

Camp Lutherlyn Passive Treatment System
SRI O&M TAG Project #1 Request #1
OSM PTS ID: PA-100

Requesting Organization: Camp Lutherlyn (in-kind partner)
Receiving Stream: Semiconon Run (Connoquenessing Creek Watershed)
Hydrologic Order: Semiconon Run→Little Connoquenessing Creek→
Connoquenessing Creek→Beaver River→Ohio River
Municipality/County: Connoquenessing Township, Butler County
Latitude/Longitude: 40°52'23.9988"N / 80°01'15.9996"W
Construction Year: 2004

Stream Restoration Incorporated was contacted by Camp Lutherlyn concerning operation and maintenance needs of the passive treatment system located on their property. The passive system constructed in 2004 consists of a settling pond and aerobic wetland designed to treat a net-alkaline discharge from an abandoned underground coal mine. After about 7 years of continuous operation, treatment efficiency within the passive system had diminished. Lutherlyn reported that approximately 8 mg/L of iron was being discharged in the final effluent. A field investigation was conducted on April 25, 2011 with field parameters measured and photographs taken to aid in evaluating the passive treatment system.

4/25/11 Field Measurements Pre-Maintenance Effort

Sample Point	pH	Alkalinity (mg/L)	Total Iron (mg/L)	Flow Rate (gpm)
Influent	6.5	70	12	NM
Effluent	7.0	56	4	~200

NM – not measured

Inspection of the treatment wetland revealed there was significant channelization, which was resulting in short-circuiting and therefore large portions of the treatment wetland were not being utilized. In addition, flow was only going through a portion of the level spreader located in the middle of the treatment wetland due to a build-up of organic matter, sediment, debris, and plants which was likely causing additional short-circuiting to occur. At the effluent spillway, another level spreader, which is used to funnel water through a flume, had also accumulated sludge, sediment, debris, etc. The area behind the level spreader needed cleaning as much of the water was bypassing the flume making accurate flow measurements difficult.

On September 26, 2011, Buck Neely, Bryan Page, Ryan Mahony, and Cliff Denholm from BioMost, Inc. and Stream Restoration Inc. met onsite with Todd Garcia-Bish, Maddy Kelley, and Patrick Maguire from Camp Lutherlyn. In order to address channelization within the wetland, 8-inch and 12-inch diameter compost socks were strategically placed by hand within the treatment wetland to block the preferential pathways as well as to function as baffles to direct the flow into unused portions of the wetland. The accumulated organic matter, sediment, debris, and plants associated with the two level spreaders were dug out by hand. Some of this material was used in the stabilization of the compost socks. The volunteers from Lutherlyn were all very helpful providing labor and the use of their skid-loader to offload and transport the two pallets of filter socks.

A site inspection was then conducted on October 26, 2011. Water was well distributed throughout the wetland. Water monitoring of field parameters also indicated success as can be seen in the table below.

10/26/11 Field Measurements Post-Maintenance Effort

Sample Point	pH	Alkalinity (mg/L)	Total Iron (mg/L)	Flow Rate (gpm)
Influent	6.5	85	14	NM
Effluent	7.3	52	1	~100

NM – not measured

The site was visited again on April 25, 2012 as part of the 2012 Passive Treatment Snapshot. Lab data from the snapshot indicated the iron concentration to be about 2 mg/L. During the Snapshot, the treatment wetland was inspected. While there was significant improvement in water distribution, there were still some areas within the treatment wetland that could benefit from installation of additional compost socks. Those socks were installed on January 7, 2013.

A monitoring event conducted on January 18, 2013 indicated that even during a high flow event of 160 gpm the iron concentration in the final effluent was 0.5 mg/L. The passive system is currently included in the Slippery Rock Watershed Coalition “Adopt-A-Passive Treatment System” Program. Field monitoring by a volunteer conducted throughout 2013 typically demonstrated total iron concentrations less than 1 mg/L. Water quality data for the system is available on *Datashed.org*. Similar O&M activities will likely need to be conducted in the future to maintain even flow throughout the system.

The project team thanks Camp Lutherlyn staff 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 quality monitoring on a quarterly basis (minimum). Include field parameters of pH, iron, and flow rate at a minimum. Alkalinity is also recommended. Iron measurements in particular will be useful for indicating treatment issues for this particular system.
- Keep the area behind the level spreaders free of vegetation and debris
- Inspect for signs of short-circuiting during monitoring events
- Sludge and vegetation will need to be removed from the settling pond in the near future



Channelization in the treatment wetland (*top left*) was causing short-circuiting to occur resulting in decreased treatment efficiency. The channelization was disrupted by installing compost filter sox (*top right and bottom right*) to block flow paths and deflect water into other underutilized areas of the treatment wetland. Iron sludge, organic debris, plants, etc., had accumulated behind the level spreaders preventing the water from being evenly distributed (*bottom left*). This area was cleaned out with much assistance provided by Camp Lutherlyn volunteers (*bottom left*).

