SHRI MADHWA VADIRAJA INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(A unit of Shri Sode Vadiraja Mutt Education Trust ®)

VISHWOTHAMA NAGARA, BANTAKAL, UDUPI

Affiliated to VTU, Belagavi, Approved by AICTE, New Delhi

Accredited by NBA (BE –CSE, ECE) and NAAC with A Grade

SMVITM

Report on Sewage Treatment Plant

2022-23

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CONTENTS

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1. INTRODUCTION:

Sewage treatment plants (STPs) are vital facilities designed to treat wastewater generated from various sources such as households, institutions, industries, and commercial establishments. Institutions like schools, colleges, hospitals, and government buildings generate significant amounts of wastewater daily, containing various pollutants and contaminants that must be treated before being discharged into the environment or reused for flushing and gardening purpose.

It's important for institutions to invest in robust sewage treatment infrastructure to mitigate environmental pollution, protect public health, and comply with regulatory requirements. Additionally, promoting water conservation measures and educating stakeholders about responsible wastewater management practices can further enhance the sustainability of institutional sewage treatment systems.

Sewage treatment plant can be done using biological reactors such as Activated sludge process, ricking filter, oxidation tank, Rotating biological contractor, sequential batch reactor.

SMVITM campus is provided with 125 KLD sewage treatment plant. The treatment plant has a sequential batch reactor as biological reactor. The system was installed by E systems. Sequential Batch Reactor (SBR) technology offers a compact, effective, and flexible solution for wastewater treatment within institutional settings. This makes them suitable for installation in areas with space constraints, allowing institutions to optimize land use. The sequential batch process allows for efficient treatment of varying loads, accommodating changes in wastewater generation throughout the day. SBRs are capable of achieving high levels of treatment efficiency due to the multiple treatment phases incorporated within each batch cycle. SBRs are enclosed systems that minimize odor emissions and visual impacts, contributing to a pleasant environment for staff, students, patients, and visitors.

Implementing SBR technology in institutions presents educational opportunities for students, staff, and the community

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2. OBJECTIVES OF SEWAGE TEATMENT PLANT:

The objectives of a sewage treatment plant for an institution can vary depending on factors such as the size of the institution, local regulations, environmental concerns, and the specific needs of the institution.

Here are the objectives:

1. The primary objective of a sewage treatment plant is to reduce pollution by treating wastewater before it is discharged into the environment
2. Ensuring that the treated wastewater meets the regulatory standards set by local, regional, and national authorities is crucial.
3. Incorporating sustainable practices such as energy-efficient technologies, reuse of treated water for non-potable purposes, and minimizing the carbon footprint of the treatment process contributes to overall sustainability goals.
4. Educating staff, students, and the community about the importance of proper wastewater management, water conservation, and environmental stewardship fosters a culture of responsibility and sustainability.

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3. METHODOLOGY

The methodology of a Sequential Batch Reactor (SBR) installed for 125 KLD of sewage treatment plant involves a cyclic batch operation with distinct phases aimed at treating wastewater efficiently. Here is a detailed breakdown of the methodology typically employed in SBR systems

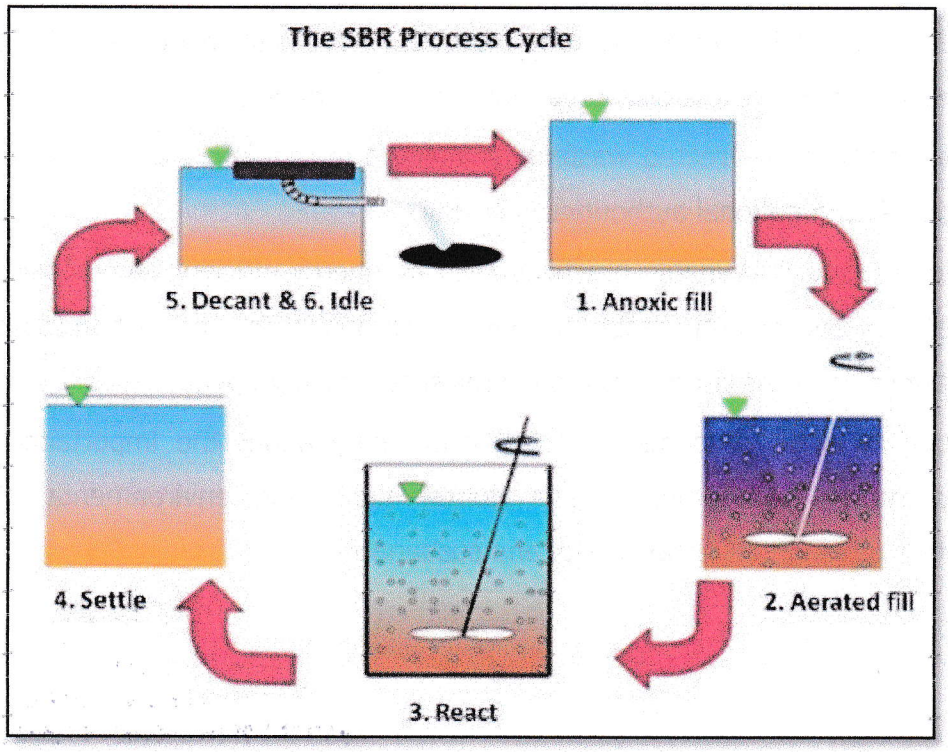

Figure1: SBR Process Cycle

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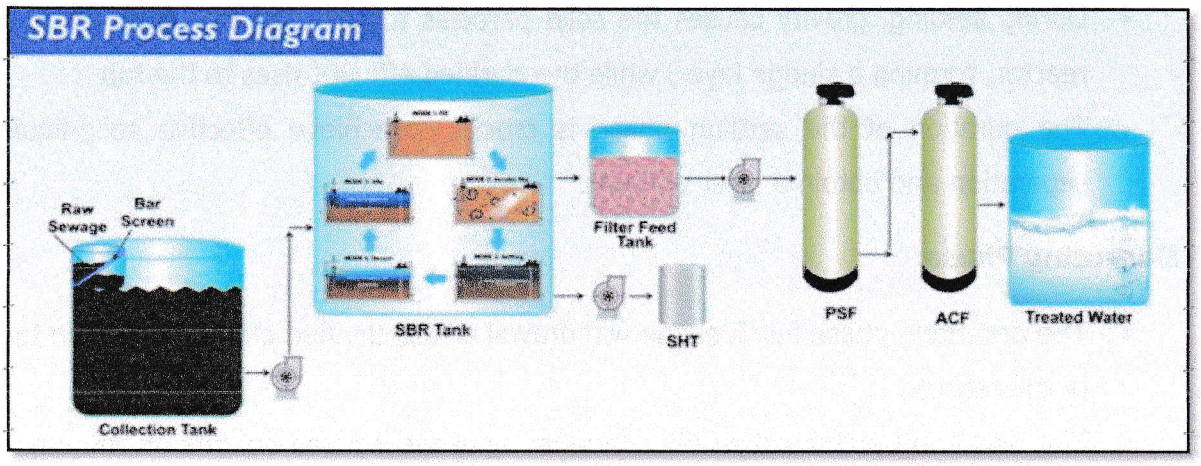

Figure 2: Flow diagram of Sewage Treatment Plant

Filling Phase:

- The SBR cycle begins with the filling phase, where influent wastewater is introduced into the reactor vessel.
- The filling process continues until the reactor reaches a predetermined fill level, ensuring that the influent volume matches the reactor's capacity.

Reaction Phase:

- Once the reactor is filled, the reaction phase begins. This phase involves the actual treatment of the wastewater.
- Aeration is typically employed for aerobic treatment, facilitating the growth of microorganisms that degrade organic pollutants in the wastewater. Mixing ensures uniform distribution of oxygen and nutrients, promoting efficient treatment throughout the reactor.

Settling Phase:

- The settling phase allows for the separation of treated effluent from suspended solids and biomass

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- During settling, gravity causes the solid particles to settle to the bottom of the reactor, forming a sludge layer, while the clarified effluent rises to the top
- The duration of the settling phase is crucial to achieve effective solid-liquid separation and obtain a clear effluent.

Decanting Phase:

- The decanting phase involves the withdrawal of the clarified effluent from the top of the reactor.
- The decanting process typically continues until the desired volume of effluent is removed, leaving behind a specified volume of sludge in the reactor

Idle Phase:

- The reactor enters an idle phase where no influent is added, and the system is prepared for the next batch cycle
- During the idle phase, any remaining sludge settles further, and the reactor is allowed to settle before the next filling phase begins

Control and Animation:

- SBR systems are equipped with sophisticated control and automation systems that regulate the sequencing of batch cycles and control various process parameters

Sludge Management:

- Sludge management is an integral part of SBR operation, involving the periodic removal of excess sludge to maintain optimal reactor performance

After the Sequential Batch Reactor (SBR) process, filtration is often employed to further polish the treated effluent before it is discharged into the environment or reused for various purposes.

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4. RESULT AND DISCUSSION:

The sewage treatment plant installed by E system is well maintained and treats 125 KLD of sewage. The aeration unit and the batch reactor is well maintained and monitored frequently. The aeration provides the dissolved oxygen for aerobic reaction of the treatment plant.

The treated water is monitored by analyzing the water frequently. The treated water is used for the flushing system. The treated water is recycled and reused for gardening purpose. This is one way of water conservation. The reuse of treatment water will reduce the pumping of fresh water for gardening and flushing system.

Assess the effectiveness of the SBR system in removing contaminants from the institutional wastewater. Include data on removal efficiencies for parameters such as organic matter (BOD/COD), suspended solids, nutrients (nitrogen, phosphorus), and pathogens. The BOD, COD, pH, turbidity, E Coli, nitrate, chorine and nitrate are well within the disposal standards.

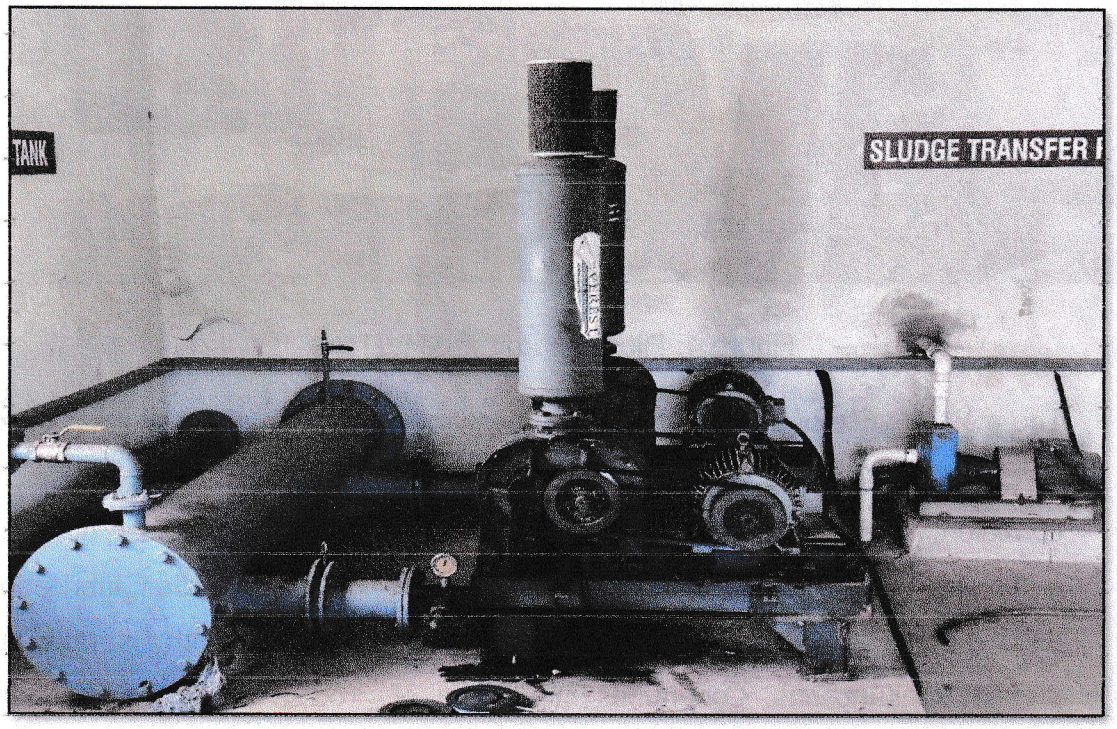

Figure 3: Sewage Treatment Plant at SMVITM

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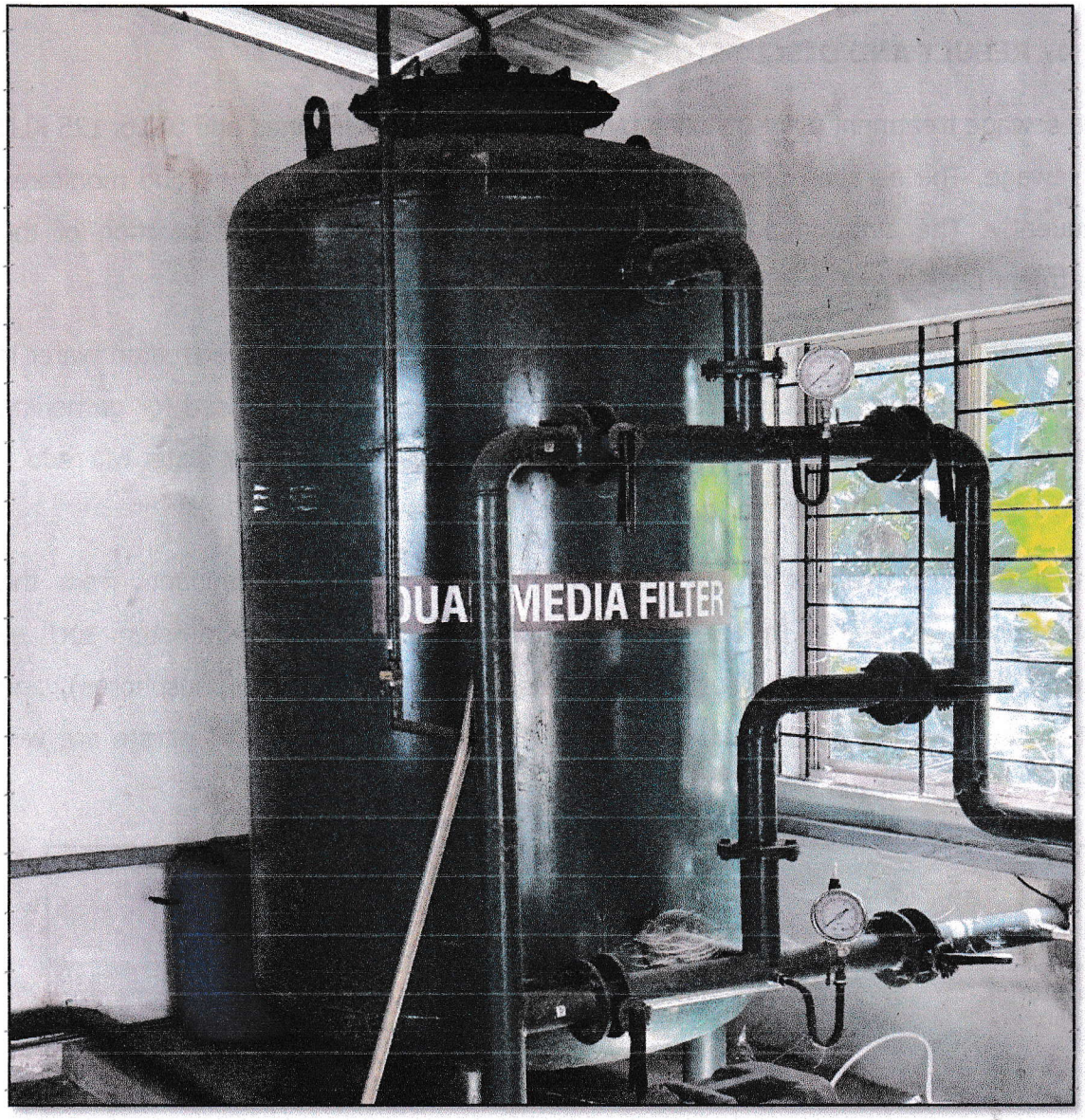

Figure 4: Filtration unit at SMVITM

- The maintenance of sewage treatment plant for all components, including tanks, pipes, valves, pumps, mixers, and instrumentation, to identify signs of wear, corrosion, leaks, or other damage is done. Inspection of aeration devices, diffusers, and air piping to ensure proper functioning and alignment. Inspection, lubrication, and maintenance of pumps, valves, and actuators to ensure smooth operation and prevent malfunctions. Continuous monitoring of process parameters, effluent quality, and system performance to detect any deviations from desired targets.

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The treated sewage analysis will be done frequently the sample test report is enclosed.

CONCLUSION:

- SBR systems are highly effective in removing contaminants from institutional wastewater, including organic matter, suspended solids, nutrients, and pathogens. The cyclic batch operation allows for thorough treatment and ensures compliance with regulatory standards for effluent quality
- The modular design and adaptive control systems allow for efficient management of fluctuating influent loads and changing treatment demands.
- SBR systems enable institutions to meet regulatory requirements for wastewater discharge, ensuring compliance with local, national, and international standards.
- Implementing SBR technology promotes environmental sustainability by reducing pollution load, recycle and reusing the treated water.
- The system provides the zero discharge system with respect to water attribute.

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SMVITM

SMVITM/TCC/2022-23/0362 20 Oct 2022

STP treated Water
SMVITM, Bantakal
Udupi.

Dear Sir,
Sub : Water Quality Testing
Ref : Your request dated 19 -10 -2022

With reference to the above, we have conducted the following tests on the sample supplied by you. The test report is as below.

Sl. No.	Tests	Results
1	pH Value	6.78
2	Suspended Solids, mg/l	102.00
3	BOD 5days at 20°C, NTU	22.00
4	COD, mg/l	124.00
5	Total Dissolved Solids, mg/l	435.23
6	Oil and grease, mg/l	NIL

20/10/22

Lab In-Charge
Department of Civil Engineering
(Ms. Deepika B V)

20/10/22.

Coordinator
Testing &Consultancy Cell-CED
(Mr. Roshan S Kotian)

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