SEWAGE TREATMENT PLANT (STP)

Complete Process Flow Diagram & Standard Technical Specifications

This document provides standard technical specifications and mechanical unit breakdowns for a **Sewage Treatment Plant (STP)** (MBBR / SBR / MBR Technology compatible). It includes a detailed unit-by-unit Process Flow Diagram (PFD) covering Preliminary, Secondary Biological, Tertiary Filtration, and Sludge Handling stages for domestic wastewater treatment.

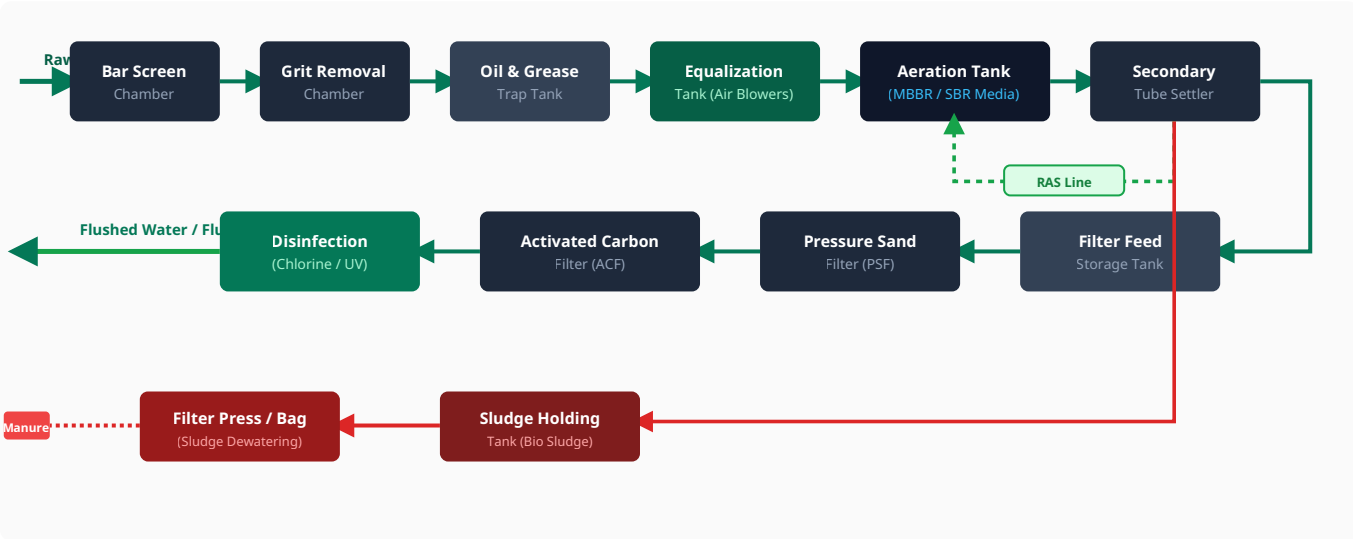

FIGURE 1: COMPREHENSIVE SEWAGE TREATMENT PLANT (STP) PROCESS FLOW DIAGRAM

1. PRELIMINARY TREATMENT ZONE (PHYSICAL SCREENING & GRIT REMOVAL)

UNIT / COMPONENT	FUNCTION & TECHNICAL SPECIFICATIONS
Bar Screen Chamber	**Function:** Prevents large floating items (polythene, rags, sanitary waste) from entering the plant. **Specifications:** MOC: Stainless Steel (SS-304); Bar Spacing: 10mm to 15mm (Coarse Screen) & 5mm (Fine Screen); Manual / Auto Rake type.
Grit Chamber	**Function:** Removes inorganic heavy particles such as sand, silt, and gravel to protect pump impellers. **Specifications:** Hopper bottom RCC design / Vortex type Mechanical Grit Collector with Air Classifier.
Oil & Grease Trap	**Function:** Traps kitchen oils, fats, and soap scum commonly found in domestic sewage. **Specifications:** Multi-baffle chamber with manual/automatic oil skimmer collection arrangement.
Equalization Tank	**Function:** Absorbs peak flow variations (morning/evening sewage peaks) and provides uniform flow rate to biological units. **Specifications:** Retention Time: 6 to 8 Hours; Coarse Bubble Air Diffusers to prevent anaerobic septic odors; Air Blower connected.

2. SECONDARY TREATMENT ZONE (BIOLOGICAL PROCESS)

UNIT / COMPONENT	FUNCTION & TECHNICAL SPECIFICATIONS
Aeration Tank (MBBR / SBR)	**Function:** Biological degradation of organic matter (BOD/COD reduction) and nitrification by aerobic microorganisms. **Specifications:** Fine Bubble EPDM Diffusers; Target DO: 2.0 – 3.0 mg/L; MBBR Polypropylene Media filling (400–500 m^2/m^3 specific surface area).
Secondary Tube Settler / Clarifier	**Function:** Settles bio-flocs (activated sludge) from treated sewage supernatant. **Specifications:** PVC Tube Settler Media (60° slope angle); Hopper bottom sludge pit with RAS (Return Activated Sludge) pumps.

3. TERTIARY TREATMENT ZONE (FILTRATION & DISINFECTION)

UNIT / COMPONENT	FUNCTION & TECHNICAL SPECIFICATIONS
Pressure Sand Filter (PSF)	**Function:** Removes fine carryover suspended solids and lowers turbidity down to < 5 NTU. **Specifications:** MOC: FRP / MS Lined; Media: Multi-grade Quartz Sand and Silica Gravel; Multi-port valve for backwash.
Activated Carbon Filter (ACF)	**Function:** Eliminates organic color, foul odor, and residual chlorine. **Specifications:** High Iodine Value Coconut Shell Activated Carbon (> 900 mg/g); Frontal piping arrangement for backwashing.
Disinfection System (UV / Hypo)	**Function:** Destroys pathogenic bacteria (E. coli, coliforms) to make water safe for flushing and gardening reuse. **Specifications:** Automatic Sodium Hypochlorite Dosing System or Closed-vessel SS-316 UV Sterilizer.

4. SLUDGE DEWATERING & MANAGEMENT SYSTEM

UNIT / COMPONENT	FUNCTION & TECHNICAL SPECIFICATIONS
Filter Press / Screw Press / Bag Filter	**Function:** Dewaters waste activated sludge into dry sludge cakes suitable for eco-friendly garden manure. **Specifications:** PP Filter Plates with hydraulic press or Stainless Steel Volute Screw Press; Sludge feed pump included.

Note: Treated effluent standards comply with Central Pollution Control Board (CPCB) norms for reuse in toilet flushing, horticulture, and cooling towers (pH: 6.5–8.5, BOD < 10 mg/L, TSS < 20 mg/L, COD < 50 mg/L).