

De Sale Phase 1 Passive Treatment System
SRI O&M TAG Project #21 Request #2
OSM PTS ID: PA-113

Requesting Organization: Slippery Rock Watershed Coalition
Receiving Stream: Unnamed Tributary to Seaton Creek
Watershed: Slippery Rock Creek
Municipality/County: Venango Twp., Butler Co.
Latitude/Longitude: 41° 8' 33" N / 79° 49' 48" W

The De Sale 1 Passive Treatment System was constructed in 2000 to treat an acidic, metal-bearing discharge in Venango Township, Butler County, PA. The system was designed by BioMost, Inc., (BMI) and originally consisted of an anoxic collection system, flow splitter box, two layered Vertical Flow Ponds (VPS) with 2-tiered underdrain systems, a settling pond/wetland complex and a Horizontal Flow Limestone Bed (HFLB). Various upgrades and maintenance activities have taken place over the years including the recovery of iron oxide. In 2005, a small grant from Butler County was used to install a Forebay to remove low pH iron that was causing plugging problems. The Forebay typically removes 50-75% of the iron prior to entering the VFPs.

The system is monitored and maintained by the Slippery Rock Watershed Coalition (SRWC). Ever since the Forebay had been installed in 2005, about once per year, one if not both of the pipes that convey water to the VFPs would become partially if not completely plugged and would need to be rodded out. When one of the pipes would become plugged, it would force more water to the other VFP, which could become overwhelmed reducing treatment effectiveness. In September 2014, the SRWC requested assistance to either install larger pipes or replace with channels. It was also noted that the HFLB was in need of stirring, but needed to wait until after the Smithsonian Institute completed their research.

In December 2014, while equipment and tools were at De Sale 2 for more extensive maintenance, a site visit was conducted to replace the Forebay pipes at De Sale 1. A 10" pipe was installed in place of each 6" pipe, which should reduce the frequency of cleaning. The newly installed pipes were also shorter than the previously installed pipes, which should ease cleaning. In addition to retrofitting the Forebay pipes, it was noted while on-site that the VFP outlet pipes were overgrown with vegetation and iron accumulation. The channels below the VFP outlets were cleared of these materials to allow flow measurements to be taken at the VFP peri-pipes.

In December of 2015, BMI returned to the site to stir the HFLB. The accumulation of manganese and vegetation had resulted in short-circuiting on top of the bed. While the bed was stirred, it was not cleaned. A significant amount of manganese sludge, sediment and other materials are still present within the HFLB, which will need to be removed sometime in the future. While equipment was on-site, the VFP outlets were cleared of built-up vegetation. Field water monitoring was also conducted, which revealed that VFPS had poor water quality and reduced flow capacity. Short-circuiting pathways into the treatment media were discovered after draining the pond. VFPS was then stirred, which should also increase permeability.

This project would not have been possible without landowner support, support from PA DEP, Stream Restoration Inc., and the SRWC. Funding for technical assistance and maintenance was provided by the PA DEP's Growing Greener grant programs and in-kind volunteer services from the watershed association.



Top Left: Forebay effluent pipes extended into the middle of the Forebay which would plug with low pH iron and frequently need to be cleaned.

Top Right: The pipes were replaced by a shorter length, but larger diameter pipe.

Bottom Left: The VFP outlet channels were completely overgrown and full of sediment.

Bottom Right: The channels were excavated to remove vegetation and sediment that had accumulated.





Top Left: Vegetation and sediment clogged the HFLB at De Sale 1.

Top Right: HFLB treatment media was stirred and vegetation was removed from the surface.

Bottom Left: Holes were discovered in the VFPS treatment media, which resulted in short-circuiting.

Bottom Right: VFPS treatment media was stirred using an excavator.

