UWR Rainwater Offset Unit Standard

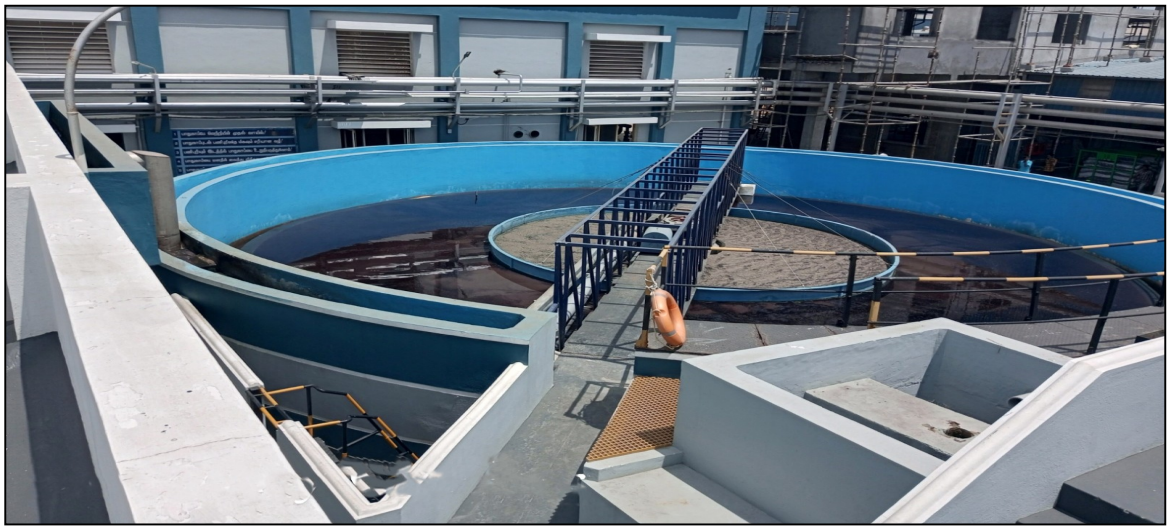
(UWR RoU Standard)

Concept & Design: Universal Water Registry

www.uwaterregistry.io

Project Concept Note & Monitoring Report

(PCNMR)



Project Name: Jeyavishnu Wastewater Recycle & Reuse Project, Tirupur

UWR RoU Scope:5

Monitoring Period: 01/01/14- 31/12/2024

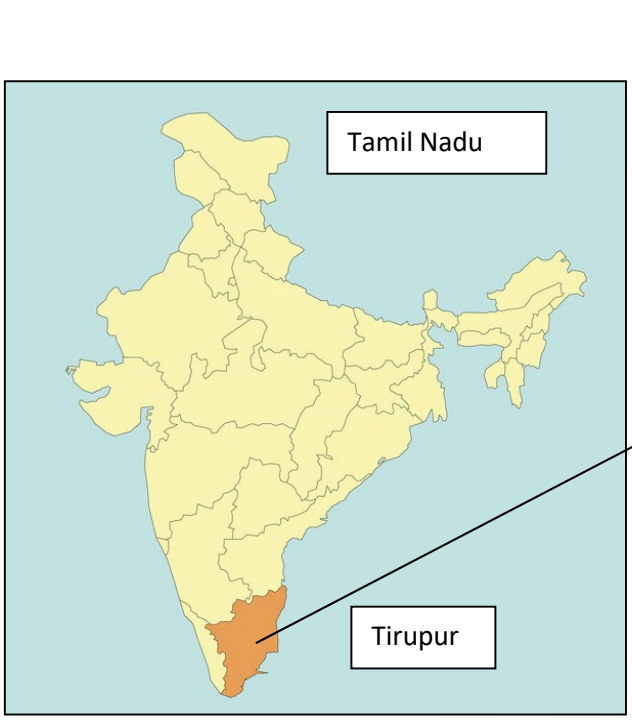
Crediting Period: 2014- 2024

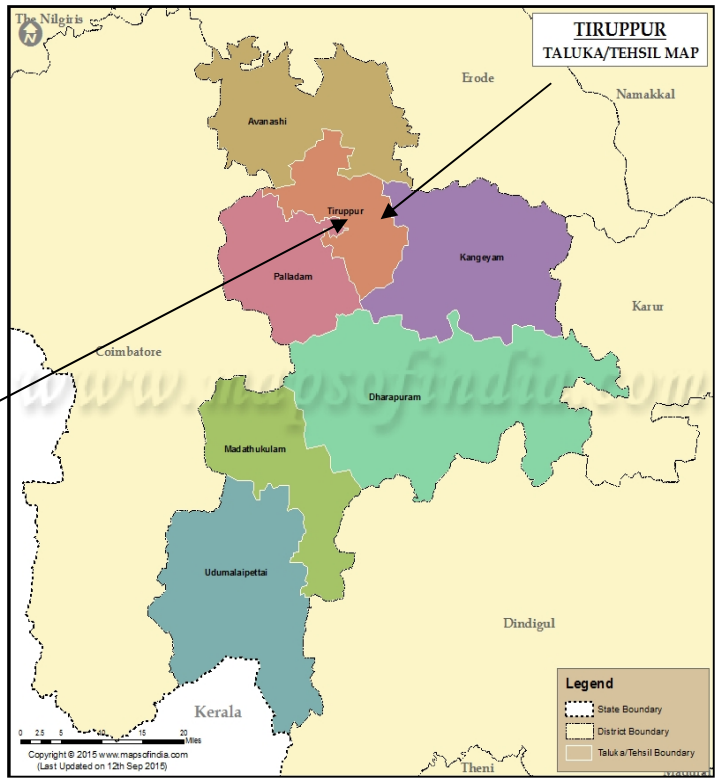
UNDP Human Development Indicator:0.64[1]

[1] https://www.undp.org/

A.1 Location of Project Activity

Address of the Project Activity	S.F. No:163/1B, Patchankattupalayam, Karaipudur Village, Arulpuram, Tirupur-641605
State	Tamil Nadu
District	Tirupur
Block Basin/Sub Basin/Watershed	Noyyal river basin http://cgwb.gov.in/watershed/basinsindia.html
Lat. & Longitude	Latitude: 11.033248 Longitude: 77.326726
Area Extent	Textile Industry
No. of Villages/Towns	Karaipudur





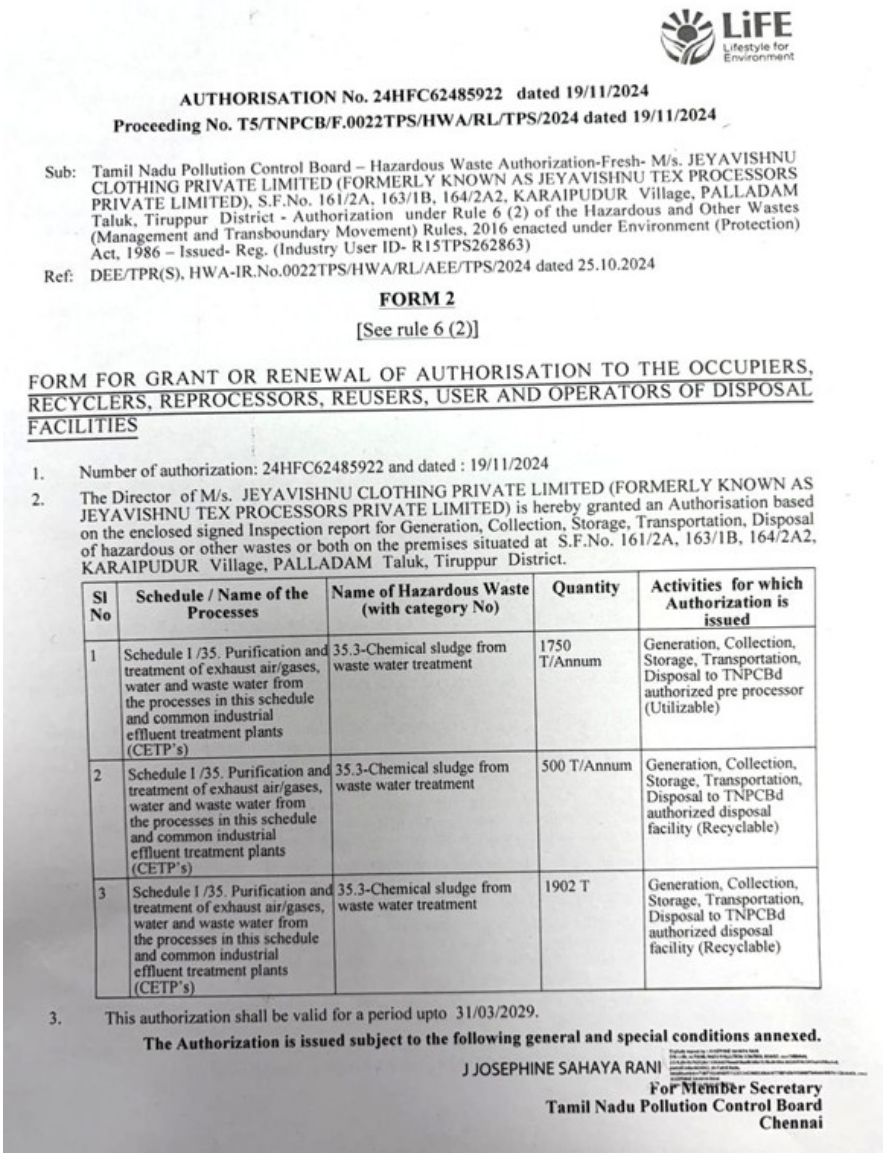
Project Activity

Purpose of the project activity:

Jeyavishnu Clothing Private Limited installed 3.6 MLD capacity Effluent treatment Plant, which was commissioned in 2013. The operation capacity is 2.6 KLD. The plant is designed to treat the effluent with complete biological oxidation process and reverse osmosis system with Installation of new MBR system in the year March'2023. Design flow, pressure and treated water parameters were achieved as per TNPCB norms.

Nowadays, the treatment of water occupies a predominant place in modern industries. Moreover, treatment of water is required for various purposes, from portable use to industrial applications such as food, beverages, leather, textiles and heavy chemical industries. Also, the treatment of wastewater especially effluent from toxic disposals attracts attention nowadays due to increase global awareness of ecological & environmental protection.

Treatment of water implicitly means changing its physical & mainly its chemical properties by removing undesirable suspended & dissolved impurities of both organic & inorganic nature. The level of chemical dosing involved, and methods adopted for treatment are according to the end consumers requirement as well as the nature of composition of raw water sources, which are all mainly from surface wells, lakes, rivers or from underground sources such as deep wells in some places from sea.



AUTHORISATION No. 24HFC62485922 dated 19/11/2024

Proceeding No. T5/TNPCB/F.0022TPS/HWA/RL/TPS/2024 dated 19/11/2024

Sub: Tamil Nadu Pollution Control Board – Hazardous Waste Authorization-Fresh- M/s. JEYAVISHNU CLOTHING PRIVATE LIMITED (FORMERLY KNOWN AS JEYAVISHNU TEX PROCESSORS PRIVATE LIMITED), S.F.No. 161/2A, 163/1B, 164/2A2, KARAIPUDUR Village, PALLADAM Taluk, Tiruppur District - Authorization under Rule 6 (2) of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 enacted under Environment (Protection) Act, 1986 – Issued- Reg. (Industry User ID- R15TPS262863)

Ref: DEE/TPR(S), HWA-IR.No.0022TPS/HWA/RL/AEE/TPS/2024 dated 25.10.2024

FORM 2

[See rule 6 (2)]

FORM FOR GRANT OR RENEWAL OF AUTHORISATION TO THE OCCUPIERS, RECYCLERS, REPROCESSORS, REUSERS, USER AND OPERATORS OF DISPOSAL FACILITIES

1. Number of authorization: 24HFC62485922 and dated : 19/11/2024
2. The Director of M/s. JEYAVISHNU CLOTHING PRIVATE LIMITED (FORMERLY KNOWN AS JEYAVISHNU TEX PROCESSORS PRIVATE LIMITED) is hereby granted an Authorisation based on the enclosed signed Inspection report for Generation, Collection, Storage, Transportation, Disposal of hazardous or other wastes or both on the premises situated at S.F.No. 161/2A, 163/1B, 164/2A2, KARAIPUDUR Village, PALLADAM Taluk, Tiruppur District.

Sl No	Schedule / Name of the Processes	Name of Hazardous Waste (with category No)	Quantity	Activities for which Authorization is issued
1	Schedule I /35. Purification and treatment of exhaust air/gases, water and waste water from the processes in this schedule and common industrial effluent treatment plants (CETP's)	35.3-Chemical sludge from waste water treatment	1750 T/Annum	Generation, Collection, Storage, Transportation, Disposal to TNPCBd authorized pre processor (Utilizable)
2	Schedule I /35. Purification and treatment of exhaust air/gases, water and waste water from the processes in this schedule and common industrial effluent treatment plants (CETP's)	35.3-Chemical sludge from waste water treatment	500 T/Annum	Generation, Collection, Storage, Transportation, Disposal to TNPCBd authorized disposal facility (Recyclable)
3	Schedule I /35. Purification and treatment of exhaust air/gases, water and waste water from the processes in this schedule and common industrial effluent treatment plants (CETP's)	35.3-Chemical sludge from waste water treatment	1902 T	Generation, Collection, Storage, Transportation, Disposal to TNPCBd authorized disposal facility (Recyclable)

3. This authorization shall be valid for a period upto 31/03/2029.

The Authorization is issued subject to the following general and special conditions annexed.

J JOSEPHINE SAHAYA RANI

For Member Secretary
Tamil Nadu Pollution Control Board
Chennai

NOC For 3. Safe Disposal of Effluent dated- 19/11/202

The Technical Appraisal of Solid Wastes Disposal

Tamil Nadu Pollution Control Board (TNPCB) has given permission (consent number 24HFC62485922, dated 19-12-2024) for safe storage of Hazardous solid waste generated from ETP.

MBR system (Membrane Bioreactor)

AERATION TANK

Equalization Tank

Neutralization Tank

Printing ETP

MBR blower and pumps

Agitated Thin Film Dryer

RO system

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

Project Proponent (PP):	Jeyavishnu Clothing Private Limited
UCR Project Aggregator	Viviid Emissions Reductions Universal Private Limited
Contact Information:	lokesh.jain@viviidgreen.com

The Project Proponent (PP) affirms that they meet all the requirements outlined in the management plan regarding ownership, legal rights, permits, and cost details for the successful implementation of the project. Specifically.

Water User Rights: The PP holds the necessary water user rights for the area within the project's boundary. These rights are legally secured and ensure that the PP has full entitlement to use the water resources required for the project's operations accredited By TNPCB.

Legal Land Title: The PP holds an uncontested legal land title for the entire project area within the project's boundary. The title is fully documented and free of any disputes, confirming the PP's legal right to utilize the land for project purposes.

Necessary Permits: The PP has obtained all the required permits for the implementation of the project. In cases where certain permits are pending, the PP has already applied for the necessary approval and is working in full compliance with the relevant regulatory requirements to ensure the timely commencement of the project.

Cost Details: The PP has thoroughly assessed and documented the cost details for project implementation. A detailed cost breakdown is available in the DPR, Capital Cost of project was RS. 60 Crores. covering all aspects of project development, including infrastructure, permits, equipment, and operational costs.

By meeting these criteria, the PP ensures that all legal and regulatory requirements for the project are satisfied, enabling the project to proceed without hindrance.

A.2.1 Project RoU Scope

PROJECT NAME	**Jeyavishnu Wastewater Recycle & Reuse Project, Tirupur**
UWR Scope:	Scope 5: Conservation measures taken to recycle and/or reuse water, spent washing 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	31-03-2025

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

NA

A.7. Alternate methods

All Textile Plant in Tamil Nadu, They have a mandate to maintain the TDS below 1500 mg/L from the state government; however, they have installed Membrane Bioreactor (MBR) and Agitated Thin Film Dryer (ATFD), which serve as alternative solutions for the Effluent Treatment Plant (ETP). RO is used to remove dissolved solids, and MBR helps as membranes act as a physical barrier, effectively removing suspended solids, bacteria, and viruses. These systems are designed to reduce the TDS levels in the effluent.

Despite the installation of RO and MBR systems, the TDS level in the treated effluent remains much higher than the standards set by the Pollution Control Board (PCB). As a result, the JVCPL has installed a MEE(Multiple effect evaporator) & Zero Liquid Discharge (ZLD) system as an alternative method to ensure compliance with the regulatory requirements. The ZLD system helps in eliminating the discharge of liquid waste by treating all effluent and recovering water for reuse, thus effectively reducing the TDS concentration and achieving the desired standards.

The RoU program promotes wastewater treatment and reuse initiatives, thereby offering an alternative to the release of wastewater through surface Discharge which could have an adverse impact on soil Health.

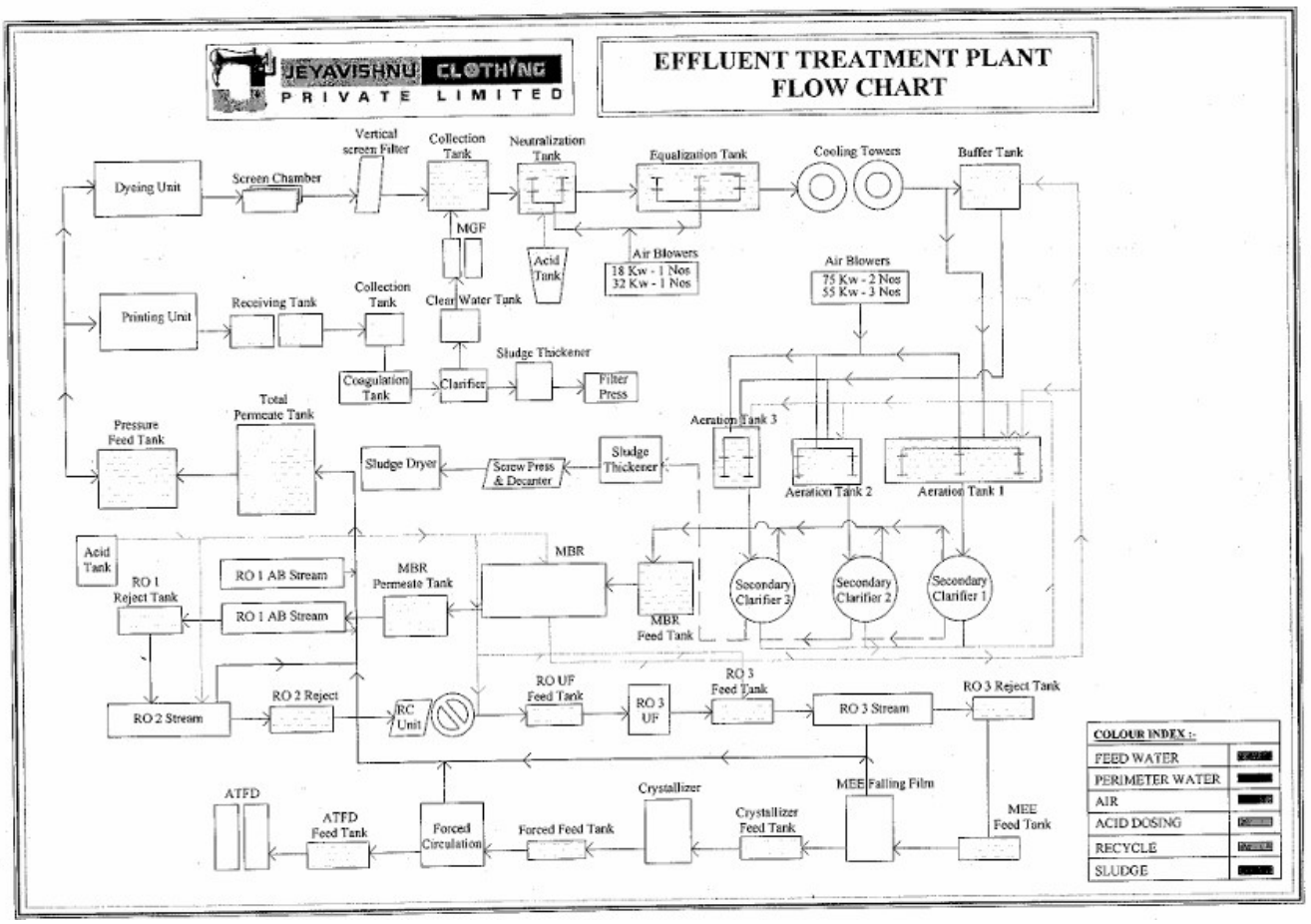
A.8. Design Specifications

EFFLUENT TREATMENT PLANT: PROCESS DESCRIPTION

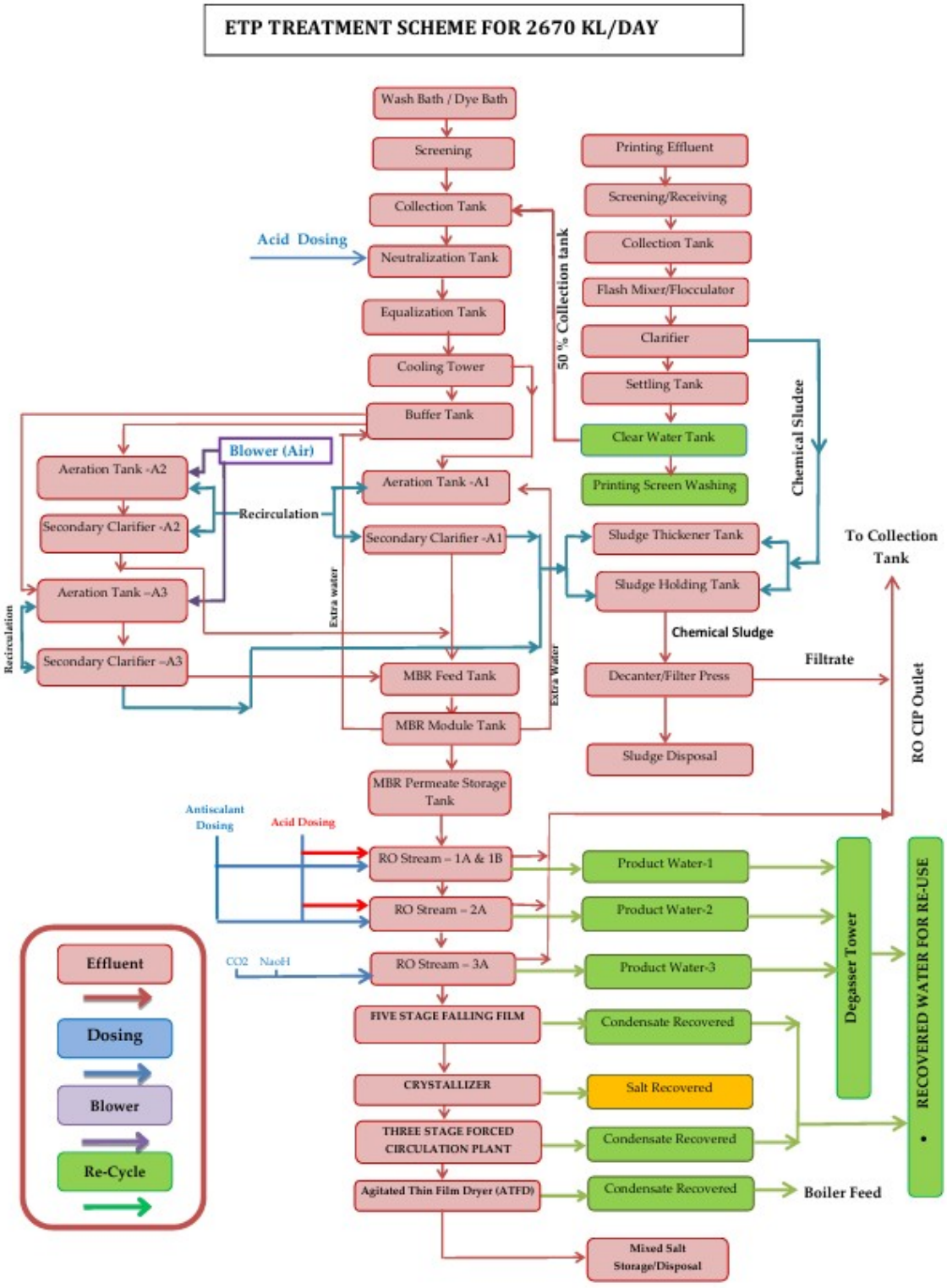
The effluents from the different sections in process are collected into a collection tank through a Bar Screen for removal of fibrous materials & solid particles. From the collection tank the effluent is pumped to equalization tanks, the collection tank will be of 2 compartments each having capacity of 250 KL capacity. From the equalization tanks, the effluent is pumped to cooling tower and collected in buffer tank, from buffer tank effluent fed into A1, A2 and A3 Aeration tank. Aeration is done using energy efficient diffused aeration system, which results in compact layouts and reduces the power consumption. Air from the blower is diffused through the Diffuser grid. It consists of porous membranes of 12" dia disc type diffusers made of EPDM material. The diffusers are of non-buoyant type, which during shutdown condition contracts to prevent any back-flow.

The diffuser is designed to ensure uniform permeability and to produce a flow of fine air bubbles and

provides high contact area and more contact time due to slow rise of the bubbles which makes the system very efficient in terms of oxygen transfer efficiency thus low installed HP for the blower drive and hence low operational cost.



ETP (Flow Chart)



ETP Scheme flow chart

After a residence of 24 hours in the aeration tank the measure of water and activated sludge flows to a secondary clarifier where the biomass is allowed to settle. The settled biomass in the secondary clarifier is re-circulated back to the aeration tank to maintain the mixed liquor suspended solids (MLSS) up to the level of 3000 mg/l suitable for the activated sludge process. The excess waste sludge is sent to sludge tank. The COD & BOD reduction in the activated sludge process will be up to 85%. The over flow clear water from the secondary clarifier is fed into MBR.

RO Reject Treatment

RO 1A

RO Plant Running Parameters :

Total treated effluent	3200 KL per day,
Feed flow rate	80+80 = 160 Cu.m/h
Permeate flow rate	7 Cu.m/h.
Recovery %	70%
Reject flow rate	3 cu.m/h
Feed Pressure Required	250 psi
Feed TDS	6000 ppm
Permeate TDS	< 300 ppm.
Reject TDS	18000 ppm

RO 2

RO Plant Running Parameters :

Total treated effluent	600 KL per day,

Feed flow rate	30 Cu.m/h
Operation hours	20 hours/day
Permeate flow rate	15 Cu.m/h.
Reject flow rate	15 Cu.m/h.
Recovery %	50 %
Reject flow rate	15 cu.m/h
Feed Pressure Required	<300 psi
Feed TDS	26000 ppm
Permeate TDS	< 250 ppm.
Reject TDS	52000 ppm

RO 3

RO Plant Running Parameters :

Total treated effluent	240 KL per day,
Feed flow rate	12 Cu.m/h
Operation hours	20 hours/day
Permeate flow rate	6 Cu.m/h.
Reject flow rate	6 Cu.m/h.
Recovery %	50 %
Feed Pressure Required	<400 psi
Feed TDS	52000 ppm
Permeate TDS	< 1200 ppm.
Reject TDS	10400 ppm

MBR(Membrane Bio-Reactor)

The concentrate from the MVR, with a TDS of approximately 100,000 ppm, will be pumped to a new Mechanical Evaporator (ME) system. This system will include a new crystallizer, boiler, and cooling tower. The ME will be designed with mother liquor return. The primary product recovered will be sodium sulfate salt.

The evaporation process occurs in two stages. The first stage involves pre-heating using process condensate, partial vapors from the first effect, and then steam. The first three effects of the evaporator will be of the enhanced falling film type, while the final effect will be a forced circulation type. Concentrated slurry from the last effect will be collected in a thickener with external chilling to facilitate crystallization. The crystals will then be processed in a pusher centrifuge to separate the crystals from the mother liquor. The mother liquor will be recycled back to the last evaporator for further concentration. The ME system will consist of one 600 KL unit and one 100 KL unit.

The entire evaporation system will operate under vacuum, with provisions for returning mother liquor and separately extracting the mixed salts concentrate for evaporation. The design is optimized to recover sodium sulfate salt while minimizing the volume of salt requiring disposal. Specifically, after the sodium sulfate salt is recovered, the remaining waste liquor will be concentrated to produce mixed salts in powder form, thereby eliminating the need for solar evaporation of the reject stream.

The recovered sodium sulfate will be dried and bagged for reuse by member industries. This system will ensure minimal salt volume for disposal and maximize the recovery of both sodium sulfate and permeate water.

Design Basis

Influent flow	:	2670 cu.m/day
Operation hours	:	24 Hours
Average flow rate	:	111 cu.m/h.

1. COLLECTION/ EQUALISATION TANKS:

Collection tank : 9.36X 7.32X 5.22 = 357 KL(2nos)

Retention time preferred: 12 hours,

Batch. Retention available: 6.43 hour.

2 (a). Equalization tanks:

Capacity 1080 KL (19X 11.37 X 5KL)

Average effluent flow 110 cu.m/h

Retention time required 10 hrs for homogenization from batch operations. But considering the temperature of the effluent to get cooled, it is recommended at her capacity.

Retention time available : 9.73 hrs, hence OK.

2 (b).

S.NO	DESCRIPTION	NO'S.	TANK DIMENSION (L X B X H) METER	CAPACITY M3
1.	Effluent Tank For Heat Recovery System	1	9.15 x 3.35 x 3.43	105.138
2.	Equalization Tank_2	1	10.8 x 16.4 x 3.8	673.056
3.	Buffer Tank	1	11.92 x 7.7 x 3.67	336.847
4.	Lamella Clarifier Feed Tank	1	4.19 x 5.12 x 5.5	119.834
5.	Lamella Clarifier	1	4.19 x 5.12 x 5.5	119.834
TOTAL				**1354.709**

3. AERATION TANK

Influent BOD 300 mg/l max.(assumed).

Process selected Activated sludge process. Influent flow 2100 cu.m/day.

Design conditions:

F/M (Food/Microbes) = 0.1

MLSS (Mixed liquor suspended solids) = 4000 mg/l

Calculation of Aeration tank volume

F/M = 400 / (3.2x 2400)

F/M : Food to microbes ratio in d ñ1

So : Influent substrate concentration in mg/l.

MLVSS : Mixed liquor volatile suspended solids in mg/l = 0.8 x MLSS

- Hydraulic retention time = V/Q V- Aeration

tank volume in Cu.m

Q - Effluent flow in cu.m per day

Hence substituting these values, A + B

V = 4100 KL, Selected volume = Aeration tank (2627+1846) = 4473KL

4. SECONDARY CLARIFIER

Dimension	26.0 m dia x (3.0 + 0.5) m Ht
SOFR	0.6 cu.m/Sq.ft/hr
Average flow	130 cu.m/hr Q+QR (100+30)
Area of clarifier required	216 Sq. ft
Día of clarifier required	21.0m Selected dia 26 m
Clarifier A dimension	= 14M
Clarifier B dimension	= 11.5M
Total dia :	25.5m

MULTIPLE EFFECTS EVAPORATING PLANT: 200 KL/D

GENERAL PROCESS DESCRIPTION OF EVAPORATOR

The Feed is received in an tank and passed through pre-heaters, heat exchanger and vapor separators of various effects. The evaporation takes place under vacuum, which is maintained by a vacuum system. Steam is supplied as a heating medium to the first effect jacket. Vapor & concentrated liquor enters the vapor separator in a tangential entry. The vapor gets separated and goes to the 2nd effect as heating medium while the concentrated liquor is pumped to the 2nd effect calandria. The same procedure is followed in the 3rd,4th and 5th effect also. Finally the concentrated liquor is collected and sent to a Crystallizer for salt recovery.The reject from Crystallizer is being sent to Three stage Forced Circulation Evaporator.The reject from Three stage Forced Circulation Evaporator in Slurry form and is being sent to ATFD plant.The condensate collected will be used for boiler/process.

TECHNICAL SPECIFICATION

EQUIPMENT	MULTIPLE EFFECT
EVAPORATOR TYPE	5 EFFECT FALLING FILM
TYPE M.O.C.	ALL CONTACT PARTS SS-316
TUBES	SS 316
CAPACITY	9000 Kg/h WATER EVAPORATION
	10000 LPH RO REJECT
CONCENTRATE	1000 LPH, Glaubers Salt 30 Wt%

SERVICES/UTILITIES REQUIRED

STEAM REQUIREMENT AT 7 BAR PRESSURE	:	1640 Kg/h
COOLING WATER REQUIREMENT	:	140 M3/h
ELECTRICAL LOAD	:	415 V,3Ph,50 Hz.AC

COOLING WATER INLET TEMPERATURE : 30-32 DEG.C

COOLING WATER OUTLET TEMPERATURE : 38-40 DEG.C

: 38-40 DEG.C

THE EVAPORATING PLANT WILL COMPRISE THE FOLLOWING EQUIPMENT

1. Feed Pump:

Quantity	:	1 No.
Make	:	Johnson
MOC	:	Stainless steel

The centrifugal pump with mechanical shaft seal capable for pumping the required feed flow rate. The pump will have sealing arrangements and will be coupled to an electric motor of suitable horsepower rating.

2. Pre-heaters:

Type	:	Straight tube type
Quantity	:	5 Nos.
MOC	:	SS, Tubes SS 316

It will be straight tube type for heating the feed by means of vapor from various effects.

Heat Exchangers:

Quantity : 5 Nos.

MOC : Tubes : SS 316

Body : SS Base : SS

Heat exchanger will have bundle of tubes welded to the tube plates in a vertical shell and provided with efficient distribution assembly on top for even distribution of feed over the tubes. The bottom of the heat exchanger will be made as a container to receive the concentrate and a connection for vapor duct leading to vapor separator.

Heat exchanger will be provide with level indicators at the bottom of the jacket to monitor the condensate level and necessary connections for steam, vapor, condensate, non-condensable, air vent, product inlet, concentrate outlet, etc.

Condenser

Quantity	:	1 No.
Type	:	Shell and Tube
Capacity	:	As per specified evaporation rate
MOC	:	Shell SS, Tubes SS-316

This will have a bunch of SS tubes mounted in a Horizantal shell. The water is circulated in the tubes and vapor gets condensed on the shell side. All product contact parts shall be of SS. The condenser will be complete with following fittings and accessories.

Circulation Pumps

These pumps will have adequate capacity to pump the feed through the heat exchangers and its separators to the next effect. The pumps will be supplied with suitable horsepower rating motors.

ATFD plant

THE ATFD PLANT WILL COMPRISE THE FOLLOWING EQUIPMENTS

1.Feed pump- 1 no

Type : Diaphrm

2.Vapour Separator: 1 no

3.Condenser: 1 no

Type: Tube and Shell

Capacity : 40 m3/hr

MOC : SS

4. Heat Exchanger: 1 no

5.Blower : 2 nos

This is for Separate non vapour from the system.

Volume of concentrate liquor (FINAL REJECT) generated from MEE & CRYSTALLISER equipments : 3520 liters per day.

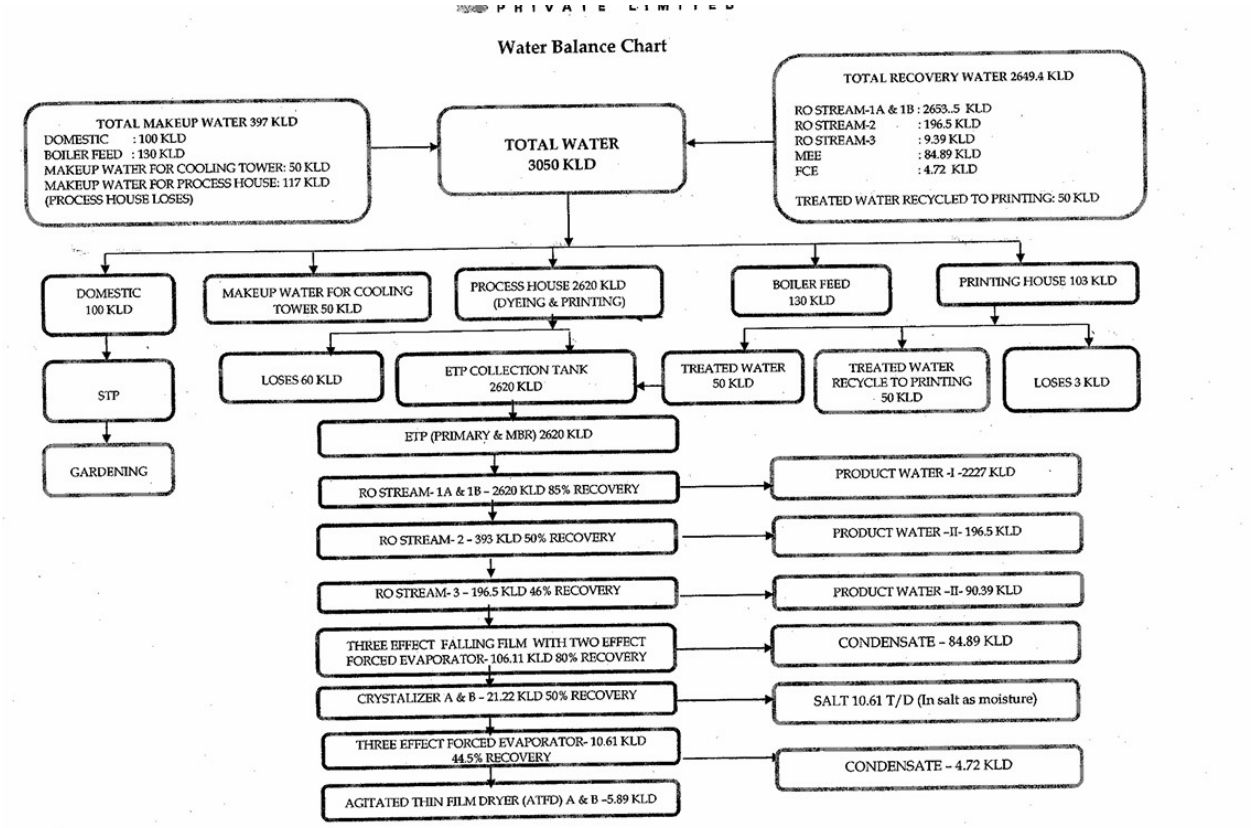
Above 3520 liters in Slurry form and is being sent to ATFD where 60% is recovered as Condensate water.

Chemical Dosing

S.No	Chemical Name	Purpose of Dosing	Place/Stage
1	Sulphuric Acid 98%	pH neutralization on before ETP Feed	ETP
2	Hydrochloric Acid 33 %	pH neutralization on After MBR permeate	MBR
3	Lime	Colour removal in Printing effluent	Printing ETP
4	Ferrous	Colour removal in Printing effluent	Printing ETP
5	Poly Electrolyte	Colour removal in Printing effluent	Printing ETP
6	Dewater polymer	Sludge dewater	Screw press and Decanter
7	Sodium Hypo Chloride	MBR Cleaning	MBR
8	Citric Acid	MBR Cleaning	MBR
9	RO Antiscalent	Antiscalent	RO all Stages
10	EDTA	RO membrane Cleaning	RO all Stages
11	SLS	RO membrane Cleaning	RO all Stages
12	SMBS	RO membrane Cleaning	RO all Stages
13	Caustic Soda	RO membrane Cleaning	RO all Stages

14	Caustic Soda 2	Re carbonization work	RC
15	Sulphuric Acid 33%	Re carbonization work	RC
16	MEE Antiscalent	Antiscalent	Evaporator
17	Defoamer	Running	Evaporator
18	Nitric Acid	Cleaning	Evaporator

KEY WATER BALANCE CHART



A.9. Implementation Benefits to Water Security

Textile industry effluents contain a variety of chemicals, including hydrogen peroxide, sodium hypochlorite, sodium hydrosulfite, and sodium dithionite, along with smaller amounts of phosphates, nitrates, and salts of sodium and calcium. Additionally, the use of sodium chloride for preservation and pickling, as well as sulfate salts (primarily basic chromium sulfate) in dyeing and finishing processes, contributes significantly to the total dissolved solids (TDS) in the effluent. Further, there are various finishing operations further add to the salt load in the wastewater.

It is noted that the bulk of the hydrogen peroxide, sodium hypochlorite, sodium hydrosulfite emanates from the operations and the dying operations from semi-processed (EI/Wet blue) to finishing of washing result in effluent containing TDS, on a lower scale, mostly in the form of sulphates.

The implementation of ETPs has been crucial in safeguarding aquatic ecosystems in Noyyal River and soil health by effectively treating this harmful effluent.

Recycling wastewater from Dying and returning it to the production process after treatment is a pivotal step toward sustainability. This circular approach significantly reduces the reliance on groundwater, a precious natural resource. By minimizing the demand for fresh water, dying industries can contribute to water conservation efforts and alleviate pressure on depleting aquifers.

This project aims to inspire all Textile industries, 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.

A9.1 Objectives vs Outcomes

The impact assessment or objectives of this project activity can generally be enumerated as follows:

- The project activity highlights the catalytic role that corporate India must play vital role in reducing industrial water consumption as well as water pollution per unit of industrial output.
- The PP has showcased technology that creates safe industrial grade water from an effluent source and has overcome the challenges faced by the alternate methods implemented and/or being proposed for the same.
- The PP has showcased the successful wastewater treatment of industrial effluent, thus saving millions of liters of wastewater for the production of Lether.
- The project activity showcases best-in-class wastewater treatment technology that can replace the equivalent freshwater and industrial demand in different sectors for nonportable purposes while reducing the proportion of untreated wastewater and substantially increasing recycling and safe reuse in India.

A9.2 Interventions by Project Owner / Proponent / Seller

The project aligns sustainable resource management by prioritizing the reuse of treated effluent over depleting groundwater sources. The PP has voluntarily invested in treating and reusing effluent, conserving millions of liters of potable water for the city.

As population growth and rising living standards increase water demand, groundwater, which supplies 85% of rural areas, faces increasing pressure. Overexploitation has led to declining water tables, water shortages, saltwater intrusion in coastal regions, and higher energy costs for pumping.

The PP's initiative has directly contributed to water security in the region. By avoiding excessive groundwater extraction, the project helps mitigate issues like falling water levels, water scarcity, saltwater intrusion, and increased energy consumption for pumping.

A.10. Feasibility Evaluation

The installed ETP and ZLD System by the PP are robust and smoothly adapt to variations in wastewater effluent. Before establishing the project, PP has done the feasibility test as per **DPR** (Detailed Project Report)**.**

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

This project demonstrably achieves sustainable management and efficient utilization of India's natural resources. The project proponent (PP) had the option to install borewells, potentially depleting local groundwater reserves. Alternatively, they could have continued relying on existing, potentially potable, water resources registered with the Universal Water Registry.

Recognizing the environmental impact, the PP commendably opted for a more sustainable approach. They chose to treat and reuse the effluent generated by the Effluent Treatment Plant (ETP), resulting in significant water savings for the dying operations, measured in millions of liters.

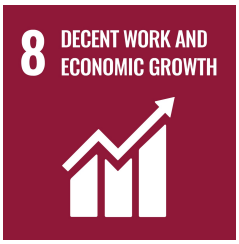
JVCPL has done Environmental Assessment in accordance with ISO14001:2015 Standard to ensure meets applicable environmental laws and regulations.

JVCPL encourages the industrial sector, particularly large-scale leather processing facilities, to adopt similar sustainable practices regarding their captive water needs and overall groundwater management.

This ETP effectively treats the textile's effluent, and the use of impervious machinery within the ETP area further safeguards against potential leakage and contamination of surrounding soil.

The sustainable development attributes attached to the project activity are demonstrated below:

Sustainable Development Goals Targeted	Most relevant SDG Target/Impact	Indicator (SDG Indicator)
	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.
	3.9: 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 promote healthy lives and well-being in the region.
	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 shown recycling and safe reuse of 3.6 million liters within the industry during this monitored period, which directly correlates to this indicator 6.3.
	4.2: By 2030, ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education.	PP has provided school amenities to 500 children in Government Higher secondary school, Koduvai to ensure child development & Care.

	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.
	15.2.1 Progress towards sustainable forest management.	The PP has implemented a reforestation project in 1. 3 acres land Planted 5,000 trees in Ponnapuram village (species- Pungai, Vembu, Soram, Kondrai) to ensure Positive ecosystem. 2. 25 Acres land Planted 20,000 trees in Various Public areas (species- Pungai, Vembu, Soram, Kondrai).

A.12. Recharge Aspects:

NA

A.12.1 Solving for Recharge

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 **one or all** of the below 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 recycling and reuse.

Hence the following baseline scenario is applicable for this project activity:

"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. The primary set of data records are kept at plant level, managed by Jeyavishnu ETP operation team. Also, for conservative purposes, the working days or operational days have been assumed at 330 days in a year during the 1st monitoring period **(01/01/2014 to 31/12/2024)**. However, the number of days is not an

influential parameter on RoUs calculation as RoUs are calculated based on total quantity of treated water being recycled & reused.

SL NO	MONTH & YEAR	INLET FLOW M3/DAY	OUTLET ETP FLOW M3/DAY	TREATED WATER M3/DAY	RoUs	Year wise
1	Jan-14	11510	13069	13178	12914	
2	Feb-14	13510	13105	13086	12825	
3	Mar-14	14371	13105	14532	14241	
4	Apr-14	15213	14635	15569	15258	
5	May-14	15918	16298	16620	16288	
6	Jun-14	14271	14305	14417	14129	
7	Jul-14	14191	14136	19727	19332	
8	Aug-14	11841	11168	11105	10883	
9	Sep-14	21211	18921	18988	18608	
10	Oct-14	20255	20070	20962	20543	
11	Nov-14	23513	22526	23845	23368	
12	Dec-14	26262	24776	24552	24061	202450
13	Jan-15	18838	18131	18133	17770	
14	Feb-15	16010	14973	14901	14603	
15	Mar-15	21224	21576	21263	20838	
16	Apr-15	23259	23760	23245	22780	
17	May-15	25345	25203	23968	23489	
18	Jun-15	25031	24680	24390	23902	
19	Jul-15	26469	26867	25888	25370	
20	Aug-15	25851	25635	24957	24458	
21	Sep-15	26537	27471	26754	26219	
22	Oct-15	29146	31451	29823	29227	
23	Nov-15	20832	22260	20663	20250	
24	Dec-15	28204	29999	28493	27923	276828
25	Jan-16	22015	24007	22839	22382	
26	Feb-16	28537	26779	27731	27176	
27	Mar-16	31183	29648	29043	28462	
28	Apr-16	25946	23892	24717	24223	
29	May-16	28019	26436	26108	25586	
30	Jun-16	29062	28050	28287	27721	
31	Jul-16	29308	27383	28635	28062	
32	Aug-16	29056	28329	29122	28540	
33	Sep-16	30209	29892	29021	28441	301964

34	Oct-16	24756	22233	22700	22246	
35	Nov-16	24856	23479	23901	23423	
36	Dec-16	17550	17629	16023	15703	
37	Jan-17	17550	17629	16023	15703	
38	Feb-17	32015	33061	31468	30839	
39	Mar-17	38370	38412	39542	38751	
40	Apr-17	39143	41164	40303	39497	
41	May-17	41159	42444	41128	40305	
42	Jun-17	31152	30398	30653	30040	
43	Jul-17	42704	41200	42521	41671	
44	Aug-17	40136	39644	39123	38341	
45	Sep-17	43478	42559	42619	41767	
46	Oct-17	34870	34831	35358	34651	
47	Nov-17	34870	34831	35358	34651	
48	Dec-17	40139	40716	39972	39173	425387
49	Jan-18	33801	33009	33624	32952	
50	Feb-18	31029	30982	31274	30649	
51	Mar-18	42426	41571	41677	40843	
52	Apr-18	44101	43155	42876	42018	
53	May-18	42327	41962	41965	41126	
54	Jun-18	39273	38404	38319	37553	
55	Jul-18	41999	40974	41240	40415	
56	Aug-18	37398	36245	36278	35552	
57	Sep-18	41728	40538	40761	39946	
58	Oct-18	43010	41948	42110	41268	
59	Nov-18	31549	30416	30828	30211	
60	Dec-18	44744	43600	44026	43145	455678
61	Jan-19	37771	37086	37050	36309	
62	Feb-19	38015	37361	37107	36365	
63	Mar-19	42336	41364	41904	41066	
64	Apr-19	39373	38532	38669	37896	
65	May-19	43067	41979	42188	41344	
66	Jun-19	39424	38717	38735	37960	
67	Jul-19	52326	51665	51334	50307	
68	Aug-19	49101	47909	48633	47660	
69	Sep-19	50390	50002	50058	49057	
70	Oct-19	39611	38638	37225	36481	
71	Nov-19	47364	46634	47077	46135	506963

72	Dec-19	47862	47603	47329	46382	
73	Jan-20	40517	39937	40209	39405	
74	Feb-20	36339	35082	35789	35073	
75	Mar-20	29290	28781	29069	28488	
76	Apr-20	0	0	0	0	
77	May-20	14901	16037	12181	11937	
78	Jun-20	33053	31897	32429	31780	
79	Jul-20	43421	43833	43144	42281	
80	Aug-20	37754	37077	37573	36821	
81	Sep-20	43973	44185	43804	42928	
82	Oct-20	47296	47099	47016	46076	
83	Nov-20	36754	36745	36639	35906	
84	Dec-20	51052	51035	50960	49941	400638
85	Jan-21	39080	39079	39008	38228	
86	Feb-21	47209	47308	47154	46211	
87	Mar-21	52114	52151	51976	50937	
88	Apr-21	46053	46041	45747	44832	
89	May-21	0	0	0	0	
90	Jun-21	21351	21387	21094	20672	
91	Jul-21	50693	50700	50507	49497	
92	Aug-21	53783	53809	53546	52475	
93	Sep-21	50085	50094	49698	48704	
94	Oct-21	46388	52493	52644	51591	
95	Nov-21	40127	40197	40084	39282	
96	Dec-21	54707	54673	54503	53413	495842
97	Jan-22	42769	42722	42649	41796	
98	Feb-22	44652	44679	44625	43733	
99	Mar-22	48577	48631	48519	47549	
100	Apr-22	44721	44744	44627	43734	
101	May-22	40973	40957	40849	40032	
102	Jun-22	44591	44621	44498	43608	
103	Jul-22	38489	38588	38465	37696	
104	Aug-22	46705	46749	46698	45764	
105	Sep-22	44331	44281	44238	43353	
106	Oct-22	23735	23652	23282	22816	
107	Nov-22	34649	34684	34621	33929	
108	Dec-22	38217	38188	38104	37342	481352
109	Jan-23	25742	25762	25705	25191	539776

110	Feb-23	33917	33949	33847	33170	
111	Mar-23	48370	48348	48202	47238	
112	Apr-23	44719	44765	44673	43780	
113	May-23	44699	44714	44624	43732	
114	Jun-23	39260	39278	39189	38405	
115	Jul-23	40008	40040	39923	39125	
116	Aug-23	46571	46553	46434	45505	
117	Sep-23	55832	55862	55743	54628	
118	Oct-23	59783	59824	59762	58567	
119	Nov-23	49556	49565	49480	48490	
120	Dec-23	63357	63338	63210	61946	
121	Jan-24	48544	48484	48448	47479	
122	Feb-24	55999	56036	56049	54928	
123	Mar-24	68113	68078	68130	66767	
124	Apr-24	60325	60314	60298	59092	
125	May-24	67211	67162	67185	65841	
126	Jun-24	63030	63116	63037	61776	
127	Jul-24	65375	65454	64906	63608	
128	Aug-24	60289	60236	60237	59032	
129	Sep-24	65527	65507	65445	64136	
130	Oct-24	60409	60387	60460	59251	
131	Nov-24	58213	58190	58206	57042	
132	Dec-24	66506	66420	66408	65080	724033
	TOTAL	**4944624**	**4916580**	**4909093**	**4810911**	**4810911**

Quantification

Year	Total ROUs (1000 liters)/yr UCR Cap (1 million RoUs/yr
2014	202450
2015	276828
2016	301964
2017	425387
2018	455678
2019	506963

2020	400638
2021	495842
2022	481352
2023	539776
2024	724033
Total RoUs	**4810911**

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

According to the UCR RoU Standard principles, the project activity accomplishes the following:

• Increases the sustainable water yield in areas where over development has depleted the aquifer
According to the data released by the Central Groundwater Board in 2021, the total amount of groundwater that can be utilised in India in a year is 398 billion cubic meters (BCM), of which, approximately 245 BCM is currently being utilised, which is about 62 per cent of the total. But the level of exploitation of groundwater is very high in States like Punjab, Rajasthan, Haryana, Delhi and Tamil Nadu. This project activity was commissioned in 2008, and the PP has reduced the proportion of untreated wastewater that future generations would need to recycle and has showcased recycling and safe reuse within the industry from unutilized water resources. Revenue from the sale of UCR RoUs will enable scaling up such project activities.
• Collect unutilized water or rainwater and preserve it for future use
In India, at the district level, in 24 states/UTs, as many as 267 districts had stages of groundwater extraction more than 63 per cent, ranging from 64 per cent to 385 per cent (source: https://www.business-standard.com/article/current-affairs/from-58-to-63-india-pumped more-groundwater-between-2004-and-2017-121122101377_1.html). This project activity serves as an example to recycle and reuse wastewater and encourages companies, especially large and transnational companies in the biotechnology and biopharmaceuticals sector, to adopt similar sustainable practices in regard to captive water requirements and groundwater management.
• Conserve and store excess water for future use
The project activity decreases the dependence on groundwater, thereby preventing excessive depletion. Between 2014 to 2024, the project activity has reused 3.6 million litres of ETP effluent successfully post treatment with gainful end use of the same.

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

Scaling up effluent treatment in India's textile industry requires a multi-pronged approach, building upon successful models like the Jeyavishnu ETP. Effluent treatment plants (ETPs) with Zero Liquid Discharge (ZLD) and Membrane Bioreactor (MBR) technologies should be prioritized in major textile hubs, tailored to each region's specific wastewater characteristics and volumes. Additionally, promoting the adoption of cleaner production techniques, such as the use of eco-friendly dyes and chemicals, process optimization to minimize water usage, and the implementation of chemical recycling and reuse strategies, is crucial. Moreover, stricter enforcement of environmental regulations and providing financial incentives for industries adopting sustainable practices can accelerate the transition towards reduced chemical and TDS loads in textile effluents. This is supported by studies that highlight the potential of integrated treatment systems and cleaner production in minimizing environmental impact in the textile sector ([2]Kant, 2012; Holkar et al., 2016).

The textile industry's pursuit of sustainable effluent management is witnessing a surge in technological innovation. Advanced membrane technologies like nanofiltration and forward osmosis, coupled with enhanced membrane bioreactors, are refining separation processes, minimizing energy consumption, and yielding higher-quality treated water (Muthu, 2021). However, PP has a provision for expanding the treatment Plant with fund allocation.

Appendix> Flow Meter Details

NO	FLOWMETER NAME	FM ID	MAKE	MODEL NO	Sl no
1	Collection Tank	FM-01	FREHNIG	FMF 2040	1221-215352
2	Backwash A	FM-02	FREHNIG	FMF 2040	0322-21969
3	Backwash B	FM-03	FREHNIG	FMF 2040	0821-21045
4	RO 1 A Feed	FM-04	FREHNIG	FMF 2040	0922-23168

[2] Kant, G. (2012). Textile dyeing industry: an environmental hazard. *Natural Science*, *4*(01), 22.
Holkar, C. R., Jadhav, A. J., Pinjari, D. V., Mahamuni, N. M., & Pandit, A. B. (2016). A critical review on textile wastewater treatments: efficacy of adsorption and chemical coagulation. *Journal of environmental chemical engineering*, *4*(1), 461-479.
Muthu, S. S. (Ed.). (2021). *Sustainable Technologies for Textile Wastewater Treatments*. Elsevier.

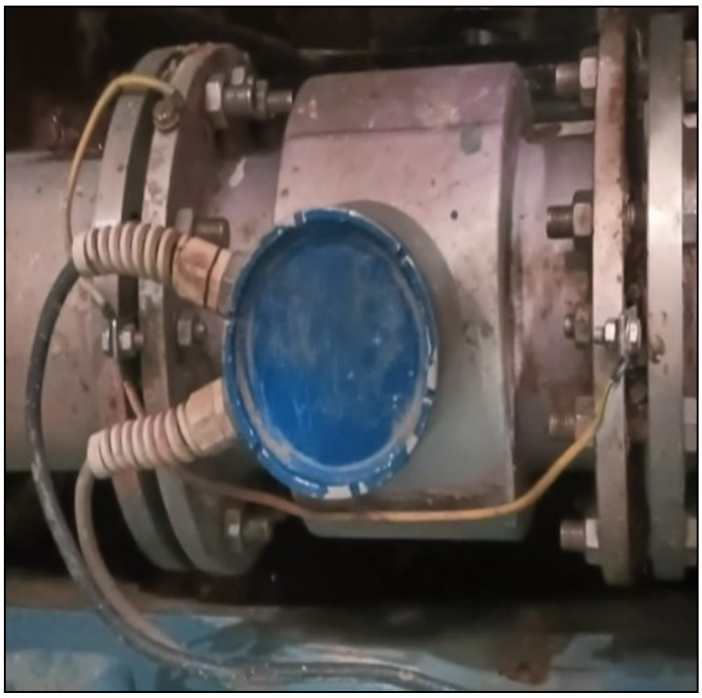
5	RO 1 A 1st Stage Permeate	FM-05	KRONE (IFC 050)	ECOMAG	1110003760
6	RO 1 A 2nd Stage Permeate	FM-06	KRONE (IFC 050)	ECOMAG	116403764
7	RO 1 A 3rd Stage Permeate	FM-07	KRONE (IFC 050)	ECOMAG	116403763
8	RO 1 A 4th Stage Permeate	FM-08	KRONE (IFC 050)	ECOMAG	116403766
9	RO 1 A Reject	FM-09	KRONE (IFC 050)	ECOMAG	116403765
10	RO 1 B Feed	FM-10	FREHNIG	FMF 2040	0922-23266
11	RO 1 B 1st Stage Permeate	FM-11	FREHNIG	FMF 2040	0822-23060
12	RO 1 B 2nd Stage Permeate	FM-12	FREHNIG	FMF 2040	0822-23058
13	RO 1 B 3rd Stage Permeate	FM-13	FREHNIG	FMF 2040	0922-22133
14	RO 1 B 4th Stage Permeate	FM-14	KRONE MARSHALL	ECOMAG	112565
15	RO 1 B Reject	FM-15	KRONE (IFC 050)	ECOMAG	116403761
16	RO 2A Feed	FM-16	FREHNIG	FMF 2040	0822-23059
17	RO 2A 1st Stage Permeate	FM-17	KRONE (IFC 050)	ECOMAG	116403762
18	RO 2A 2nd Stage Permeate	FM-18	FREHNIG	FMF 2040	0822-23066
19	RO 2A 3rd Stage	FM-19	FREHNIG	FMF 2040	0822-23007

	Permeate				
20	RO 2A Reject	FM-20	FREHNIG	FMF 2040	1220-21144
21	RO 3 Feed	FM-21	FREHNIG	FMF 2301	1023-25537
22	RO 3 1st Stage Permeate	FM-22	FREHNIG	FMF 2301	0723-24900
23	RO 3 2nd Stage Permeate	FM-23	FREHNIG	FMF 2301	1023-25412
24	RO 3 Reject	FM-24	FREHNIG	FMF 2301	1023-25547
25	Falling Film Feed	FM-25	KRONE	IFC 050	123416133
26	Falling Film Condensate	FM-26	KRONE	IFC 050	123416132
27	FF Reject Cum DF Feed	FM-27	FREHNIG	FMF 2040	0324-26285
28	Forced Circulation Condensate	FM-28	KRONE MARSHALL	ECOMAG	90587
29	Double Forced Reject	FM-29	KRONE MARSHALL	ECOMAG	1123220
30	Crystallizer Feed	FM-30	KRONE MARSHALL	IFC011	1092149
31	Single Forced Feed	FM-31	FREHNIG	FMF 2040	0120-19123
32	Single Forced Reject	FM-32	FREHNIG	FMF 2040	0120-19120
33	ATFD Feed (Forced Reject)	FM-33	FREHNIG	FMF 2040	1222-21539
34	Steam Flow (A)	FM-34	FORBES	FLOWIRL 8700K	1171143
35	Steam Flow (B)	FM-35	KROHNE Messtechnik	OPTISWIRL	1222000000000236

			GmbH	4200C	
36	Process Feed Inlet	FM-36	KRONE (IFC 050)	ECOMAG	116403765
37	Process Makeup Water	FM-37	FREHNIG	FMF 2040	1120-19145
38	Domestic	FM-38	FREHNIG	FMF 2040	0719-18344
39	Boiler BD Feed	FM-39	FREHNIG	FMF 2040	0821-21059
40	Boiler Feed	FM-40	KRONE MARSHALL	IFC011	91901
41	Process Inlet (Printing)	FM-41	KRONE (IFC 050)	ECOMAG	14404789
42	Collection Tank (Printing)	FM-42	KRONE (IFC 050)	ECOMAG	14405025
43	Semi Treated Water (Printing)	FM-43	KRONE (IFC 050)	ECOMAG	14404790

Appendix> Flow Meter

Collection well (Inlet)



Process Outlet

Appendix> CHARACTERISTICS OF THE EFFLUENT

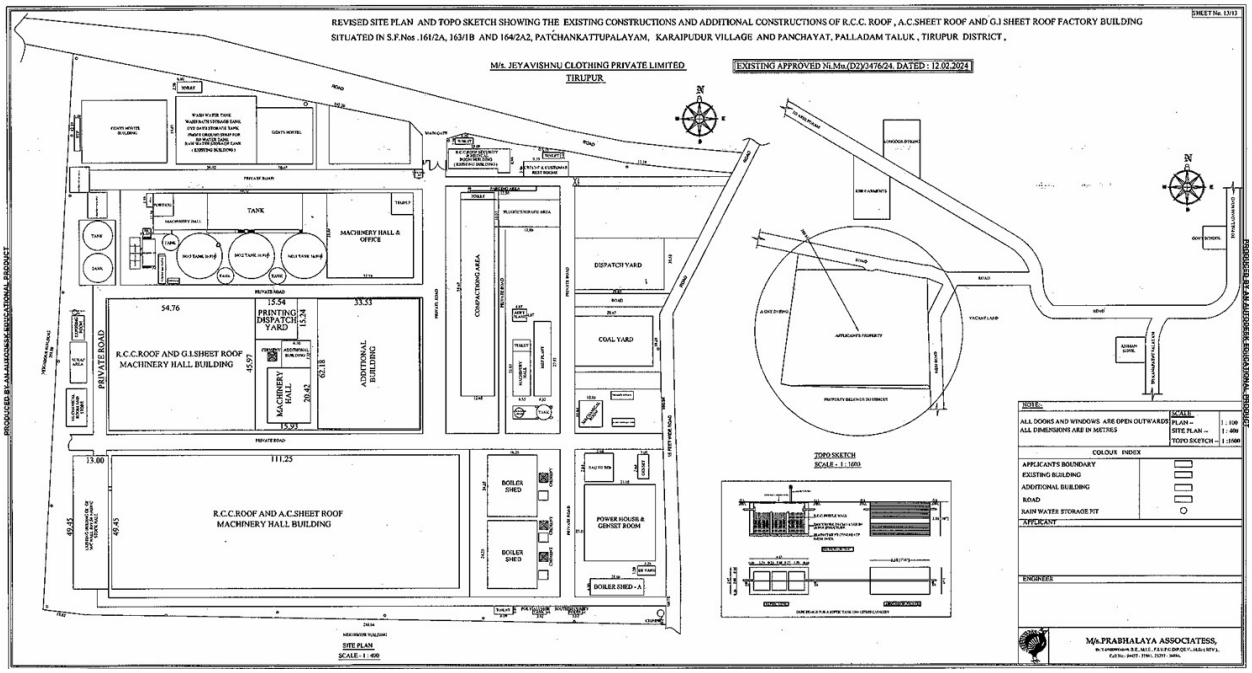
S. No	Parameter	Value	Unit
1	Colour	Colored/turbid	--
2	PH	9-11	--
3	Total dissolved salts	4000 - 5000	Mg/L
4	COD	1200 - 1500	Mg/L
5	BOD_5 at 20 Deg C	400 - 450	Mg/L
6	Total suspended solids	300	Mg/L
7	Total Hardness as $CaCO_3$	400	Mg/L

8	Silica as SiO_2	10 - 20	Mg/L

CHARACTERISTICS OF THE TREATED WATER(RO+Brine)

PARAMETER	TREATED WATER TO RO	RO TREATED WATER(AVERAGE)	UNIT
PH	6.5 - 7.5	6.0 - 7.0	
Total suspended solids	< 1	Nil	Ppm
Total dissolved solids	6000	< 300	Ppm
Total Iron as Fe	< 0.1	Nil	Ppm
Calcium as CaCO3	75	< 10	Ppm
Total hardness as CaCO3	100	< 15	Ppm
Chlorides as Cl	500	< 50	Ppm
Sulphates	4000	< 100	
Total silica as SiO2	< 20	< 5	Ppm
Oil & Grease	Nil	Nil	Ppm
Organics	Nil	Nil	Ppm
Colour	Colorless	Nil	Ppm
Turbidity	< 1	Nil	Ppm
Heavy metals	Nil	Nil	Ppm
Temperature	< 35	< 35	Deg C
COD	< 100	< 2	Ppm
BOD	< 25	< 1	Ppm

Appendix> Plant Layout



Appendix> Details Civil work

S.NO	DESCRIPTION	NO'S.	TANK DIMENSION (L X B X H) METER	CAPACITY M3
1.	Collection tank	2	(9.36 x 7.32 x 5.22) X 2	715.280
2.	Effluent Tank For Heat Recovery System	1	9.15 x 3.35 x 3.43	105.138
3.	Equalization Tank_1	1	19.0 x 11.37 x 5.22	1127.676
4.	Equalization Tank_2	1	10.8 x 16.4 x 3.8	673.056
5.	Buffer Tank	1	11.92 x 7.7 x 3.67	336.847
6.	Lamella Clarifier Feed Tank	1	4.19 x 5.12 x 5.5	119.834
7.	Lamella Clarifier	1	4.19 x 5.12 x 5.5	119.834
8.	Aeration Tank_1	1	33.4 x 11.75 x 6.7	2629.145
9.	Aeration Tank_2	1	27.0 x 12.0 x 5.7	1846.8
10.	Aeration Tank_3	1	14 dia x 11.6	1784.776
11.	Secondary Clarifier-1	1	14 dia x 3.9	600.054
12.	Secondary Clarifier_2	1	11.5 dia X 3.0	311.45
13.	Secondary Clarifier_3	1	14 dia X 3.0	461.580
14.	RC Feed Tank	1	4.4 x 7.6 x 3.67	122.724
15.	Dewater additional Tank	1	7.1 x 3.4 x 3.0	72.420
16.	Flash Mixer_1	1	3.0 x 3.0 x 2.0	18.000
17.	Flash Mixer_2	1	1.5 dia x 1.5	2.649
18.	Flash Mixer_3	1	1.5 dia x 1.5	2.649
19.	Flash Mixer_4	1	2.4 dia x 1.5	6.782
20.	RC Clarifier	1	11.5 dia X 3.0	311.45
21.	MBR Feed tank	1	18.19 x 12.80 x 3.12	726.435
22.	MBR tank_1	1	4.95 x 3.45 x 3.6	61.479
23.	MBR tank_2	1	4.95 x 3.45 x 3.6	61.479
24.	MBR tank_3	1	4.95 x 3.45 x 3.6	61.479
25.	MBR Permeate Tank	1	6.0 x 2.0x 6.7	80.4
26.	RO I Feed Tank	1	21.14 x 6.60 x 3.12	435.314
27.	RO II Feed Tank	1	10.38 X 5.6 x 3.12	181.359
28.	RO II Feed Tank	1	10.38 X 5.6 x 3.13	181.940
29.	UF Feed Tank	1	11.91 X 5.0 X 3.12	185.796
30.	RO Permeate Tank	1	25.09 X 9.92 X 3.12	776.545
31.	Additional Tank	1	18.19 x 7.95 x 3.12	451.184
32.	Boiler Feed Tank(RO Permeate)	1	5.66 X 3.2 X 3.12	56.509

33.	Sludge holding Tank_1	1	3.0 x 1.85 x 3.67	20.368
34.	Sludge holding Tank_2	1	3.0 x 1.85 x 3.67	20.368
35.	Falling Film Evaporator Feed Tank	1	14.5 x 12.5 x 4.0	725.000
36.	Crystallizer Feed Tank	1	4.87 x 12.5 x 4.0	243.500
37.	Forced Circulation Evaporator Feed Tank	1	4.87 x 12.5 x 4.0	243.500
38.	Condensate Tank	1	12.5 x 12.0 x 4.0	600.000
39.	Forced Circulation Evaporator Reject Tank	1	4.87 x 12.5 x 4.0	243.500