

De Sale Phase III Passive Treatment System
SRI O&M TAG Project # 23 Request #1
OSM PTS ID: PA-117

Requesting Organization: Slippery Rock Watershed Coalition (in-kind partner)
Receiving Stream: Unnamed Tributary (Slippery Rock Creek Watershed)
Hydrologic Order: Unnamed Tributary→Seaton Creek→Slippery Rock Creek→
Beaver River→Ohio River
Municipality/County: Venango Township, Butler County
Latitude/Longitude: 41°08'31.9992"N / 79°50'16.0008"W
Construction Year: 2002

The De Sale Phase III Passive Treatment System located in Venango Township, Butler County, PA was constructed in 2002 to treat one of the most polluted discharges in the entire Slippery Rock Creek Watershed. The system discharges to the headwaters of Seaton Creek. The passive system was designed by BioMost, Inc., (BMI) and consists of a collection pond, collection ditch, forebay, Vertical Flow Pond 1 (VFP1), Settling Pond 1 (SP1), Vertical Flow Pond 2 (VFP2), Settling Pond 2 (SP2), and a Horizontal Flow Limestone Bed (HFLB). The VFPs are layered systems with 2-tiered underdrain systems. The Slippery Rock Watershed Coalition (SRWC) has monitored and maintained the site since installation.

In November 2012, the SRWC requested assistance for multiple issues related to the system. After a decade of operation, a significant amount of low pH iron had accumulated on top of the compost layer in VFP1 and was reducing permeability where, at times, a portion of the AMD was overflowing through the emergency spillway into SP1. The HFLB effluent pipe and/or treatment medium had also become plugged to the point that water was flowing out of the HFLB emergency spillway into the receiving stream. In addition, the baffle curtain in SP2 was no longer functioning and needed to be replaced. Maintenance of the existing access road was also needed for volunteers to gain access to the site.

On 2/25/13, BMI began onsite maintenance. Water bypassing the HFLB had a pH of 5.9 with 6 mg/l alkalinity. The VFP1 drain valves were opened and the component was back-flushed using an air compressor. Back-flushing opened the perforations within the header pipe and caused the VFP1 effluent flow rate to increase, but stirring was still needed in order to restore performance. An attempt was made to stir the upper portion of the VFP1 treatment media, but a thick layer of ice inhibited work and that portion of the project was placed on hold until warmer weather. The HFLB was stirred on 3/4/13 to increase permeability within the limestone bed. An inlet trench was also installed in the HFLB to provide better flow distribution throughout the limestone bed. In June, the low pH iron that had accumulated on top of the VFP1 treatment media was removed and stored for possible later reuse. The upper 1 to 2 feet of the VFP1 treatment media was then stirred to reduce short-circuiting. A new directional baffle curtain was also installed within SP2 to increase retention. The entrance to the access road from SR-58 was improved to allow volunteers site access, including the installation of a culvert pipe to convey storm-water runoff and help prevent erosion at the site entrance. Vegetation was also cleared and grubbed, as needed.

Field inspection and water monitoring conducted on 9/25/14 indicated the system was working well. The final effluent had a pH of 6.7 with an alkalinity of 100 mg/L.

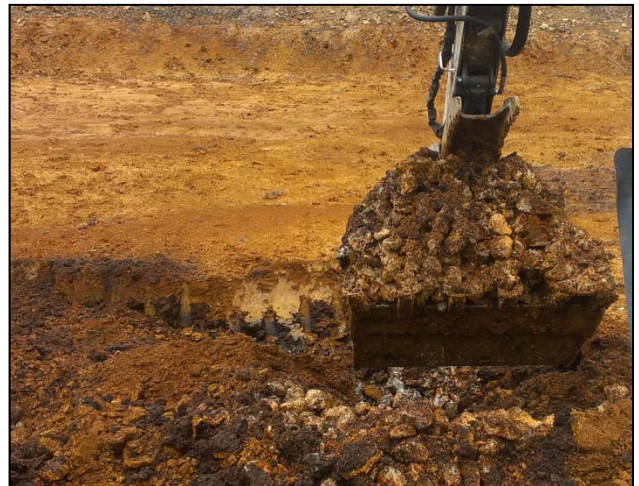
The project team thanks the SRWC for all of their efforts including support and assistance. Funding for technical assistance and maintenance was provided by the PA DEP's Growing Greener and the Foundation for Pennsylvania Watersheds grant programs and in-kind services by project partners.

Additional Recommendations & Considerations:

Continue to conduct site inspections and water testing on at least a quarterly basis. Include field parameters of pH and flow rate at a minimum. Alkalinity measurement is also recommended.



The Horizontal Flow Limestone Bed (HFLB) outlet pipe was not flowing (*top left*) causing the water level in the HFLB to increase and flow through the emergency spillway. The pipe was back-flushed with compressed air (*top middle*) and the pipe began to flow at full-pipe (*top right*) indicating that perforations within the manifold of the effluent pipe had become plugged. The HFLB was also stirred (*bottom left*) to increase permeability and an inlet trench was constructed to assist with flow distribution (*background - bottom right*).



VFP1 was overflowing (*top left*) due to the accumulation of several inches of low pH iron solids on the compost layer (*middle left*). After removing the iron, the upper 1 to 2 feet of treatment media was stirred (*top right*) to reduce short-circuiting and to improve permeability (*middle right*). In addition, a new baffle curtain was installed in SP2 (*bottom left*) and the access road entrance repaired including installation of a culvert.