San Diego State University Mission Valley Wastewater Learning Lab

E. Winterton (ewinterton9@gmail.com), S. Chao, K. Metkiff, F. Pinongcos, A. Rocha, D. Sisk, H. Steele, T. Smith and C. Dykstra

Department of Civil, Construction, and Environmental Engineering, San Diego State University

Introduction

Background:
In efforts to expand research space and opportunities for SDSU students, a proposed decentralized wastewater treatment system (DEWATS) will allow for students to conduct research projects in wastewater treatment engineering.

Motivation:
A learning lab will add another element to the learning experience of future engineers in water and wastewater treatment. SDSU can upgrade to a Carnegie classified "R1" rating through more research spaces.

Goals:
The focus of this project is to design a modular wastewater system for a proposed learning lab on the new campus that will allow for undergraduate, masters, and PhD students to have a hands-on experience to conduct wastewater research.

Figure 1: Proposed Learning Lab Interior

Alternative Effluent Uses

Options:
- ❖ Return to Sewer
- ❖ Cooling Tower
- ❖ Discharge to San Diego River
- ❖ Polishing Pond
- ❖ On Campus Recreational Uses
- ❖ Potable Reuse
- ❖ Flushing water for Toilets

Rationale:
These options were not pursued due to cost limitations, low permitting viability, negative public perception, harmful impacts to the environment or others, or treatment standards could not be met. See DEWATS to right for elected effluent use.
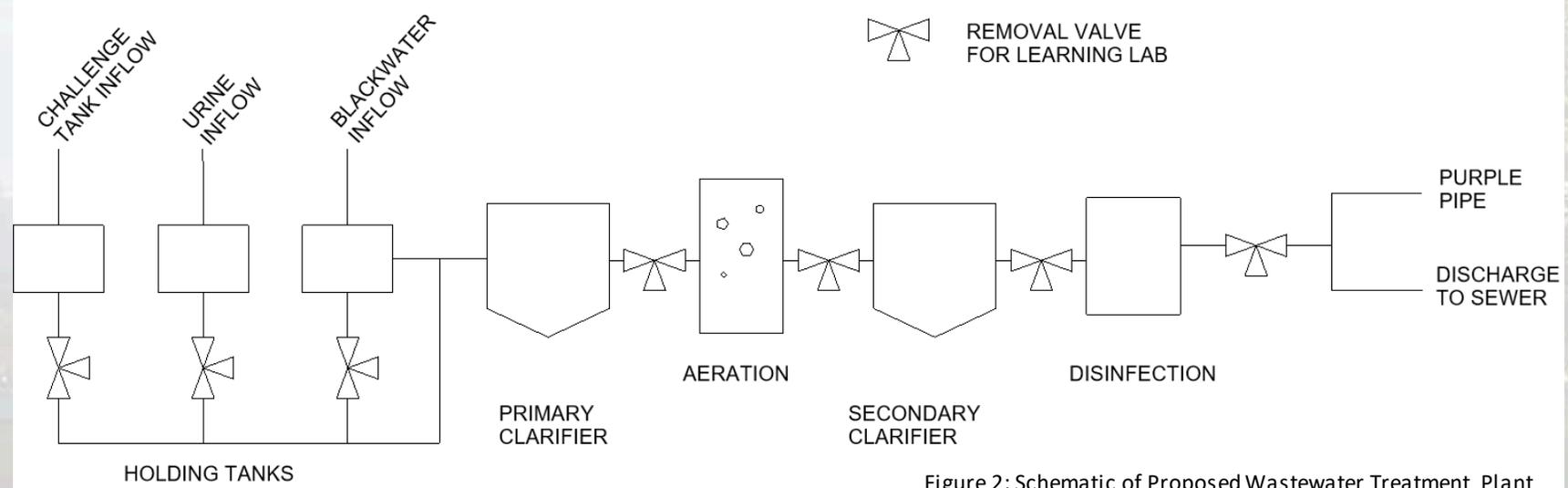
Recommended Design

Figure 2: Schematic of Proposed Wastewater Treatment Plant

Learning Lab

- ❖ Urine diversion toilets will separate the urine and solids to account for all potential studies.

- ❖ A challenge tank will be incorporated into the design to allow for experimental types of influent.

- ❖ Modular sections are implemented in the design where students can design their own treatment experiments using wastewater from any point in the treatment train.

  - ❖ Taking urine from a dual plumbing system to explore struvite recovery, bio-electrochemical systems, anaerobic digestion, composition of solids, nutrient recovery, photodegradation of DEWATS effluent and more.

DEWATS

- ❖ The effluent will meet the State Water Resources Control Board Order WQ 2014-0153-DWQ (General Waste Discharge Requirements for Small Domestic Wastewater Treatment Systems).

  - ❖ Disinfected with a stream of chlorine to comply with recycled water requirements.

  - ❖ Effluent will be suitable for irrigation on-campus landscapes.

- ❖ The treated water will discharge into a 5,000-gallon cistern below the lab awaiting distribution to the University's purple pipe irrigation system.