UWR Rainwater Offset Unit Standard

(UWR RoU Standard)

Concept & Design: Universal Water Registry

www.uwaterregistry.io

Project Concept Note & Monitoring Report

(PCNMR)

Project Name : Initiative for Wastewater Treatment & Reuse Project by Kasipalayam CETP

UWR RoU Scope: 5

Monitoring Period: 01/01/2015 - 31/12/2024

Crediting Period: 01/01/2015 - 31/12/2024

UNDP Human Development Indicator: 0.644 (India)[1]

https://hdr.undp.org/data-center/country-insights#/ranks[1]

A.1 Location of Project Activity

<table>
<tr><td>Title</td><td colspan="3">Initiative for Wastewater Treatment & Reuse Project by Kasipalayam CETP</td></tr>
<tr><td>Country</td><td colspan="3">India</td></tr>
<tr><td>State</td><td colspan="3">Tamil Nadu</td></tr>
<tr><td>District</td><td colspan="3">Tiruppur</td></tr>
<tr><td>Block Basin/Sub Basin/Watershed</td><td colspan="3">Noyyal River [2]</td></tr>
<tr><td rowspan="2">Project location</td><td>Name of the Village</td><td>Latitude</td><td>Longitude</td></tr>
<tr><td>Kasipalayam</td><td>11°07'13.0"N</td><td>77°23'49.0"E</td></tr>
<tr><td>Type and Scope of RoU Project Activity</td><td colspan="3">Type Scope 5: Conservation measures taken to recycle and/or reuse water, spent wash, wastewater etc. across or within specific industrial processes and systems, including wastewater recycled/ reused in a different process, but within the same site or location of the project activity. Recycled wastewater used in off-site landscaping, gardening or tree plantations/forests activity are also eligible under this Scope.</td></tr>
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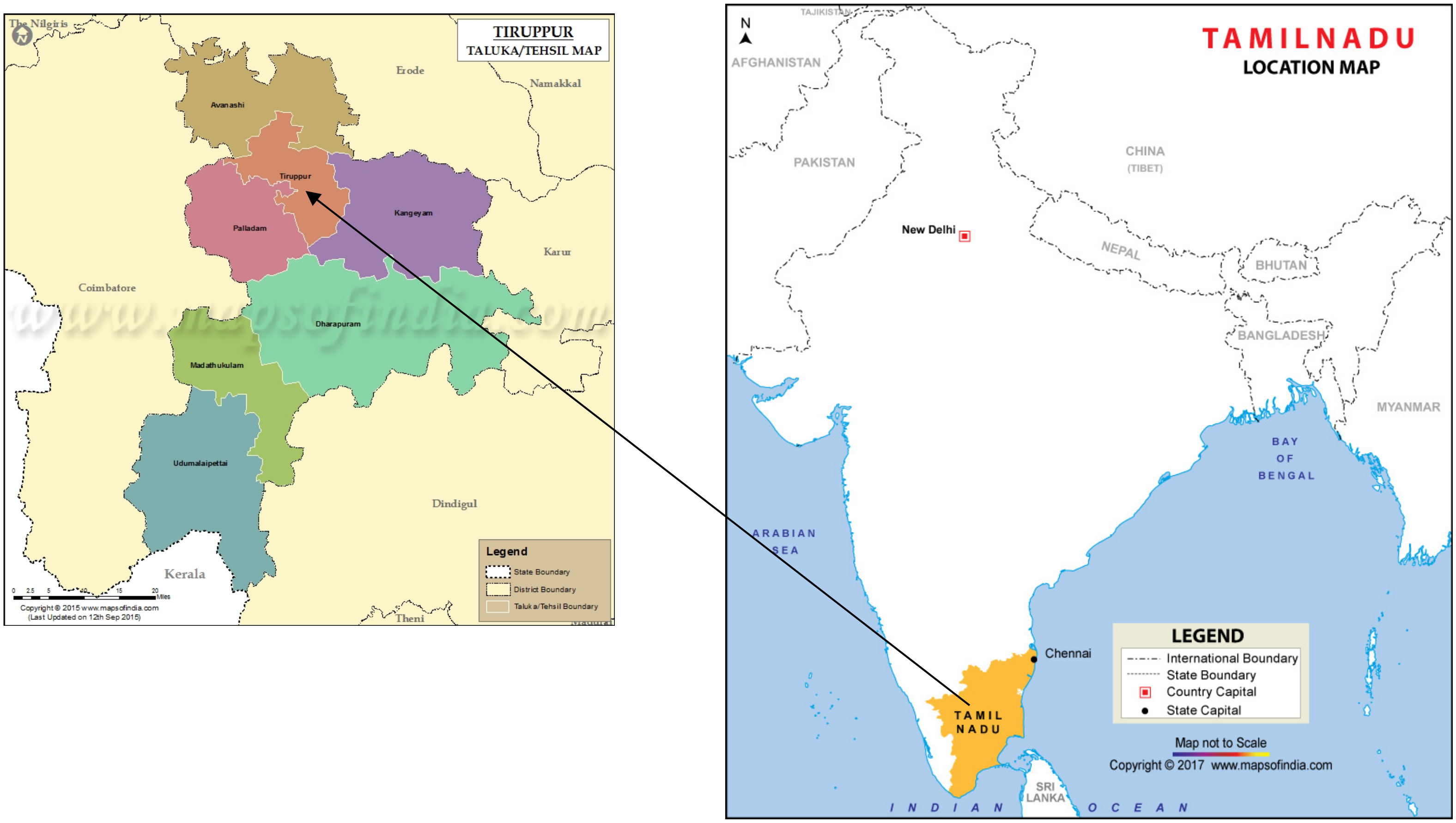
https://www.mapsofindia.com/maps/tamilnadu/[2]



Project Site

A.2. Project owner information, key roles and responsibilities

Project Proponent (PP):	Kasipalayam Common Effluent Treatment Plant Private Limited
UCR Project Aggregator	Viviid Emissions Reductions Universal Private Limited
Contact Information:	lokesh.jain@viviidgreen.com

The project participant, Kasipalayam Common Effluent Treatment Plant Private Limited, operates a vertically integrated Common Effluent Treatment Plant Private Limited capacity of 4.4 MLD, with the earliest commissioning of 24 December 2008. The company has established the combined Common Effluent Treatment Plant (CETP) with a cost of Rs. 24.62 crores. The project is 0.5 km from Noyyal River. The total area required for the project is 3.25 acres. The proposed ETP will consist Primary treatment, biological treatment, Ion-exchange and R.O to treat the textile effluents and is designed for Zero liquid discharge. No incineration is planned for the project. The effluents from the. 15.member units will be collected through pipelines. The percentage of 3639 KLD from the R.O will be reused in textile units and 642 KLD of reject will be evaporated and the residue, i.e salt of 39.6 TPD should be reused in the industrial units.

Ultrafiltration, Additional Stage RO and Boilers at Kasipalayam CETP

Effluent Treatment units of Kasipalayam CETP

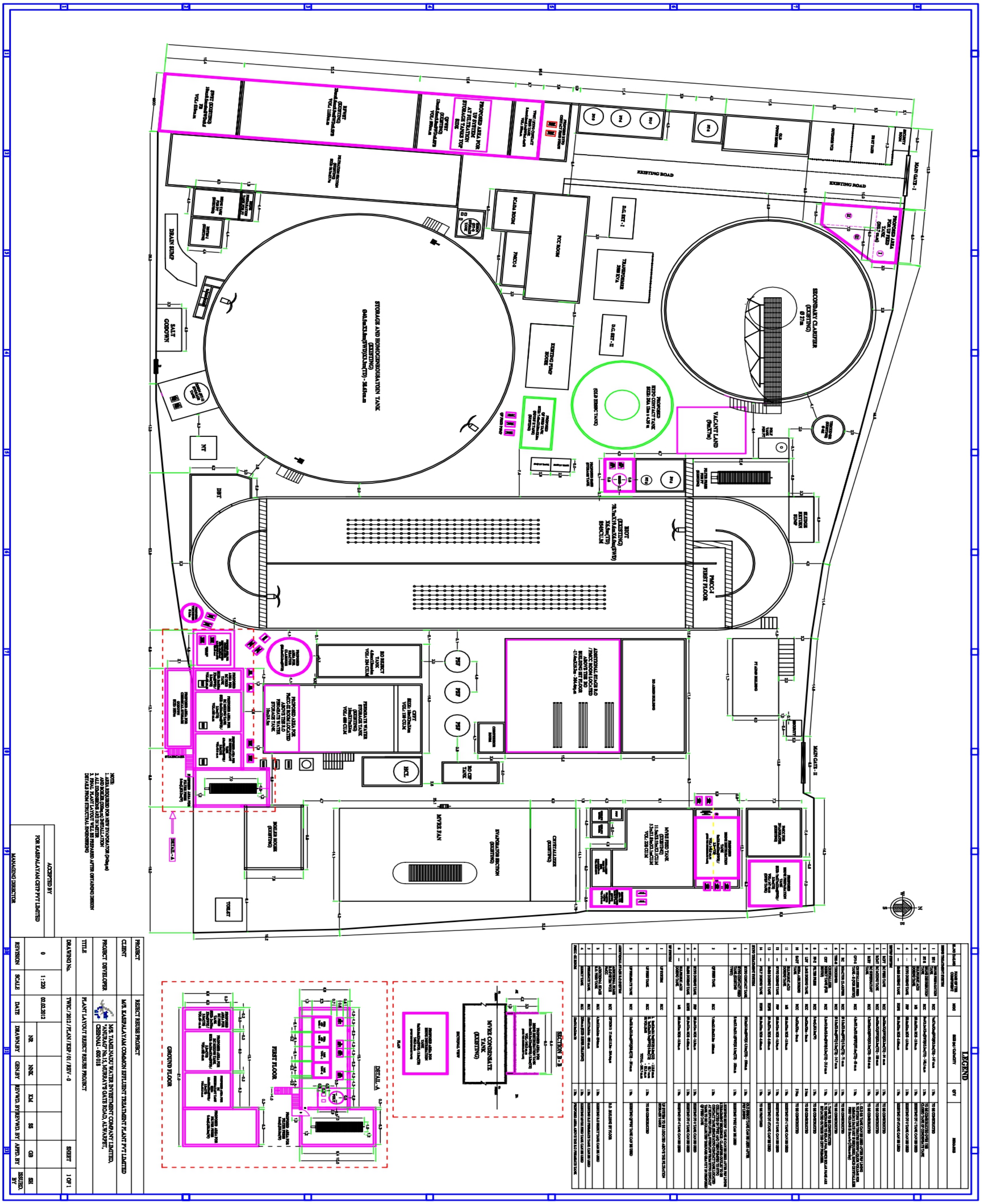
A.2.1 Project RoU Scope

PROJECT NAME	Initiative for Effluent Treatment at Kasipalayam
UWR Scope:	Type Scope 5: Conservation measures taken to recycle and/or reuse water, spent wash, wastewater etc. across or within specific industrial processes and systems, including wastewater recycled/ reused in a different process, but within the same site or location of the project activity. Recycled wastewater used in off-site landscaping, gardening or tree plantations/forests activity are also eligible under this Scope.
Date PCNMR Prepared	27/06/2025

The project consists of the development of a 4.4 MLD Common Effluent treatment plant, aiming to significantly reducing reliance on freshwater resources. In the absence of this project activity by Kasipalayam Common Effluent Treatment Plant Private Limited water would have sourced through groundwater extraction to meet, exacerbating the already critical issue of water scarcity in India. With urban and industrial sectors generating over 72,368 million liters of wastewater daily, only 28% of which is currently treated[3], the challenge of wastewater management remains a pressing concern[1]. The baseline scenario involved the discharge of untreated or partially treated wastewater, leading to groundwater depletion and environmental pollution. However, through the advanced treatment processes implemented—including Effluent Treatment Plants (ETPs), ultrafiltration (UF), and reverse osmosis (RO) systems—the prosject now ensures the recycling and reuse of water, reducing the dependency on groundwater and promoting a sustainable water management approach.

NITI Aayog Report, 2022: Urban Wastewater Scenario in India[3]

[2]https://pib.gov.in/Pressreleaseshare.aspx?PRID=1779784#:~:text=As%20per%20the%20report%20of,of%2031841%20mld%20is



A.3. Land use and Drainage Pattern

Not Applicable

This project activity involves treating and reusing wastewater. It doesn't include any land-use practices. Also, this is an industrial process designed with technical requirements and following the specified norms of the local pollution control board. Hence, the project activity does not harm any land and Drainage system.

A.4. Climate

The project activity does not rely on the climatic conditions of the area as it treats and reuses only the wastewater from the dying & textile without letting the water be exposed to any climatic condition

A.5. Rainfall

The project activity is not dependent on the rainfall pattern of the area as it treats and reuses the wastewater from the dying Industry.

A.6. Ground Water

Not Applicable

The project activity is not dependent on groundwater of the area, and it treats and reuses the wastewater from its own operations

A.7. Alternate methods

1. **Stormwater Harvesting:**
   Stormwater harvesting offers an alternative method for addressing water scarcity, especially in regions with high rainfall variability. But due to the high-water demand of the textile industry rainwater harvesting alone cannot meet operational needs year-round.

2. **Traditional Groundwater Extraction**: Industries and institutions often rely on groundwater abstraction for non-potable water requirements, particularly in regions where aquifers are accessible. But due to the depleted groundwater resources it further exacerbates water scarcity

3. **Surface Water Utilization** An innovative method gaining traction is nutrient recovery from wastewater, particularly in agricultural applications. By recovering nutrients like nitrogen and phosphorus from treated wastewater, it is possible to reduce the need for chemical fertilizers. This method not only helps in managing wastewater but also supports sustainable agricultural practices. With India generating significant amounts of wastewater daily, implementing nutrient recovery could reduce both environmental and agricultural dependency on chemical fertilizers, providing dual benefits of waste management and improved crop yields.

A.8. Design Specifications

This project entails the installation and operation of Common Effluent Treatment Plants (CETPs) and Ultra-Filtration Plant with Reverse Osmosis System of 4.4 MLD.

The CETP was designed to treat 4400 m^3/day of effluents from the bleaching and dyeing units listed in Table 1. The treatment scheme included Pre-treatment (equalization and biological oxidation followed by clarification, quartz filtration, resin filtration and softening filtration) and the Reverse Osmosis System for water and brine recovery.

S.No	Name of Member Units	Type of Unit	Consent quantity (m^3/Day)
1.	Amirtham Bleachers	Bleaching	135
2.	Dhanashree Bleaching & Dyeing	Dyeing	485
3.	High Power Process	Dyeing	600
4.	Friends Colours	Dyeing	255
5.	Spencer Processing Mills	Dyeing	485
6.	Sri Abinaya Dyers	Dyeing	495
7.	Shanthi Bleaching	Bleaching	110
8.	Thangamman Process	Dyeing	650
9.	Texwel Process	Dyeing	385
10.	Vikram Processors	Dyeing	200
11.	Viswam Process	Dyeing	600
Total			4400

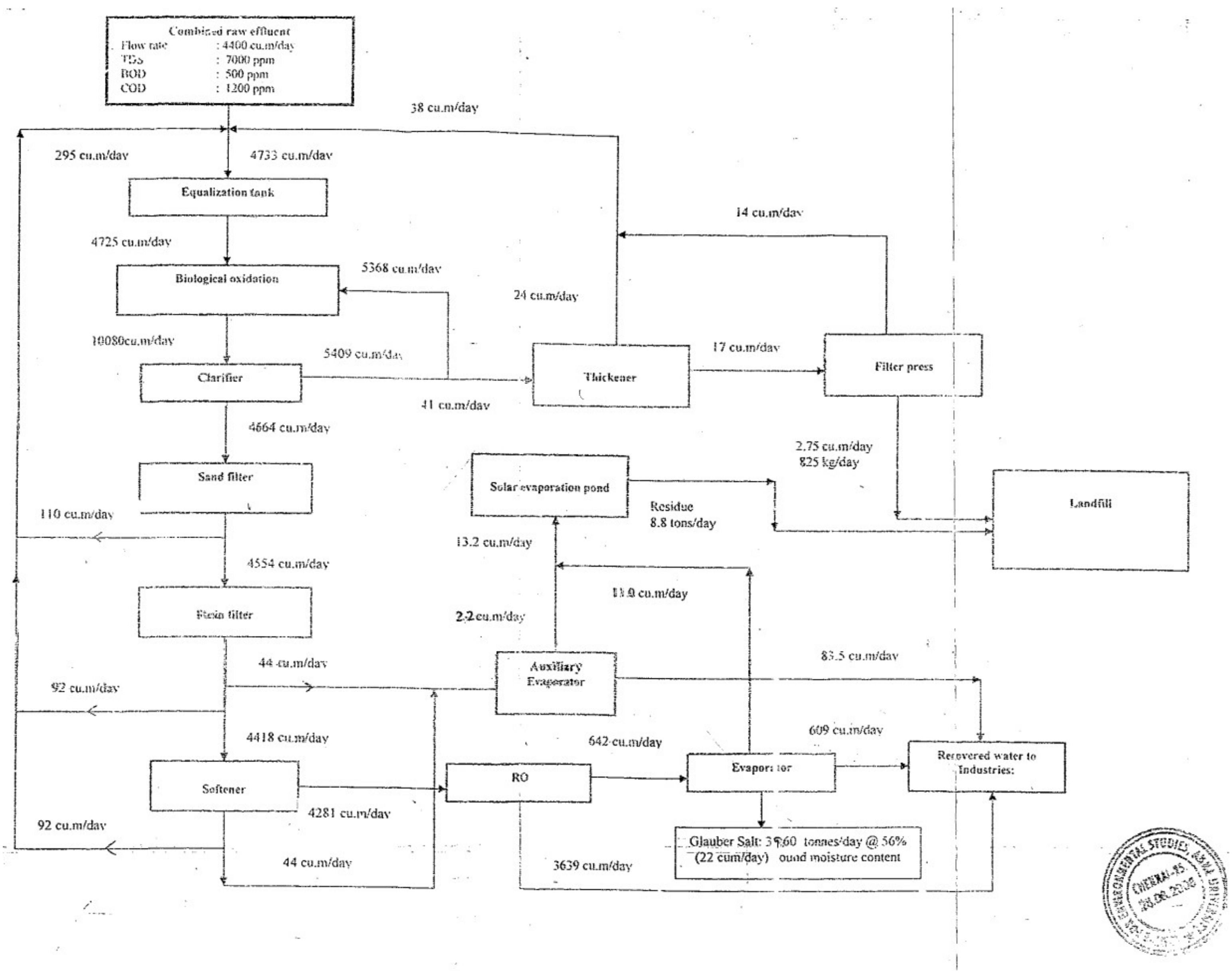
Design parameters

Description	Unit	Value
Average Flow	m^3/day	4400
COD	ppm	1000-1200
COD load	Kg/day	5280
BOD,	ppm	400-500
BOD, load	Kg/day	2200
Suspended solids	ppm	200-300
Suspended solids load	Kg/day	1320
Total Nitrogen (TKN)	ppm	10-40
Total Nitrogen (TKN) load	Kg/day	110
Temperature	°C	38
pH	ppm	8.5-10
Maximum outlet COD	ppm	50
Maximum outlet BOD.	Kg/day	5
BOD, eliminated	ppm	2189
COD Minimum yield	%	95%
BOD, Minimum yield	%	94%
TDS		6000-7000

Design Philosophy and Treatment Approach

The project design incorporates advanced physico-chemical and biological treatment processes, integrated with membrane filtration technologies (UF and RO). The treatment system is configured to achieve significant reductions in the following:

- Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD),
  - Organic pollutants, which originate from food & other material etc., are also present in sewage Such impurities are reflected in analysis of biochemical oxygen demand (BOD) and COD. These pollutants are controlled by use. of biological treatment processes
- Suspended solids:
  - The presence of SS in the sewage is one of the main problems in domestic wastewater. SS are easily visible to human eye at very low concentration.



Treatment Process

The core treatment process of this wastewater recycling project is centered around advanced biological treatment using the Moving Bed Biofilm Reactor (MBBR) technology, followed by high-rate solid-liquid separation. In this design, the clarified effluent from the primary tube settler is conveyed to the MBBR tank, where biological degradation of organic pollutants occurs. MBBR technology utilizes specially designed plastic carriers, known as biofilm carriers or media, which provide a large surface area for microbial biofilm growth. These carriers are kept in continuous motion within the reactor by fine bubble diffusers placed at the bottom of the tank. The diffusers not only supply the necessary oxygen for aerobic biodegradation but also provide the mixing energy required to maintain the suspension of biofilm carriers, ensuring uniform contact between the wastewater and the biofilm. The aerobic microorganism. The aerobic microorganisms growing on the biofilm carriers consume organic pollutants as a substrate, effectively reducing Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) by up to 90-95%.

The effluent from the MBBR tank flows through a sieving grid that retains the biofilm carriers within the reactor while allowing the treated water to pass to the secondary tube settler. This clarified effluent, with significantly reduced suspended solids, BOD, and COD concentrations, is then directed to the pre-filtration tank and subsequently pumped through a dual-stage filtration system. The first stage employs Dual Media Filters (DMF) comprising layers of sand and anthracite to remove fine suspended solids and colloidal particles, enhancing water clarity and protecting the downstream membrane units from fouling. The second stage utilizes Activated Carbon Filters (ACF), which absorb residual organic compounds, color, and odor-causing substances, acting as a polishing step to ensure high-quality effluent. The treated water from the ACF is then fed to the Ultrafiltration system. The UF system is designed to remove remaining colloids, bacteria, and high molecular weight organics, serving as an effective pretreatment step for the Reverse Osmosis (RO) system. This pretreatment significantly reduces membrane fouling in the RO unit. The RO system having vertical multistage pumps has been designed for high recovery and sustainability, using semi-permeable membranes housed in Fiber Reinforced Plastic (FRP) pressure vessels. The reject water, accounting for approximately 25% of the feed, is repurposed for plantation, and the rest 75% is repurposed for the process. The RO-UF provides a robust treatment, employing membranes with pore sizes typically 0.01-0.1 µm to remove suspended solids, colloids, bacteria, and viruses. This significantly reduces turbidity and the Silt Density Index (SDI) of the feedwater. Subsequently, Reverse Osmosis (RO) utilizes semi-permeable membranes with much finer pores (<0.001 µm) and applied pressure exceeding osmotic pressure to reject dissolved salts, ions, and low molecular weight organic molecules. The process requires significant applied pressure, substantially exceeding the osmotic pressure of the feedwater, to force water molecules across the membrane while rejecting dissolved salts, multivalent ions, and most organic contaminants. The UF permeate becomes the RO feed, protecting the RO membranes from fouling and scaling, thereby ensuring high rejection rates and producing high purity permeate for reuse or discharge.RO systems are typically designed with multiple pressure vessels in series (stages) and/or parallel arrays to optimize permeate recovery and minimize concentrate volume. Anti-scalant chemicals are commonly dosed upstream of the RO to inhibit precipitation of sparingly soluble salts like calcium carbonate, calcium sulfate, and silica on the membrane surface. Monitoring includes feed pressure, permeate pressure, concentrate pressure, permeate flow, concentrate flow, and conductivity/TDS of the feed, permeate, and concentrate streams to assess salt rejection and recovery rate. Membrane cleaning-in-place (CIP) with specialized chemicals (e.g., acidic or alkaline cleaners) is performed to remove fouling and scaling and restore performance. Permeate quality is critical and assessed against specific water quality requirements for the intended reuse application or discharge standards. The RO reject water utilized for purposes including irrigation and cleaning, while the treated water is used in the processing stages , especially for operations where water quality is less critical.

RO Treatment Steps

Following treatment steps are envisaged in the RO process;

a) Pressure sand filtration,

b) Dechlorination

c) Micron filtration

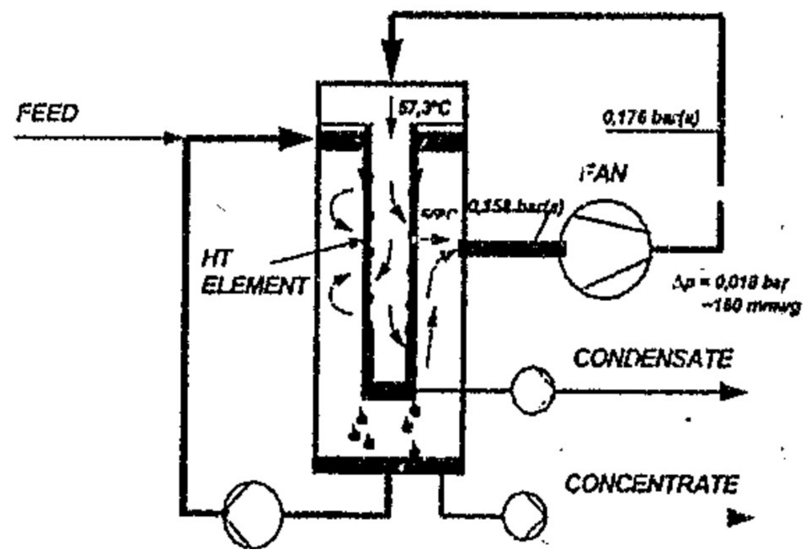
d) Antiscalant dosing

e) RO-stage-1

f) RO-stage-2

g) Degasser tower

h) RO product water storage and distribution



Simplified flow diagram of the evaporator
(operating temperature 55 deg. C)

Description

The treated water from biological section after passing through resin filters is collected in the resin filter storage tank and is drawn by centrifugal pumps and is passed through Pressure sand filters to remove any possible suspended solids formed due to the addition of sodium hypochlorite in the resin filter storage tank (pretreatment section). The filtered Water is collected in a sump, from where this water is pumped to a set of cartridge filters loaded with 5-micron (nominal rating) polypropylene fiber, honeycomb type cartridge filter elements. Also there exists two stages of filtration prior to feeding the RO membranes. The two stages of filtration comprises of a coarse. sand filtration followed by the fine filtration through 5 microns cartridge filter elements. These ensure the removal of any fine particles of less than 5 microns and further reduce the Silt Density Index.

The RO membranes shall be standard 8-inch spiral wound polyamide membranes with FRP Pressure vessels suitably selected to withstand maximum operating pressure with adequate safety factor. The RO permeate is then passed through a degasser tower to strip off the carbon di oxide gas, the pH is adjusted by suitable addition of alkali and the permeate stored in the permeate storage tank. A set of pumps deliver the recovered water to the industries through the recovered water transmission system.

Details of Design Criteria of RO System

SI. No	Description	Unit	Design criteria/value
1.	Pressure sand filters		
	Feed flow rate	cum/hr	184
	No of filters	cum/hr	20p+1s
	Velocity	m/hr	14 to 16
	Height on standing	mm	2500
	Media		Graded sand /Pebbles
2.	Cartridge filters		
	No of filters	Nos.	3 op + 1s
	Velocity	m/hr	Max. 4.0
	Element length	inches	40
	Element type		Polypropylene fiber honeycomb wound
3.	R.O plant/skid		
	No of streams	Nos.	3
	No of stages		2
	Elements/Pressure vessel	Nos.	6
	RO elements	inches	8" dia x 40" long
	R.O Recovery	%	85

	Type of membrane		Spiral wound polyamide FR type
4.	Degasser tower		
	Numbers	Nos.	1
	Hydraulic Loading	cum/m²/hr	50 to 60
	Tower height	m	2.75
5.	Chemical cleaning-cartridge filters		
	Number of filters	nos	lop+1s
	Velocity	m/h	4
	Element length	inches	40
	Element type		Polypropylene fiber honeycomb wound
6.	Cartridge filter feed tank		
	No. of tank	Nos.	1
	Capacity	m^3	100
7.	RO permeate tank		
	No. of tank	Nos.	1
	Capacity	m^3	600
8.	RO reject tank		
	No. of tank	Nos.	1
	Capacity	m^3	200

Pre-Treatment Section					
Sr. No.	TANK	DIMENSION IN MTS	TANK CAPACITY	NO OF PUMPS	PUMPING CAPACITY
1.	Collection Well -1	9m x 4.75m x 7.3m	312 KL	2W + 1S	Transfer Pump: 160 m^3 / Hr
2.	Collection Well -2	5.20m x 7.75m x 4.15m	167 KL	1W + 1S	Transfer Pump: 200 m^3 / Hr
3.	Storage and Homogeneous Tank	40.5mDia x 3mHt	3863 KL	2W	Air Flow: 220 m^3/Hr
4.	Neutralization Tank	3m x 3m x 4m	36 KL	Pump 1W +1S	220 m^3 / Hr
5.	Biological Oxidation Tank	78.7m x 19.6m x 6m	78.7m x 19.6m x 6m	78.7m x 19.6m x 6m	Air Flow: 2651 N m^3 / Hr
6.	Sedimentation Feed Tank	3.8m x 3.8m x 5.8m	3.8m x 3.8m x 5.8m	1W + 1S	Transfer Pump: 240 m^3/ Hr
7.	Clarifier	27m Dia x 2.7mHt	1545 KL	Clarifier mechanism	NA
8.	Thickener	4mDia x 8.5mSWD	47 KL	1W	Feed Pump: 10 (m^3) / Hr
9.	Filter press	1000mm x 1000mm	81 plates	NA	NA
10.	Treated Water Storage Tank	9.4m x 3.5m x 5.1m	182 KL	Pump 3W +1S	Transfer Pump: 60 (m^3) / Hr
11.	Chlorine Contact Tank	13.0m Dia X 4.3m SWD	570 KL	NA	NA
12.	Intermediate Storage Tank	7.45m x 3.85m x 5.8m	166 KL	Pump 2W +1S	Transfer Pump: 60 (m^3) / H r
13.	Quartz Filter	3.1m Dia x 3mHt	Vessel 5.0 Nos	4W + 1S	Feed Pump: 60

14.	Quartz Filter Water Storage Tank	12m x 8.5m x 5.8m	591.6 KL		(m^3) / Hr
15.		23m x 8.3m x 5.9m	1153.45 KL		
16.	Softener Filter -(A,B,C & D)	1.8m X 2.8m HOS	Vessel 4.0 Nos	5W+1S	Feed Pump: 60(m^3)/ Hr
17.	Softener Filter -(E)	3.1m Dia X 3.0m Ht	Vessel 1.0 Nos		
18.	Soft Water Storage Tank	10.0 m X 8.5m X 6.0m	510 KL	2W +1 S	Feed Pump: 110 (m^3)/ Hr
Reactive Clarifier - II (MEE Reject Treatment)					
19.	Reactive Clarifier - II	5.5m Dia X 3.0m Ht	66 KL	1W+1S	Feed Pump: 14 m^3/Hr
20.	Reactive Clarifier - II Supernatant Tank	4m x 4m x 4.1m	65. KL	1W+1S	Feed Pump: 23 m^3/Hr
21.	Filter press	1000mm x 1000mm	56 plates	NA	NA
22.	Thickener - For Reactor Clarifier I & 11	2.5mDia x 2.7m	12.2 KL	1W	Feed Pump: 10 m^3/Hr
RO Section					
23.	Micron Cartridge Filter Feed Tank -RO Feed Tank	3n x 10m x 4m	120KL	2W + 1S	Feed Pump: 65 (m^3) / H x r
24.	RO Permeate Storage Tank	4.0m x 17.2m x 10m	688 KL	2W + 1S	Transfer Pump: 80 m^3/Hr
25.	RO 4th Feed Tank	13.2m x 4.5m x 4m	238 KL	1W + 1S	Feed Pump: 60 m^3/Hr

26.	5th RO Feed Tank	4m x 6m x 4.75	141 KL	1W	Feed Pump: 30 m^3/Hr
27.	5th RO Reject tank	3.5m x 7.6m x 4m	106 KL	1W	Transfer Pump: 24 m^3/Hr
28.	RO-High Pressure Pump	(A.B.C.D)		4W + 1S	High Pressure Pump: 64 m^3/Hr
UF Section					
29.	UF Feed Tank	11.65m X 10.35m X 3.1m	374 KL	1W + 1S	Feed Pump: 60 m^3/Hr
30.	UF Product Storage Tank	5m x 6m x 4.15m	142.5 KL	1W	Transfer Pump: 50 m^3/Hr
31.	UF Backwash Tank	10.4M x 7.6m x 4m	316 KL	2W + 1S	Transfer Pump: 60 m^3/Hr
Reactive Clarifier I - (UF Back wash & Softener Regenerant)					
32.	Reactive Clarifier - I	13m Dia X 4m	530 KL	1W	NA
33.	Softener Regenerant Storage Tank	4.15m X 4.15m X 3.25m	56 KL	1 W	Transfer Pump: 15 m^3/Hr
34.	Clarifier Feed Tank	10.4m X 7.6m X 4.0m	316 KL	1W	Feed Pump: 60 m^3/Hr
35.	Flocculator Tank	3m X 2.5m	17.5 KL	1W	NA
36.	Mixing Chemical Tank	5.5m X 0.6m X 0.5m	1.6 KL	NA	NA
MVRE Section					
37.	MVRE Feed Tank	11.65m X 10.35m X 3.10m	374 KL	1W+1S	Feed Pump: 30 m^3/Hr
38.	MVRE Condensate	11.5m X 5.2m	120 KL	1W+1S	Transfer Pump: 25

	Tank /RO 5th Storage Tank	X 2.0m			m³/Hr
39.	MVRE Concentrate Tank	5.4m X 2.5m X 3.1m	41.85 KL	1W+1S	Transfer Pump: 15 m³/Hr
MEE & Crystallizer Section					
40.	MVRE Concentrate & MEE Feed Tank	5.4m X 2.5m X 3.1m	41.85 KL	1W+1S	Feed Pump: 10 m³/Hr
41.	Crystallizer Feed Tank	1.75m X 7.83m X 3 m	41 KL	1W	Feed Pump: 5 m³/Hr
Forced Circulation Evaporator & ATFD Section					
42.	FCE Feed Tank -I	5.0m X 5.5m X 4.1m	112 KL	1W+1S	Feed Pump: 5 m³/Hr
43.	FCE Feed Tank -II	5.0m X 5.5m X 4.1m	112 KL	1W	Feed Pump: 5 m³/Hr
44.	ATFD Feed Tank	2.0m X 2.0m X 2.5 m	10 KL	1W	Feed Pump: 1.5 m³/Hr
Brine Treatment Section					
45.	Brine Distribution Tank	6.0m X 7.0m X 4.3m	180.6 KL	1W+1S	Transfer Pump: 40 m³/Hr
46.	Brine Preparation Tank	4.48m X 6.1m X 3.3m - 2 NOS	180.6 KL		

Description of Civil Structures in RO Plant

Description	Quantity	Details
Cartridge filter feed tank	1	Size: 5.8 m X 5.8m X 3.0 m Volume: 100 cum Type: Closed MOC: RCC with epoxy coating
RO product water storage tank	1	Size: 15.0 m X 10.0 m X 4.0 m Volume: 600 cum Type: Closed MOC: RCC with epoxy coating
RO reject water storage tank	1	Size: 7.0 m X 7.0 m X 4.2 m Volume: 200 cum Type: Closed MOC: RCC with epoxy coating

A.9. Implementation Benefits to Water Security

Overextraction of groundwater for intensive agriculture has led to a critical decline in the water table. According to the Central Ground Water Board, 79% of Tamil Nadu's blocks are overexploited, leading to groundwater depletion at an alarming rate of 0.5 meters annually. Climate change exacerbates these challenges through erratic rainfall patterns and increased evaporation rates, heightening water scarcity risks.

The wastewater recycling project in Tamil Nadu represents a significant step toward addressing the region's water security challenges. By treating and reusing wastewater generated from industrial sources, this project reduces dependency on groundwater, thereby conserving a vital resource under severe stress. The project integrates advanced treatment technologies, including physico-chemical treatment, MBBR bioreactors, and membrane filtration systems like ultrafiltration (UF) and reverse osmosis (RO). These processes effectively eliminate contaminants, ensuring high-quality recycled water suitable for industrial reuse and non-potable applications such as landscaping and toilet flushing. Additionally, reuse minimizes the environmental impact of wastewater disposal, reducing pollution in water bodies and protecting aquatic life. This circular approach significantly reduces the reliance on groundwater, a precious natural resource. By minimizing the demand for fresh water, the operations of the plant can contribute to water conservation efforts and alleviate pressure on depleting aquifers.

This project aims to inspire the industry, particularly large multinational corporations, to implement sustainable water management practices. By demonstrating effective strategies for reducing captive water consumption and responsibly managing groundwater, the project hopes to foster a broader adoption of environmentally responsible approaches within the industry.

The wastewater recycle and reuse project aligns closely with several United Nations Sustainable Development Goals (SDGs) as it addresses interconnected global challenges by conserving freshwater, reducing environmental pollution, and enhancing resilience to climate change, which are core tenets of the SDGs. The ability of the project to integrate environmental, social, and economic benefits ensures they contribute to the SDG framework's holistic vision of creating a balanced, inclusive, and sustainable future for all.

A9.1 Objectives vs Outcomes

Objectives:

The primary objective of the wastewater recycling project at the industrial facility is to enhance water security by significantly reducing groundwater abstraction through the implementation of advanced Common Effluent Treatment Plants (CETPs). The project aims to recycle wastewater generated from domestic and industrial processes using state-of-the-art treatment technologies, including physico-chemical treatment, MBBR bioreactors, adsorption, ultrafiltration (UF), and reverse osmosis (RO). By increasing the total CETP capacity to 4.4 MLD and recycling treated water for non-potable applications within the plant, the project seeks to minimize the reliance on freshwater sources and contribute to sustainable water management practices. Furthermore, the project aims to demonstrate the economic and environmental viability of adopting high-efficiency water treatment systems, thereby encouraging other industries to implement similar solutions for resource conservation. An additional objective is to comply with stringent environmental regulations by achieving high reductions in BOD, COD, and suspended solids, ensuring that the treated effluent meets regulatory discharge standards. This contributes to environmental protection and safeguards local water bodies from contamination. The project also aims to optimize operational efficiency by utilizing high-recovery RO systems with vertical multistage pumps and FRP pressure vessels, thereby enhancing energy efficiency and reducing the overall environmental footprint of the wastewater treatment process.

Outcomes:
The implementation of the wastewater recycling project successfully achieved the desired outcomes by significantly reducing groundwater abstraction by 75-80%, thereby enhancing water security and contributing to sustainable water resource management. By recycling treated wastewater for non-potable applications, the project effectively offset the demand for freshwater, conserving valuable water resources and reducing the environmental impact of industrial water consumption. Additionally, the adoption of advanced treatment technologies, including MBBR bioreactors and high-recovery RO systems, resulted in a substantial reduction in BOD, COD, and suspended solids, ensuring compliance with environmental regulations and preventing water pollution. The high efficiency of the RO system and the strategic utilization of reject water for plantation further demonstrated the project's commitment to resource optimization and circular water management. The project also showcased the successful integration of sustainable practices within industrial operations, setting a benchmark for other industries to follow. By achieving operational efficiency and environmental sustainability, the project not only contributed to water security but also enhanced the industry's reputation as an environmentally responsible entity. Moreover, the project's success in demonstrating the economic viability of water recycling systems encouraged broader adoption of similar technologies, thereby supporting regional and national water conservation initiatives.

A9.2 Interventions by Project Owner / Proponent / Seller

The successful implementation of the wastewater recycling project at the industrial facility was achieved through strategic interventions by the project owner. These interventions played a pivotal role in optimizing water management, reducing environmental impact, and promoting sustainability. The key interventions are as follows:

1. **Comprehensive Planning and Design**

    - **Assessment of Wastewater Generation:** A detailed analysis of wastewater generation from domestic sources and the humidity plant was conducted to design an efficient treatment system. This included evaluating flow rates, contaminant levels (BOD, COD, suspended solids), and variability in wastewater composition.

- **Custom-Tailored Design Approach:** The CETPs at Unit 5 (500 KLD) and Unit 12 (500 KLD) were designed using advanced treatment technologies, including physico-chemical treatment, MBBR bioreactors, adsorption, ultrafiltration (UF), and high-recovery reverse osmosis (RO). This ensured maximum water recovery while achieving high-quality treated water suitable for non-potable applications.

- **Integration of High-Efficiency Systems:** The project incorporated energy-efficient components such as vertical multistage pumps and FRP pressure vessels to minimize power consumption and operational costs.

2. **Sustainable Water Management Practices**

    - **Water Recycling and Reuse:** Treated wastewater was strategically recycled within the plant for non-potable uses, such as in the humidity plant and other industrial applications. This intervention reduced groundwater abstraction by 75-80%, contributing significantly to water security.

    - **Circular Water Management:** Reject water from the RO system was innovatively utilized for plantation purposes, showcasing a closed-loop approach to water management. This minimized waste generation and supported sustainable landscaping practices.

3. **Stakeholder Engagement and Capacity Building**

    - **Collaboration with Technology Providers:** The project owner collaborated with leading technology providers to ensure the deployment of best-in-class wastewater treatment solutions. This partnership facilitated the integration of cutting-edge technology for optimized performance.

4. **Regulatory Compliance and Environmental Stewardship**

    - **Strict Adherence to Environmental Standards:** The project ensured compliance with stringent environmental regulations by achieving significant reductions in BOD, COD, and suspended solids, safeguarding local water bodies from contamination.

    - **Promotion of Best Practices:** By showcasing successful wastewater recycling and reuse, the project demonstrated the economic and environmental viability of advanced water treatment systems, encouraging wider adoption in the industry.

5. **Monitoring, Evaluation, and Continuous Improvement**

- **Automated Monitoring Systems:** The project implemented real-time monitoring systems to track water quality parameters, system performance, and operational efficiency, ensuring optimal functioning of the treatment plants.
- **Performance Evaluation and Feedback Mechanisms:** Regular assessments were conducted to evaluate the effectiveness of the CETPs. Feedback mechanisms were established to incorporate stakeholder inputs and continuously improve the treatment processes.

6. **Community and Environmental Impact**
    - **Water Security and Conservation:** By reducing groundwater extraction and promoting water recycling, the project contributed to long-term water security for the community and the industry.
    - **Environmental Awareness and Advocacy:** The project showcased the potential of advanced wastewater treatment technologies to conserve natural resources, setting an example for other industries to implement sustainable practices.

A.10. Feasibility Evaluation

PP has performed a feasibility study as per a detailed project description report. The findings and results of the report have been taken into consideration, the evaluation also established that the installed ETP by the PP is robust and can handle wastewater effluent fluctuations in load easily.

A.11. Ecological Aspects & Sustainable Development Goals (SDGs):

a) Inundation of Habitated Land:

The project helps prevent land inundation by efficiently managing wastewater through an advanced Effluent Treatment Plant (ETP) and evaporators, reducing uncontrolled discharge. In the absence of such systems, untreated industrial effluents could flood surrounding land areas, leading to soil contamination and loss of productive land. By implementing wastewater recycling, the project ensures that excess water is treated and reused rather than indiscriminately released, preventing potential habitat displacement and waterlogging in nearby settlements.

b) Creation of Water Logging and Vector Disease Prevention Mitigation

Uncontrolled discharge of industrial effluents and untreated sewage often leads to stagnant water accumulation, creating breeding grounds for mosquitoes and other disease-carrying vectors, which increase the risk of malaria, dengue, and other waterborne diseases. The project mitigates this risk by treating and reusing wastewater, ensuring that water does not stagnate in open areas. The use of high-recovery reverse osmosis (RO) and evaporators further ensures minimal residual wastewater, significantly reducing the chances of waterlogging and associated health hazards.

c) Deterioration of Quality of Groundwater

India faces severe groundwater depletion and contamination due to unregulated extraction and industrial pollution. In the absence of this project, the Project Proponent (KASIPALAYAM COMMON EFFLUENT TREATMENT PLANT PRIVATE LIMITED) would have continued relying on groundwater, further depleting this critical resource. Additionally, untreated effluent discharge contributes to groundwater contamination, affecting both human consumption and agricultural productivity. By implementing a closed-loop water recycling system, the project reduces groundwater dependency, prevents pollutants from infiltrating aquifers, and supports long-term water sustainability in the region.

Sustainable Development Goals Targeted	Most relevant SDG Target/Impact	Indicator (SDG Indicator)
13 CLIMATE ACTION	13.2: Integrate climate change measures into national policies, strategies and planning	Recycling and reusing wastewater is an effective solution for climate change adaptation because it helps mitigate the impacts of droughts, floods, and other extreme weather events that are becoming increasingly common due to climate change due to water scarcity. The quantity of wastewater recycled and reused by the PP is the SDG indicator.
3 GOOD HEALTH AND WELL-BEING	3.9: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination	The PP showcases how recycling and reusing wastewater can prevent depletion of natural water reserves and prevent water scarcity during droughts. The hazardous impact of industrial wastewater is now avoided due to this project. The PP ensures

		water availability in water-scarce zones that help promotes healthy lives and well-being in the region.
6 CLEAN WATER AND SANITATION	6.3: By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally	The PP has showcased recycling and safe reuse of approximately **4,69,970**liters within the industry during this monitored period, which directly correlates to this indicator 6.3.
8 DECENT WORK AND ECONOMIC GROWTH	8.5: By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value	Number of jobs created and also the Number of people trained as part of this project activity.

A.12. Recharge Aspects :

NA

Water Budget Component	Typical Estimated Uncertainty (%)	Description
Surface Inflow	1%	In accordance with the RoU Standard version 7, and considering that the flow meters are calibrated, PP has accounted for a 1% uncertainty factor in both inflow and outflow volumes to maintain a conservative approach. Consequently, an uncertainty factor of 0.98 is applied to all ROUs.

Precipitation	NA	Not available
Surface Outflow	1%	In accordance with the RoU Standard version 7, and considering that the flow meters are calibrated, PP has accounted for a 1% uncertainty factor in both inflow and outflow volumes to maintain a conservative approach. Consequently, an uncertainty factor of 0.98 is applied to all ROUs.
Evapotranspiration	NA	Not available
Deep Percolation	NA	Not available

A.13. Quantification Tools

Baseline scenario

The baseline scenario is the situation where, in the absence of the project activity, the PP would have implemented one or all of the below mentioned options:

a) installed multiple bore wells within the project boundary which would have depleted the local groundwater resources (aquifers); and/or

b) diverted existing safe drinking water resources from the surrounding residential area; and/or

c) discharged the ETP effluent without further treatment, recycling and reuse.

Hence the baseline scenario applicable is: "the net quantity of treated ETP effluent / wastewater that would be discharged directly into the local drain/sewer without further being recycled and/or reused daily post treatment per year"

The net quantity of treated water used is measured via flow meters installed at the site. For conservative purposes, the working days or operational days have been assumed at 330 days in a year during the 1st monitoring period. Starting from 1st December 2018 till 31st December 2024.

Sr. No.	Instrument Name	Make	Serial. No.	Date of calibration
1.	Magnetic Flowmeter	Krohne	184065083	22/01/2024

2.	Magnetic Flowmeter	Krohne Marshall	11304370	03/02/2024
3.	Magnetic Flowmeter	E+H	L8055320000	22/01/2024

Year	RoUs with Uncertainty Factor of 0.98 (Rounded Down)
2015	417,360
2016	444,853
2017	370,160
2018	93,626
2019	251,276
2020	350,199
2021	525,955
2022	637,895
2023	691,376
2024	778,858
Total	**4,561,559**

A.14. UWR Rainwater Offset Do No Net Harm Principles

According to the UWR RoU Standard principles, the wastewater recycling project accomplishes the following:

1. **Improved Sustainable Water Yield:** The project activity significantly enhances sustainable water yield in the region by reducing dependence on groundwater sources. The installation of advanced Common Effluent Treatment Plants (CETPs) with a combined capacity of 4.4 MLD enables the recycling and reuse of treated wastewater for non-potable purposes, such as in the humidity plant and industrial applications. This intervention reduces groundwater abstraction by 75-80%, thereby conserving vital groundwater reserves and contributing to long-term water security.
   According to the Central Groundwater Board, groundwater exploitation is critically high in industrial regions, leading to aquifer depletion and water scarcity. By treating and reusing wastewater, the project minimizes the need for freshwater withdrawal, ensuring a sustainable water balance in the area. This initiative not only demonstrates responsible water management but also reduces the burden on local water resources, promoting ecological sustainability.

2. **Preventing Unutilized Water and Rainwater from Entering Storm Drains:** The project effectively prevents unutilized wastewater from being discharged into storm drains or sewers by implementing a closed-loop water management system. The state-of-the-art CETPs are designed

to treat 4.4 MLD of wastewater, ensuring that all effluents are processed and recycled within the facility.

This approach not only prevents pollution of natural water bodies but also showcases an innovative method of capturing and reusing unutilized water resources. By integrating ultrafiltration (UF) and high-recovery reverse osmosis (RO) systems, the project maximizes water recovery, reducing wastewater discharge and enhancing resource efficiency.

3. **Conservation and Storage of Excess Water for Future Use:** The project activity conserves and stores excess treated water for future use, thus reducing reliance on external water sources. With the high-recovery RO system, the project achieves a recovery rate of approximately 75-80%, significantly conserving water resources. The stored treated water is strategically reused within the plant for non-potable purposes, ensuring its availability during periods of water scarcity.

   Additionally, the reject water from the RO process is utilized for plantation purposes within the facility, showcasing an innovative and sustainable approach to water management. This not only minimizes water wastage but also supports green landscaping, contributing to environmental sustainability.

4. **Enhancing Locals' Participation and Professional Development:** The project promotes gender inclusivity and women's empowerment by actively involving women in water management and operational roles. Through strategic capacity-building programs, the project provides skill development and employment opportunities for local women, enhancing their participation in sustainable water management practices.. This empowerment initiative not only supports gender equality but also contributes to community well-being by creating livelihood opportunities.

   By integrating social sustainability with environmental stewardship, the project sets an example of holistic community development, aligning with the UWR RoU Standard's principles of ethical and inclusive practices.

TAMILNADU POLLUTION CONTROL BOARD

Category of the Industry :

RED

LiFE Lifestyle for Environment

CONSENT ORDER NO. 2408258117960 DATED: 02/04/2024.

PROCEEDINGS NO.T5/TNPCB/F.0485TPN/RL/TPN/A/2024 DATED: 02/04/2024

SUB: Tamil Nadu Pollution Control Board - RENEWAL OF CONSENT –M/s. KASIPALAYAM COMMON EFFLUENT TREATMENT PLANT PRIVATE LIMITED , S.F.No. 249 (Part), 250 (Part), 250/1, AGRAHARA PERIAPALAYAM village, Uthukkuli Taluk and Tiruppur District - Renewal of Consent for the operation of the plant and discharge of emissions under Section 21 of the Air (Prevention and Control of Pollution) Act, 1981 as amended in 1987 (Central Act 14 of 1981) –Issued- Reg.

REF: 1. Board Proc.No. T5/TNPCB/ F.0485TPN/RL/TPN/W&A/2023 dated : 24.03.2023

2. DEE/TPR(N), IR.No : F.0485TPN/RL/AE/TPN/2024 dated 27.03.2024

RENEWAL OF CONSENT is hereby granted under Section 21 of the Air (Prevention and Control of Pollution) Act, 1981 as amended in 1987 (Central Act 14 of 1981) (hereinafter referred to as "The Act") and the rules and orders made there under to

The Managing Director
M/s . KASIPALAYAM COMMON EFFLUENT TREATMENT PLANT PRIVATE LIMITED
S.F No. 249 (Part), 250 (Part), 250/1
AGRAHARA PERIAPALAYAM Village
Uthukkuli Taluk
Tiruppur District.

Authorizing the occupier to operate the industrial plant in the Air Pollution Control Area as notified by the Government and to make discharge of emission from the stacks/chimneys.

This is subject to the provisions of the Act, the rules and the orders made there under and the terms and conditions incorporated under the Special and General conditions stipulated in the Consent Order issued earlier and subject to the special conditions annexed.

This RENEWAL OF CONSENT is valid for the period ending **March 31, 2026**

S RAGUPATHI Digitally signed by S RAGUPATHI Date: 2024.04.02 18:01:49 +05'30'

For Member Secretary,
Tamil Nadu Pollution Control Board,
Chennai

TAMILNADU POLLUTION CONTROL BOARD

SPECIAL CONDITIONS

1. This renewal of consent is valid for operating the facility for the manufacture of products (Col. 2) at the rate (Col. 3) mentioned below. Any change in the products and its quantity has to be brought to the notice of the Board and fresh consent has to be obtained.

Sl. No.	Description	Quantity	Unit
	Product Details		
1.	CETP undertakes Collection, Conveyance, Treatment, Recovery and Reuse of trade effluent arising from its 11 member units (2 Bleaching + 9 Dyeing)(Restricted to 90% of 4400 KLD)	3960	KLD

2. This renewal of consent is valid for operating the facility with the below mentioned emission/noise sources along with the control measures and/or stack. Any change in the emission source/control measures/change in stack height has to be brought to the notice of the Board and fresh consent/Amendment has to be obtained.

I	Point source emission with stack :			
Stack No.	Point Emission Source	Air pollution Control measures	Stack height from Ground Level in m	Gaseous Discharge in Nm3/hr
1	Diesel Generator 725 KVA	Acoustic enclosures with stack	15	
2	Diesel Generator 725 KVA	Acoustic enclosures with stack	15	
3	Diesel Generator 500 KVA	Acoustic enclosures with stack	15	
4	Coal Fired Boiler 10 T/hr	Cyclone separator attached Wet Scrubber with Common stack	30.0	
4	Wood fired Boiler 6 T	Dust collector with Common Stock	30.0	
II	Fugitive/Noise emission :			
Sl. No.	Fugitive or Noise Emission sources	Type of emission	Control measures	
1.	Diesel Generator 725 KVA	Noise	Acoustic Enclosures with stack	
2.	Diesel Generator 725 KVA	Noise	Acoustic Enclosures with stack	
3.	Diesel Generator 500 KVA	Noise	Acoustic Enclosures with stack	

Special Additional Conditions:

The unit shall obtain No Objection Certificate (NOC) from the Tamil Nadu Bio Diversity Board /National Bio Diversity Authority if the unit is using any Biological resources or knowledge associated thereto as per the provisions of Biological Diversity Act 2002.

TAMILNADU POLLUTION CONTROL BOARD

SPECIAL CONDITIONS

1. This renewal of consent is valid for operating the facility for the manufacture of products/byproducts (Col. 2) at the rate (Col 3) mentioned below. Any change in the product/byproduct and its quantity has to be brought to the notice of the Board and fresh consent has to be obtained.

Sl. No.	Description	Quantity	Unit
	Product Details		
1.	CETP undertakes Collection, Conveyance, Treatment, Recovery and Reuse of trade effluent arising from its 11 member units (2 Bleaching + 9 Dyeing)(Restricted to 90% of 4400 KLD)	3960	KLD

2. This renewal of consent is valid for operating the facility with the below mentioned outlets for the discharge of sewage/trade effluent. Any change in the outlets and the quantity has to be brought to the notice of the Board and fresh consent has to be obtained.

Outlet No.	Description of Outlet	Maximum daily discharge in KLD	Point of disposal
Effluent Type : Sewage			
1.	Sewage	2.5	On Industrys own land
Effluent Type : Trade Effluent			
1.	Trade Effluent-1(Permeate and Condensate)	3785.76	Redistributed to its member units through Pipeline conveyance system for Reuse
2.	Trade Effluent - 2 (Brine Solution)	158.4	Redistributed to its member units through Pipeline conveyance system for Reuse
3.	Trade Effluent - 3 (Crystalizer concentrate)	15.84	Mother liquor to ATFD for the recovery of Mixed salt

Special Additional Conditions:

The unit shall obtain No Objection Certificate (NOC) from the Tamil Nadu Bio Diversity Board /National Bio Diversity Authority if the unit is using any Biological resources or knowledge associated thereto as per the provisions of Biological Diversity Act 2002.

The industries shall take all efforts to use and popularize "Mission LiFE" logo and mascot which is available in TNPCB & MoEFCC website. They shall also request their employees to adopt "Mission LiFE" action points and document the same and furnish half yearly report to Board.

Additional Conditions:

TAMILNADU POLLUTION CONTROL BOARD

The industries shall take all efforts to use and popularize "Mission LiFE" logo and mascot which is available in TNPCB & MoEFCC website. They shall also request their employees to adopt "Mission LiFE" action points and document the same and furnish half yearly report to Board.

Additional Conditions:

1. The CETP Company shall operate and maintain APC measures connected to boiler and diesel generator efficiently and continuously and adhere to the Ambient Air Quality Ambient Noise Level standards prescribed by the Board.

2. The CETP Company shall adhere to the Ambient Air Quality / Ambient Noise Level standards prescribed by the Board.

3. The CETP Company shall continue to develop green belt in and around the premises.

4. The CETP Company shall dispose the ash generated from the Boiler for further beneficial use without dumping on the road side/water courses.

S RAGUPATHI Digitally signed by S RAGUPATHI Date: 2024.04.02 18:02:26 +05'30'

For Member Secretary,
Tamil Nadu Pollution Control Board,
Chennai

To
The Managing Director,
M/s.KASIPALAYAM COMMON EFFLUENT TREATMENT PLANT PRIVATE LIMITED,
S.F. No. 249 (Part), 250 (Part), 250/1 Agraharaperiyapalayam Village
Uthukuli Taluk, Tiruppur District
Pin: 641607

Copy to:

1.The Commissioner, UTHUKULI-Panchayat Union, Uthukkuli Taluk, Tiruppur District .
2. The District Environmental Engineer, Tamil Nadu Pollution Control Board, TIRUPPUR NORTH.
3. The JCEE-Monitoring, Tamil Nadu Pollution Control Board, Coimbatore.
4. File

Tamil Nadu Pollution Control Board

From	To
Er. M. Saravanakumar. M.E., District Environmental Engineer, Tamil Nadu Pollution Control Board Tiruppur North, II Floor, Kumaran Commercial Complex, Kumaran Road, Tiruppur – 641 601.	The Managing Director, M/s. Kasipalayam CETP Private Limited, S.F.No.249 Part, 250 Part, 250/1, Agraharaperiyapalayam Village, Uthukkuli Taluk, Tiruppur District - 641 607.

Letter No. : F. No. TPN0007/DEE/TNPCB/TPN/2024, dated. 20.08.2024.

Sir,

Sub: TNPC Board, O/o. DEE, Tiruppur North – CETP – M/s. Kasipalayam CETP Private Limited - Analysis of trade effluent samples –Report of Analysis communicated- Reg.
S,,

Ref : Trade effluent samples collected from your CETP on 12.07.2024.

* * * * * * * *

I herewith enclosed the Report of Analysis of the Trade effluent samples collected from your CETP on 12.07.2024. It is requested to operate the effluent treatment plant efficiently and continuously so as to bring the quality of treated effluent to satisfy the standards prescribed by the Board.

The receipt of this letter may be acknowledged.

Encl: ROA Code Nos. DEETPN 240270 to DEETPN 240272

for M. Shariff 21/8/24
District Environmental Engineer,
Tamil Nadu Pollution Control Board,
Tiruppur North.

ROA of M/s.

TAMILNADU POLLUTION CONTROL BOARD
DISTRICT ENVIRONMENTAL LABORATORY
TIRUPPUR
IInd Floor, Kumaran Complex, Kumaran Road, Tiruppur-1.
Telephone : 0421 – 2244876

REPORT OF ANALYSIS

Report No: W – 395 to 397 /DEL/TPR/2024-2025/**Dated.** 02.08.2024

1. Name and Address of the sender : The DEE, TNPCB/ Tiruppur(N),
2. Sample Collected by : The DEE/AEE/AE/TNPCB/ Tiruppur(N),
3. Nature & Number of samples : 3 No's Trade Effluent Samples
4. Date and time of collection : 12.07.2024 at 12.40 PM to 01.10 PM
5. Date and time of receipt at the Laboratory : 12.07.2024 at 03.50 PM
6. Point of collection :
   1. MEE Feed
   2. MEE Reject
   3. MEE Condensate

Sl. No	Parameters	DEE Code	DEETPN 240270	DEETPN 240271	DEETPN 240272
		LAB Code	395	396	397
1.	pH	(Num)	7.67	8.87	7.68
2.	Total suspended solids	(mg/L)	492	1428	2
3.	Total Dissolved Solids	(mg/L)	119092	335996	46
4.	Chloride (as Cl)	(mg/L)	11252	35223	8
5.	Sulfate (as SO4)	(mg/L)	57734	166840	7
6.	COD	(mg/L)	2720	9200	8
7.	BOD 3 days at 27°C	(mg/L)	< 2	75	< 2

Dy. CHIEF SCIENTIFIC OFFICER
DISTRICT ENVIRONMENTAL LABORATORY,
TAMILNADU POLLUTION CONTROL BOARD,
TIRUPPUR.

A.15. Scaling Projects-Lessons Learned-Restarting Projects

1. **Challenges in Scaling Wastewater Recycling Projects**

   - **Public Perception and Acceptance:** One of the major challenges faced in scaling wastewater recycling projects is public perception. In many regions, the notion of using treated wastewater for industrial or non-potable applications faces resistance due to misconceptions about safety and quality. Lessons from other projects indicate that effective communication strategies are crucial to changing public perception. Engaging stakeholders through awareness programs and transparent information dissemination can help build public trust and acceptance.

   - **Cost and Operational Challenges:** Initial capital investment and operational costs can be high for advanced wastewater recycling technologies such as ultrafiltration (UF) and reverse osmosis (RO). Additionally, maintenance of sophisticated systems requires skilled personnel, which can be a limiting factor for scaling up. Projects must explore cost-effective solutions, optimize operational efficiencies, and seek revenue from carbon credits or water credits to ensure financial sustainability.

   - **Regulatory and Policy Barriers:** Inconsistent regulations and lack of comprehensive policies for wastewater reuse can hinder project scaling. Coordinated efforts with regulatory authorities are necessary to establish clear guidelines that promote wastewater recycling while ensuring environmental safety.

2. **Lessons Learned from Project Implementation**

   - **Integration with Industrial Processes:** The success of the wastewater recycling project is largely attributed to its seamless integration with the existing industrial processes. By recycling treated water for non-potable applications like the humidity plant and plantation activities, the project effectively reduces groundwater abstraction by 75-80%. This approach highlights the importance of designing projects that align with the operational needs of industries, ensuring continuous demand and utilization of recycled water.

   - **High Efficiency and Sustainability through Advanced Technologies:** The use of high-recovery RO systems and energy-efficient vertical multistage pumps has demonstrated significant water conservation and energy savings. Implementing state-of-the-art technologies that enhance efficiency and sustainability is a key takeaway for scaling similar projects.

   - **Demonstrating Tangible Environmental and Economic Benefits:** The project's ability to significantly reduce BOD, COD, and suspended solids while ensuring cost savings from reduced groundwater usage has been instrumental in gaining stakeholder support. It underscores the importance of showcasing both environmental and economic benefits to drive acceptance and scalability.

3. **Restarting Projects and Overcoming Setbacks**

   - **Learning from Abandoned Initiatives:** In some instances, wastewater recycling projects are abandoned due to financial constraints, technical failures, or lack of public acceptance. However, with the availability of revenue from water credits (RoUs) under the UWR Program, previously abandoned projects can be revived. This financial mechanism provides a much-needed incentive for industries to voluntarily treat and reuse wastewater, ensuring long-term sustainability.

   - **Adapting to Changing Regulations and Market Dynamics:** The wastewater recycling industry is influenced by evolving regulations and market conditions. Projects must be agile in adapting to new policies, technological advancements, and changing stakeholder expectations. Revisiting and updating project designs to align with current standards is essential for restarting stalled projects.

   - **Building Resilience through Strategic Partnerships:** Collaboration with stakeholders, including government agencies, technology providers, and financial institutions, plays a vital role in restarting and scaling wastewater recycling projects. Strategic partnerships can provide access to funding, technical expertise, and policy support, ensuring resilience against future setbacks.

4. **Roadmap for Scaling and Expansion**

   - **Replicability and Standardization:** To achieve large-scale implementation, standardizing processes and replicating successful models in different industrial settings is crucial. The current project demonstrates a replicable model of wastewater recycling that can be adapted to various industries facing water scarcity challenges.

   - **Leveraging Carbon and Water Credits for Financial Viability:** The sale of water credits under the UWR Program presents an opportunity to create a revenue stream that supports scaling and expansion. This financial model incentivizes industries to adopt wastewater recycling practices, ensuring economic feasibility while contributing to environmental sustainability.

   - **Community Engagement and Awareness Building:** Public acceptance remains a challenge, especially in regions where recycled water usage is not culturally accepted. Building community awareness through targeted communication campaigns, stakeholder workshops, and transparent reporting of environmental and health benefits is critical for scaling up.

THE SOUTH INDIA TEXTILE RESEARCH ASSOCIATION

TEXTILE CHEMISTRY DIVISION

Chemical Testing Laboratory (Textiles, Chemicals, Food, Water and Effluent)

ISO/IEC 17025 : 2017 NABL ACCREDITED VIDE CERTIFICATE NO. TC-6944

Test Report No : W2300474

Kasipalayam Cetp Pvt.Ltd

Report Date : 27-09-2023

Ref : 553-Dt.21.09.2023

Total Nitrogen**	W2300474-1 Sample Particulars as given by Customer : Water Sample SHT	W2300474-2 Sample Particulars as given by Customer : Water Sample BIOT	W2300474-3 Sample Particulars as given by Customer : Water Sample Clarifier
Total Nitrogen, mg/L	30.7	6.52	4.35

- End of Report

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THE SOUTH INDIA TEXTILE RESEARCH ASSOCIATION

TEXTILE CHEMISTRY DIVISION

Chemical Testing Laboratory (Textiles, Chemicals, Food, Water and Effluent)

ISO/IEC 17025 : 2017 NABL ACCREDITED VIDE CERTIFICATE NO. TC-6944

Kasipalayam Cetp Pvt.Ltd

TEST RESULTS - W2300396 *Ref : 449-Dt.23.08.2023* *Report Date : 13-09-2023*

Inward No: W2300396

Descriptionb: Raw Effluent

Test Parameter	Result
Non-Biodegradable COD	249 mg/L

- End of Report -

Prepared By Reviewed By Authorised Signatory

IMPORTANT

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+91 427 3553346 +91 98940 31046 +91 81690 66785 bombaytesthouse.salem@gmail.com

Central Laboratory : Fourth Floor, Unit No.1, Banking Complex II, Plot No 9 & 10, Sector 19-A, Nr.APMC Market 2, Vashi, Navi Mumbai - 400 703. Maharastra
+91 22 4123 9185 +91 22 2783 1910 +91 98677 91055 enquiry@bombaytesthouse.com bombaytesthouse@gmail.com

TEST REPORT

A23/419

Lab Memo No :**E/243** Sample No :**AUGB23/11** Date : **18/08/2023**

Sample Submited by**party**
Received by us on :**02/08/2023**

We hereby certify that a sample described as :**WATER**
Received from :M/s. **KASIPALAYAM COMMON EFFLUENT TREATMENT PLANT PVT LT**
With the following marks : **Neutralization Tank Water**

Quantity : **1 Liter**
Analyzed on received basis and the results are obtained as follows:

	PARAMETERS	TEST METHOD	RESULTS
1	Total Suspended Solids	IS 3025 P.17 1984 RA 2009	**51mg/l**

>>>>>End of the report<<<<<

Total No Of Determination : 1 **[One Only.]**

For Bombay Test House Pvt Ltd

Authorised Signatory

★ BIS Recognized Assaying & Hallmarking Center for Gold & Silver Artefacts ★

Note:1. The test results are to the above submitted sample(s) only. 2. This report cannot be re-produced or used wholly or in part, and cannot be sued as Legal Evidence or for any advertising media without the prior written permission of Bombay Test House Pvt. Ltd. 3. Samples will be retained by us for one month for non-perishable items only. Perishable items will be destroyed after the completion of test. 4. Total liability of our Laboratory is limited to this Invoice amount only. 5. The above tested parameter(s) are not covered under NABL scope.

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Central Laboratory : Fourth Floor, Unit No.1, Banking Complex II, Plot No 9 & 10, Sector 19-A, Nr.APMC Market 2, Vashi, Navi Mumbai - 400 703. Maharastra
+91 22 4123 9185 +91 22 2783 1910 +91 98677 91055 enquiry@bombaytesthouse.com bombaytesthouse@gmail.com

TEST REPORT

A23/418

Lab Memo No :**E/243** Sample No :**AUGB23/10** Date : **18/08/2023**

Sample Submited by**party**
Received by us on :**02/08/2023**

We hereby certify that a sample described as :**WATER**
Received from :M/s. **KASIPALAYAM COMMON EFFLUENT TREATMENT PLANT PVT LT**
With the following marks : **Effluent Water**

Quantity : **5 Liter**
Analyzed on received basis and the results are obtained as follows:

	PARAMETERS	TEST METHOD	RESULTS
1	Lead as Pb	ICP-OES	**ND (LOQ=0.008)**
2	Arsenic as As	ICP-OES	**0.03mg/l**
3	Cadmium as Cd	ICP-OES	**ND (LOQ=0.0061)**
4	Chromium as Cr	ICP-OES	**0.53mg/l**
5	Thallium as Tl	ICP-OES	**ND (LOQ=0.013)**
6	Mercury as Hg	ICP-OES	**ND (LOQ=0.0069)**
7	BOD at 20° C for 5 days Incubation	IS:3025 P44:1993 RA 2009	**Nil**
8	COD	IS 3025 P.58:1988 -RA 2009	**33456mg/l**

>>>>>End of the report<<<<<

Total No Of Determination : 8 **[Eight Only.]**

For Bombay Test House Pvt Ltd

Authorised Signatory

★ BIS Recognized Assaying & Hallmarking Center for Gold & Silver Artefacts ★

Note:1. The test results are to the above submitted sample(s) only. 2. This report cannot be re-produced or used wholly or in part, and cannot be sued as Legal Evidence or for any advertising media without the prior written permission of Bombay Test House Pvt. Ltd. 3. Samples will be retained by us for one month for non-perishable items only. Perishable items will be destroyed after the completion of test. 4. Total liability of our Laboratory is limited to this Invoice amount only. 5. The above tested parameter(s) are not covered under NABL scope.

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