

A Case Study of Sewage Treatment Plant

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Abstract

This study investigates the design, operation, and performance of the Sewage Treatment Plant (STP) at [DRGITR Amravati]. It analyzes influent and effluent quality, treatment processes, energy consumption, and compliance with environmental standards. The research highlights challenges, optimization strategies, and recommendations to improve efficiency and reduce operational costs.

Keywords

Sewage Treatment Plant, Biological Treatment, Wastewater, Effluent Quality, Activated Sludge Process, Environmental Compliance.

1. Introduction

Sewage treatment plants (STPs) are essential for protecting public health and the environment by treating wastewater before its release into water bodies. This case study focuses on [STP DRGITR Amravati], examining its process flow, performance metrics, and compliance with regulatory standards.

1.1 Objectives

- Analyze the wastewater treatment process.
- Evaluate STP performance based on water quality parameters.
- Identify operational challenges and recommend improvements.

2. Literature Review

Prior studies show that STP performance depends on factors such as influent load, reactor design, sludge management, and operator expertise. Conventional activated sludge processes remain widely used due to high removal efficiency of organic matter and nutrients (Smith et al., 2019).

3. Methodology

3.1 Study Area

3.2 Treatment Process

- **Preliminary Treatment:** Screening and grit removal.
- **Primary Treatment:** Sedimentation tanks.
- **Secondary Treatment:** Activated sludge process.

3.3 Data Collection

Parameters measured:

- pH
- Biological Oxygen Demand (BOD)
- Chemical Oxygen Demand (COD)

- Total Suspended Solids (TSS)
- Nutrients (N & P)

Sampling points: Influent, Effluent, Sludge.

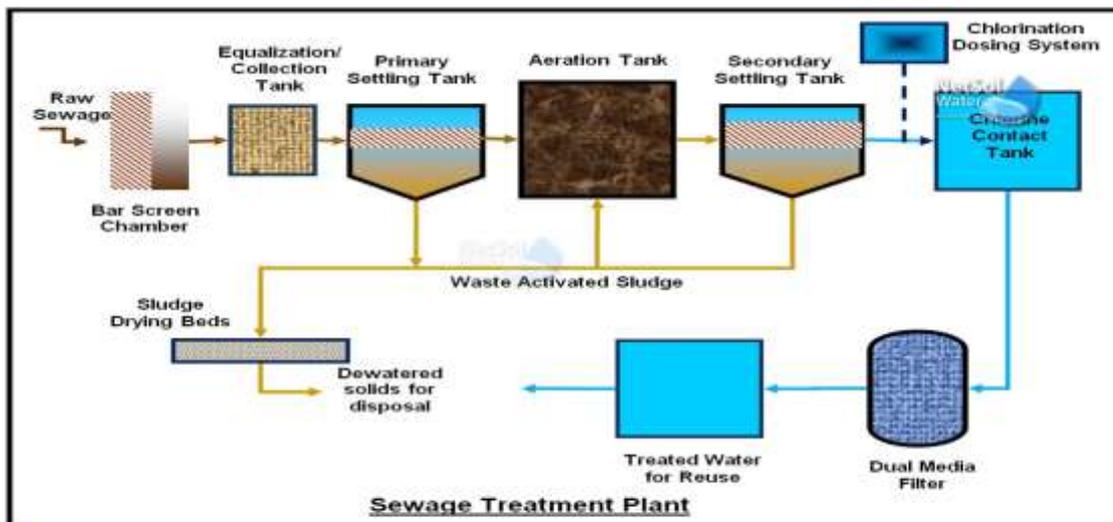
4. Treatment Plant Description

4.1 Design Capacity

Example: 10 million liters per day (MLD).

4.2 Major Units

Unit	Purpose	Capacity
Bar Screen	Remove large solids	10 MLD
Grit Chamber	Remove grit/sand	10 MLD
Primary Clarifier	Sedimentation	10 MLD
Aeration Tank	Biological treatment	10 MLD
Secondary Clarifier	Sludge settling	10 MLD
Disinfection	Pathogen removal	10 MLD



Understanding of a Sewage Treatment Plant Via Diagram

5. Results and Discussion

5.1 Influent Characteristics

Parameter Unit Value

pH	-	7.3
BOD	mg/L	250
COD	mg/L	350
TSS	mg/L	300

5.2 Effluent Quality

Parameter Unit Value Standard

pH	-	7.0	6.5–8.5
BOD	mg/L	30	≤ 30
COD	mg/L	80	≤ 100
TSS	mg/L	25	≤ 30

Results indicate compliance with regulatory standards set by [Local Authority]. Removal efficiencies are:

- BOD: 88%
- COD: 77%
- TSS: 92%

5.3 Sludge Management

Sludge is thickened and dewatered before disposal. Challenges include odor control and high moisture content.

5.4 Energy Consumption

The power requirement for aeration accounts for approximately [X] kWh/day, which constitutes the largest energy usage.

5.5 Operational Issues

- Inconsistent influent load
- Power outages
- Maintenance backlog

6. Optimization and Recommendations

To enhance efficiency:

- Implement fine screening.
- Install energy-efficient blowers.
- Introduce nutrient removal units (for nitrogen & phosphorus).
- Use automated control systems for aeration.

7. Conclusion

The STP at [DRGTR Amravati] effectively treats municipal wastewater with high removal efficiencies. With operational improvements and optimization, it can further increase performance and sustainability.

8. References

1. Smith, J., & Lee, A. (2019). Performance evaluation of municipal sewage treatment plants. *Water Research*.
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