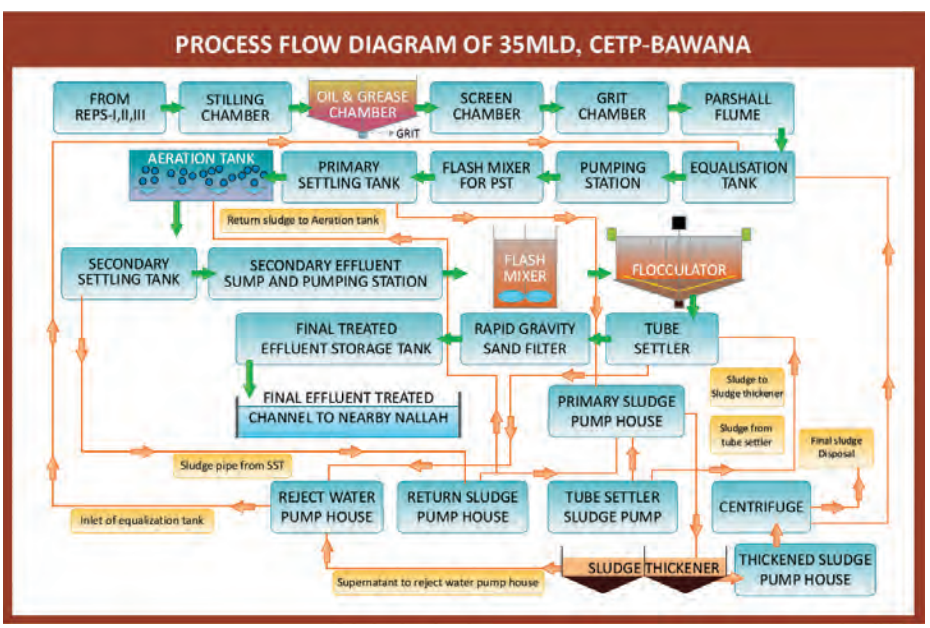
Managing Industrial Waste

SPML's initiative at Bawana

The industrial units functioning in non-conforming or residential areas in Delhi were closed in 1996 following the Supreme Court's order to that effect. To accommodate these units, the Delhi State Industrial and Infrastructure Development Corporation (DSIIDC) developed the Bawana industrial area. Spread over 1,922.94 acres, the industrial area has 20,000 industrial plots. So far, 16,000 industrial units have acquired plots here and about 7,000 units are operational.

These industries generate large quantities of wastewater. To treat the wastewater discharged by these industrial units, and utilise the same for horticulture and gardening purposes, a common effluent treatment plant (CETP) has recently been operationalised.

Overall, Delhi generates a total of about 700 million litres per day (mld) of sewerage. The total treatment capacity is about 510 mld, leaving a gap of around 187 mld. Currently, there are 13 CETPs in Delhi (including Bawana. To reduce the treatment gap, the National Environmental Engineering Research Institute proposes to construct a total of 15 CETPs (of which 13 are already operational) in the industrial areas of Delhi.



The CETP at Bawana was constructed by SPML Infra Limited on an engineering, procurement and construction (EPC) basis for DSIIDC. It has a capacity of 35 mld. Built at an investment of Rs 537.4 million, the plant is spread over 53,000 square metres. SPML is responsible for the operations and maintenance of the plant for a period of three years, after which it will be managed by DSIIDC.

Rishabh Sethi, Chief Operating Officer, SPML Infra Limited, commented "The Bawana CETP is a testimony of our capabilities in executing large water and wastewater projects. Through our efforts in wastewater treatment, we are contributing to environmental sustainability by managing wastewater and not allowing it to harm our ecosystem. Recycling wastewater further enhances reuse and social responsibility conforming pollution control norms. We have proven domain expertise of over three decades in water and wastewater management and SPML is a preferred partner for such projects."

The plant has a three-tier treatment system comprising primary, secondary and tertiary treatment. It is equipped with treatment facilities which can remove suspended solids, biological oxygen demand (BOD), chemical oxygen demand (COD) and other pollutants in the effluent. The main units of the CETP are screen chambers, oil and grease (O&G) removal tank, grit chamber, equalisation tank, chemical treatment, clarifiers, aeration tanks, tube settlers, rapid

Treated effluent characteristics

Parameter	Primary settling tank	Secondary settling tank	Tube settler (mg per litre)	Rapid gravity sand filter (mg per litre)
Suspended solids	Removal <65 per cent of raw effluent	Removal <90 per cent of raw effluent	15	0-4
BOD	Removal <45 per cent of raw effluent	Removal <95 per cent of raw effluent	7	1-2
COD	Removal <45 per cent of raw effluent	Removal <95 per cent of raw effluent	8	1-5
Coliform	–	–		99-99.99 per cent removal

sand gravity filter and centrifuge.

Wastewater generated by industries in Bawana is transported to the CETP by pumping of effluent from three raw effluent pumping stations through rising mains. The effluent through raw water pumping stations initially reaches a stilling/inlet chamber, after which it flows into the O&G chamber for removing O&G in the wastewater, using a skimming mechanism. During this process, air and chlorine are injected into the chamber and the separated O&G is then disposed of. Wastewater moves from the O&G chamber to be collected in the screen chamber for the removal of floating materials in the effluent. Apart from floating materials and O&G, the effluent also contains solid particles like grit and sand. This is removed in the grit chamber before undergoing biochemical treatment.

After passing through these chambers, the effluent is collected in the wastewater equalisation tank before undergoing primary treatment. From the equalisation tank, the effluent flows into the flashed mixers. Since the raw wastewater contains substantial amounts of suspended solids, which cannot be removed by bar screens and the grit chamber, it is mixed with chemicals like alum or lime or polymer in the flash mixers to separate solids through chemical coagulation and sedimentation.

The effluents discharged from the flash mixers flow into the primary settling tank via a distribution box for the gravitational separation of flocs resulting from the coagulation/flocculation process. The primary treatment process results in the formation of sludge, which is collected in a sludge pit at the bottom of the primary settling tank.

Then, the effluent undergoes secondary treatment. From the primary settling tank, the effluent flows into the aeration tank for biodegradation of organic matter in the presence of oxygen supplied by the aerators. The biologically degraded effluent is discharged into the secondary settling tank and the settled sludge is collected in sludge pits at the bottom of the tank.

The secondary treated effluent flows into the secondary effluent sump and pumping station for further removal of pollutants with the help of chemicals like alum or lime or polymer. The effluent mixed with chemicals is discharged into the coagulation/flocculation chambers resulting in floc formation. The colloidal flocs formed settle at the bottom of the tube settler attached to the flocculation chamber.

From the tube settler, the clarified or treated effluent flows into the rapid gravity sand filter for the final stage of tertiary treatment. In the rapid gravity sand filter, the remaining suspended solids and other pollutants in the treated effluent are removed using the filtration process. The filtered effluent is collected in the final effluent storage tank. Finally, chlorine is injected into the tank to further reduce the level of pollutants in the treated effluents.

The rapid gravity sand filter is connected through water channels to the final effluent storage tank and the reject water pump house. A backwash pump house is attached to the final effluent storage tank to store water for filters. The wastewater collected in the reject water pump house is pumped to the primary sludge pump house from where it flows into the sludge thickener. The thickened sludge is discharged into the thickened sludge pump house from where it flows into the centrifuge house. Finally, the sludge extracted from the centrifuge house is collected in the trolley for disposal.

Currently, the Bawana CETP is serving 7,000 industrial units. This is expected to increase to 16,000 units once all the industries become operational. It is utilising about 35 per cent of its total capacity, treating 10-12 mld of effluent daily. As against the standards stipulated for BOD at 30 mg per litre and COD at 80-120 mg per litre under the Environment (Protection) Act, 1986, the BOD and COD content of the treated effluents discharged by the plant ranges from 18 mg per litre to 26 mg per litre and 80 mg per litre to 120 mg per litre respectively.

As India undergoes rapid industrialisation and urbanisation, the amount of wastewater generated by industries will increase in future. This necessitates that states take up similar initiatives and also encourage large industries to set up their own CETPs to reduce the waste generated at source.

Contributed by Nikita