



# Restoring the north branch blacklick creek with a centralized mine drainage treatment facility

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## Extended Abstract

Three mine water discharges in Indiana and Cambria Counties, Pennsylvania, are large sources of acid mine drainage loadings to the Blacklick Creek Watershed. These discharges include the Vinton No. 6 boreholes which are three boreholes located within the North Branch of Blacklick Creek, the Commercial No. 16 Mine discharge to the North Branch Blacklick Creek, and the Wehrum Shaft discharge, located approximately three miles downstream on the east side of the main stem of Blacklick Creek. The goal of the Blacklick Creek Treatment Facility is to eliminate the uncontrolled discharges of untreated mine water within the Blacklick Creek watershed and restore the North Branch Blacklick Creek and the main stem of Blacklick Creek to a viable sport fishery downstream to the confluence with Two Lick Creek, approximately 25 stream miles (40 km).

The PADEP Bureau of Abandoned Mine Reclamation contracted the design and permitting to convey mine pool water from three mines to a central treatment location. The treatment facility will be constructed on 28 ac (0.113 km<sup>2</sup>) of previously reclaimed Abandoned Mine Lands. The design includes a plan to draw down and maintain the mine pools to provide storage capacity for 30-days of maximum inflow during temporary shutdown of the extraction pumps to allow for maintenance activities. Treated sludge is to be injected into the underground mine workings. Feasibility reviews of collecting and treating of multiple discharges and multi-year data collection began in 2015. Design and permitting were completed in 2021.

The treatment facility was designed to raise the pH of the blended mine waters; neutralize the hot acidity; add residual alkalinity to the effluent; oxidize ferrous iron and precipitate it as ferric oxyhydroxide; precipitate aluminum as an oxyhydroxide; and remove the resulting suspended solids prior to discharge. To support the design, a bench scale treatability study was performed in 2018 using composite samples consisting of a flow proportioned blends of the source waters. The treatment system consists of: *Blending Tank* → *Maelstrom Oxidizer® Tanks* → *Reaction Tanks* → *Flocculating Clarifiers* → *Polishing Pond* → *Constructed Wetland* → *Discharge to Blacklick Creek*. The blended mixture of the mine waters arriving at the treatment plant headworks is expected to exhibit moderately acidic pH values, hot acidity ranging from 313 to 552 mg/L, no alkalinity, total inorganic carbon ranging from 22 to 34 mg/L, total aluminum ranging from 9 to 12 mg/L, total iron ranging from 132 to 258 mg/L, and total manganese ranging from 2.1 to 2.7 mg/L. The facility will treat an annual average influent flow of 2,800 gpm (10,599 L/min) with a design flow of 5,000 gpm (18,927 L/min). Daily Maximum effluent standards used for the design are 1.0 mg/L total aluminum, 3.0 mg/L total iron, 4.0 mg/L total manganese, 70 mg/L total suspended solids, and pH to be between 6.0 and 9.0.

Construction of the facility commenced June 2022 and start up and wet commissioning is expected in June 2024. Pollution loadings to be removed from the watershed are anticipated to be 8,778 lb/d (3,981 kg/d) of acidity; 260 lb/d (117 kg/d) of aluminum; 3,998 lb/d (1813 kg/d) of iron; and 60 lb/d (27 kg/d) of manganese. Finally, an immediate and rewarding benefit of the project will be the aesthetically improved stream reaches that lie within view of the well-traveled, 46-mile-long (74 km) Ghost Town Trail (named as Pennsylvania's "Trail of the Year" in 2020).