

SR 286 Passive Treatment System
SRI O&M TAG Project #16 Request #2
OSM PTS ID: PA-241

Requesting Organization: AWARE

Requesting Organization Representative: Chris Schaney

Municipality/County: Center Township, Indiana County

Dates of work performed: 8/14/19 – 8/15/19 & 1/29/20-2/4/20

Initial Request: On 4/10/2019, AWARE requested assistance related to the development of preferential flow paths within the treatment wetland and their concern on impacts to treatment effectiveness.

Initial Site Visit, Observations, and Identified Needs: A large volume of iron precipitates and cattails had accumulated within the wetland and outlet channel and channelized flow paths had developed. Water within the wetland outlet channel was quickly flowing to the system outlet where it should have been slowing down and spreading out to allow for more iron oxidation and precipitation. Disruption of preferential flow paths for better flow distribution, reduced short circuiting and channelizing within the wetland, and an improved retention capacity was desired. The flow measurement structure at the system outlet channel was also compromised.

Work Completed: In August 2019 BioMost mobilized to the site. Over time, the accumulation of material within the wetland outlet channel has increased channelization and further reduced system residence time. The wetland outlet channel was cleared of debris, vegetation, and accumulated sediment as feasible with a mini excavator. Additional measures were completed to disrupt preferential flow paths including removing excess vegetation and iron sludge in areas and installing filter socks to act as directional baffles, etc. Though the initial maintenance work did increase iron removal efficiency from 22% to 68%, elevated iron concentrations remained at the outlet of the system, 6.1 mg/L on 10/28/19.

BioMost, Inc returned to the site in January and February 2020. During that time, it was determined that further increasing the water elevation in the wetland by raising the outlet embankment height to improve retention time would be beneficial. To further disrupt preferential flow pathways and increase retention time, directional baffle curtains were installed in the wetland.

Results: Following completion of this work, a dye test was performed to evaluate the system improvements. The dye test demonstrated that the water was slowing down, spreading out and utilizing the wetland indicating that the preferential flow paths had been disrupted. Water samples had been collected in July 2019 before any work was complete, in October 2019 after initial work and in May of 2020 after all work had been completed. The data is provided in the below tables. The sample collected in October 2019 indicated an improvement in iron removal efficiency from 22% to 68%. The sample collected in May 2020 demonstrates that the iron removal efficiency further increased to 87%. Notably the iron load removed before the maintenance work was 2.4 lb/day and after the baffle curtains were installed, iron load remove increased almost a full order of magnitude to 20.4 lb/day.

7/16/19 Data (before initial work)

Point	Flow gpm	F. pH	Acid mg/L	Fe mg/L	Mn mg/L	Al mg/L	SO4 mg/L	TSS mg/L
SR286 (in)	81	6.51	-67	11.4	0.5	0.2	124	19
85-16 (out)	81	7.26	-65	8.9	0.6	<0.1	98	17

2.4 lb/day iron removed (**22%**)

10/28/19 Data (after initial work)

Point	Flow gpm	F. pH	Acid mg/L	Fe mg/L	Mn mg/L	Al mg/L	SO4 mg/L	TSS mg/L
SR286 (in)	86	6.96	-42	19.3	0.7	<0.5	154	5
85-16 (out)	86	6.22	-41	6.1	0.6	<0.5	136	24

13.6 lb/day iron removed (**68%**)

5/20/20 Data (after baffle curtain installation)

Point	Flow gpm	F. pH	Acid mg/L	Fe mg/L	Mn mg/L	Al mg/L	SO4 mg/L	TSS mg/L
SR286 (in)	163	7.58	-63	11.9	0.6	0.1	107	5
85-16 (out)	163	5.80	-72	2.9	0.6	<0.1	123	<5

20.4 lb/day iron removed (**87%**) (note, lab pH at 85-16 was 6.85)

Recommendations: Continue monitoring water quality on regular basis. There is additional settling capacity available within the wetland as it fills with precipitates over time. If needed, the wetland elevation could be raised again to increase settling capacity.

Photo Log



Top Left: Wetland outlet channel was cleared of sediment as feasible (8/15/19).

Top Right: Baffle Curtains were installed to improve retention time and reduce short-circuiting in the wetland (1/29/20).

Bottom Left: Wetland elevation was raised to increase settling capacity (8/15/19).

Bottom Right: Baffle curtains were installed for improved retention time (1/30/20).