Puritan Passive Treatment System
SRI O&M TAG Project #31 Request #2 & #3
OSM PTS ID: PA-245

Requesting Organization: Saint Francis University
Requesting Organization Representative: Jim Eckenrode
Dates of work performed On-Site: 2/15/23, 3/28/23, 5/30/24, 6/13/24, 7/17/24, 7/31/24, & 9/30/24

Requests: Saint Francis University (SFU) notified Stream Restoration Incorporated (SRI) in January 2023 that the Puritan Passive Treatment system was not functioning properly. Autoflushing Vertical Flow Pond 1 (AFVFP1) appeared to not be flushing as designed and the skimmer within Settling Pond 1 (SP1) was floating above the water surface causing water to exit via the emergency spillway. The system was reconfigured prior to our arrival to act in a flow through mode configuration, bypassing any flushing functions while still allowing for some treatment of water by utilizing other system components. SFU contacted SRI again in May 2024 regarding additional issues. Both of these requests are addressed by this report.

Initial Site Visit, Observations, and Identified Needs: Local volunteers familiar with the system noted items of concern and took photos that were then relayed to BioMost, Inc. (BMI). From these observations and photos, reasonable assumptions were made that the skimmer needed redesigned and the most likely cause of the AFVFP1 failure was due to solar controller or battery failure at the master Agri Drain control box.

Work Completed: Initially, on 2/15/2023, BMI mobilized to the site to replace the battery and solar controller in the Agri Drain control box. The battery was determined to be in good working order; the solar controller was giving erroneous information and was replaced with a new identical component. The new controller functioned properly and began charging the battery as designed. No other issues were noted. The box was tested and appeared to function as designed. During the site visit the skimmer was inspected and an attempt was made to restore function, it was ultimately decided to remove the skimmer inlet assembly and fabricate a new inlet with a revised design. On 3/28/2023 BMI returned to site to install a redesigned skimmer. All components of the old skimmer were disassembled and removed from SP1. The components of the new skimmer were assembled onsite and installed in SP1, consisting of two floats attached with stainless steel hardware to the inlet end of an 8-inch flexible intake suction hose and weights to allow the skimmer inlet to be held about one foot below the water level. The new skimmer was tested by filling SP1 and observing its function, simultaneously the Agri Drain control box was tested when configuring the control box to flush water from AFVFP1 into SP1. The control box and skimmer both appeared to work as designed. On 5/30/24 a site inspection was performed by BioMost personnel to check the function of the Master control box. The box was uninstalled and taken back to BioMost office to troubleshoot the software and reprogram as necessary. On 7/17/24 the Master box was reinstalled and tested to verify function, the box performed as designed. On 6/13/24 BioMost personnel were onsite to address mine water overflowing the area of the mine wet seal and bypassing the system inlet. The pipeline from the mine seal to the system inlet flume was jettered to remove iron oxide buildup and other sediments from the pipeline. Flow was restored after this cleaning and water was no longer observed overtopping the wet seal area or bypassing the system. On 7/31/24 BioMost personnel were onsite to repair the drive pin in the AFVFP1 drain valve. All stop logs were removed and the valve was pulled to the top of the box to gain access to the drive pin. Once repaired, the valve and stoplogs were replaced and set at an elevation just below the emergency spillway.

Evaluation, Recommendations & Future Considerations: The Puritan AMD Full Treatment system has been proven to be effective, with backups in place to continue water treatment even during minor system anomalies. Volunteers routinely monitor the system and conduct academic research experiments at the site. System function and effectiveness will continue to be regularly monitored. Any future considerations will be based off unforeseen future failures or attempts to increase efficiency through ongoing testing at the site.

Photo Log

Top Left: Malfunctioning solar controller displaying erroneous data (2/15/23).
Top Right: Newly installed solar controller displaying appropriate data and functioning as designed (2/15/23).
Bottom: Newly installed floating skimmer (3/28/23).

Top Left: Using Jetter to remove iron oxide and other sediments from pipeline to mine seal (6/13/24).
Top Right: View of iron sludge actively being removed from pipeline from mine seal (6/13/24).
Bottom Left: BioMost personnel verifying water is no longer overtopping the mine seal (6/13/24).
Bottom Right: BioMost personnel repairing a sheared drive pin on the removed Agri Drain gate valve (7/31/24)