UWR Rainwater Offset Unit Standard

(UWR RoU Standard)

Concept & Design: Universal Water Registry

www.uwaterregistry.io

Project Concept Note & Monitoring Report

(PCNMR)

Project Name: CETP wastewater Treatment by RTETC, Tamil Nadu India

UWR RoU Scope: 5
Monitoring Period: 01/01/2014-30/6/2024
Crediting Period:1/01/2014-31/12/2024
UNDP Human Development Indicator: 0.644 (India)
RoUs Generated During 1st Monitoring Period: 17,438

A.1 Location of Project Activity

Title	**CETP wastewater Treatment by RTETC, Tamil Nadu India**
Address of Project Activity	S.F No.636/8, 617/2, 617/3, 618/1, 618/2, 634/2, 636/6, 597/1&2,601,602,603,605,603/3,606,607,608/1,3&4,613/1,2,3&5,612 /1,2&3A etc. VANNIVEDU Village, Walajah Taluk, Ranipet District
Lat. & Longitude	**Lat** 12.921435, **Long** 79.348334
Type and Scope of RoU Project Activity	Small Scale Project 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. The project activity recycles wastewater from 77 Tanneries within the defined project boundary and reuses the treated water into the process of these Lather industries. The project activity showcases efficient reuse of industrial wastewater as a key corporate environmental intervention towards achieving more water security in India.
No. of ETPs	1
Project Commissioning Date	5 June 1995
Rivers and water bodies near the project activity	Tamil Nadu is Near by the Palar River basin
SDG Impacts	**SDG 8:** Decent Work and Economic Growth **SDG 6:** Clean Water and Sanitation **SDG 3:** Good Health and Well-being **SDG 13:** Climate Action
Climatic Conditions	Annual Mean Maximum Temperature: 42 °C

	Annual Mean Minimum Temperature: 23˚c Annual Mean Maximum Rainfall: 400 mm
Calculated RoUs per year	(see table below)
State	Tamil Nadu
Country	India

Year	Total ROUs (1000 liters)/yr UCR Cap (1 million RoUs/yr)
2014	1680
2015	1449
2016	1541
2017	1968
2018	2008
2019	2182
2020	1300
2021	1267
2022	1417
2023	1693
2024	933
Total RoUs	**17,438**

Fig1: Satellite view of the Ranitec-CETP and its surroundings

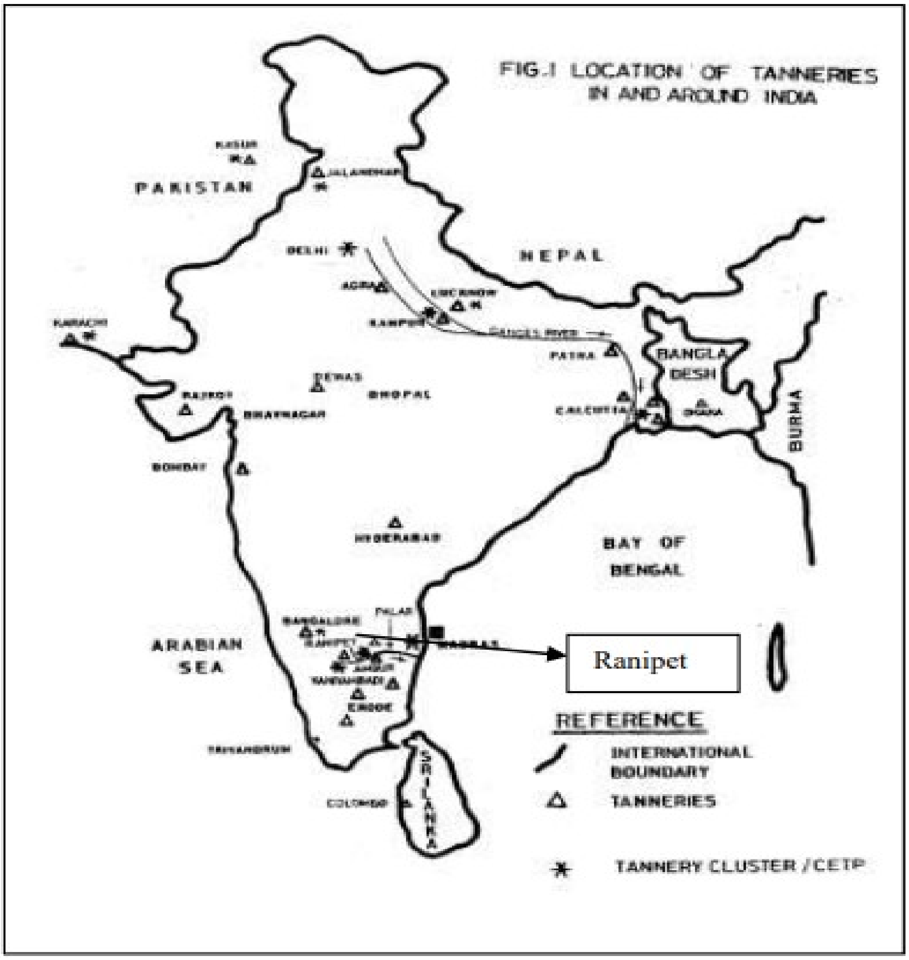


Figure 2: Location of the Project Activity

Purpose of the project activity:

Ranipet is an industrial town about 110 km from Chennai on Chennai-Bangalore national highway, in India. It has an important tannery cluster. There are more than 200 tanneries operating in and around Ranipet town. Apart from the tanneries there are about 51 leather product units, including factories for making shoes, leather goods, shoe components, etc. in and around this town. The total export turnover of the leather industrial sector from this cluster is about Rs.1000 crores per annum.

There are five common effluent treatment units (CETPs) operating for tanneries in Ranipet and adjoining Melvisharam tannery clusters in the region. Apart from the CETPs there are 10 individual effluent treatment plants for the tanneries.

The project activity includes Ranitec CETP, which is the largest CETP in tannery sector in Tamil Nadu with an installed treatment capacity of 4000 m3/d. It services 77 member tanneries in the region.

Treatment Company Limited, a company established by the member tanners, is responsible for operation and maintenance of the CETP. It is managed by a Board of Directors comprised of elected member tanners. Mr. Ramesh Prasad, a tanner of the area, is currently the Chairman of the company.

This is being one of the first CETPs to be commissioned in the state, the Ranitec CETP was commissioned in the year 1995. Subsequently, it has been receiving continual technical assistance and support from CLRI, NEERI and UNIDO. Many additional features were added to the original CETP.

These include two pre-settlers, tertiary treatment etc. Over a period, Ranitec CETP has been regarded as a model CETP. Technical personnel from neighboring countries such as Sri Lanka, Bangladesh, Pakistan, Nepal and Indonesia had come to Ranitec CETP for on-the-job training under the aegis of UNIDO.

The basic data on Ranitech CETP is in Table-1 below:

Total number of tanneries included	77
Number of tanneries operational currently	62
Number of tanneries processing raw hides/skins to semi-finished stage	39
Number of tanneries processing semi-finished to finished leather	23
Raw material processed	Buffalo & cow calf hides, goat & sheep skins
Total production capacity of tanneries, as per design of CETP	135,150 kg/day
Current production in the cluster	100,000 kg/day
Number of tanneries processing wet blue leather	26
Number of tanneries processing vegetable tanned leather	13
Designed flow rate to the CETP	4000 m³/day
Current average flow rate to the CETP	2100 m³/day
Commissioning date of the CETP	June 1995
Total area covered by the CETP	14 hectares
Total length of effluent conveyance pipeline	11 km
Number of pumping stations	2
Total CETP cost incurred so far (Indian rupees)	85.2 million

The plant is designed to handle about 4500 cum/day of effluent, making it one of the largest Common Effluent Treatment Plant (CETP) for tannery wastewater in the country. Since its establishment in the year 1995, the CETP has been constantly upgraded with either partial assistance or matching grant from the Government of India and Tamil Nadu.

CETP treats wastewater effluents by means of a collective effort mainly for a cluster of small-scale industrial units at reasonable cost. Wastewater of individual industries often contains significant concentration of pollutants; and to reduce them by individual treatment up to the desired concentration, become techno - economically difficult – CETP is better and economical option. To overcome the issue of inadequate treatment of wastewater, the concept of CETPs were introduced in early 1990s in the state of Gujarat.

Treating tannery wastewater tackles all these crucial aspects simultaneously. It safeguards our environment and public health by removing harmful pollutants from the water. Additionally, by treating the wastewater, tanneries can potentially reuse the treated water in non-critical processes within the facility, reducing their overall water consumption, as well as displaces an equivalent water that would have been otherwise sourced from other water bodies and thus promoting conservation and sustainability. This reduces the reliance on freshwater resources, making the leather industry more water efficient and environmentally friendly.

The project activity qualifies under the UCR RoU program since the PP has undertaken water conservation measures to recycle and reuse Industrial wastewater. Industrial Wastewater is a highly potential source of water for various purposes and is highly underutilized in the country.

Some representative photos of the project:

Category of the Industry :

RED

CONSENT ORDER NO. 2305149431973 DATED: 30/01/2023.

PROCEEDINGS NO.T1/TNPCB/F.0029VLR/RL/VLR/W/2023 DATED: 30/01/2023

SUB: Tamil Nadu Pollution Control Board –CONSENT TO OPERATE – DIRECT -M/s. RANIPET TANNERY EFFLUENT TREATMENT COMPANY , S.F.No. 636/8, 617/2, 617/3, 618/1, 618/2, 634/2, 636/6, 597/1&2,601,602,603,605,603/3,606,607,608/1,3&4,613/1,2,3&5,612/1,2&3A etc.,, VANNIVEDU villageWalajah Taluk and Ranipet District - Consent for the operation of the plant and discharge of sewage and/or trade effluent under Section 25 of the Water (Prevention and Control of Pollution) Act, 1974 as amended in 1988 (Central Act 6 of 1974) – Issued- Reg.

Ref: 1. Latest RCO Proc.No.T1/TNPCB/F.0029VLR/RL/VLR/W&A/2022 dated: 08.07.2022
2. Unit's application No. 49431973 for CTO direct dated 04.01.2023
3. IR.No : F.0029VLR/RL/ACEE/VLR/2023 dated 12/01/2023

CONSENT TO OPERATE is hereby granted under Section 25 of the Water (Prevention and Control of Pollution) Act, 1974 as amended in 1988 (Central Act, 6 of 1974) (hereinafter referred to as "The Act") and the rules and orders made there under to

The Managing Director,
M/s . RANIPET TANNERY EFFLUENT TREATMENT COMPANY
S.F No.636/8, 617/2, 617/3, 618/1, 618/2, 634/2, 636/6,
597/1&2,601,602,603,605,603/3,606,607,608/1,3&4,613/1,2,3&5,612/1,2&3A etc.,,
VANNIVEDU Village,
Walajah Taluk,
Ranipet District.

Authorising the occupier to make discharge of sewage and /or trade effluent.

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 CONSENT is valid for the period ending March 31, 2025

RAGHAVAN SARASAVANI

For Member Secretary,
Tamil Nadu Pollution Control Board,
Chennai

To
The Managing Director,
M/s.RANIPET TANNERY EFFLUENT TREATMENT COMPANY,
Ranipet Tannery Effluent Treatment Company,
"Malack Mohamed Hashim Sahib Square",
S.F.No.139/1B, Chennai-Bangalore Road (NH-48),

NOC for RANITEC from TPCB dated 12/01/2023

No	List of members of Ranitec-CETP
1	A. Ahmed & Co.,
2	A.B. Mohamed Sulaiman
3	A.S. Leather Agency
4	Afreen Leathers
5	Annai Fathima Leathers
6	Aswad Prime Tannery
7	B.S. Leathers
8	B.S. Shoes Pvt Ltd.,
9	Bismi Leathers
10	C. Usha & Co.,
11	C.M. Basheer & Co., (B Units)
12	C.M. Basheer & Co., [A Unit]
13	C.S. Leathers
14	E.O. Md. Hassan
15	Enyes Prime Tannery
16	Fathima Tanning Company
17	G.S. Co., Leathers
18	Ghani Rasheed & Co.,
19	Golden Leather Industries
20	Good Leather Company
21	Guru &Co.,
22	Hindusthan Prime Tannery
23	K.A. Rasheed & Sons
24	K.A.R. Leathers (P) Ltd.,
25	K.A.S. Industries India Ltd.,
26	K.A.S.Bashu & Co.,
27	K.G. Leathers
28	K.H. Shoes Ltd.,

29	K.K.S.K. Hides Private Limited
30	K.R. Leathers
31	Kailash Leathers
32	Karson Leathers
33	Kaustav Hides
34	Khizaria Leathers
35	Kovai Leathers
36	M. Mohiadeen Thumby & Co.,
37	M. Sam bandam & Sons.,
38	M. Sambandam & Co.,
39	M.A. Ismail & Co.,
40	M.A. Khizar Hussain & Sons.,
41	M.J.S. Iqbal & Co.,
42	M.J.S. Moorthy & Co.,
43	M.M.G. Leathers
44	M.S. Abdullah Basha & Co.,
45	Malack Chrome Company
46	Malack Leathers
47	Mara Mohamed Ishaq & Co.,
48	Mohamed Ismail & Co., Ammoor
49	Mohamed Ismail & Co., Pinji
50	Mumtaz Ahmed & Co.,
51	P.R.C. Leathers
52	Prakash Leathers
53	R.G.S. Leather Exports
54	R.V. Varadiah & Bros..
55	Raasiga Leathers
56	Rabee Leathers
57	Rathna Leathers
58	Ravi Leather Company

59	S.L.S Leather Pvt. Ltd.,
60	Saalim Shoes [P] Ltd
61	Safiullah Leathers
62	Saleem Leather Exports
63	Shaheen Leathers
64	Siddique Leathers
65	Sooraj Tanners
66	Sree Ayyappa Enterprise
67	Sri Ganesh Leathers
68	Sri Lakshmi Leathers.
69	Sri Sakthi Leather & Co.,
70	T.M. Abdul Rahman & Sons,
71	Taj Leathers
72	Tasmiah Leathers
73	Taurus GKK Leathers Pvt. Ltd.
74	Teeyam Lethers
75	Thrive Leathers
76	V.A. Haseeb & Co.,
77	Zakir Prime Tannery

RO System:

Reverse osmosis, also known as hyperfiltration, is the finest filtration known. This process will allow the removal of particles as small as ions from a solution. Reverse osmosis is used to purify water and remove salts and other impurities to improve the color, taste or properties of the fluid. The most common use for reverse osmosis is in purifying water. It is used to produce water that meets the most demanding specifications that are currently in place.

Reverse osmosis uses a membrane that is semi-permeable, allowing the fluid that is being purified to pass through it, while rejecting the contaminants that remain. Most reverse osmosis technology uses a process known as cross flow to allow the membrane to continually clean itself. As some of the fluid passes through the membrane the rest continues downstream, sweeping the rejected species away from the membrane. The process of reverse osmosis requires a driving force to push the fluid through the membrane, and the most common force is pressure from a pump. The higher the pressure, the larger the driving force. As the concentration of the fluid being rejected increases, the driving force required to continue concentrating the fluid increases.

Reverse osmosis is capable of rejecting bacteria, salts, sugars, proteins, particles, dyes, and other constituents that have a molecular weight of greater than 150-250 Daltons. The separation of ions with reverse osmosis is aided by charged particles. This means that dissolved ions that carry a charge, such as salts, are more likely to be rejected by the membrane than those that are not charged, such as organics. The larger the charge and the larger the particle, the more likely it will be rejected.

Membrane used in Reverse Osmosis

Though many types of membranes are available in the market, spiral wound configuration is the most common one. Spiral-wound membrane elements (separators) were used mainly for basic water purification until the mid to late 1970s, when broader uses began to receive attention. New applications often require special consideration such as sanitary construction, high temperature and high-pressure capability for desalination. In addition, aggressive chemicals either in the feed stream or in necessary cleaners had to be dealt with. As the sophistication of the membrane industry grew, so did increased use of specialty polymers, improved adhesives, more engineering thermoplastics, and even stainless steel in separators and their ancillary parts. This has allowed the expanded scope of application, which continues to grow today.

RO System

Original designs used a plastic tape outer cover with a concentrate seal to direct flow through the feed channels. The permeated tube protruded from the material package on each end; requiring this thermoplastic part to bear the entire axial compressive load for the series of separators (up to six) placed in one housing. An FRP outer cover was next developed for both handling protection and improved hydraulic load bearing. A "close coupled" design followed where the sheet materials are trimmed flush with the permeate tube end. This maximizes the available space in the housing and efficiently transfers the load between separators. Most commercial separators today employ this design.

Membrane materials

The membrane is usually the compatibility limiting component of separators. Thus, the advantages of the spiral-wound design make it the first configuration to consider for all four membrane classes (RO, NF, UF, MF). Membrane choice is often governed by compatibility considerations rather than separation performance and flux-related characteristics.

The evolution of membrane materials for RO separators began with the cellulose acetates (which are still workhorses). Both homogeneous and thin-film composite polyamide membranes were followed to provide wider pH range, improved separation and biological degradation resistance. Since these are more expensive and less tolerant of oxidizing agents than the celluloses, they have not replaced CA but closely rival it for total use. Sulfonated polysulfone RO membrane is more resistant to oxidation, but must be operated on completely softened, brackish water to maintain its salt rejection capacity, which is not as high as the polyamides to begin with.

Design basis of Multiple Effect Evaporator at Ranitec

The plant is specially designed for handling R. O. Reject. The description is as below: It is a 7-effect evaporator with TVR. The feed is introduced into Tubular Pre Heaters No.7, No.6, No.5, No.4, No.3 ,No.2 & No.1 in sequence one after the other for gradual increase of sensible heat. The pre-heaters are connected on vapor side to Condenser, calendria 7, 6, 5, 4, 3, 2 & 1 respectively. Therefore they utilize part of the vapors introduced on shell side of respective calandrias for heating the product. The preheated feed is now fed to calandria No.1 at top, which works on falling film principle.

The feed gets well distributed to all the tubes due to the presence of a properly designed efficient liquid distributor. The liquid loses its flash heat if any and accounts for flash evaporation at top of calandria. The liquid has natural free fall and falls in each tube as falling film across the full wall of each tube. The liquid gains heat by heat transfer due to condensing hot vapors on the outside surface of tubes. The liquid starts evaporating at constant boiling temperature and both liquid film and evaporated vapors travel down. The concentrate is collected at bottom portion of calandria from where it is pumped further. The evaporated vapors enter the vapor separator connected at the bottom where due to centrifugal action the droplets get separated out. These droplets are pooled back to the concentrate leaving the bottom portion of calandria. The vapor leaves the vapor separator from the top. Part of the product moved out from bottom portion of calandria is recycled back to top portion of calandria to maintain required wetting.

Calendria 2 also works on Falling Film Principle same as Calendria 1. Calandria No. 5, 6 & 7 work on forced circulation principle as they handle higher concentrations of product above saturation solubility. In each of these, Product from Flash vessel is circulated by an axial flow pump/centrifugal into the calandria entering from bottom. Adequate velocities are maintained in tubes for better heat transfer and to retard fowling.

The product gains sensible heat as it travels up inside the tubes. Hot vapors on shell side condense and provide the required heat. The Hot liquid enters the flash vessel through a pressure-reducing device and gets flash evaporated inside the flash vessel. The concentrate gets recycled as explained above and the evaporated vapors move out from center at top of flash vessel. The feed to the forced circulation evaporator is introduced through a side tapping at suction line of pump. The product is taken out by a separate product in case of last effect and through a side tapping of recycle pump discharge in case of effect 6 & 7.

Product from Effect No.1 is fed as feed to Effect No.2. Product from Effect No.2 is fed as feed to affect No 3. Product from Effect-3 to Effect-4. Product from effect No. 4 to Effect 5 product from Effect-5 Product from effect No. 5 to Effect-6, Product from effect No. 6 to Effect-7 Product from effect No.7 is taken out as final product in the form of sludge/ slurry and fed to a nutch filter. The wet crystals are collected as the final product. The mother liquor is recycled back to evaporator continuously as additional feed at calandria No.6. Part of the evaporated vapors from Effect 2, are sucked by Thermo Vapor Re compressor (TVR), where live steam at 8 bar (g) is used as motive fluid. The mixed vapors from discharge of TVR are used as heating medium for Calandria 1.

The Balance evaporated vapors from Effect 2 (after part being sucked by TVR) are used as heating medium for effect 3. The entire evaporated vapors of effect 1 are used as heating medium for effect 2 and similarly the entire evaporated vapors of effect 3 are used as heating medium for effect 4. Evaporated vapours from effect 4 are used as heating medium for effect 5 and Evaporated vapours from effect 5, Evaporated vapours from effect 5 are used as heating medium for effect 6, Evaporated vapours from effect 6 are used as heating medium for effect 7 and Evaporated vapours from effect 7 are finally condensed on condenser. The condensate generated in effect no.1 is taken out from shell side at bottom and flashed on shell side for Calendria 2. Similarly combined condensate from shell side calendria (i.e. condensate received from previous effect and generated in effect No.2.) is taken out from bottom and flashed on shell side effect No.3. Like with the 3 to 4, 4 to 5, 5 to 6 and 6 to 7 effects. Final combined condensate at lowest temperature is pumped out by a common condensate pump. This flash heat recovery greatly helps steam economy. The non-condensable from each effect shell side are drawn parallelly and sent to shell side of condenser. The total non-condensable are continuously pumped out by a vacuum pump connected to the shell side of condenser.

Units in Evaporation

Feed Strainer (02 Nos)

Duplex strainer assembly is provided to filter the incoming liquid. Easy opening arrangement is provided to enable cleaning of filter element whenever required.

Feed Pump (FP)

A centrifugal direct driven pump is used for transferring the feed from the battery limit to the plant. The pump is with mechanical seal and water flushing arrangement for the mechanical seal. The pump assembly is mounted on a common base frame and complete with drive motor. The Material of Construction is SS316 for contact parts.

Evaporator Calendria (7 Nos)

A vertical fixed tube sheet type heat exchanger is used as evaporator calendria. A steam jacket is provided on the outside of the tube with necessary arrangements for condensate and non-condensate removal. The product inlet / outlet/Recycle nozzles are provided on tube side. A detachable top cover is provided for easy access of calendria tubes for cleaning. Necessary ports for instrument mountings and sight glasses are provided on the jacket. The jacket may have a provision of insulation wherever required. Necessary bracket supports are provided for mounting the calendria.

Vapor Separator (7 Nos)

Each vapor separator is sized to ensure effective separation of vapors from concentrate. It is efficiently designed based on centrifugal separation principle. The separator will be provided with vapor outlet nozzle, product outlet at bottom, sight and light glass. The vapor separator is connected at the bottom of the calendria in case of falling film evaporators and at top in case of forced circulation and rising film evaporators. The Material of Construction is SS304.

Product Transfer & Circulation Pumps (8 Nos)

A centrifugal direct driven pump is used for transferring the product from effect1 to effect2 and for recycle as well. Centrifugal pumps are used for circulation & transfer of product in case of forced circulation calandrias. A centrifugal pump is used exclusively for taking out product in case of effect No.3. All these pumps are with mechanical seal and water flushing arrangement for the mechanical seal.

The pump assembly is mounted on a common base frame and complete with drive motor. The Material of Construction is SS316 for process contact parts.

Condensate Pump (CP)

One no. of centrifugal direct driven pump is used for extracting out the condensate from evaporator. The pump assembly is mounted on a common base frame and complete with drive motor. The Material of Construction is SS304.

Duct (Vapor)

Vapor ducting is provided for interconnection calandrias, vapor separator and condenser. A complete set is provided for all these interconnections. The ducts at the first effect calandria shall be insulated. The Material of Construction is SS304.

Piping (concentrate)

A complete set of interconnecting piping with necessary pipes, pipes fitting, valves etc. are provided for connecting the various components of the plant to the transfer pumps and from the pumps to the calendrias. The piping are laid out to make the arrangement compact as well as easily accessible for operation and maintenance. The Material of Construction is SS316.

Piping (Condensate)

A complete set of interconnecting piping with necessary pipes, pipes fitting, etc. are provided for connecting all calendrias jacket to the condensate pumps. The piping are laid out to make the arrangement compact as well as easily accessible for operation and maintenance. The Material of Construction is SS304.

Piping (non-condensate)

A complete set of interconnecting piping with necessary pipes, pipes fitting, etc. are provided for connecting all calendrias to the condenser. The piping are laid out to make the arrangement compact as well as easily accessible for operation and maintenance. The Material of Construction is SS304.

Spray Condenser (SC) (1 No)

It is direct contact Spray condenser to condense vapours from last effect vapour separator. Material of construction is SS304.

Vacuum Pump (VP) (1 No)

A water ring type single stage vacuum pump is provided on the shell side of the condenser to evacuate the system and maintain vacuum in the system by continuously pumping out the non-condensibles in the system. Material of construction is CS / CI.

Thermo Vapour Recompressor (TVR) (1 No)

A steam jet ejector is used as a vapour re-compressor to recompress part of the vapours from vapour separator 1 and use it for heating in Calendria No.1. The material of construction is MS body and SS304 Nozzle.

Settling Tank (1 No.)

A vertical tank is provided to receive concentration from the evaporator and allow settling of solids by natural decantation. The tank is in SS304 construction.

Pusher Centrifuge (1 No.)

A horizontal pusher centrifuge is provided. The thickened mother liquor from the bottom of the settling tank is fed to this. The wet solids from the mother liquor are separated and discharged. The mother liquor is sent to the mother liquor tank. The material of construction is SS-316 for rotating parts.

Mother Liquor Tank (1 No.)

A vertical tank is provided. The overflow from the settling tank and the mother liquor from the pusher centrifuge are collected in this. This liquid is fed continuously to calendria 6 by a pump. The material of construction is SS304.

Sealing Water Pump (SWP):

One no. of centrifugal direct driven pump is used for supply of water to all double mechanical seal for seal flushing. The pump assembly is mounted on a common base frame and complete with drive motor. The Material of Construction is SS304.

Sealing Water PHE: 1 No.

One plate heat exchanger is provided on sealing water pump discharge to cool sealing water in closed loop system. Material of construction for plate is SS304.

Sealing Water Tank: 1 No.

One tank is provided to store seal water with ball float valve at the inlet of makeup water. Necessary nozzles are provided for cooling water inlet and outlet. The material of construction is SS304.

Others

Air Compressor with Air Dryer and FRP cooling tower with cooling water pumps and piping.

Auto-control Loops and Instruments

• Steam pressure control loop for pressure control at inlet of TVR.

• Feed flow indication and control on feed line to the evaporator.

Level Indication and control loop for regulation of product out from each forced circulation evaporators and ML tank to maintain constant level in flash vessel/ ML tank.

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

Project Proponent (PP):	Ranipet Tannery effluent treatment Company
UCR Project Aggregator	Viviid emission Reduction Universal private limited
Contact Information:	lokesh.jain@viviidgreen.com
Date PCNMR Prepared	07-07-2024

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 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 tanneries without letting the water 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 tanneries.

A.6. Ground Water

The project activity does not draw water from the ground water reservoirs as it treats and reuses wastewater.

A.7. Alternate methods

The tanning industry of Tamil Nadu has an important place in the leather industrial sector of India. With over 780 operational tanneries in the state, more than 55% of country's 2500 tonnes/day of hides and skins are processed in the state. Pollution control in the tanning sector has been receiving the attention of the Tamil Nadu Pollution Control Board and the GoTN for the past over two decades.

By The excellent initiatives of the state government and TNPCB and also monetary support of the Government of India and the state government, the tanning industry in the state can today claim to have effluent treatment facility catering to all the operational tanneries in the state.

TDS in effluent is treated in developed countries and also in some other developing countries by adopting either of the two options:

(1) to combine it with domestic sewerage where it gets diluted for further treatment, or
(2) to discharge the high TDS treated effluent into the sea (marine discharge).

Unfortunately, neither of these options is readily available for the Tamil Nadu tanners. In the first instance, the domestic sewerage from the areas where tanneries are concentrated (Ranipet – Ambur – Vaniyambadi belt) is not at all treated.

Secondly, marine discharge (of the teared effluent) option is impractical as the nearest sea coast is at least 250 km from the tannery district. Accordingly the treated effluent in Vellore district is discharged as such into the surface finally reaching the Palar river basin. Though Pallavaram is situated within the limits of Chennai metro, somehow, the CETP has not been offered the choice of either diluting its effluent with city sewerage or marine discharge; so, here surface discharge of treated effluent is resorted to.

Some other options such as 'High Rate Transpiration System (HRTS)' suggested by NEERI and internal recycling of different streams of effluent within the tannery were attempted on a pilot scale with conspicuous lack of success.

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

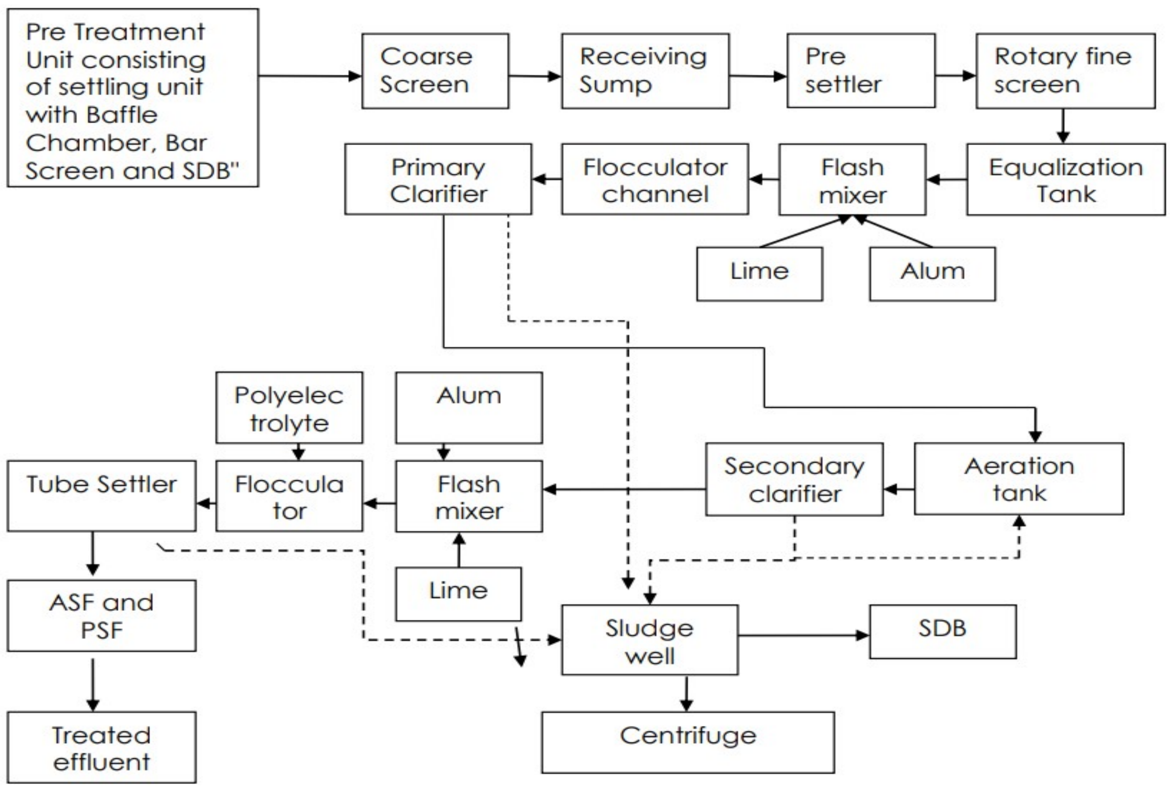


Figure 3: Existing Scheme of the Ranitec CETP

Pre-treatment systems in member tanneries

All the tanneries connected to the CETP have pre-treatment units. The pre-treatment units consist of a settling unit with baffle chamber to arrest floating materials, 2 screens of 10 mm clearance, collection and conveyance and a sludge drying bed. The effluent after pretreatment is admitted into manholes leading to the CETP effluent collection network. The soak & pickle liquor from the tanneries are segregated and is sent to solar evaporation pans set up in each of the tanneries. The tanneries carrying out chrome tanning segregate the chrome liquor and process it in a chrome recovery unit.

Treatment process

The effluent is collected in the receiving sump, through a mechanically cleaned coarse screen, provided with one submersible mixer (flygt) for homogenization of effluent and oxidation of sulphides.

The effluent is then pumped to two numbers of pre-settlers to settle coarse solids. Approximately 40% of the solids are removed here. The pre-settled effluent is admitted through a mechanical rotary fine screen into an equalization tank equipped with 6 submersible mixers.

The equalized effluent is pumped to the flash mixer where chemicals such as alum, lime and polyelectrolyte slurry are added. The mixture passes through a flocculation channel and thereafter enters a primary clarifier. The chemical sludge settles at the bottom of the clarifier. The physico-chemical treatment removes approximately 30-40% of BOD, 50-65% of COD and almost all residual chromium. The overflow of the clarifier is admitted into an aeration tank, provided with diffused aeration, for biological stabilization of the effluent.

The biological treatment removes 90-95% of BOD and 85-90% of COD. The overflow of the aeration tank with active biological solids is admitted to secondary clarifiers. The settled sludge in the clarifiers is pumped back to the aeration tank to maintain the MLSS at the required level. Some quantity of sludge, which is wasted, is sent to the sludge well.

The overflow of the clarifiers is admitted to a flash mixer where tertiary treatment chemicals are dosed, and which is flocculated in a flocculator and settled in a tube settler. The overflow of tube settler is pumped to Pressure Sand Filter, followed by Activated Carbon Filter and then discharged as treated effluent.

The sludge settled during the physico-chemical treatment in the clarifiers is taken to sludge well and then part of it is pumped to sludge drying beds and part to the centrifuge for dewatering. The dewatered sludge is disposed of in the sludge-dumping site. The CETP has been regularly operated since its commissioning.

Rational Of ZLD System Capacity

At present, Ranitec CETP is getting an average flow of 2100 m3 /d which sometimes goes upto 2400 m3 /d during peak production times. The soak and pickle effluents are presently segregated from the main effluent and are sent to the solar evaporation pans. The solar pans seldom work and often result in complaints of ground water contamination due to overflowing pans. The CETP plans to stop the option of separate treatment of soaked liquor and to mix it with main effluents to be sent to the CETP. This addition will result in an increase of TDS in the raw effluent by approximately 2000-3000 mg/l and accordingly the inlet TDS of the ZLD system is re-modified as maximum 17,000 mg/l (14,000-15,000 mg/l is expected in actual practice).

The average daily effluent flow from Ranitec is expected to be about 2400 m3 /d when the soak & pickle liquor is combined with the main effluent. The flow from tanneries presently 27 connected to the Meltec CETP, but to be connected to Ranitec ZLD system under the project, is expected to be around 300 m3 /d and hence the total average volume comes to 2700 m3 /d.

Table 2: Ranitec CETP performance TNPCB standards

SI. No.	Parameter	Value in mg/l (except for pH)	Limits stipulated by TNPCB	Limits acceptable for RO system
1	Ph	7.1	100	5.5-7.5
2	Suspended Solids	88	Not specified	0
3	B.O.D, 5-day 20 C	42	30	5
4	Total dissolved Solids	10340	2100	Not specified
5	C.O. D	920*	250	50
6	Sulphides	3.4	2	0.1
7	Ammoniacal Nitrogen	81.5	50	10
8	Total Chromium	0.6	2	0.1
9	Chlorides	4990	1000	Not specified
10	Sulphates	522	1000	Not specified

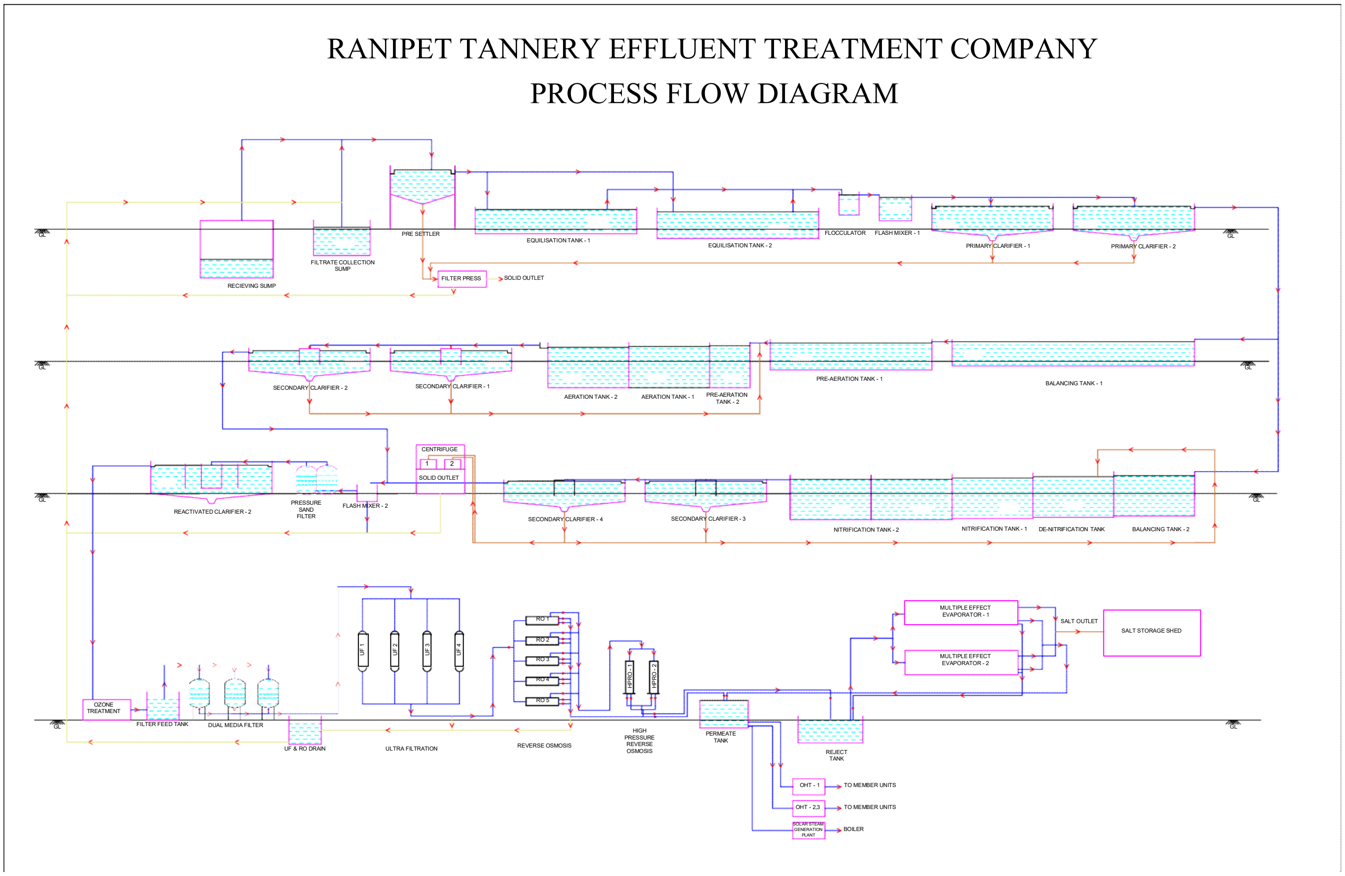


Table 4: Design basis of CETP

Parameter	Value
Duty	20 hrs operation
Capacity	4000 m³/d
Type	Physical-Chemical followed by biological treatment
Odour control	Wet scrubber in Receiving sump
Coarse solids separation	Pre-settlers with 10-20 min HRT
Screening	Fine screening by Konica drum
Equalization Mixing	Submersible mixers with aerators for sulphide oxidation.
Equalization Time	20 hours
Chemicals used in primary treatment and dosages maintained	Lime (400 mg/l), alum (400 mg/l) and Polyelectrolyte (2 mg/l)
BOD & COD removal in primary treatment	30% & 40%

Type of aeration	Fine bubble diffused aeration
F/M ratio	0.1-0.12
MLSS concentration	3000-4000 mg/l.
Type of Tertiary treatment	Chemical coagulation & Filtration
Dosage in Chemical coagulation in Tertiary	Alum (300 mg/l), Polymer (2 mg/l)
Primary sludge generation	660 m^3/d
Secondary sludge generation	190 m^3/d
Sludge dewatering	Chamber Filter Press
Dewatered sludge moisture and quantity	30-35%, 45-50 tonnes/day
Dewatered sludge disposal	Secured Landfill

A.9. Implementation Benefits to Water Security

The tannery effluent contains chloride, carbonates and sulphates (and to smaller extent others such as phosphates, nitrates etc.) of metals such as sodium, calcium etc. The TDS in tannery effluent comes in the form of sodium chloride used in the preservation of raw hides and skins and also in pickling and sulphate salts (mostly basic chromium sulphate) used as well as sulphates derived from the sulphuric acid in tanning and re-tanning processes. Besides the above various processes including finishing operations contribute salts in various loads.

It is noted that the bulk of the sodium chloride emanates from the beam house operations and the tanning operations from semi-processed (EI/Wet blue) to finishing of leather 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 Palam River and soil health by effectively treating this harmful effluent.

Recycling wastewater from tanneries 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, tanneries can contribute to water conservation efforts and alleviate pressure on depleting aquifers.

This project aims to inspire Lether 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.

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 promotes 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 showcased recycling and safe reuse of 4000 million 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.

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 activity hence achieves the sustainable management and efficient use of India's natural resources since the PP had the option to install bore wells that would have depleted the local groundwater resources and/or continued to use existing drinking water resources in the surrounding area. The PP has instead intervened and chosen to treat and reuse ETP effluent voluntarily at significant costs, thus saving millions of liters of safe drinking water for the city.

Increase in population density and improvement in quality of life has resulted in an increase in demand of natural resources like water. Groundwater being the major source of water supply catering to about

85% of rural water supply, the stress on groundwater is ever increasing. It has resulted in over-exploitation of the resources at places. The situation demands a reorientation of the strategy for its development and management.

The intervention of the PP has had a direct impact on the water security of the area. Over-development of the ground water resources results in declining ground water levels, shortage in water supply, intrusion of saline water in coastal areas and increased pumping lifts necessitating deepening of ground water structures and increase in power costs.

A.10. Feasibility Evaluation

The installed CETP and ZLD System by the PP are robust and smoothly adapts 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:

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 Common Effluent Treatment Plant (CETP), resulting in significant water savings for the tannery operations, measured in millions of liters.

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

The CETP effectively treats the tannery's effluent, and the use of impervious machinery within the CETP area further safeguards against potential leakage and contamination of surrounding soil.

Ecological Issues addressed by the project activity in terms of	
Inundation of habitated land	The project does not lead to inundation of residential land.
Creation of water logging and vector disease prevention mitigation	The CETP effluent is zero discharge plant. Impervious flooring is done in CETP area to avoid any type of leakage that can be percolated into the surrounding soil
Deterioration of quality of groundwater	By avoiding the use of borewells the project activity does not deplete aquifers and hence prevents the depletion of groundwater resources.

A.12. Recharge Aspects:

NA

A.12.1 Solving for Recharge

Water Budget Component	Typical Estimated Uncertainty (%)	Description
Surface Inflow	NA	The total quantity of treated ETP wastewater is measured via flow meters and recorded daily.
Precipitation	NA	Not available
Surface Outflow	NA	Not available
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 **<u>one or all</u>** 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 RTECT team (as defined under the Organization Chart under the Appendix 2. Also, for conservative purposes, the working days or operational days have been assumed at 330 days in a year during the 1st monitoring period. 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.

Months	Total ETP Capacity installed (MLD)	Total ETP effluent teartment (MLD)	Evaporator feed (KL)	Evaporator Condensate (KL)	Salt Recovered (kgs)	RoUs	**RoUs Year wise**
Jan-14	4.5	2	10294	11314	270700	136	**1680**
Feb-14			10832	11900	237200	143	
Mar-14			12022	13181	289950	158	
Apr-14			12052	13270	218390	159	
May-14			9827	10832	177650	130	
Jun-14			10298	11066	149400	133	
Jul-14			11075	12257	188000	147	
Aug-14			12636	14136	204500	170	
Sep-14			11745	11910	124600	143	
Oct-14			9728	9002	121800	108	
Nov-14			9299	9869	95200	118	
Dec-14			10038	11265	127380	135	
Jan-15			10650	11301	198200	136	**1449**
Feb-15			9385	11080	136100	133	

Mar-15			8683	10719	101950	129	
Apr-15			10162	10618	104800	127	
May-15	4.5	2	8075	8061	83600	97	
Jun-15			7894	8205	83150	98	
Jul-15			9272	9020	118000	108	
Aug-15			13278	13382	175500	161	
Sep-15			9751	10223	144800	123	
Oct-15			9625	10511	95900	126	
Nov-15			9046	9119	87230	109	
Dec-15			7875	8536	112200	102	
Jan-16			9413	10139	158700	122	**1541**
Feb-16			11156	11588	334750	139	
Mar-16			12680	12368	355500	148	
Apr-16			11229	10742	138400	129	
May-16			10468	9181	177000	110	
Jun-16			10670	10124	280300	121	
Jul-16			10954	10794	299500	130	
Aug-16			11204	11847	312000	142	
Sep-16			8700	9598	327500	115	
Oct-16			9964	10607	333000	127	
Nov-16			9867	10957	247000	131	
Dec-16			9344	10484	176200	126	
Jan-17			9997	10983	205500	132	**1968**
Feb-17			12499	13832	343000	166	
Mar-17			14429	15784	478000	189	
Apr-17			11151	11960	339000	144	
May-17			12756	14051	433000	169	
Jun-17			14503	15637	432250	188	
Jul-17			10793	12938	325500	155	
Aug-17			12789	14710	340000	177	
Sep-17			13062	14500	303500	174	
Oct-17			10392	11904	236000	143	
Nov-17			10742	12122	249000	145	
Dec-17			14222	15539	383900	186	
Jan-18			12063	16744	276000	201	**2008**

Feb-18			11020	12186	271500	146	
Mar-18			12271	14025	275500	168	
Apr-18			11421	12969	357800	156	
May-18			12121	13605	334800	163	
Jun-18			11167	12303	283200	148	
Jul-18			10599	12068	267080	145	
Aug-18			13828	15516	475050	186	
Sep-18			12401	13899	436350	167	
Oct-18			11111	12343	353200	148	
Nov-18			13287	14809	336820	178	
Dec-18			14618	16888	458950	203	
Jan-19			10587	11808	352650	142	
Feb-19			13021	14083	320910	169	
Mar-19			14906	15721	290830	189	
Apr-19			15990	17009	350940	204	
May-19			14807	16122	381005	193	
Jun-19			17598	17598	393475	211	**2182**
Jul-19			14111	14966	274900	180	
Aug-19			13365	13909	336250	167	
Sep-19			13490	15149	333940	182	
Oct-19			13315	14717	334650	177	
Nov-19			13120	14665	322800	176	
Dec-19			14531	16074	396800	193	
Jan-20			11324	12984	389250	156	
Feb-20			9666	11262	346750	135	
Mar-20			9817	10961	288500	132	
Apr-20			1049	1309	10700	16	
May-20			5816	7739	209750	93	
Jun-20			8172	9614	302400	115	**1300**
Jul-20			8282	8120	219350	97	
Aug-20			8933	10343	339500	124	
Sep-20			9306	10477	260400	126	
Oct-20			9315	10487	238250	126	
Nov-20			6557	7300	209227	88	
Dec-20			6900	7746	178300	93	

Jan-21			7286	8134	208200	98	
Feb-21			7142	7977	198100	96	
Mar-21			8096	9352	257200	112	
Apr-21			7281	9096	217450	109	
May-21			3862	4521	111700	54	
Jun-21			7817	9124	208100	109	**1267**
Jul-21			9130	10396	231300	125	
Aug-21			8094	9547	187600	115	
Sep-21			8675	10406	169800	125	
Oct-21			6640	8086	122900	97	
Nov-21			5510	6620	74000	79	
Dec-21			10068	12339	242900	148	
Jan-22			6940	8344	152000	100	
Feb-22			7535	9383	159300	113	
Mar-22			8146	10153	180150	122	
Apr-22			7739	9789	197100	117	
May-22			8509	9896	220200	119	
Jun-22			10356	11100	238600	133	**1417**
Jul-22			10557	11667	204000	140	
Aug-22			7130	8869	162900	106	
Sep-22			9928	11823	192900	142	
Oct-22			7827	9203	140300	110	
Nov-22			6238	8459	139900	102	
Dec-22			7718	9365	179000	112	
Jan-23			7253	8481	164150	102	
Feb-23			7935	8789	137900	105	
Mar-23			11747	13871	209900	166	
Apr-23			11590	12693	152700	152	
May-23			8392	11018	219500	132	
Jun-23			10225	12740	338550	153	**1693**
Jul-23			10046	11391	317100	137	
Aug-23			11752	14380	325550	173	
Sep-23			13057	14166	353800	170	
Oct-23			10123	11680	301100	140	
Nov-23			9787	10937	222900	131	

Dec-23			9997	10936	217200	131	
Jan-24			8437	9513	196950	114	933
Feb-24			11084	12374	362100	148	
Mar-24			12276	13851	429000	166	
Apr-24			11309	11052	208900	133	
May-24			12673	14349	414900	172	
Jun-24			14134	16594	318000	199	
							17438

Quantification of RoUs based on annualized data:

Year	Total ROUs (1000 liters/yr) UCR Cap (1 million RoUs/yr)
2014	1680
2015	1449
2016	1541
2017	1968
2018	2008
2019	2182
2020	1300
2021	1267
2022	1417
2023	1693
2024 (Till June 2024)	933
Total RoUs	**17438**

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 1995, 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 of 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 1995 to 2024, the project activity has reused 4000 million litres of ETP effluent successfully post treatment with gainful end use of the same.

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

With rapid and unplanned urbanisation and economic growth, the demand for fresh water for various purposes is on the rise in India. However, spatio-temporal variations in freshwater availability, vagaries of the monsoon and variability in climate, as well as human, development and management challenges pose great threats to water supplies in the country. While excessive withdrawal from surface and underground sources and inefficient use of water were recognised as reasons for reduced availability of fresh water with respect to space and time, the role of pollution of water sources, both surface and ground water, in reducing the quantum of available fresh water for various uses, has not received due importance. It is estimated that 75-80 per cent of water pollution in terms of volume of water polluted is from domestic sewage. The data on water quality in rivers upstream and downstream of selected cities over a period of time was analyzed to understand the changes in crucial water quality parameters over time. The status of sewage treatment across Indian states was also studied, to understand the gaps in waste water treatment. The existing institutional and legal measures available for the control of water pollution were also analyzed.

Health and economic prosperity being very much dependent on clean water supply and good sanitation, an integrated approach balancing infrastructure and socio-economic measures for water quality management is proposed. The paper further argues for construction of new wastewater treatment infrastructure, improvement of the existing wastewater treatment systems, upgrading of wastewater treatment technologies and renovation of the sewer system, all with an accent on economic viability and environmental sustainability. It is also necessary to create awareness on sanitation and pollution issues among users to ensure their cooperation in maintaining their own environments.

Industrial Wastewater

Chennai's deteriorating water situation

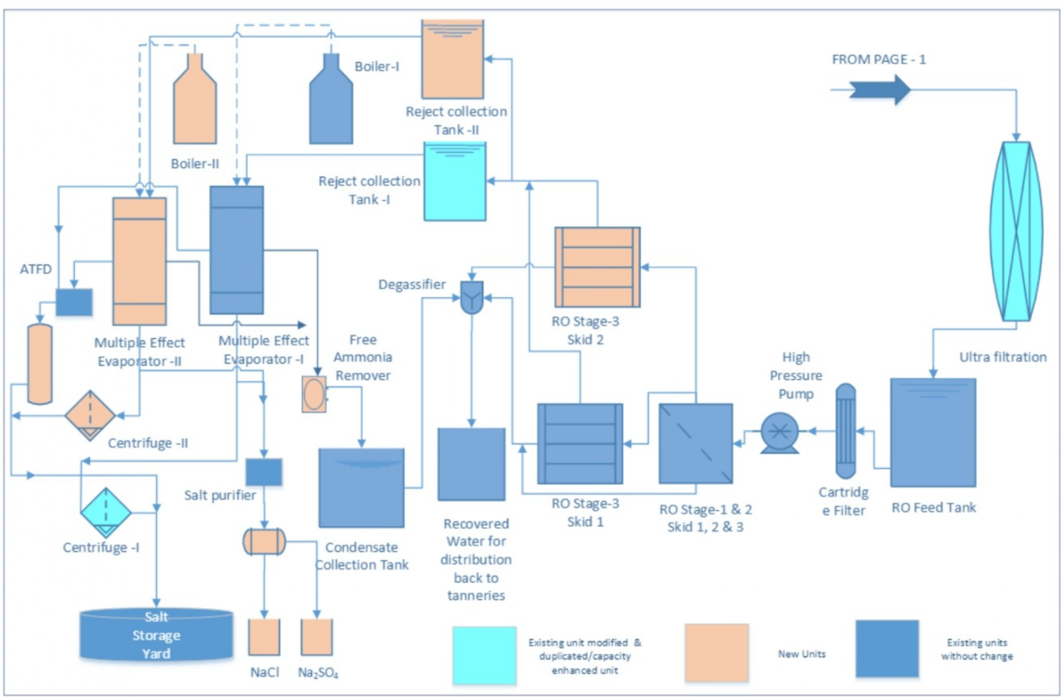
Traditionally, this city of 9 million - which has some of the highest annual rainfall in India - has taken its water from four major lakes that are replenished by the annual monsoon rains. However, while Chennai needs around 1,200 MLD of water each year, these lakes, in their current condition, are only able to supply between 500 to 800 MLD a year, depending on the volume of rainfall that has occurred.

Recycled water therefore adds a new, more sustainable water source for the city – one that saves both fresh and desalinated water, is always available and is more reliable than rainfall which can vary from year to year.

As urbanization proceeds apace, water resources dwindle, and rainfall becomes more unpredictable, each city will need to explore a variety of options to augment its water supply, depending on its geographic, geological, and socio-economic conditions.

Revenue from water credits (RoUs) provides a much needed incentive to encourage voluntary treatment and reuse of similar ETP effluents across industries, enabling them to be built at the scale and speed demanded by the present climate and global heating crisis.

RANITEC CETP schematic Process Flow Diagram showing existing and upgraded units



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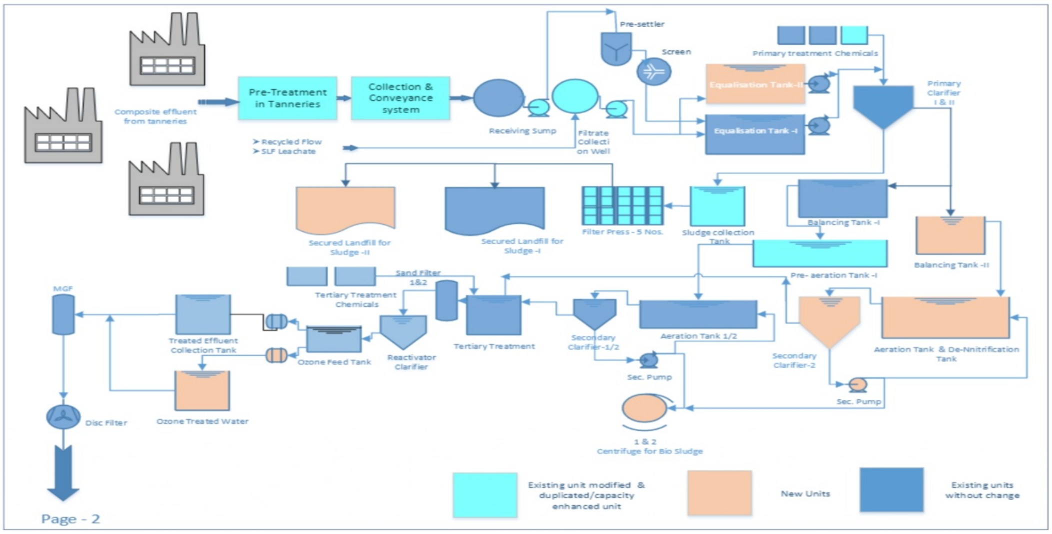
RANITEC CETP schematic Process Flow Diagram showing existing and upgraded units



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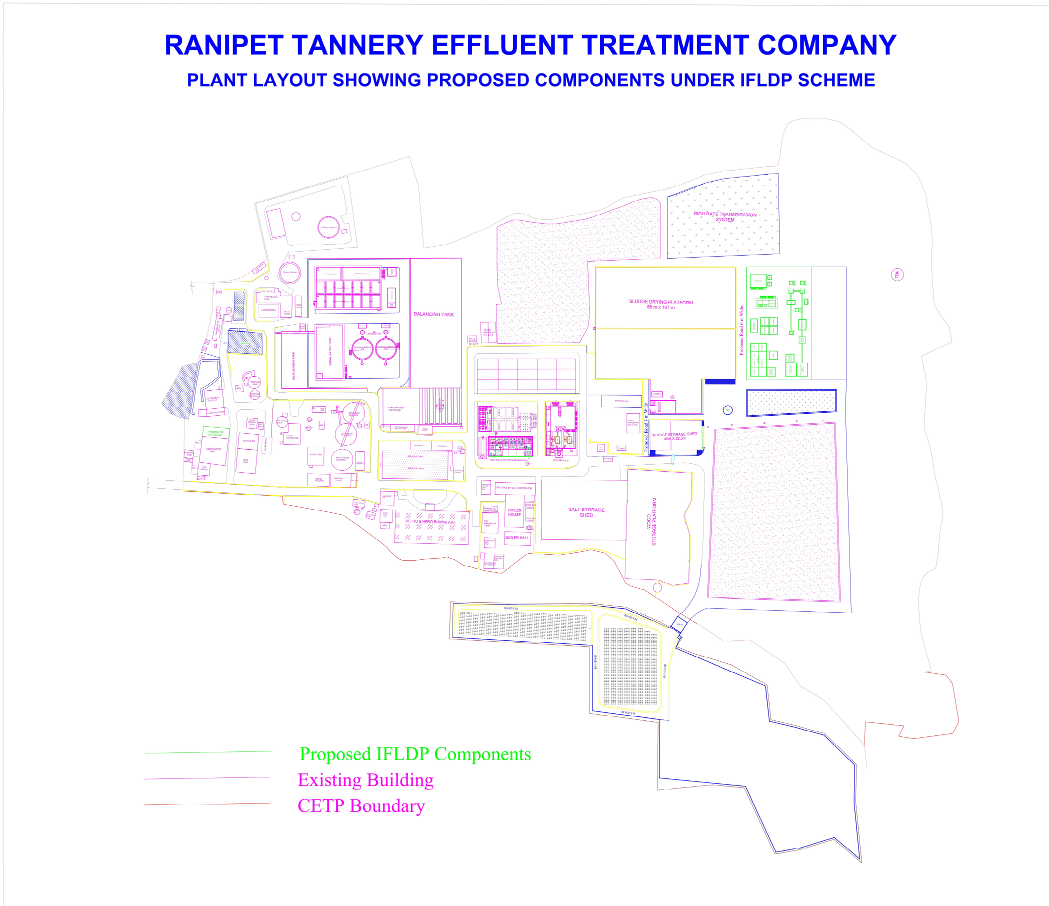
RANIPET TANNERY EFFLUENT TREATMENT COMPANY
PLANT LAYOUT SHOWING PROPOSED COMPONENTS UNDER IFLDP SCHEME
BALANCING TANK
SLUDGE DRYING PLATFORM
SALT STORAGE SHED
BOILER HOUSE
Proposed IFLDP Components
Existing Building
CETP Boundary