

# EASTERN CONNECTICUT CONSERVATION DISTRICT, INC.

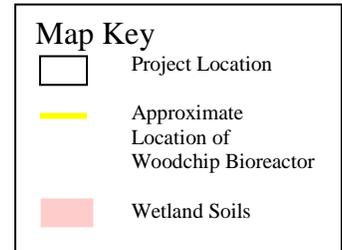
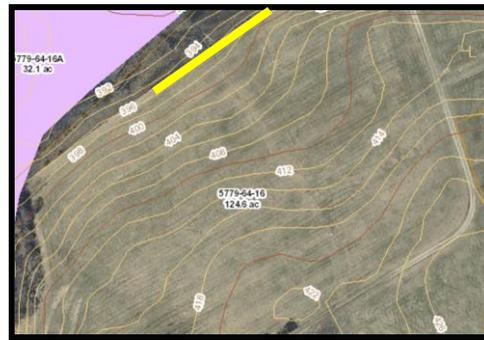
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## Woodstock, CT Woodchip Bioreactor Demonstration Project Fact Sheet



**Project Location:**  
Castle Rock Farm (Valleyside Farm)  
286 RT 169  
Woodstock, CT

**Project Purpose:** To install a “woodchip bioreactor” to intercept and treat currently untreated farm field tile drain runoff. The system will reduce the nutrient concentrations in the runoff. As part of this demonstration project, ECCD will collect and analyze water samples before and after going through the bioreactor to measure any changes in nutrient concentrations.

### **What is an agricultural land tile drainage system?**

Tile drains are subsurface drainage systems, which is an approved conservation practice by the USDA Natural Resource Conservation Service (NRCS). They consist of conduit installed beneath the ground surface to collect and/or convey excess water. The agricultural benefits of a tile drainage system:

- Maintain water table at proper level for healthiest plant growth,
- Keep soil voids free of excess water, which permits air flow and allows important biological processes to take place in soil,
- Minimize inefficient equipment operation caused by wet areas. (Panuska)

### **Are there unintended consequences of agricultural land tile drainage systems?**

Contaminants such as N, P and fecal coliform bacteria leach through the soil and are not filtered out before the water reaches the tile drainage outlets. In many cases, the outlet consists of a pipe emptying straight into an adjacent surface drainage ditch. (Boucher)

### **Problem Solution:**

ECCD will install a woodchip bioreactor to intercept and remove nutrients from the tile drain outflow at Castle Rock Farm in Woodstock, CT.

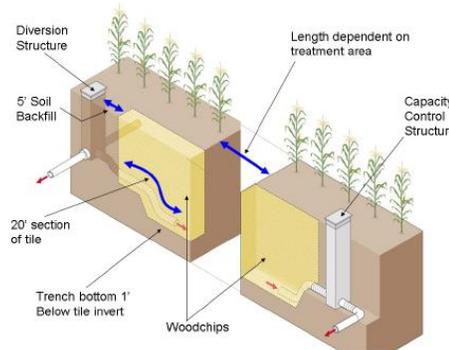
## What is a woodchip bioreactor?

A woodchip bioreactor is typically a ditch filled with woodchips intercepting the outflow from the tile drain system. The untreated, nutrient enriched tile drain runoff is directed to flow through the woodchips. Using natural denitrifying soil bacteria, the nitrate concentrations in the runoff are reduced to Nitrous oxide or N<sub>2</sub> gas. In certain cases, phosphorus and coliform bacteria reductions may also occur. In some systems, as space and funding allows, a “treatment train” approach can be designed to further reduce the phosphorus concentration in the outflow. This may involve adding an iron enriched sand filter or a layer of biochar on the top of the woodchips.

Woodchip bioreactors have successfully been installed in many mid-western states. This approach to reducing NPS pollution has not been tried in Connecticut. The CT DEEP has awarded ECCD EPA Clean Water Act § 319 funds to install a woodchip bioreactor demonstration project in Woodstock, CT.



A woodchip bioreactor being installed in Minnesota.  
(Minnesota Dept. of Agriculture, University of Minnesota Extension)



## What is the life expectancy of a woodchip bioreactor?

The literature indicates that a woodchip bioreactor may continue to function for up to 20 years. Once the nutrient reduction efficiency is reduced, the decomposed woodchips can be dug up and replaced with fresh woodchips.

## How will ECCD demonstrate the water quality benefits of the woodchip bioreactor?

The woodchip bioreactor project at Castle Rock Farm will be engineered to include water sampling portals. After rain events, drainage water flowing into and out of the woodchip bioreactor will be collected and analyzed at a qualified laboratory for specific nutrient concentrations. ECCD will continue collecting data for several months after the system is installed to track its performance. The data from this demonstration project will be published and presented to the public at a future public forum.

## References

- Boucher, Jude. "When a Solution Isn't Necessarily a Good Solution: Thoughts on Tile Drainage ." *Crop Talk*. Storrs, CT: University of Connecticut, March 2015. Newsletter.
- Minnesota Dept. of Agriculture, University of Minnesota Extension. "Woodchip Bioreactors." Fact Sheet. undated. electronic.
- Panuska, John. *An Introduction to Agricultural Drainage Systems*. PowerPoint Presentation. Madison, WI: University of Wisconsin Extension System, 2012. electronic.