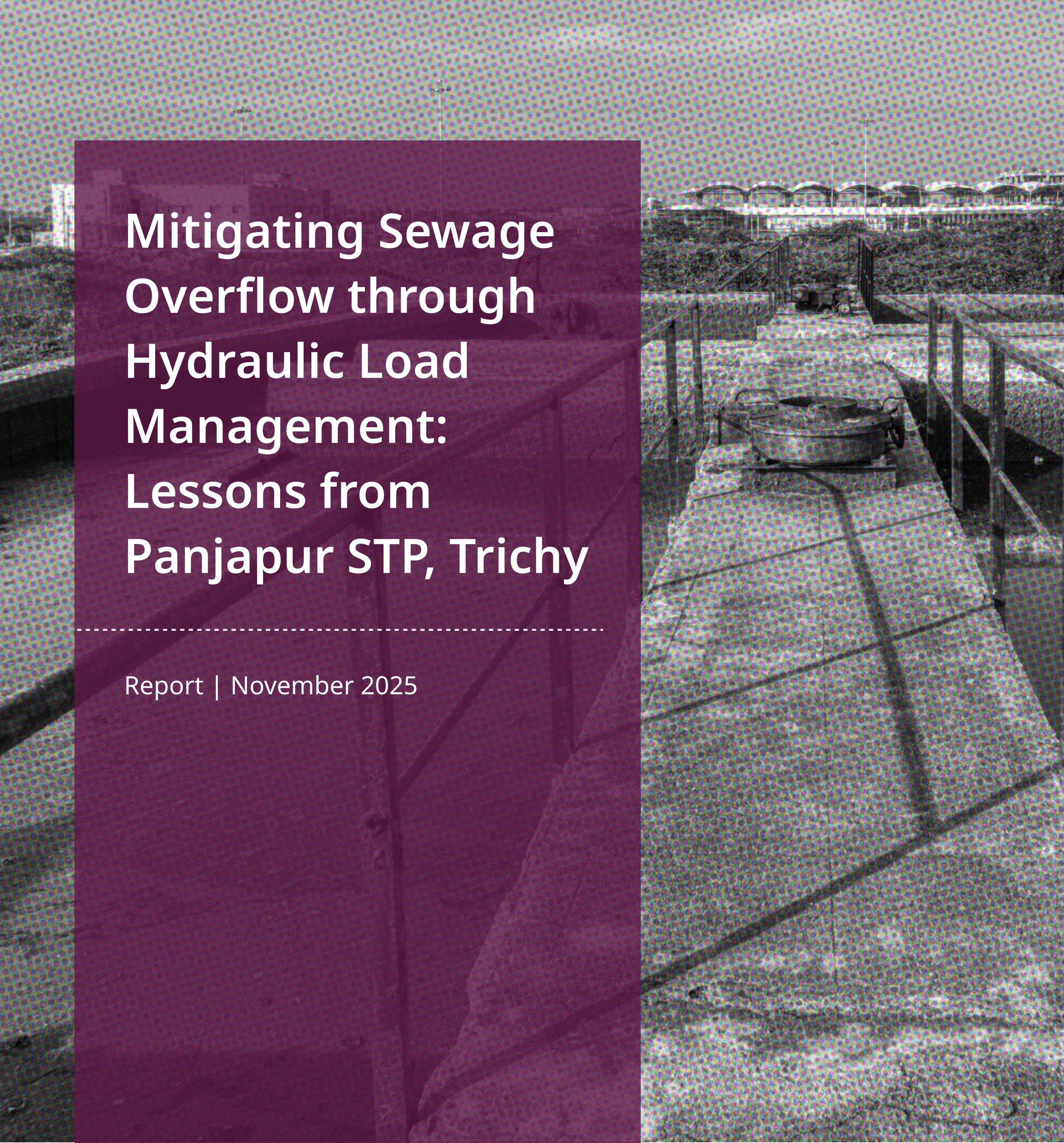


Mitigating Sewage Overflow through Hydraulic Load Management: Lessons from Panjapur STP, Trichy

Report | November 2025

INDIAN INSTITUTE FOR HUMAN SETTLEMENTS

CWIS TRICHY

MITIGATING SEWAGE OVERFLOW THROUGH HYDRAULIC LOAD MANAGEMENT: LESSONS FROM PANJAPUR STP, TRICHY

November 2025

iihs®
INDIAN INSTITUTE FOR HUMAN SETTLEMENTS

CWIS TRICHY

Mitigating Sewage Overflow through Hydraulic Load Management: Lessons from Panjapur STP, Trichy

November 2025

DOI: https://doi.org/10.24943/MSOHLM11.2025

For Citation: CWIS -Trichy (2025). Mitigating Sewage Overflow through Hydraulic Load Management: Lessons from Panjapur STP, Trichy

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: Yohananthan Sukumar, Jeevanraj S, Kanmani Raja S, Ravikumar K, K.V. Santhosh Ragavan

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

2. BMGF funding acknowledgement: This Research / Work was supported by Bill & Melinda Gates Foundation.

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

CONTENTS

Figures

Tables

Abbreviations

AT	Aeration Tank
ASP	Activated Sludge Process
CCT	Chlorine Contact Tank
CWIS	Citywide Inclusive Sanitation
HP	Horsepower
MLD	Million Litres per Day
MPS	Main Pumping Station
O&M	Operation and Maintenance
PST	Primary Settling Tank
SBR	Sequential Batch Reactor
SST	Secondary Settling Tank
STP	Sewage Treatment Plant
TNUSSP	Tamil Nadu Urban Sanitation Support Programme
TCC	Tiruchirappalli City Corporation
ULB	Urban Local Body
WSP	Waste Stabilisation Pond

Executive Summary

Executive Summary

As part of the Citywide Inclusive Sanitation (CWIS) initiative of the Tamil Nadu Urban Sanitation Support Programme (TNUSSP), the Tiruchirappalli City Corporation (TCC) sought technical assistance to address sewage overflow issues which caused continuous operational challenges at the Sewage Treatment Plant (STP) in Panjapur. This report presents the findings of the assessment of the overflow issue and proposes a phase-wise action plan for mitigation.

The Panjapur STP, with a capacity of 58 million litres per day (MLD), uses Waste Stabilisation Pond (WSP) technology, a combination of sedimentation, sunlight, algal photosynthesis and microbial activity. To understand the causes of the overflow, the CWIS team conducted a field assessment at the Panjapur STP as well as the pumping stations—Othakadai, Anna Stadium, Venice Street, Beema Nagar, Sastri Nagar, and Vayalur Road.

The study found that while the plant's design flow rate was 9,565.2 m3/hr, its actual flow was only 4,500 m3/hr, with blockages in the transmission line and grit accumulation at Othakadai pumping station, causing overflow. Simultaneous pump operations, poor coordination and communication between the multiple pumping stations, and the absence of operators during non-peak hours compounded the problem. During one pilot control exercise, the overflow duration reduced from 75 minutes to 53 minutes when pump operations were manually coordinated by the CWIS team across the pumping stations.

The phase-wise recommendations were categorised into short-, medium-, and long-term measures for ease of implementation. Short-term measures include communication protocols and basic monitoring, which can be immediately implemented with minimal investment. Medium-term actions, such as systematic grit management and operator training, can be integrated into routine municipal practices. Long-term measures, such as equalisation tanks, comprehensive grit management plans and sensor-based monitoring, require capital investment but provide sustainable solutions to improve sewage treatment efficiency.

The recommendations were implemented by the TCC which resulted in nearly 80 per cent reduction in overflow. The average overflow decreased from 3.4 MLD to 0.3 MLD, and the duration reduced to 10-15 minutes throughout the day. With significant impact observed at Panjapur, the recommendations can serve as a replicable model for other Urban Local Bodies (ULBs) to improve efficiency and sustainability of sewage treatment plants.

Introduction

1

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:

1. Ensure safe management of fecal sludge across the entire sanitation chain
2. Improve service delivery for the urban poor and other vulnerable populations
3. Strengthen the capacity of local governments and communities
4. Integrate gender equity across sanitation planning and service delivery
5. Enhance the well-being and dignity of sanitation workers
6. 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 Background

Trichy is the fourth largest municipal corporation in Tamil Nadu with a population of 9,16,857 [2](Census, 2011). Spread over 167 square kilometres (sq. km), on the southern banks of the river Cauvery, the city is governed by the TCC. Trichy is a partially sewered city, with the Sewage Treatment Plant (STP) located on a 498-acre land owned by the TCC, at Panjapur. The STP uses Waste Stabilisation Pond (WSP) technology for the treatment of sewage. WSPs use a series of shallow ponds where sewage undergoes treatment through a combination of sedimentation, sunlight, algal photosynthesis, and microbial activity. The system typically includes anaerobic ponds (for settling and digestion of solids),

[1] The organisation was formerly known as Bill and Melinda Gates Foundation (BMGF).
[2] Ministry of Home Affairs. (2011). Census of India. Government of India.

facultative ponds (where aerobic and anaerobic processes occur), and maturation ponds (for pathogen removal). It has 11 pond cells, of which only 6 are currently operational.

Sewage overflow happens when untreated or partially treated sewage is released into the environment. Between 2021 and 2023, prevalent sewage overflow at the headworks of the Panjapur STP led to wastewater stagnation around the screen and grit chamber areas. Ideally, there should be no overflow from sewerage systems, apart from those caused by exceptional circumstances like extreme wet weather events and major sewerage system failure. However, sewage overflow in this scenario was a regular occurrence during peak hours of daily operations. The City Engineer, during routine inspections, observed sewage overflow at the WSP headworks, and requested the CWIS team to analyse and propose solutions. The TCC had earlier identified a contractor to refurbish the unit, but budget constraints postponed the work.

1.2 Objectives

Usually, sewerage systems are designed with structures to control the location and quantity of overflow, but frequent overflows, as in this case, require immediate short-term arrangements and well-planned long-term solutions. While the overflow at STP headworks was a temporary issue until the completion of infrastructure improvements proposed by TCC, it was important to determine the cause for overflow to propose preventive and corrective measures.

To control the flow, it was necessary to understand the time of peak flows into STPs so that the operators at pumping stations can be advised to stop or alternate between the pumps to avoid overflow. The objectives of the study were to,

1. Analyse the causes of overflow and recommend measures to control it;
2. Assess the flow rate at the headworks and the peak flow rate into the STP;
3. Check flow control by streamlining pumping across various stations through operator coordination;
4. Provide workable solutions for pumping station operators; and
5. Explore the possibility of storing excess sewage in the equalisation tank at the STP site to prevent process disruptions and ensure that the STP operates at its designed flow rate

Site Observation and Assessment

2

2. Site Observation and Assessment

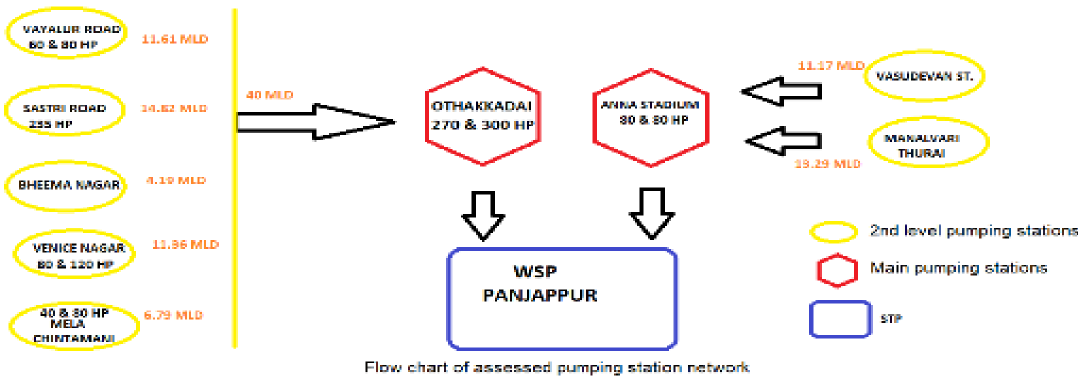
A full-day exercise was carried out on 19 January 2021 at two Main Pumping Stations (MPS)—Othakadai and Anna Stadium—to understand the peak flow rate discharge into the headworks of the STP. The switch-on and switch-off timings of pumps were recorded to calculate the flow into the STP. The collected data revealed that Othakadai MPS accounts for 70 per cent of sewage inflow. Therefore, the study focused on identifying measures to control the flow into Othakadai main and sub-stations.

The assessment was followed by a demonstration exercise of regulating pumping operations at Othakadai and its sub-stations to control the overflow at the grit chamber of WSP. For this study, CWIS team members were deployed in the following lifting stations (sub-stations), which pump sewage to Othakadai MPS:

- Shastri Road
- Bheema Nagar
- Venice Street
- Vayalur Road

To control the pumping operations, the team member at the Othakadai MPS coordinated with members deployed at the lifting stations and the Panjapur STP. The flow chart of the pump houses is illustrated in Figure 2.1.

Figure 2.1: Sewage flow in the study area



Source: *CWIS, 2022*

2.1 Observations on Hydraulic Loads

During discussions with the TCC, it was found that while the design flow rate for the 58-million litres per day (MLD) STP at Panjapur was 2,657 litres per second, i.e., 9,565.2 m^3/hr, the pumping flow rate-based data shows a maximum flow of 4,500 m^3/hr, which was half of the designed flow rate. The pipe design details were not available for verification. However, the site assessment showed a possibility of leakage in the transmission line.

The key observations and recommendations are listed in Table 2.1.

Table 2.1: Observations from Site Assessment		
S. No	**Name of the location**	**Observations**
1.	Beema Nagar	1. Two 80 HP pumps were used alternatively for pumping sewage to Othakadai. 2. Total running hours on 8 February 2021 were 5 hours 14 minutes. Even though there was no major impact from this station, a flow rate of 716 m^3/hr was observed when the M2-80 HP pump ran between 9 am and 10 am.
2.	Venice Street	1. This sub-station housed two pumps—120 HP and 40 HP, respectively. During peak hours (9 am to 10 am and 3 pm to 4 pm), both pumps were run, resulting in a total flow rate of 2,314 m^3/hr to Othakadai pumping station (120 HP - 1,182 m^3/hr and 40 HP - 1,132 m^3/hr).
3.	Sastri Nagar	1. Two 235-HP pumps were used to transfer wastewater to Othakadai. 2. Due to power failure during the peak hour (9 am to 10 am), wastewater was stored in the collection well. This led to higher flow into the MPS as both pumps were run later.
4.	Vayalur Road	1. This sub-station used a 80-HP and 60-HP pump. 2. Both the pumps were run continuously causing an average flow of 813 m^3/hr.
5.	Anna Stadium	1. Overflow was observed at intervals during the day. The maximum flow rate at which sewage can be pumped into WSP is 5,032.8 m^3/hr (Refer Annexure 3). 2. The operator shuts off two pumps when the sewage level in the collection well is low and runs both pumps simultaneously when it increases. This causes overflow at WSP if the 300 HP pump is also running at Othakadai.
6.	Othakadai WSP	1. Controlling the flow at peak hours by using three pumps was a major challenge as collection wells were already running at more than 50% of their capacity, and operators could not risk switching off the pumps at MPS. 2. Overflow was prevalent when three pumps were operated simultaneously, one at Othakadai (300 HP) and two at Anna Stadium. 3. If a 270 HP pump ran continuously in Othakadai, there was no overflow. However, due to accumulation of grit and the resulting lack of reserve space in the collection well during peak flow, the operator had to run the 300 HP pump as well.
Source: *CWIS, 2022*		

2.2 Grit Accumulation

1. Collection well level-indicator sensors were not available in all the collection wells, and the available sensors, as in Othakadai, were manual floating ball-type indicators.

2. Grit removal facilities were available only in the following locations—Beema Nagar, Sastri Nagar, Anna Stadium and Panjapur STP.

3. While all pumping stations required grit removal in the collection well, Othakadai MPS was the highest priority.

4. In WSP, the wastewater transmission line had to be renovated and the grit removed.

2.3 Summary of Observations

1. The design peak flow at the WSP is 9,565 m^3/hr, whereas the peak flow observed from the pumping station data was approximately 4,500 m^3/hr.

2. The blockage in the transmission line at WSP was also a reason for the overflow.

3. During overflow, the 300 HP pump in Othakadai and two 80 HP pumps in Anna Stadium were running simultaneously.

4. During non-peak hours, i.e., between 1 pm and 2 pm, all the pumping stations, including level 2 pumping stations, were running.

5. While the duration of overflow was 75 minutes during the study on 19 January 2021, it was only 53 minutes during the overflow control pilot practice on 8 February 2021. This shortened duration was due to controlled overflow through regulated pump operations.

6. Grit accumulation at Othakadai collection well was also a constraint to overflow control at the WSP.

7. Most of the pumping houses did not have toilet facilities, which led to operators leaving the sites. During this period, without a designated person available during operating hours, WSP witnessed uncontrolled overflow for about 10 to 15 minutes.

Recommendations

3

3. Recommendations

Based on assessments and observations, the following actions have been recommended to be carried out in a phased manner.

3.1 Short-Term Actions (Immediate and High Priority)

3.1.1 Operational coordination and communication:

- Consultation with pump operators by TCC officials to understand operational challenges.
- Coordination between pumping station operators to prevent overflow at WSP headworks.
    - Othakadai MPS operators should inform respective lift station operators of sudden increases in incoming sewage levels to regulate pumping by switching off a pump or running a low-capacity pump.
- Monitoring incoming sewage levels at the WSP and coordination between the operators of Othakadai and Anna Stadium pumping stations to ensure proper pump operation and avoid overflow.
- Establishing proper communication, recordkeeping of pump operations, collection of well-level indications, and overflow data, along with regular monitoring at key locations.
- Running both pumps at the same time should be avoided. While a 120-HP pump can be run continuously when the water level is high, a 40-HP pump can be used during non-peak hours.

3.1.2 Monitoring and maintenance:

- Regular monitoring of grit accumulation in grit chambers and pumping stations.
- Provision of a floating device at the headworks of grit chamber to monitor wastewater levels (as implemented at Othakadai; refer to Figure A1.4 in Annexure 1).
- Assessment of the transmission line between headworks and the anaerobic pond at WSP.

3.1.3 Technological interventions:

- Implementation of sensor-based on and off systems at all pumping and lifting stations.
    - Sensors help monitor water levels in real time, ensuring that pumps operate efficiently to maintain a steady flow rate. This prevents turbulence, which can resuspend settled grit and reduce removal efficiency.

3.2 Medium-Term Actions (3-6 Months)

3.2.1Grit management and removal:

- Construction of at least one air release and grit removal arrangement in the transmission line at WSP.
- Evaluation and enhancement of grit removal mechanisms at all pumping and lifting stations.
- Provision of grit handling and removal facilities at the WSP and pumping stations.
- Periodic grit removal at all pumping stations following the best practices from Anna Stadium and Venice Street.
- Removal of accumulated grit from Othakadai collection tanks to restore 37 per cent of lost capacity and improve operational efficiency.
- Repair of the WSP grit chamber mechanism and implementation of a regular grit removal schedule.

3.2.2 Operational efficiency and training:

- Conducting baseline data analysis and training WSP operators on overflow control.
- Regulating pumping station operations to prevent overload and overflow at STPs.

3.2.3 System optimisation and maintenance:

- Optimisation of STP utilisation and prevention of biomass loss (Mixed Liquor Suspended Solids) to maintain treatment efficiency through controlled sewage volume intake.

3.3 Long-Term Actions (1-2 Years)

3.3.1 Sensors and monitoring devices:

- Installation of flow meters at WSP inlet and outlet to monitor peak flow times.
- Enhancement of sensor-based flow control and monitoring devices at major pumping stations.

3.3.2 Grit management plan:

- Development and implementation of a comprehensive grit management plan at pumping stations and the WSP.
- Structural improvements to headworks at the WSP to prevent grit-related operational issues.

3.3.3 Equalisation tanks and sewage storage:

- Construction of equalisation tanks to stabilise and store excess loads during peak hours, maintain a consistent design flow rate, and regulate the treatment process, particularly for STPs using the Activated Sludge Process (ASP) (Refer to Annexure 4 for a detailed list of Urban Local Bodies (ULBs) requiring equalisation tanks).

- Utilisation of an existing pump house, if available, instead of constructing an equalisation tank.

- Assessment of STP sites for provision of sewage storage to maintain an optimal flow rate within the plant.

- Assessment of the outlet pipe carrying sewage from headworks to the division chamber to determine its discharge capacity, addressing flow reduction due to accumulated grit.

- Provision of manhole or air releasing arrangements to improve flow capacity.

Implementing these recommendations across STPs in ULBs will help address the prevalent issue of sewage overflow and improve the overall efficiency of sewage treatment systems. While these recommendations are based on the Trichy context, the identified challenges—such as grit accumulation, overflow at head works, inadequate operational coordination, and lack of real-time monitoring—are common across many ULBs in India. Adopting this phased approach can serve as a model framework for other ULBs to strengthen their O&M systems.

Short-term measures (e.g., communication protocols and basic monitoring) can be immediately implemented across ULBs with minimal investment. Medium-term actions, such as systematic grit management and operator training, can be integrated into routine municipal practices. Long-term measures, such as equalisation tanks, comprehensive grit management plans, and sensor-based monitoring, require capital investment but provide sustainable solutions that significantly improve sewage treatment efficiency.

3.4 Implementation and Impact

Based on the findings of the assessment, the CWIS team conducted a workshop to the TCC officers to streamline the overflow timings and introduce the recommendations. Five months after TCC implemented the recommendations at the STP, it was assessed that overflow reduced by nearly 80 per cent. The average overflow decreased from 3.4 MLD to 0.3 MLD, and the duration reduced to 10-15 minutes throughout the day. With significant impact observed in Trichy, the recommendations can serve as a replicable model for ULBs to improve efficiency and sustainability of their STPs.

Annexures

Annexure 1: Grit chambers and grit accumulation at the WSP Headworks and Pumping Station

Figure A1.1: Backflow above weir level at grit chamber

Figure A1.2: Grit accumulation at Grit chamber

Figure A1.3: Less discharge through transmission line at WSP grit chamber

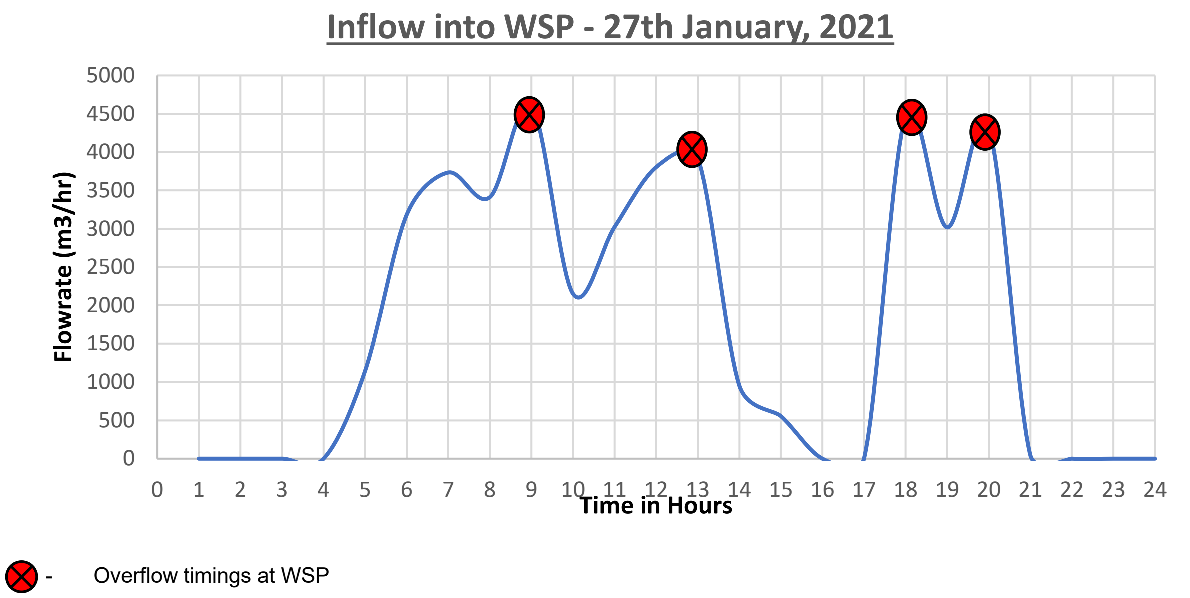
Figure A1.4: Level indicator provided at Othakadai pumping station

Figure A1.5: Grit accumulation at Othakadai MPS collection well

Source: CWIS, 2021

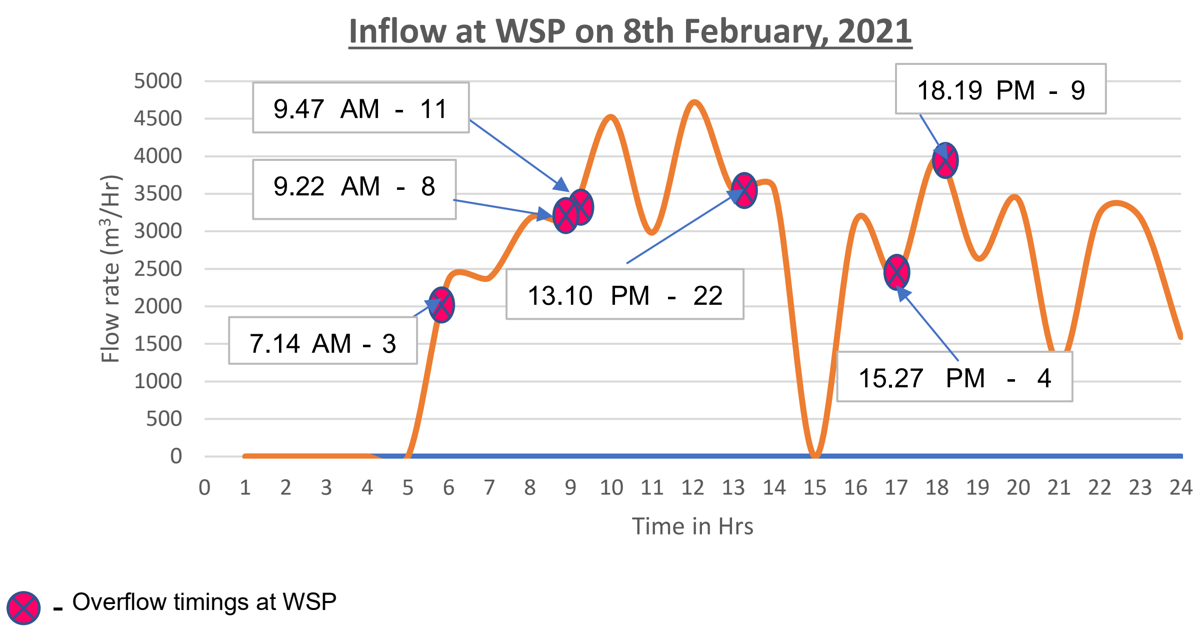
Annexure 2: Peak flow at WSP and Othakadai MPS

Figure A2.1: Sewage inflow observation into WSP STP on 27 January 2021



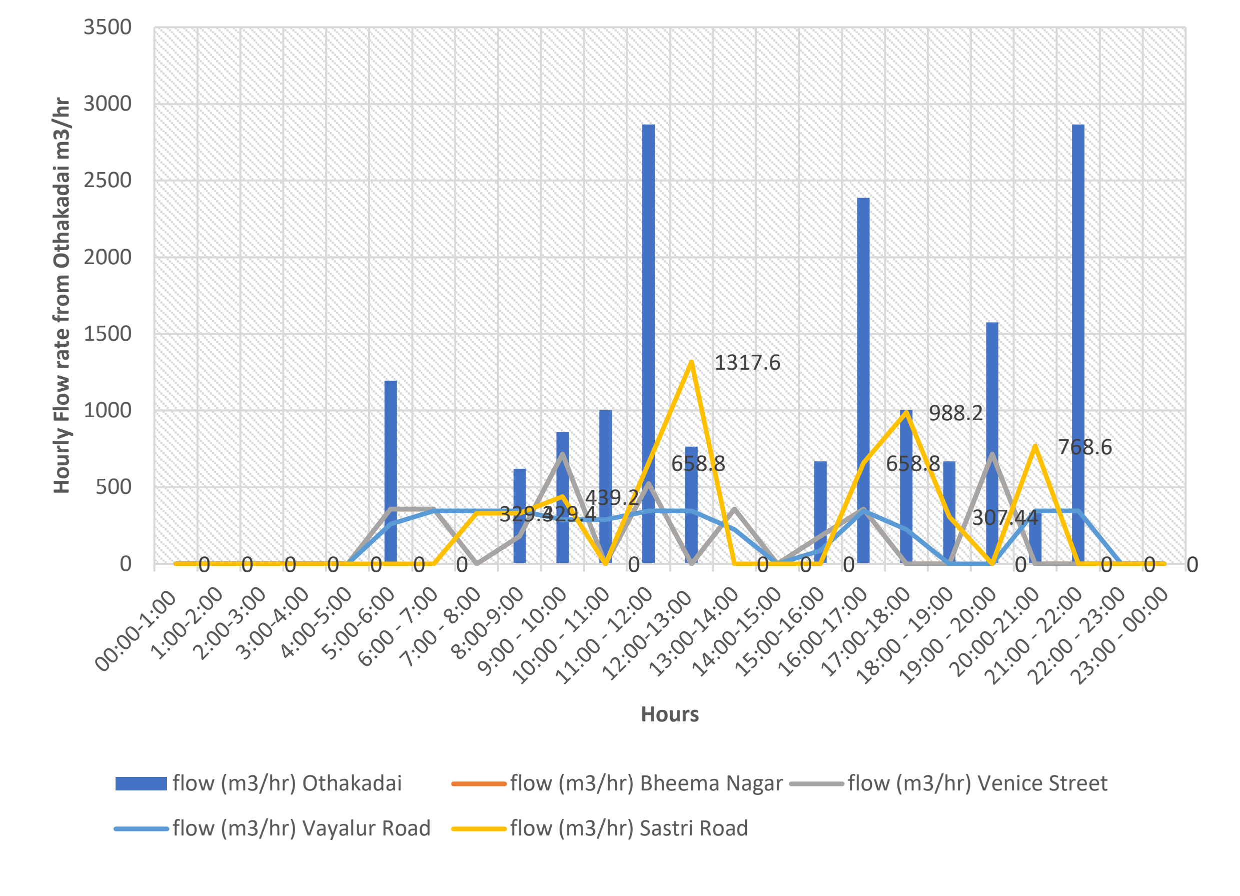
Source: CWIS, 2021

Figure A2.2: Sewage inflow observation into WSP STP on 8 February 2021



Source: CWIS, 2021

Figure A2.3: Hourly Flow rates from substations to Othakadai



Source: CWIS, 2021

Annexure 3: Observations of overflow at WSP and Pumping Stations

Table A3.1: Overflow at WSP headworks on 27 January 2021					
Hours	YES / NO	Duration of overflow	Overflow time (minutes)	Flow rate (m^3/hr)	Remarks
00:00-01:00	No				
01:00-02:00	No				
02:00-03:00	No				
03:00-04:00	No				
04:00-05:00	No			1146.24	Flow was observed at Headworks
05:00-06:00	No			2121.6	
06:00 - 07:00	No			4794.48	Both pumping station pumps were running
07:00 - 08:00	No			3216.6	
08:00-09:00	***Yes***	***8.38 to 9.20***	***42***	***3648.18***	***Overflow observed (300 HP, 80 HP- 2 pumps working)***
09:00 - 10:00	No			3154.02	
10:00 - 11:00	No			3023.28	One 300 HP pump at Othakadai was running and both pumps at Anna stadium were stopped
11:00 - 12:00	No			3602.52	
12:00-13:00	***Yes***	***12.53 to 13.07***	***14***	***3551.28***	***1. 300 HP pump in Othakadai 2. 80 HP (2 pumps) in Anna Stadium (all the pumps were working)***
13:00-14:00	No			318.24	
14:00-15:00	No			555.12	
15:00-16:00	No			0	
16:00-17:00	No			0	
17:00-18:00	***Yes***	***17.23 to 17.36***	***13***	***3931.44***	***1. Overflow due to all pumps running 2. Controlled by switching off Anna stadium pumps***
18:00 - 19:00	No			2900.04	
19:00 - 20:00	***Yes***	***19.29 to 19.35***	***6***	***3713.04***	***Overflow controlled by stopping the pump forcefully at Othakadai pumping station***

Table A3.1: Overflow at WSP headworks on 27 January 2021					
Hours	YES / NO	Duration of overflow	Overflow time (minutes)	Flow rate (m^3/hr)	Remarks
20:00-21:00	No			1235.76	
21:00 - 22:00	No			0	
22:00 - 23:00	No			0	
23:00 - 00:00	No			0	
		Total	***75 minutes***		
Source: CWIS, 2021					

Table A3.2: Overflow at MPS on 19 January 2021						
Hours	**Sastri Road Flow (m^3/hr)**	**Bheema Nagar flow (m^3/hr)**	**Venice Street Flow (m^3/hr)**	**Vayalur Road Flow (m3/hr)**	**Othakadai Flow (m^3/hr)**	**Anna Stadium (m^3/hr)**
00:00 - 01:00	0	0	0	0	0	0
01:00 - 02:00	0	0	0	0	0	0
02:00 - 03:00	0	0	0	0	0	0
03:00 - 04:00	0	0	0	0	0	0
04:00 - 05:00	0	0	0	0	0	0
05:00 - 06:00	570.96	358.2	358.2	358.2	2360.88	0
06:00 - 07:00	614.88	358.2	358.2	358.2	1856.4	524.28
07:00 - 08:00	658.8	0	0	0	1326	1850.4
08:00 - 09:00	658.8	179.1	602.7	602.7	1363.44	1850.4
09:00 - 10:00	988.2	716.4	1182.36	1182.36	2981.28	1542
10:00 - 11:00	175.68	0	0	0	1533.36	1449.48
11:00 - 12:00	658.8	525.36	525.36	525.36	2865.6	1850.4
12:00 - 13:00	1317.6	0	0	0	2090.16	1449.48

Table A3.2: Overflow at MPS on 19 January 2021						
Hours	**Sastri Road Flow (m^3/hr)**	**Bheema Nagar flow (m^3/hr)**	**Venice Street Flow (m^3/hr)**	**Vayalur Road Flow (m3/hr)**	**Othakadai Flow (m^3/hr)**	**Anna Stadium (m^3/hr)**
13:00 - 14:00	988.2	358.2	358.2	358.2	2705.04	863.52
14:00 - 15:00	329.4	0	635.4	635.4	0	0
15:00 - 16:00	1317.6	179.1	1132.2	1132.2	2206.8	925.2
16:00 - 17:00	658.8	358.2	485.28	485.28	2388	0
17:00 - 18:00	988.2	0	0	0	2435.04	1542
18:00 - 19:00	307.44	0	0	0	1252.08	1387.8
19:00 - 20:00	658.8	716.4	928.2	928.2	1576.08	1850.4
20:00 - 21:00	768.6	0	0	0	1236	0
21:00 - 22:00	1098	0	635.4	635.4	3236.88	0
22:00 - 23:00	1317.6	0	0	0	3182.4	0
23:00 - 00:00	0	0	0	0	1591.2	0
Total (m^3/ day)	**14076.36**	**3749.16**	**7201.5**	**7201.5**	**38186.64**	**17085.36**
Source: CWIS, 2021						

Table A3.3: Overflow details at WSP on 8 February 2021					
Hours	**YES/ NO**	**Duration of overflow**	**Overflow time (minutes)**	**Flow Rate (m^3/hr)**	**Remarks**
04:00-05:00	No			0	
05:00-06:00	No			2360.88	
06:00 - 07:00	No			2380.68	
07:00 - 08:00	***Yes***	***07:14 to 07:17***	***3***	***3176.4***	***300 HP at Othakadai, 2 Nos 80HP in Anna Stadium***
08:00-09:00	Near Overflow			3213.84	Full level but controlled by switch off of 300 HP motor at Othakadai

Table A3.3: Overflow details at WSP on 8 February 2021					
Hours	**YES/ NO**	**Duration of overflow**	**Overflow time (minutes)**	**Flow Rate (m^3/hr)**	**Remarks**
09:00 - 10:00	***yes***	***9:22 to 09:28 09:47 - 09:58***	***6 11***	***4523.28***	***Over flow controlled by switching off the 300 HP pump at Othakadai and 120 HP pump switch off at Venice Street***
10:00 - 11:00	no			2982.84	
11:00 - 12:00	no			4716	90% to 95% level maintained at WSP due to running of 270 HP at Othakadai and two 80 HP running in Anna Stadium
12:00-13:00	Near Overflow			3539.64	Controlled with the coordination of Anna stadium operator and WSP
13:00-14:00	***Yes***	***13:10 to 13:30***	***20***	***3568.56***	***Both 80 HP at Anna Stadium and 300 HP in Othakadai***
14:00-15:00	No			0	1. Both 80 HP at Anna Stadium and 300 HP in Othakadai. 2. Overflow controlled by switch off 300 HP at Othakadai
15:00-16:00	Near Overflow			3132	Controlled the flow by the coordination between WSP and Othakadai operators (Motor switched off for 10 Min at Othakadai)
16:00-17:00	no			2388	
17:00-18:00	***Yes***	***17:27 to 17:31***	***4***	***3977.04***	***Controlled after 4 Min with the coordination of pump operators from Othakadai and Shastri Road***
18:00 - 19:00	***Yes***	***18:19 to 18:27***	***9***	***2639.88***	***1. Both 80 HP at Anna Stadium and 300 HP in Othakadai 2. Stopped after 9 min overflow***
19:00 - 20:00	Near Overflow			3426.48	Controlled with the coordination of pump operators Othakadai and Shastri Road pumping stations

Table A3.3: Overflow details at WSP on 8 February 2021					
Hours	**YES/ NO**	**Duration of overflow**	**Overflow time (minutes)**	**Flow Rate (m^3/hr)**	**Remarks**
20:00-21:00	No			1236	
21:00 - 22:00	No			3236.88	
22:00 - 23:00	No			3182.4	
23:00 - 00:00	No			1591.2	
		Total	***53 minutes***		
Source: CWIS, 2021					

Annexure 4: ULBs required to construct equalisation tanks for maintaining hydraulic load

S. No	Name of ULB	Plant capacity (MLD)	Utilisation (MLD)	% of utilisation	Treatment technology	Equalisation requirement	Volume of tank required (million litres)	Cost of the tank (Rs)
1	Tirunelveli	24.20	8	33%	WSP	WSP - Not required		
2	Theni	12.05	5.6	46%	Activated Sludge Process(ASP):AerationTank(AT)-SST(Secondary Settling Tank)-Chlorine Contact Tank(CCT)	Yes	2	1,20,00,000
3	Madurai	125.00	12	10%	Sequential Batch Reactor (SBR)	SBR - not required		
4	Madurai	45.70	13	28%	SBR	SBR - not required		
5	Dindigul	13.65	2.5	18%	ASP:PST - AT - SST - CCT	Yes	2	1,20,00,000
6	Cuddalore	12.25	5	41%	ASP:PST - AT - SST - CCT	Yes	2	1,20,00,000
7	Thanjavur	24.00	18	75%	ASP:PST - AT - SST - CCT	Yes	4	2,40,00,000
8	Coimbatore	70.00	27	39%	SBR	SBR - not required		
9	Coimbatore	60.00	6	10%	SBR	SBR - not required		
10	Tiruppur	15.00	8	53%	ASP:AT-SST-CCT	No - Both pump house and STP		

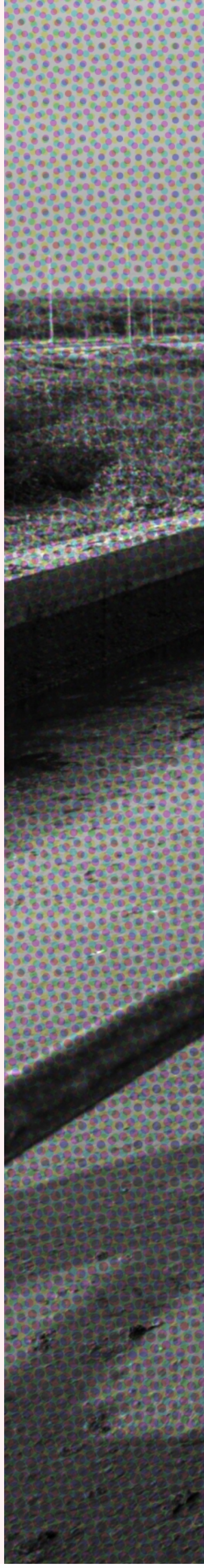
S. No	Name of ULB	Plant capacity (MLD)	Utilisation (MLD)	% of utilisation	Treatment technology	Equalisation requirement	Volume of tank required (million litres)	Cost of the tank (Rs)
						were well-co-ordinated		
11	Vellore	10.00	7.5	75%	ASP: Primary Settling Tank(PST) - AT - SST - CCT	Yes	2	1,20,00,000
12	Dharmapuri	4.86	1	21%	ASP:PST - AT - SST - CCT	Yes	1	60,00,000
13	Krishnagiri	9.00	6.7	74%	ASP:PST - AT - SST - CCT	Yes	2	1,20,00,000
14	Chinnamanur	3.99	3	75%	ASP: Anoxic Tank (AXT)- AT - SST - CCT	No - Pump house in the STP premises		
15	Periyakulam	5.47	3.3	60%	ASP:AT - SST - CCT	Yes	1	60,00,000
16	Viruthunagar	7.65	3.3	43%	ASP:PST - AT - SST - CCT	Yes	1	60,00,000
17	Ramanathapuram	7.00	5	71%	ASP:PST - AT - SST - CCT	Yes	1	60,00,000
18	Tiruvarur	6.92	4	58%	ASP:PST - AT - SST - CCT	Yes	1	60,00,000
19	Villupuram	9.00	5.8	64%	ASP:PST - AT - SST - CCT	Yes	2	1,20,00,000
20	Villupuram	3.50	1.6	46%	ASP:PST - AT - SST - CCT	Yes	1	60,00,000
21	Udumalpet	7.81	3.5	45%	ASP:PST - AT - SST - CCT	No - Pump house in the STP premises		
22	Ooty	5.00	4	80%	ASP: AT - SST - CCT	Yes	1	60,00,000
23	Perambalur	4.20	3.6	86%	ASP:PST - AT - SST - CCT	Yes	1	60,00,000
24	Chidambaram	9.44	2.4	25%	ASP:PST - AT - SST - CCT	Yes	2	1,20,00,000

S. No	Name of ULB	Plant capacity (MLD)	Utilisation (MLD)	% of utilisation	Treatment technology	Equalisation requirement	Volume of tank required (million litres)	Cost of the tank (Rs)
25	Kumbakonam	17.00	9	53%	ASP:PST - AT - SST - CCT	Yes	3	1,80,00,000
26	Mayiladuthurai	5.85	6.07	104%	WSP	WSP - Not required		
27	Nagapattinam	9.83	4.5	46%	ASP:PST - AT - SST - CCT	Yes	2	1,20,00,000
28	Nagapattinam	2.90	0.2	7%	ASP:PST - AT - SST - CCT	No - Pump house in the STP premises		
29	Pudukottai	10.62	4.5	42%	ASP:PST - AT - SST - CCT	No - Pump house in the STP premises		
30	Mamallapuram	2.34	1	43%	ASP:AT-SST	Yes	0.4	24,00,000
31	Thirumazhisai	3.00	0.5	17%	ASP:Equalisation Tank (EQT)-AT-SST-CCT	No - Equalization tank available		
32	Erode	50.55	20	40%	Moving Bed Bio Reactor (MBBR):AT-SST	Yes	8	4,80,00,000
33	Orathanadu	1.50	1.2	80%	ASP:PST - AT - SST - CCT	No - Pump house in the STP premises		
34	Thoothukudi	28.00		0%	ASP:PST - AT - SST - CCT	Yes	5	3,00,00,000
35	Thiruchendur	4.39	0.6	14%	ASP:AT - SST - CCT	No - Pump house in the STP premises		
36	Rasipuram	6.96	2	29%	ASP:AT - SST - CCT	No - Pump house in the STP premises		

S. No	Name of ULB	Plant capacity (MLD)	Utilisation (MLD)	% of utilisation	Treatment technology	Equalisation requirement	Volume of tank required (million litres)	Cost of the tank (Rs)
37	Mettur	0.82	0.27	33%	ASP:PST - AT - SST - CCT	No - Pump house close to the STP		
38	Mettur	0.92	0.13	14%	ASP:PST - AT - SST - CCT	No - Pump house close to the STP		
39	Mettur	5.45	1.7	31%	ASP:PST - AT - SST - CCT	No - Pump house in the STP premises		
40	Ariyalur	4.16	0.7	17%	ASP		1	60,00,000
42	Kanchipuram	14.70	14.7	100%	WSP	WSP - Not required		
44	Namakkal	5.00	5	100%	ASP: AT-SST	No - Pump house in the STP premises		
45	Karur	15.00	15	100%	ASP: AT-SST	Yes	3	1,80,00,000
46	Trichy	88.64	55.32	62%	WSP	WSP - Not required		
						Total no. of STPs requiring equalisation tank: 23		**29,04,00,000**

iihs® INDIAN INSTITUTE FOR HUMAN SETTLEMENTS | CWIS TRICHY

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