

Richards Passive System Rehabilitation

A Blacklick Creek Watershed Association Project

Cherryhill Township, Indiana County, Pennsylvania

www.blacklickcreekwatershed.org



Before Rehabilitation: [ABOVE] The inlet system catch basin and piping often plugged causing raw water to bypass system (7/9/15); [RIGHT] Once raw water entered the vertical flow ponds, the treatment media was found to be plugged with iron and aluminum (5/23/17).

Stream Order: Two Lick Creek → Blacklick Creek → Conemaugh R. → Kiskiminetas R. → Allegheny R. → Ohio R.

Project Sponsor: Stream Restoration Incorporated (www.streamrestorationinc.org)

Problem: The existing passive system was unable to effectively treat Acid Mine Drainage (AMD) from an abandoned underground coal mine that degraded Two Lick Creek.

Goal: Rehabilitate the passive treatment system to treat the entire AMD discharge.

Project Description: The Richards Passive System was initially constructed in 1999 (Phase 1: VFR1→settling pond) and expanded between 2001 and 2003 (Phase 2: VFR2A & VFR2B→wetland). Various issues complicated system operation over the years. Defining the amount of drainage to be treated has been particularly problematic due to a lack of consistent and comprehensive flow measurement. Untreated drainage often bypassed the treatment system due to plugging issues with the collection/distribution system. Prior to the current efforts, it was determined that the three vertical flow reactors (VFRs) were plugged to the point of being unable to provide effective treatment. To eliminate inlet plugging issues, an innovative three-way flow splitting weir box was plumbed directly into the mine drain that will allow for accurate flow measurements and proportional distribution of flow. VFR1 was enlarged and reconfigured as a Jennings-type vertical flow pond (JVFP1), VFR2A and VFR2B were combined into a single, larger Jennings-type vertical flow pond (JVFP2), and the Phase 2 sludge holding basin was enlarged and reconfigured into a third Jennings-type vertical flow pond (JVFP3). JVFP1 discharges to the settling pond where an earthen directional baffle and a primary spillway pipe were added. JVFP2 and JVFP3 discharge to the wetland where PVC Z-Pile directional baffles were added and the basin was reconfigured to improve retention time. A seep encountered during Phase 2 and previously piped to the stream untreated was captured in a new French drain and piped to the wetland to mix with the alkaline effluent of JVFP2 and JVFP3. An artesian flowing corehole encountered in the wetland during Phase 2 construction continues to discharge to the final 1/3 of the wetland.

The rehabilitated system has a hydraulic capacity of 1,000 gpm and is designed to treat up to 747 gpm (max flow) with an average flow of 117 gpm. Pollutant load design capacity is 1,005 lb/day acidity, 148-296 lb/day or iron, and ~128 lb/day aluminum.



After Rehabilitation: Richards System with VFP2 (left), VFP3 (back middle) and Wetland with directional z-pile baffles (right) (7/8/21).

Project Partners

PA Department of Environmental Protection, Bureau of Abandoned Mine Reclamation (\$528,024 Growing Greener Grant)|U.S. Office of Surface Mine Reclamation and Enforcement (\$100,000 WCAP Grant)|Foundation for Pennsylvania Watersheds (\$18,000 Grant) |Stream Restoration Incorporated (\$47,893 In-Kind; Grant Administration)|BioMost, Inc. (\$94,567 In-Kind; Design/Permitting & Construction)|Dennis J. Richards (Landowner) Blacklick Creek Watershed Association (Project Assistance)