

JB2 Passive Treatment System
SRI O&M TAG Project #28 Request #2
OSM PTS ID: PA-8

Requesting Organization: Independence Conservancy, Washington County Conservation District, Washington County Watershed Alliance

Requesting Organization Representative: Vicky Michaels

Municipality/County: Smith Township, Washington County

Dates of O&M work performed: 12/1/2021-12-22-2021

Initial Request: On 11/4/2021, the Independence Conservancy (IC) reported numerous issues concerning the JB2 system including plugged pipes, treatment media, and flow control structures as well as the need for sludge to be removed.

Initial Site Visit, Observations, and Identified Needs: A site meeting and investigation was conducted on 12/1/21 to review site conditions and develop a plan. The forebay (aka collection pond) outlet pipe which conveys the AMD to the FeAlMn style bed was partially clogged, causing the AMD to periodically bypass the system and has been an ongoing concern. Significant amounts of low pH iron sludge could be observed on top of and within the limestone in the FeAlMn Bed (a/k/a Sloped Limestone Bed or SLB) which appeared to prevent flow to the component underdrain. Low pH iron precipitates and vegetation were clogging the FeAlMn outlet pipe (muskrat cage), raising the water level within that component.

Work Completed: The muskrat cage was unclogged at the outlet pipe. The raw water Forebay collection system outlet pipe was replaced with a Terraced Iron Formation (TIF) channel to promote the precipitation of iron and reduce existing pipe clogging and bypass issues related to the SLB. This work included seeding and mulching the affected area as appropriate. Vegetation was removed from embankments as feasible to establish access for maintenance and maintain long-term slope stability of embankments around the system.

The limestone within the FeAlMn bed was washed to re-establish media permeability and the iron sludge was pumped to the settling pond for storage. A portion of the piping was abandoned and the remaining section was reconfigured as a down-flow vertical flow pond. This was done as a stop-gap measure to provide treatment until further funding can be obtained. The settling pond outlet also had various obstructions which were removed to allow flow to exit the system as designed.

System Evaluation & Future Recommendations: Water quality data was collected immediately before and shortly after maintenance. Select data is provided in the table below. Results are mixed. While the system is now neutralizing significantly more acidity, iron and manganese concentrations were higher in the effluent following maintenance. This may be due to the partial conversion back to a vertical flow pond that is not fully operational. Sampling of the newly installed TIF did not indicate iron removal. This may be due to sampling too soon after installation and before iron precipitates had a chance to become established. Additional water monitoring is needed.

12/7/21 Select Data (before maintenance work – full data on www.datashed.org)

Point	Flow gpm	F. pH	F. Alk. mg/L	Acid mg/L	Fe mg/L	Mn mg/L	Al mg/L	SO4 mg/L	TSS mg/L
JB2 (in)	71	5.2	30	116	76.87	4.97	0.79	773	<5
SLB(limestone bed)	71	7.0	100	-31	0.29	<0.05	<0.10	772	48
SB (out)	71	7.3	63	-18	0.19	<0.05	<0.10	772	32

114 lb/day acidity and 65 lb/day iron removal

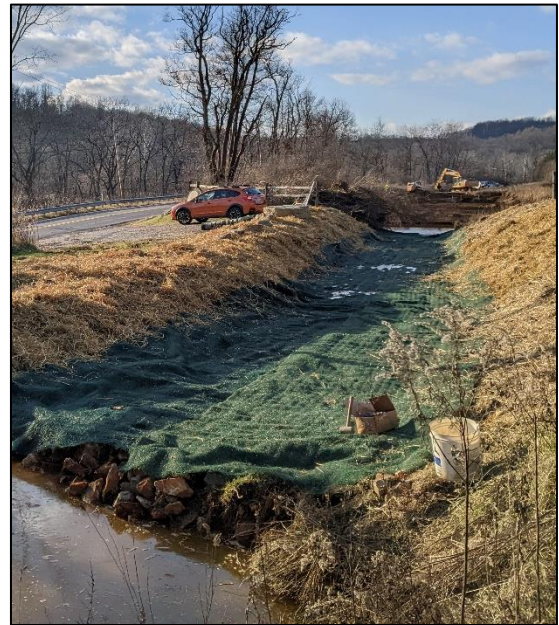
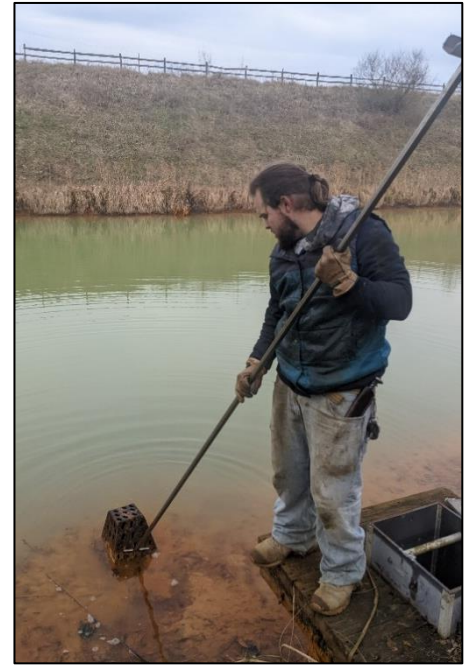
12/7/21 Select Data (after maintenance work – full data on www.datashed.org)

Point	Flow gpm	F. pH	F. Alk. mg/L	Acid mg/L	Fe mg/L	Mn mg/L	Al mg/L	SO4 mg/L	TSS mg/L
JB2 (in)	75	5.3	48	84	49.53	4.17	0.65	741	<5
TIF (new inlet)	75	5.3	49	63	50.56	4.28	0.56	785	<5
SLB(limestone bed)	75	6.3	101	-53	22.83	3.70	0.66	787	39
SB (out)	75	6.5	110	-89	7.91	3.12	<0.10	792	<5

159 lb/day acidity and 35 lb/day iron removal

Considering the age of the system, past maintenance issues, and severity of the AMD, the system should be redesigned and rebuilt in the near future. The system could likely benefit by expanding the size of the TIF to promote more low pH iron removal as well as adding stone to provide a more effective substrate for iron oxidation and precipitation. As plugging of the treatment limestone has been an ongoing issue, installing a new automatic flushing system would likely be beneficial. A conceptual design and cost estimate was previously developed by BioMost, Inc. and provided to the IC in 2018 as part of the O&M TAG Request 28-1. SRI recommends applying to BAMR's new AMD program utilizing BIL funding to complete a full design with bid specifications. In the interim, the system should be monitored and flushed on a regular basis.

Photo Log



Top Left: VFW pipe reconnected and repaired after washing, new perforated HDPE shown (12/17/21).

Top Right: Clearing the VFW outlet muskrat cage (12/9/21).

Bottom Left: Limestone was washed, and sediment pumped to the settling basin (12/14/21).

Bottom Right: A channel (TIF) replaced the culvert pipe from the forebay to avoid water plugging the pipe and bypassing the system (short circuiting and encourage iron oxidation at low pH (12/21/21).