Andrews Run (Bulldog Excavating) Passive Treatment System

Operation and Maintenance Plan

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Background

The Andrews Run site passive treatment system is located in Sewickley Township, Westmoreland County, PA on a former Bulldog Excavating surface mine. The system was constructed by the PA Department of Environmental Protection through its bond forfeiture program. In 2009 PADEP contracted with Hedin Environmental to develop a passive treatment plan for the discharges. The treatment plans were delivered to the PADEP in 2011 and were used by Sewickley Creek Watershed Association to develop a treatment proposal that was submitted to the PA Growing Greener Program in 2012. The project was funded in 2013 and the system was installed in 2016. This report explains the operation and maintenance of the treatment system.

Treatment System Function

The layout of the system is shown in Figure 1. The site is divided by a small unnamed tributary (UNT) to Andrews Run. The passive system design includes an anoxic limestone drain (ALD) for alkalinity generation, a settling pond for the oxidation and settling of iron (Settling Pond 1), an oxic bed of aggregate for manganese removal (Mn Bed), and a final pond that provides polishing and settling of solids produced during maintenance events (Settling Pond 2). The ALD is located on the north side of the UNT while the remaining treatment units are on the south side of the UNT.

Treatment System Operation and Maintenance

Anoxic Limestone Drain

Description: The ALD contains 265 tons of AASHTO#3 Vanport limestone produced by Allegheny Mineral's Worthington Mine. The ALD is wrapped in a 30 mil liner. The ALD is plumbed directly to a subsurface collection system that captures the flow from behind the coal crop. Water enters the ALD through a perforated pipe along its western side. Water leaves the ALD through a perforated pipe along its eastern side. The elevation of the outlet pipe in the aeration pond sets the water level inside the ALD.

Inspections: A walk around the ALD downslope of the system could reveal leakage if the collection system has failed. There is an observation port at influent end of ALD with a cap. Remove cap and see if ALD is full of water, if not, the liner may have developed a leak. Verify function of the ALD Pipeline before performing maintenance on the ALD. Always replace the cap securely to prevent transfer of oxygen into the pipeline and ALD.

Maintenance: The ALD should require little maintenance. A loss of flow or a breakout of seeps adjacent to the ALD would indicate a need to excavate and repair the ALD.

ALD Pipeline

Description: Flow from the ALD is piped to Settling Pond 1 on the south side of the stream through the ALD Pipeline. The pipe has a negative but continuous slope to the stream then a positive and continuous slope up to the Settling Pond 1. The pipeline is constructed of 8" PVC and contains a valve cleanout at its low-point near the stream. The outfall of the pipe to the First Settling Pond is designed to distribute the flow and provide aeration.

Inspections: Accumulation of iron solids within the pipe are a concern due to the negative slope of the pipe. The pipeline was oversized with this in mind. The outfall should be inspected for accumulation of solids that obstructs flow.

Maintenance: Maintenance of the ALD Pipeline would involve removal of accumulated metals solids. Both the outfall and the cleanout valve can be used as access points for pipe cleaning and inspection equipment. Solids dislodged during cleaning should be captured and disposed of properly.

Settling Ponds 1 and 2

Description: Settling Pond 1 has an empty volume of 60,700 gallons and Settling Pond 2 has an empty volume of 63,500 gallons.

Inspections: The influent and effluent of both ponds should be inspected for obstructions to flow. Evidence of damage to the earthen berms should be noted as should any muskrat or beaver activity.

Maintenance: The settling ponds are intended to collect solids. Eventually, the accumulation of solids (sludge) will reach a point that degrades solids settling and treatment system effectiveness. The solids should be removed and properly disposed of. Both of the ponds are large relative to the expected solids accumulation and sludge cleanout is not anticipated to be necessary for at least 20 years.

Mn Bed

Description: The aggregate bed removes Mn through microbial oxidative processes. Settling Pond 1 and the Mn Bed are separated by an earthen dam with a HDPE "V" notch weir that aerates the Mn Bed influent. Water flows downward through the aggregate to discharge pipes placed at the bottom of the bed. The routine discharge from the Mn Bed is via a 6" PVC perforated pipe that is connected by solid pipe to a water level control structure (WLCS) that discharges to Settling Pond 2. The water elevation in the Mn Bed is controlled by the WLCS. The Mn Bed can also be flushed and drained empty by opening an 8-inch gate valve plumbed to a designated flush pipe located at the bottom of the bed near the influent.

Inspections: Evidence of damage to the earthen berms should be noted as should any muskrat or beaver activity. The water level in the Mn Bed should be just below the aggregate surface. Some water may be visible above the aggregate due to irregularities in the aggregate level,

especially under high flow conditions when the water level will rise. If the entire aggregate surface is submerged the outlet plumbing should be inspected for obstructions. If the water level inside the water level control structure is lower than the water level in the Mn Bed then there is a permeability problem within the aggregate.

Maintenance: If permeability problems develop (water is standing on top of the LS aggregate), several actions are recommended. Removal of a board from the WLCS should lower the water level in the Mn Bed. This fix is temporary. To remove the permeability restriction, the Mn Bed should be flushed to empty to remove solids that have accumulated in the bed. Flushing (to empty) should be repeated several times and the water levels should be observed after each flushing event. If flushing does not restore permeability, then the aggregate should be mixed and cleaned using an excavator and pumps. Solids produced during cleaning can be discharged to Settling Pond 2.

Sampling

Sampling locations are shown in Figure 1. Every sampling round should include field measurement of pH, alkalinity, and, where possible, flow rate. Laboratory analysis should include the following parameters: pH, conductivity, hot acidity, alkalinity, iron, manganese, aluminum, sulfate, and total suspended solids.