Case Study

Turning Failure to Success - Making Right of Failing STP

for

150 kld Underground STP in Community Apartment in Chennai

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Problem Statement

A small community of 220 flats Apartment in suburban Chennai having 150 kld capacity Underground STP failed to deliver Quality Water for Toilet Flushing and Gardening.

Causes of failure

FINE BUBBLE AERATION:

- Fouling, Clogging and Puncturing of Membrane Diffusers causing improper aeration resulting in carry over of untreated wastewater moving to settling tank and clarified water tank.

- Required replacement twice within 20 months.

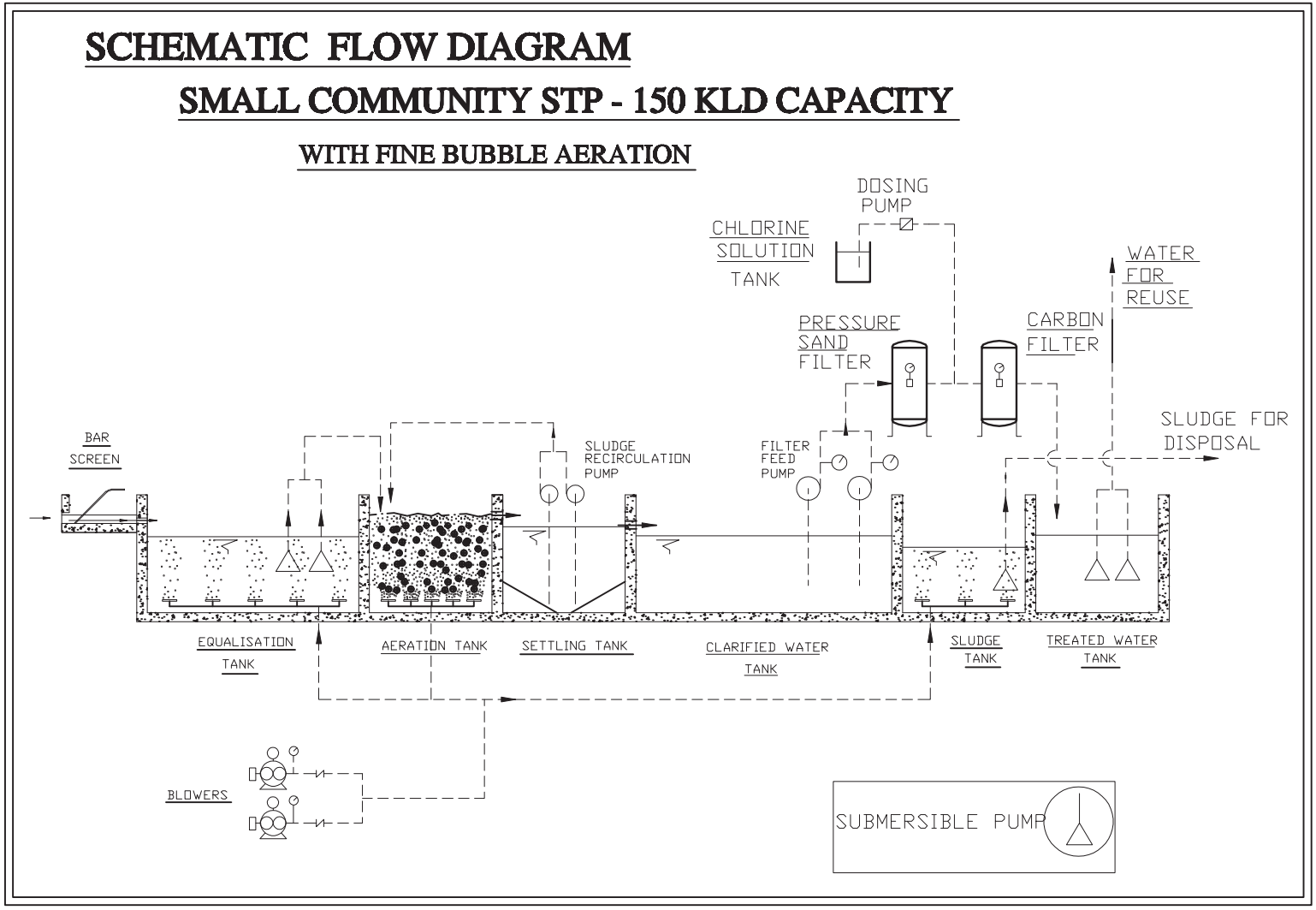
SETTLING TANK DESIGN:

- Bottom slope of 35 Degree against 60 Degree allows carry over of SS.

FLOATING FLOCS :

- Uncontrolled floating flocs in settling tank.

Schematic Flow Diagram



Fine Bubble Aeration Advantages and Disadvantages in Small STP

Advantages

- Exhibit high OTEs.
- Exhibit high aeration efficiencies (mass oxygen transferred per unit power per unit time).
- Are easily adaptable to existing basins for plant upgrades.
- Result in lower volatile organic compound emissions than nonporous diffusers or mechanical aeration devices.
- Can satisfy high oxygen demands.

Disadvantages

- Fine pore diffusers are susceptible to chemical or biological fouling that may impair transfer efficiency and generate high headloss; as a result, they require routine cleaning.
- Fine pore diffusers may be susceptible to chemical attack (especially perforated membranes); therefore, care must be exercised in the proper selection of materials for a given wastewater.

- Because of the high efficiencies of fine pore diffusers at low airflow rates, airflow distribution is critical to their performance and selection of proper airflow control orifices is important.
- Because of the high efficiencies of fine pore diffusers, required airflow in an aeration basin (normally at the effluent end) may be dictated by mixing—not oxygen transfer.
- Aeration basin design must incorporate a means to easily dewater the tank for cleaning. In small systems STP cleaning is challenge especially for Underground STP.

Settling Tank Slope - Poor Design

- 32 Degree settling tank bottom slope poorly affected sludge recycling and allowed carry over of SS downstream.
- High BOD and TSS in the treated water
- Covered below ground tanks with only 600x600mm Manhole restricts any civil work to make slope to 60 Degree.
- Hydraulic Retention Time : 2 hours

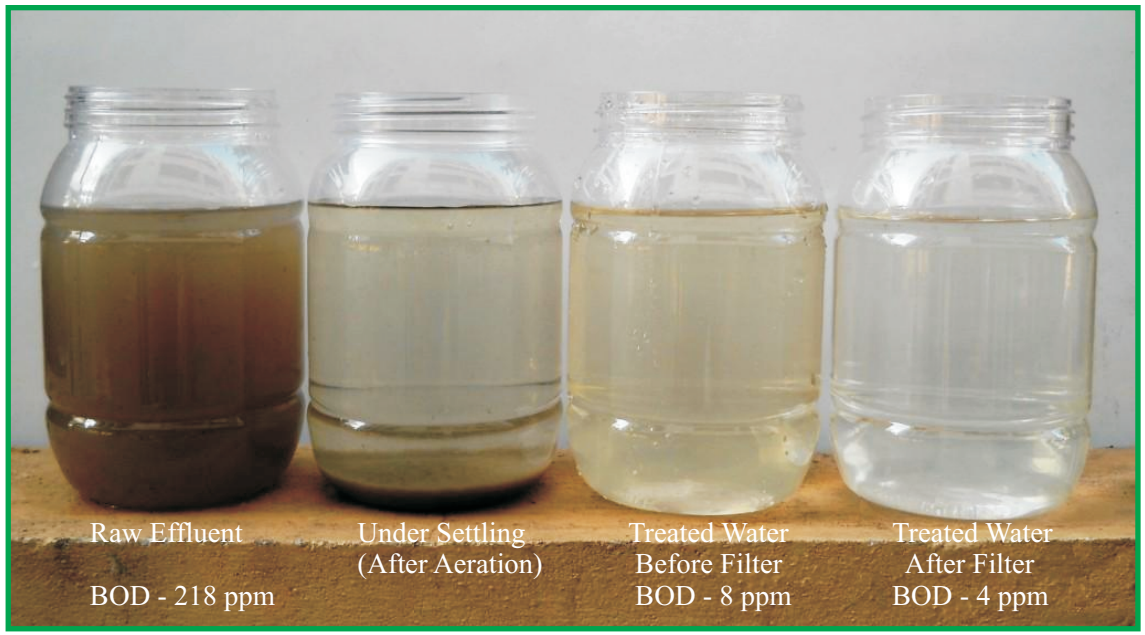
FINAL SOLUTION

- Study and implementing various combinations using further mechanical equipments like pumps, aeration and water line pipes with valves over a period of 3 months, without much affecting daily controlled treatment, arrived at a final solution of Sequential Batch Reactor with Extended Aeration.

- This resulted reusable quality effluent and solving repeated costly replacement of fine bubble diffusers.

Analytical Test Results				
Sl No.	Parameter	Test Result Before Treatment	Test Result After Treatment	Permissible Norms
1.	BOD	218 ppm	4 ppm	BOD < 20 ppm
2.	TSS	194 ppm	4 ppm	BOD < 20 ppm
3.	pH	7.8	7.4	6.5 to 8.5

Images



Underground Advanced SBR