Cessna Run Passive Treatment System
SRI O&M TAG Project #61 Request #1
OSM PTS ID: PA-3

Requesting Organization: Indiana County Conservation District
Requesting Organization Representative: Brooke Russick
Municipality/County: Rochester Mills, Indiana County
Dates of O&M work performed: 2/28/2020 to 3/12/2020

Initial Request: On 3/20/2019, Indiana County Conservation District (ICCD) requested technical assistance regarding maintenance of the Cessna Run passive treatment system. The ICCD reported that the system was not performing well and suspected that the siphon was not working correctly.

Initial Site Visit, Observations, and Identified Needs: The ICCD collected samples of the treatment systems 5/24/19. Data was evaluated confirming poor performance and a decision was made that maintenance was needed including washing the treatment media. An initial site visit was conducted on 2/25/20. Large amounts of leaves and material were observed to be deposited in both siphon vaults as well as the pipe within the Type M grate at the inlet to D3. Water was unable to drain from the siphon vaults properly due to vegetation within downstream system components. The D2 discharge capture point was overflowing due to leaf debris and sediment clogging the "French drain" infiltration stone. The maintenance needed at the site included setting a flow measurement pipe at D2, digging an inlet pool at the D2 inlet, draining the D2 pond and cleaning stone in D2. Other needs included D3 embankment stabilization, draining and cleaning D3 stone, access road maintenance, and general site troubleshooting and repair.

Work Completed: BioMost mobilized to the site on 2/28/20 to conduct the maintenance. Flow measurement pipes were installed above D2 within the system collection channel as well as upstream of the D3 capture point. This will help data collection and loading calculations for better water quality sampling in the future by including raw flow data for each system respectively.

Due to upstream conditions and apparent high flow events, a large amount of stone was present in the D3 Type M box. The lid was lifted and this material was removed. A piece of fiberglass grating was secured to the steel grating with the hope of shedding leaf debris as well as diverting additional rocks away from the inlet box, primarily during the fall leaf drop and high flow events in the spring. Since the fiberglass grating has smaller holes than the steel grate it should help to divert rocks from entering the inlet much better while still accepting flow to the system for treatment. This was tested and it was observed that rocks bounced away from the box to the overflow channel due to the energy and force of the water flowing from the road culvert pipe into the inlet box.

The outlet pipe from the D3 siphon vault was excavated to remove accumulated vegetation and sediment. The pipes and inlets between each settling pond were cleaned/dredged as applicable to return to design water elevations and desired flow patterns. Perforations were added to riser pipe outlet guard for the D3 settling pond to extend the amount of time before the outlet pipe will clog.

Both siphon vaults were filled with leaf litter and the siphon bells were clogged with material, preventing the D2 and D3 vertical flow ponds from being able to flush as designed. This material was removed from the siphon vaults. Siphon triggers were removed to confirm they were free of blockages. Flush valves for the D2 and D3 ponds were exercised to confirm functionality.

The collection channel above D2 was excavated to re-establish full flow of the discharge to the D2 discharge capture point and the "French drain" infiltration stone around the capture point was cleaned. Once the leaf litter was removed the stone appeared to be in very good condition with few precipitates from the water, indicating minimal low pH iron removal at that particular part of the system.

Limestone was washed and the underdrain was repaired as applicable for both D2 and D3 vertical flow ponds. The emergency spillway for D3 was lowered so that water would flow to the settling ponds instead of short circuiting the pond embankment if the underdrain becomes clogged in the future.

Results: Water samples were collected before (May 2019) and after (July 2020) maintenance was conducted. Select data of the final effluent is provided in the table below. The full data set is available on Datashed. Results were somewhat mixed. As can be seen, pH and alkalinity significantly increased and the effluent was once again net-alkaline (negative acidity) following maintenance; however, iron and aluminum concentrations were slightly higher while manganese was lower. The metals are total metals and the slightly higher concentrations post-maintenance could be solids. At a 6.65 pH, the aluminum should be mostly, if not all, precipitates (solids).

Cessna Run Passive Treatment System Outlet (D2/D3 Outlet)

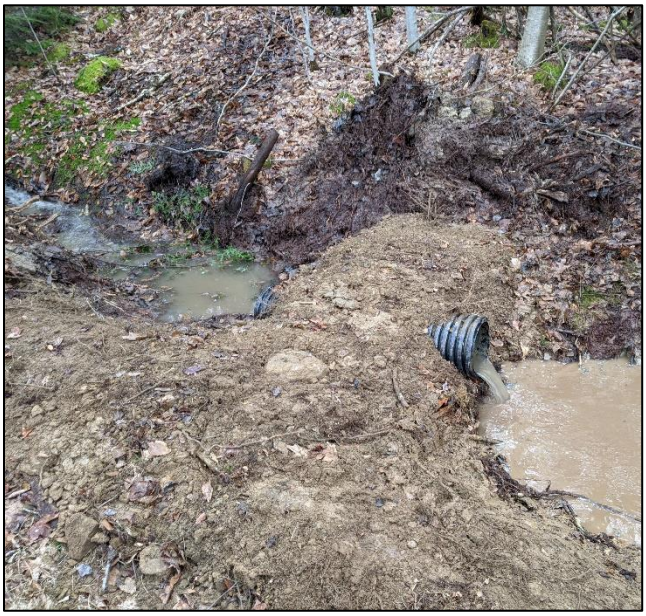
Date	F. pH	F. Alkalinity	Acidity	T. Fe	T. Mn	T. Al
5/24/19	5.36	15	25	0.13	9.35	1.23
7/9/20	6.65	100	-13	0.71	5.96	2.26

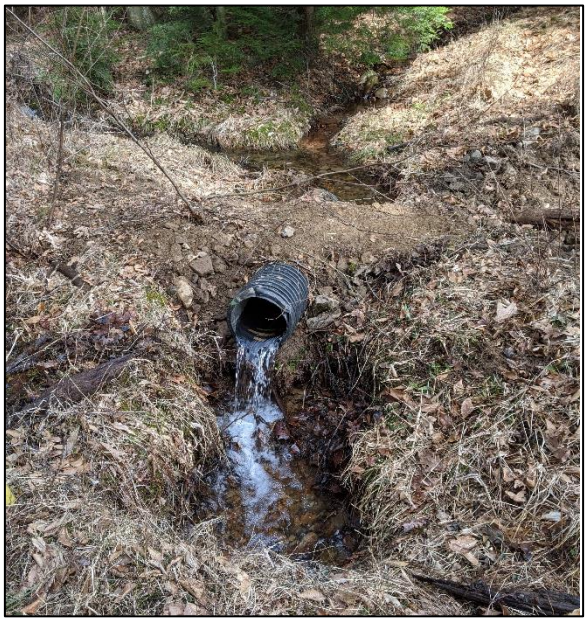
All units in mg/L, except pH (s.u.).

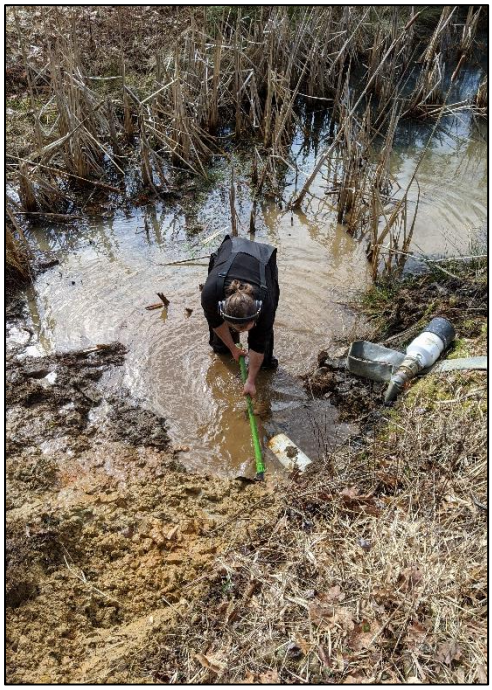
Recommendations & Future Considerations: In accordance with the Cessna Run OM&R plan, the "system should be inspected on an annual basis and after 100-year storm events"[1]. Periodic cleaning of the settling pond outlet guards will be a labor-intensive ongoing maintenance task. As there is a long collection channel upstream of the D2 discharge capture point, periodic leaf removal may be necessary to maintain flow to the system. The maintenance plan calls for removal of leaf debris and trees from "the two inlets, the outlet and channel"[1]. In addition, sediment from the siphon vault should be removed on a regular basis to maintain functionality. Water monitoring including flow measurements should also be conducted on a more regular basis to document treatment performance. This data will become important when it is time to redesign and rebuild the system.

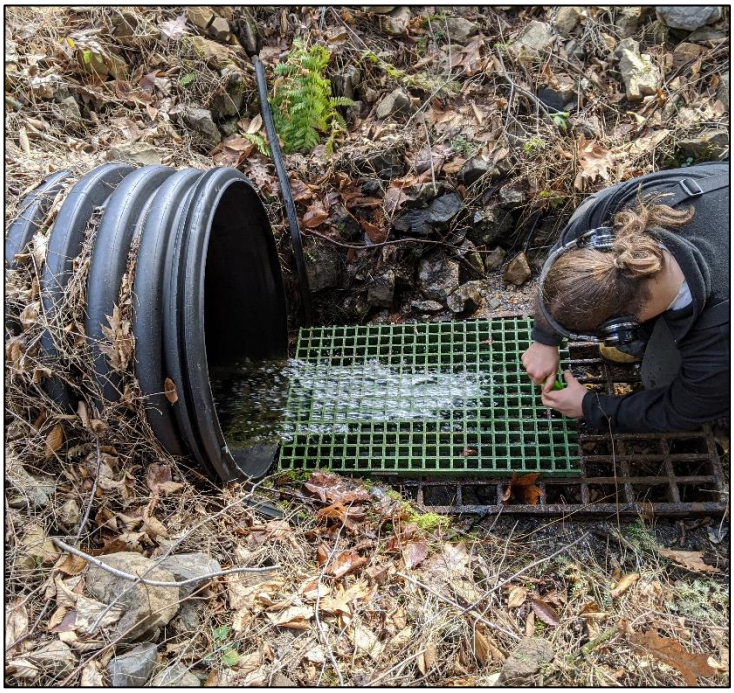
[1] Cessna Run Abandoned Mine Drainage Treatment System Operations, Maintenance, and Replacement Plan available at https://www.datashed.org/sites/default/files/cessna20run20omr20plan.pdf

Photo Log

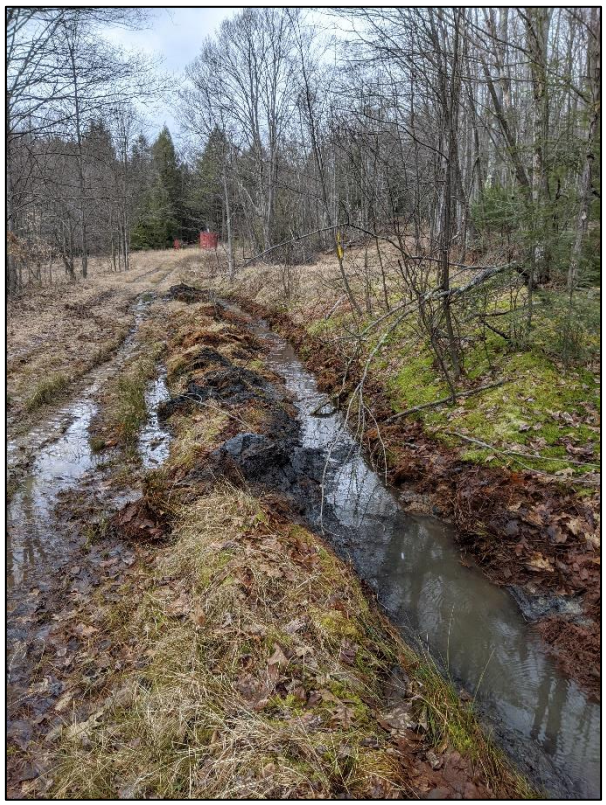


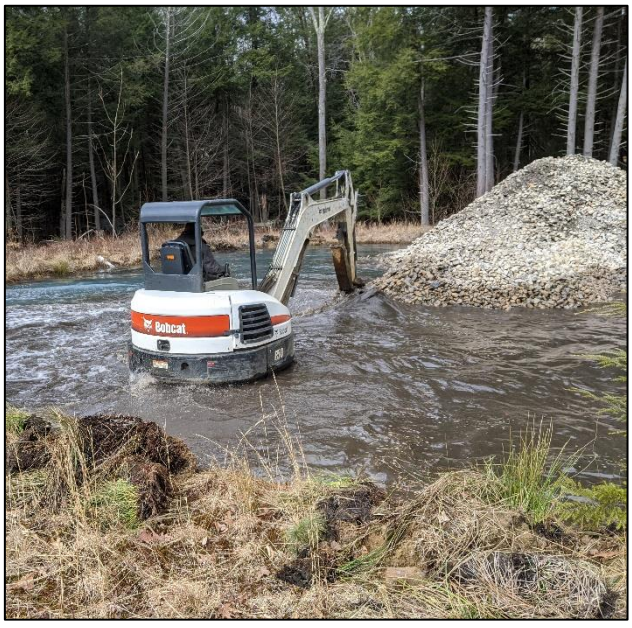


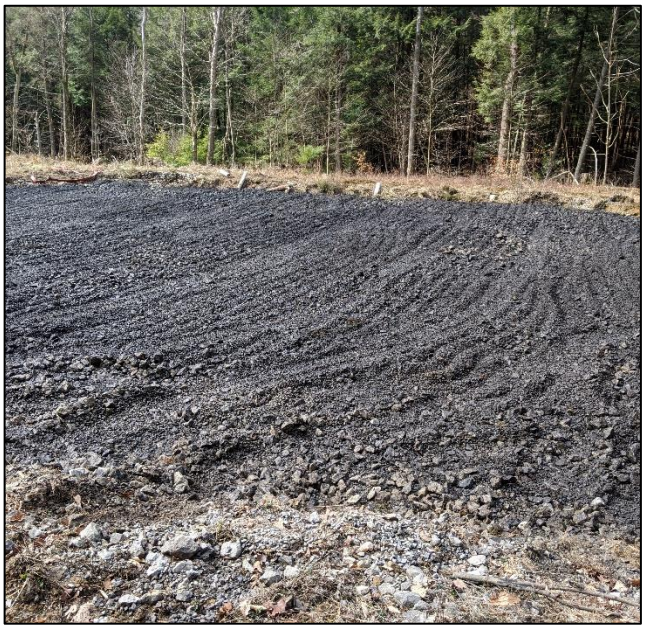




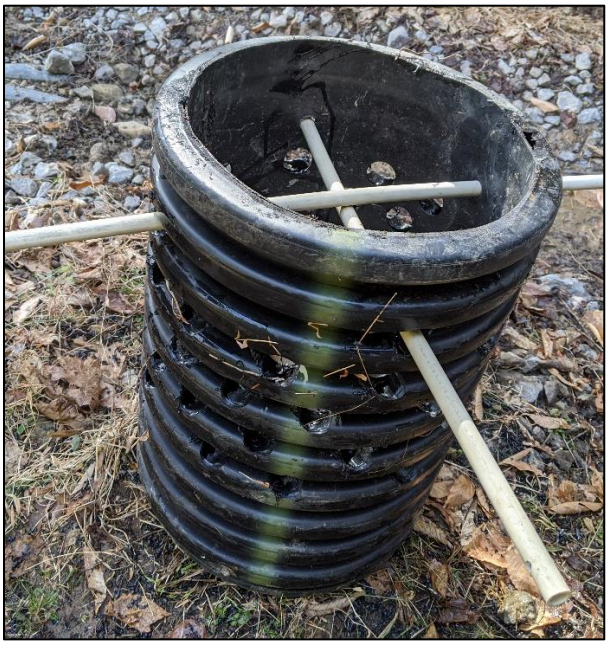
Top Left: Flow measurement pipe installed at the D2 discharge (3/5/20).
Top Right: Flow measurement pipe installed at the D3 discharge (3/6/20).
Bottom Left: The outlet pipe from the D3 siphon vault was excavated to remove accumulated vegetation and sediment (3/4/20).
Bottom Right: Fiberglass grate fastened to D3 grate to reduce material entering the box (3/5/20).

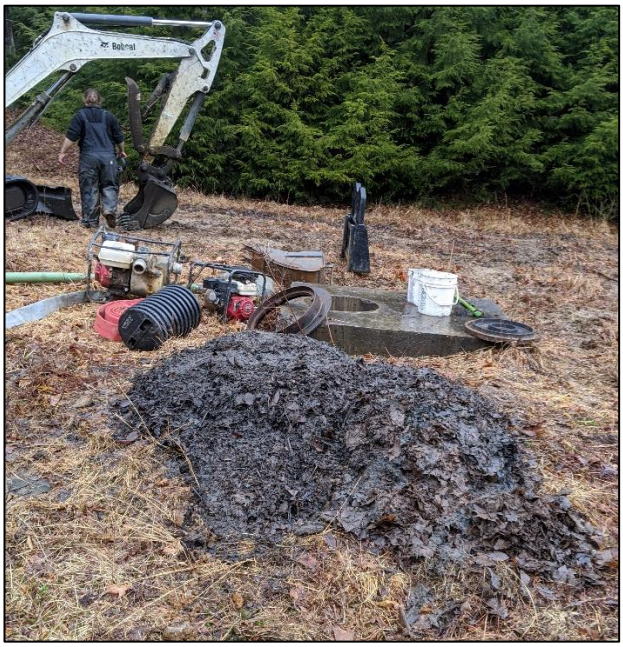


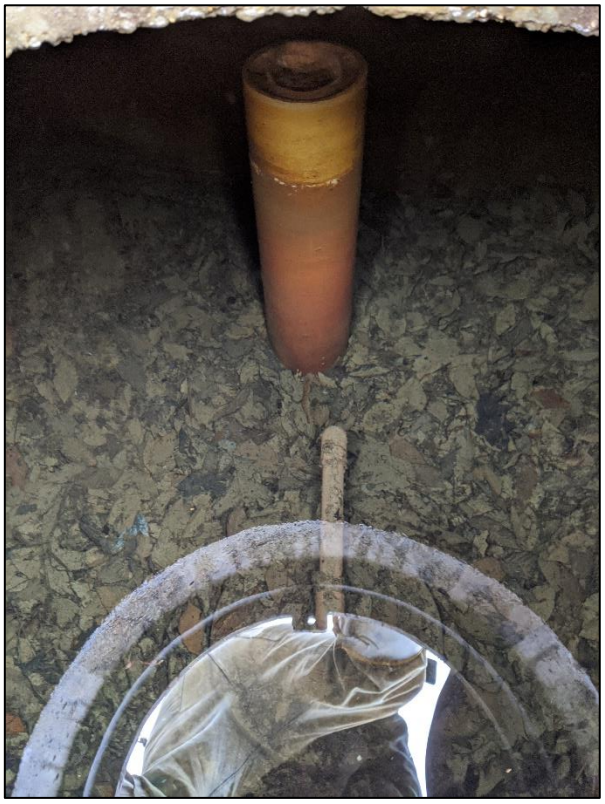


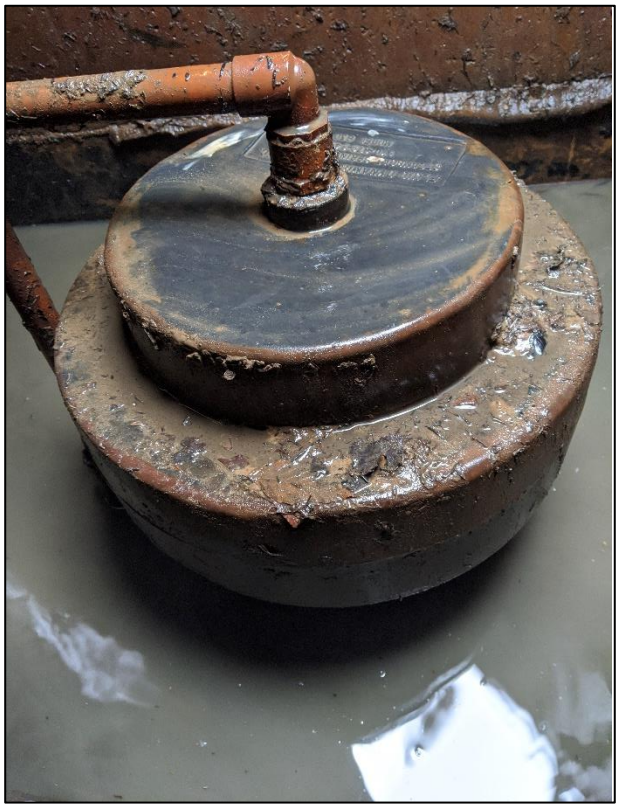


Top Left: The collection channel above D2 was excavated (3/6/20).
Top Right: The "French drain" was cleared of leaf litter (3/6/20).
Bottom Left: Washing D3 VFP stone (3/4/20).
Bottom Right: D3 VFP stone was cleaned and re-placed as media (3/12/20).









Top Left: Perforations were added to riser pipe outlet guard for the D3 settling pond (3/5/20).
Top Right: Both siphon vaults were filled with leaf litter (D3 pictured) (3/3/20).
Bottom Left: D3 siphon vault prior to cleanout (2/25/20).
Bottom Right: D3 siphon vault after cleanout (3/3/20).