, which may include sharp objects, medical waste, and other hazardous materials.

5.2.1 Safety measures

- **Hand protection:** Workers must wear cut-resistant gloves to prevent injuries from sharp debris.
- **Automated raking (if available):** This reduces direct manual handling of hazardous waste.
- **Lock-out Tag-out (LOTO) for maintenance:**
 - Before cleaning or repairing screens, power supply to motorised screens must be turned off.
 - Clear signage should indicate when maintenance is in progress.
- **Proper waste disposal:** Collected waste should be **bagged and disposed of in designated areas** to prevent contamination.

- **Regular cleaning:** This prevents clogging and bacterial build-up, thereby reducing infection risks.

5.3 Grit Chamber

The grit chamber removes sand, gravel and heavy solids from sludge, reducing equipment wear.

5.3.1 Safety measures

- **PPE usage:** Workers must wear **splash-proof goggles and rubber gloves** to protect against grit-laden wastewater.
- **Dust control:** Sprinkling water on dry grit before handling reduces airborne dust hazards.
- **Safe grit removal:**
 - Grit should be removed manually only with long-handled tools to **minimise direct contact**.
 - If automated grit removal is used, operators must follow **LOTO procedures before servicing the system**.
- **Proper disposal:** Grit should be transported and **disposed of at designated landfill sites** following municipal waste management protocols.

5.4 Pump Well

The pump well houses motors and pumps that transport FS and wastewater. Risks include **electrical hazards, entrapment, and toxic gas exposure**.

5.4.1 Safety measures

- **Electrical safety:**
 - **LOTO procedures** must be followed before servicing pumps or motors.
 - Workers must wear **insulated gloves and boots** when handling electrical equipment.
- **Pump maintenance precautions:**
 - Any blockages must be cleared only after **turning off the power supply**.
 - **Hand tools with long handles** should be used to minimise direct contact with wastewater.
- **Ventilation:** Since pump wells are **confined spaces**, adequate ventilation is required before entry.
- **Protection against drowning:**
 - Safety harnesses and lifelines should be used when working around deep pump wells.
 - A **buddy system** should be followed, ensuring no worker enters alone.

5.5 General Health and Safety Measures across all Components

- **Regular disinfection:** Tools, equipment, and surfaces should be cleaned with disinfectants to prevent contamination.
- **First aid and emergency kits:** These must be easily accessible at all workstations.
- **Training and drills:** Workers should be trained in **emergency response, first aid, and CPR** (Cardiopulmonary Resuscitation).
- **Odour control:** Proper aeration and deodorising agents should be used to minimise worker discomfort and health risks.

By implementing these targeted safety measures for each component, the risks associated with decanting station operations can be significantly minimised, ensuring worker safety and regulatory compliance.

Estimated O&M Cost for Decanting Stations

6

6. Estimated O&M Cost for Decanting Stations

The cost of O&M at a decanting station includes supervision, testing and material cost, while cleaning-related activities are a part of pumping station maintenance activities. The amount available for O&M of decanting stations is less as it is covered under the maintenance cost of STP or pumping station. Since de-sludging is carried out during daytime, the cost considers a single supervisor carrying out operations during one shift.

The estimated O&M cost of **INR 2.5 lakhs (~USD 3,012)** applies to the decanting station at Anna Stadium, and is separate from the pumping station maintenance costs. The cost breakdown in Annexure 4 is based on the outlined activities and excludes electrical and water charges, as summarised below.

Estimated O&M costs for decanting-cum-pumping station (Capacity: 70 trucks/day)

- **Energy Consumption:** Charges vary based on site conditions.
- **Maintenance:** INR 5,000 (~USD 60) for instrument, motor and facility upkeep (periodical).
- Chemicals and monitoring:
 - INR 6,500 (~USD 78) for FS testing equipment, PPE, and disposal (periodical).
 - INR 7,000 (~USD 84) for consumables like distilled water, pH strips, and PPE (regular).
- **Human resource charges:** INR 12,000 (~USD 144) monthly for manpower, supervision, cleaning, and safe disposal.
- Annual maintenance repetitions:
 - Regular: 12 times
 - Periodical: 2 times
 - Annual: 1 time
- **Total O&M Cost per Annum:** INR 2,51,000 (~USD 3,012)

Conclusion



7. Conclusion

Effective operation and maintenance of decanting stations are central to sustaining Trichy's co-treatment system and advancing the city's Citywide Inclusive Sanitation (CWIS) objectives. Beyond routine maintenance, the practices outlined in this report strengthen the sanitation service chain by improving reliability, efficiency, and safety at key interface points between onsite sanitation systems and the sewer network.

By institutionalising standard O&M protocols—including routine cleaning, regular monitoring, manifest-based recordkeeping, and periodic testing—Tiruchirappalli City Corporation (TCC) can ensure consistent and safe disposal of fecal sludge, reducing the risk of environmental contamination and system overloading at the STP. Enhanced training and safety procedures directly contribute to worker welfare and dignity, a key CWIS priority. Furthermore, systematic data collection through recordkeeping and manifest systems builds an evidence base for performance monitoring, supporting more responsive governance and resource allocation.

Financially, the cost framework proposed promotes realistic budgeting and transparent fund utilisation, strengthening institutional sustainability. Collectively, these measures transform decanting stations from peripheral infrastructure into critical enablers of equitable and resilient sanitation services. They help operationalise CWIS's vision—ensuring that sanitation in Trichy is not only technically efficient but also inclusive, safe for workers, and environmentally responsible—setting a replicable model for other cities in Tamil Nadu and beyond.

References

1. CDD Society & Tamil Nadu Urban Sanitation Support Programme. (2018). *Compendium of innovative technologies for urban sanitation*. Consortium for DEWATS Dissemination (CDD) Society. <https://cddindia.org/wp-content/uploads/2019/04/TNUSSP-Compendium-of-Innovative-Technologies.pdf>
2. Central Pollution Control Board. (2008). Guidelines on Odour Pollution & its Control. <https://cpcb.nic.in/openpdffile.php?id=UmVwb3J0RmlsZXMvTmV3SXRIbV8xNDFfcGFja2FnZV9vZG91cnJlcG9ydF8yLjEyLjA4LnBkZg>
3. Central Public Health and Environmental Engineering Organisation [CPHEEO]. (2013). Manual on Sewerage and Sewage Treatment Part A: Engineering. Ministry of Housing and Urban Affairs, Government of India.
4. Madonna, AD. (2024, September 8). With Phase IV of underground drainage project, coverage will improve to 90% of Tiruchi city. The Hindu. <https://www.thehindu.com/news/cities/Tiruchirappalli/with-phase-iv-of-underground-drainage-project-coverage-will-improve-to-90-of-tiruchi-city/article68618448.ece>
5. Ministry of Urban Development. (2017). National Policy on Faecal Sludge and Septage Management (FSSM). https://www.cseindia.org/static/mount/recommended_readings_mount/14-National-Policy-on-Faecal-Sludge-and-Septage-Management,-2017.pdf
6. Tamil Nadu Urban Sanitation Support Programme [TNUSSP]. (2017). Sewage and Fecal Sludge Treatment in Tiruchirappalli: Current Status, Proposed Plans and Recommendations for Improvement. https://www.researchgate.net/profile/Kavita-Wankhade/publication/350278110_Sewage_and_Fecal_Sludge_Treatment_in_Tiruchirappalli_Current_Status_Proposed_Plans_and_Recommendations_for_Improvement/links/6061982a92851cd8ce74c6da/Sewage-and-Fecal-Sludge-Treatment-in-Tiruchirappalli-Current-Status-Proposed-Plans-and-Recommendations-for-Improvement.pdf
7. Tamil Nadu Urban Sanitation Support Programme [TNUSSP]. (2018). Sanitation Situation Assessment: Tiruchirappalli. https://www.susana.org/_resources/documents/default/3-3784-226-1615554748.pdf
8. Tamil Nadu Urban Sanitation Support Programme [TNUSSP]. (2019). Needs Assessment Study of Occupational and Health Hazards faced by Desludging Workers in a City in India. <https://tnussp.co.in/wp-content/uploads/2020/08/Draft-NAS-report-min.pdf>
9. Tamil Nadu Urban Sanitation Support Programme [TNUSSP]. (2020). CWIS in Trichy. City Wide Inclusive Sanitation. <https://citywideinclusivesanitation.com/>
10. The Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, Ministry of Law and Justice (2013). <https://ncsk.nic.in/sites/default/files/manualsca-act19913635738516382444610.pdf>
11. Tiruchirappalli City Municipal Corporation [TCC]. (2024). Tiruchirappalli City Municipal Corporation Budget 2024-2025. https://www.trichycorporation.gov.in/wh-assets/tccdetailes/annul_budget/budget_24_25_English.pdf

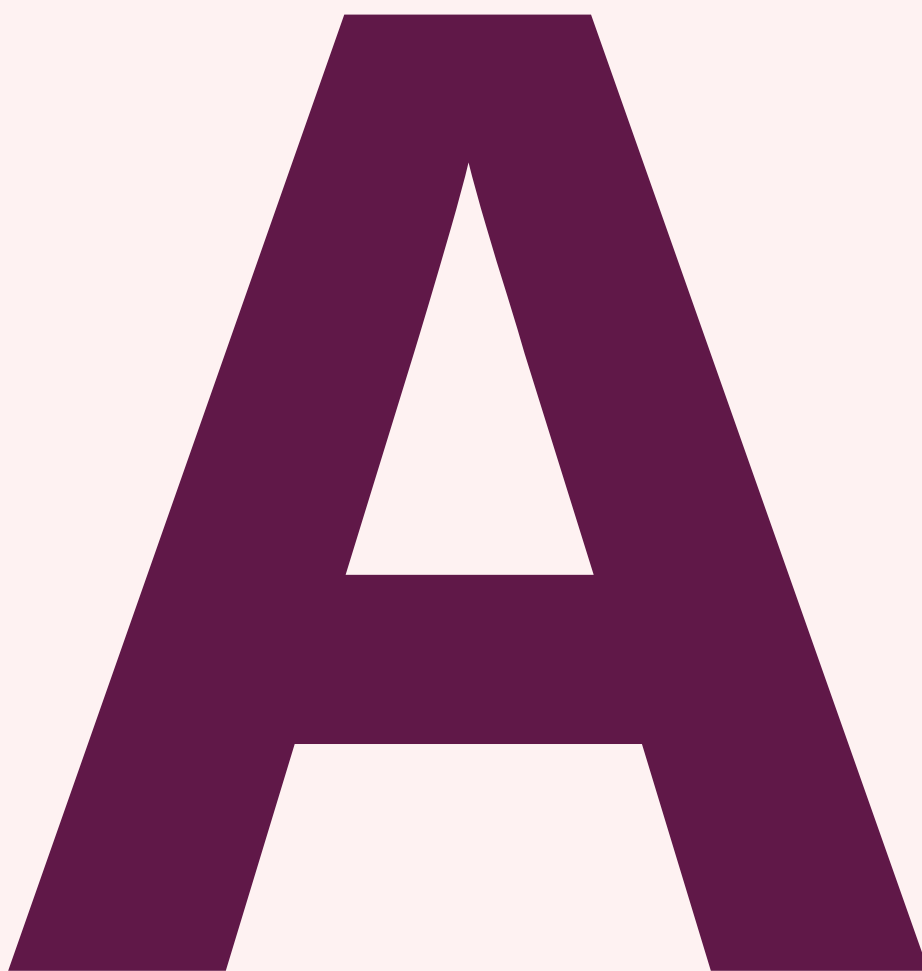
Annexures

Annexure 1: Fecal Sludge Sampling
and Testing Procedure A3

Annexure 2: Fecal Sludge Sampling
Data Sheet A6

Annexure 3: Manifest System A7

Annexure 4: Costing for O&M of
Decanting-cum-Pumping Stations A8



Annexure 1: Fecal Sludge Sampling and Testing Procedure

A. Sampling Procedure





- The sample shall be collected from the outlet valve or any other outlet provided in the de-sludging truck. When collecting from the truck outlet valve, the operator shall allow the flow to become low (or one fourth of the valve opening) before sample collection, to avoid splashing.
- A bucket with 5-litre capacity can be used for sample collection. A grab sample shall be collected from every truck. Pour the sample collected in the bucket into a smaller container for convenience as approximately 50 mL is needed for testing. The same sample can be used for testing both pH and EC.
- The sampling personnel shall avoid direct contact with FS and must use PPE like safety shoes, safety goggles, mask and hand gloves.
- Hand-washing facility and 24/7 water availability shall be ensured at site.
- After testing, the sample shall be disposed safely.

B. Testing procedure

The materials or equipment needed for FS screening and testing is presented below.

Table A1.1: List of items needed for fecal sludge screening and testing	
1	Sampling data sheet
2	Writing pad and pens, clipped with sampling data sheet
3	Electrical conductivity analyser
4	pH paper strips
5	Demineralised water
6	Hand gloves set
7	Masks
8	Wash bottle
9	Hand sanitiser
10	Tissue paper roll
11	5-litre bucket and rod
12	100mL beaker

Figure A1.1: Equipment for testing fecal sludge

EC measuring kit	500 ml jar and EC meter
	
pH strip	Hand gloves
	
<p>Source: CWIS, 2020</p>	

The well mixed sample is tested for pH and EC as per the procedure below:

1. pH:

- Dip the end of the pH strip into the sample.
- After a few seconds, remove the paper and compare the colour of the pH strip to the colour chart provided with the pH paper kit to determine the pH range.
- Dispose the used pH paper strips appropriately.
- Do not reuse a pH paper to retest or test another sample. Always use a new pH strip.

2. EC:

- Remove the cap and press power button (⏻) to turn on the tester.
- Immerse the sensor fully into the sample.
- Stir the sample with sensor, once or twice to stabilise the reading and note down the displayed value.
- Hold function in the tester freezes the reading temporarily for ease of recording. To hold reading, press hold/ent (⏸) button. Screen flashes H□ once, and displays the measurement with blinking unit (mS) to indicate that the tester is in the hold mode. Press again to cancel hold mode (H□).

- Do not press Cal button during measurement.
- Refer to the manual if for troubleshooting or for other details.
- Rinse both the beaker and sensor with demineralised water twice and dry using tissue paper.
- Take adequate care not to cross-contaminate the samples. This can be done by cleaning and drying (using soft tissue paper) the sensor and sampling container for each sample taken.
- Press power button (⏻) to turn off the tester.

Annexure 2: Fecal Sludge Sampling Data Sheet

Table 2A.1: Sampling data sheet								
Name of facility:								
Date:								
Name of the operator recording the information:								
No.	Vehicle Registration number	Sampling point	Time	pH	EC (mS)	Temp (deg C)	Colour	Odour
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								
11.								
12.								
13.								
14.								
15.								
16.								

Annexure 3: Manifest System

Table A3.1: Septage Manifest Form - Part 1		
COLLECTION (to be filled by truck operator)		
1	Date and Time	Date: _____ Time: _____
2	Septage/ Fecal Sludge Source	(Tick anyone of the following) a) Residential b) Commercial c) Institutional d) Others
3	Collected from: Name and Address	Name [House owner, manager, employee]: _____ Address: _____
4	Volume collected (litres)	_____
5	Is there any chemical added during the de-sludging?	_____
6	Type of Containment	(Tick any one of the following) a) Septic Tank b) Others (mention): _____
7	When was the toilet pit/septic tank last emptied? Write as YYYY [Year]	_____
8	Collected by:	Truck operator's address: _____ Contact Number: _____ Vehicle Registration Number: _____ Name: _____ Signature: _____

Table A3.2: Septage Manifest Form - Part 2		
DELIVERY (to be filled by plant operator)		
1	Date and Time	Date: _____ Time: _____
2	Delivered To	(Tick any one of the following) a) Decanting Station/ Pumping station b) Sewage Treatment Plant c) Fecal Sludge Treatment Plant Address of facility: _____
3	Received by	Name: _____ Designation: _____ Signature: _____
4	Observations	Colour: _____ Odour: _____
5	Remarks	_____

Annexure 4: Costing for O&M of Decanting-cum-Pumping Stations

Table A4.1: Estimated Operation and Maintenance of Decanting Cum Pumping Station					
Sl. No.	Descriptions	Regular	Periodical	Annual	Total O&M per Annum
					(in INR.)
Decanting station (for the capacity of 70 trucks per day)					
1	Energy Consumption				
	Providing energy consumption charges (motor and other appliances) for necessary activities, etc. (varies depending on site conditions)	-	-	-	-
2	Maintenance				
	Supply of material and maintenance activities for preventing wear and tear of instruments, motors and other facilities	-	5000	-	-
3	Chemicals and Monitoring Charges				
	Supply and providing FS testing equipment with proper recording system, and PPE with proper disposal facility for operators in compliance with standard specifications of respective departments	-	6500		
	Supply and providing FS testing consumable distilled water and pH strips, PPE with proper disposal facilities in compliance with standard specifications of respective departments.	7000	-	-	-
4	Human Resource Charges				
	Supply and providing manpower including supervision charges for 1 shift, cleaning and safe disposal to SWM unit	12,000	-	-	-

Table A4.1: Estimated Operation and Maintenance of Decanting Cum Pumping Station					
Sl. No.	Descriptions	Regular	Periodical	Annual	Total O&M per Annum
					(in INR.)
Decanting station (for the capacity of 70 trucks per day)					
	(including removal of debris to the respective location with necessary accessories) and along with proper PPEs in compliance with standard specifications of respective departments				
	Repetition per annum	12	2	1	
	Total Cost (only for the decanting facilities)	2,28,000.00	23,000.00	0.00	2,51,000.00

Note:

Provided amount is tentative shall be used for the reference purpose only. Based on the site conditions and assumptions, actual cost may vary. For tendering and contract, separate actual BOQ shall be prepared based on the ULBs requirement and site conditions.

The cost provided here is based on the market enquiry and Public Works Department Schedule of Rates (PWD SOR) reference.

The energy cost for the decanting stations is very minimum and is negotiable with the total expenditure of the pumping station energy consumption charges.

The estimate prepared only for the O&M activities of decanting station facilities, which is not included the pumping station O&M components, listed below.

Pumping Station Operation and Maintenance Activities

- A. Grit removal at Collection well, Screen chamber, Grit chamber and Pump well
- B. Repairing of electro-mechanical instruments, pumps and other miscellaneous components
- C. Electricity charges including diesel charges
- D. Regular maintenance activities like painting, retrofitting of old civil structures, repair or replacing of electro-mechanical equipment, electrical maintenance including replacement of wires and panels, upgradation of electrical equipment, etc.
- E. Security services
- F. Regular maintenance of transformer yard including clearing vegetation



City-Wide Inclusive Sanitation programme, Tiruchirappalli (CWIS-Trichy), Tamil Nadu supports the Trichy City Corporation (TCC) to make the improvements along the full cycle of sanitation. In particular, this programme will enable inclusive sanitation by mainstreaming gender, seeking improvements in service for the urban poor, increasing occupational safety, welfare for the sanitary workers and improvements in infrastructure.



IIHS, CHENNAI

Floor 7A, Chaitanya Exotica, 24/51 Venkatnarayana Road, T Nagar, Chennai 600 017, India.

T: +91 44 6630 5500/6555 6590 | E: tnussp@iihs.ac.in | W: www.tnussp.co.in