



# Decentralized Sequencing Batch Reactor and Wastewater Learning Lab

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## Design Concept

The SDSU Mission Valley Campus will incorporate a decentralized wastewater treatment system DEWATS that will treat building B2. Wastewater from the building will be treated in a SBR, the effluent will be disinfected to class A using UV. The water will be sent to four water towers across campus. The water towers will supply irrigation throughout the campus. The building will also house the wastewater modular learning lab. This lab will offer five bench scale treatment options.

The SBR was chosen because of its small footprint and savings after the capital cost. The SBR requires significantly reducing the O&M cost compared to any other traditional system.

## Sequencing Batch Reactor (SBR)

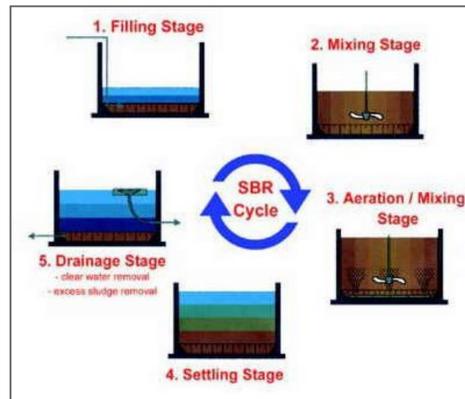


Figure 1: SBR Process Flow

### SBR Advantages

- Entire treatment process takes place in 1 tank.
- Operating flexibility to handle varying flow from academic year to breaks.
- Capital costs savings
- Low maintenance
- High treatment efficiencies for BOD, COD, TSS, N, and P
- Biogas Capturing available.

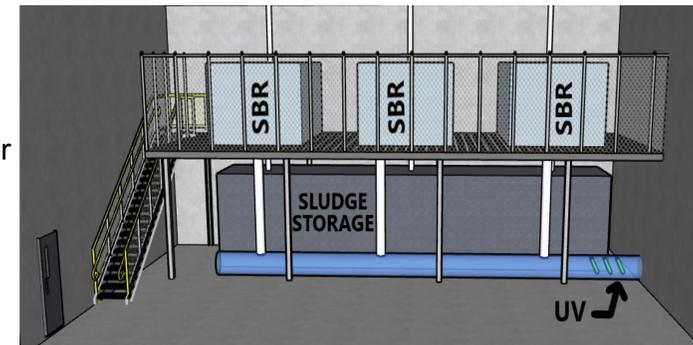


Figure 2: DEWATS Concept

### DEWATS Process

- All wastewater will be processed in 1 of 3 sequencing batch reactor located underground.
- The SBR achieves denitrification (nitrogen removal) and phosphorus removal by changing the conditions in the tank from aerated to non aerated.
- Following the 6 hour treatment the clean effluent will pass through a UV disinfection system. The water will be transported to a 1 of 4 water towers across campus

## Wastewater Learning Lab

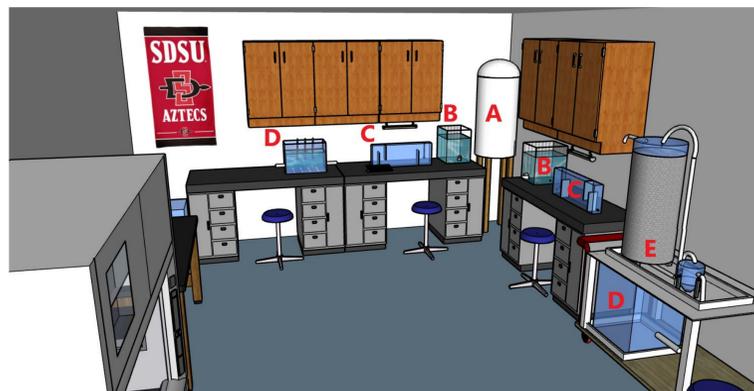


Figure 3: Learning Lab (A holding tank, B suspension tank, C sedimentation tank, D collection tank, E modular cart).

### Lab Objective

*The objective of this learning lab is to offer students a custom hands on learning experience. Researchers will have the ability to test multiple treatments and adjust the system to create the scenario of the research*

This wastewater treatment offers students and researchers 5 processes sedimentation, activated sludge, biofilm trickling filter, anaerobic, and Sequencing Batch Reactor.

- The Activated sludge system will be online at all times.
- The sedimentation system is equipped with a suspension tank that allows the operator to change the wastewater characterizes using chemicals or other additives. It can be used independently and is the connection port for the remaining treatments.
- The biofilm trickling filter (Figure 1, E), anaerobic, and SBR are all on a separate carts to protect the system while not in use and to provide the ability add additional treatment processes without changing the physical lab.
- Each of the treatments offered have adjustable parameters like flow rate, biological media, and can be retrofitted for biogas collection.

## Water Reuse



Figure 4: Decorative water towers across campus for recycled water storage.



Figure 5: Green roof

### Water Reuse Cost Analysis

390,000 gallons per year available for reuse  
Savings \$24,000 per year.

### Water Usage

Estimate irrigation area = 20,000 sq ft  
Drip watering system = 12,335 gal/week  
• Drought resistant plants  
• Watered three times per week  
5 Campus buildings with green rooftop = 9,500 gal/week