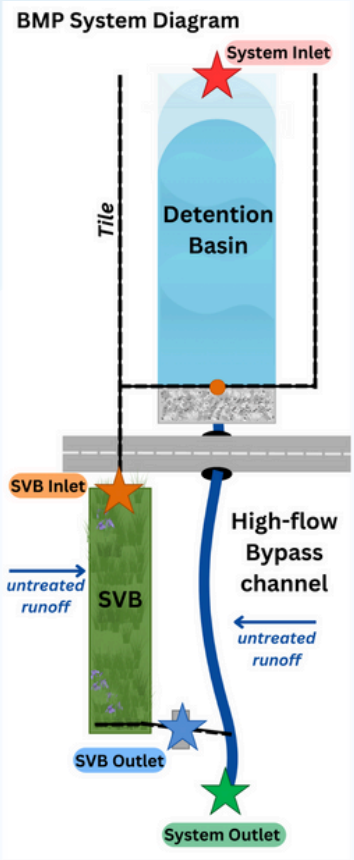
Submerged Vegetated Bed - *Treating Agricultural Surface Runoff*

Project Summary

In 2011, Clermont SWCD and partners proposed an agricultural practice to address ongoing erosion issues along a grassed waterway located in a sub-watershed of the East Fork Little Miami River (EFLMR - southwest Ohio). The practice merged concepts of urban detention with constructed wetlands to reduce erosion and increase infiltration. The practice was designed to maximize detention and pollutant removal. High-frequency water quality monitoring stations were positioned throughout the system to measure pollutant removal. Data show the system is an effective practice for sediment and nutrient removal. The project benefited the landowner and provided downstream benefits to the EFLMR and the USACE Harsha Reservoir, a source of drinking water for Clermont County.



Goals & Objectives

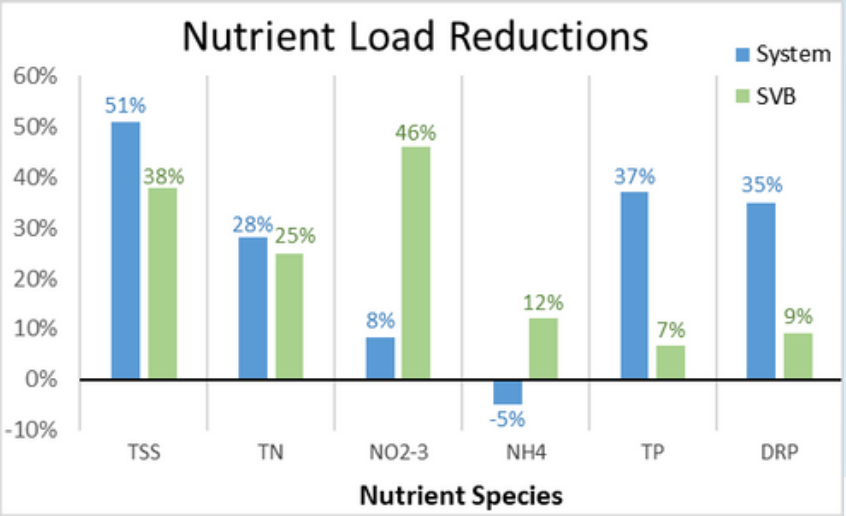
- Goal: Determine the effectiveness of an alternative conservation practice to mitigate agricultural nonpoint source runoff and provide landowner benefits.
- Objectives:
  - Reduce farm field erosion
  - Test alternative practices to mitigate widespread surface drainage and soil erosion problems associated with the Clermont Soil Series (Ct)
  - Test conservation practices to reduce sediment and nutrient pollution
    - Implement practices to mitigate Harmful Algal Blooms (HABs) in the watershed and Harsha Reservoir
    - Measure practice effectiveness with high-frequency water quality monitoring

Design & Construction

- The design idea was to retrofit an urban Subsurface Vegetative Bed, to filter larger amounts of Nitrogen and Phosphorus than traditional settling ponds and other agricultural practices. In conjunction with cover crops, we hoped to show that large amounts of pollutants could be removed or retained on site.
- Design work was completed by Clermont Soil & Water and reviewed by Hazen and Sawyer Engineering Firm.

Funding:
USDA NRCS Conservation Innovation Grant

Results



Component	TSS	TN	NO2-3	NH4	TP	DRP
System (kg/ha/yr)	287	2.97	0.13	-0.04	1.47	0.64
SVB (kg/yr)	2086	37.11	11.85	1.82	3.03	1.8

- Overall this practice shows high nutrient reduction potential.
- The SVB portion of the system showed proportionally high decreases in TN.
- The sediment settling capacity of the detention basin was the primary driver of TP removal for the entire treatment system.

Cost Effectiveness

- This practice has significant cost efficiency for nutrient reduction when compared to common management practices.
- Original construction cost was $26,000.00 (2013) and was offset by not outsourcing the construction labor (farmer graded and excavated, district and partners planting wetland plugs by hand.)

Cost of removal of total phosphorus and total nitrogen per acre for the total system (AgBMP) and common management practices (Cover crop + No Till). Management has yearly costs, and AgBMP was the total cost divided by the practice lifespan of 15 years. Yearly maintenance costs were not factored for the Ag BMP

Practice	TN ($/kg/ac.)	TP ($/kg/ac.)
Cover Crop + No Till	$ 38.02	$ 60.35
AgBMP	$ 4.32	$ 10.48

Conclusions & Next Steps

- The practice effectively reduces TN and TP loads in nonpoint surface runoff
- The practice controls and conveys water efficiently and reduces field erosion
- Clermont SWCD seeking opportunities for widespread implementation of this practice
  - Potential as an official agricultural BMP offered through the Farm Bill / NRCS
    - This would allow for federal cost-share opportunities for implementation reducing the upfront cost burden.
  - State NRCS supports initiative