

**Environment and Natural Resources Trust Fund  
2011-2012 Request for Proposals (RFP)**

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**LCCMR ID: 058-B**

**Project Title:** Improving Woodchip Bioreactors for Nitrate Management

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**Category:** B. Water Resources

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**Total Project Budget:** \$ 28,040

**Proposed Project Time Period for the Funding Requested:** 3 yrs, July 2011 - June 2014

**Other Non-State Funds:** \$ 0

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**Summary:**

We want to install a woodchip bioreactor on a 17.6 acre tile-drained agricultural field to demonstrate a cost-effective way for agricultural producers to reduce nitrate levels in tile discharge water.

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**Name:** Jim Hruska

**Sponsoring Organization:** Dodge County Soil & Water Conservation District

**Address:** 916 2nd Street SE  
Dodge Center MN 55927

**Telephone Number:** 507-374-6364 x3

**Email:** Jim.hruska@mn.nacdnet.net

**Web Address:** http://www.dodgeswcd.org/

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**Location**

**Region:** SE

**Ecological Section:** Minnesota and NE Iowa Morainal (222M)

**County Name:** Dodge

**City / Township:** Claremont Township

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_____ Funding Priorities	_____ Multiple Benefits	_____ Outcomes	_____ Knowledge Base
_____ Extent of Impact	_____ Innovation	_____ Scientific/Tech Basis	_____ Urgency
_____ Capacity Readiness	_____ Leverage	_____ Employment	_____ TOTAL _____%

# 2011-2012 MAIN PROPOSAL

## PROJECT TITLE: IMPROVING WOODCHIP BIOREACTORS for NITRATE MANAGEMENT

### I. PROJECT STATEMENT

Nitrate levels in surface and groundwater have become not only a local problem, but a national problem as well. To help reduce this problem, education and outreach of real solutions is needed. Finding pro-active, cost-effective ways for agricultural producers to maximize their nutrient reduction and impact on water quality is the main goal of our project. It is known that when a farmer feels ownership of a project that has a measurable benefit to society, it greatly increases the long-term success and adoption rate of a practice. Through progressive action, producers can be more involved in water quality solutions, and feel more in control of their overall farming operations. By monitoring nitrogen input from the field, and comparing it to output from a bioreactor, producers can directly see their impact, and how changing fertilizer and/or manure applications may save them money in the long run, either with increased yields, or simply by using fewer products. Hopefully this can open new doors to implementation of other BMPs that had been previously overlooked.

Our hope is to improve on an earlier bioreactor project, begun in the fall of 2007 by the Dodge Soil & Water Conservation District, in cooperation with MDA, in which an experimental biological filter was installed to remove nitrate from tile-drained water. Over the past 2 years, water samples have been collected and analyzed before and after treatment in the bioreactor with an average reduction of 10 mg/L nitrate, or 48%, of the treated water. Design factors have been considered as a cause for lower than hoped results. With this in mind, we are ready to install another bioreactor with design corrections to improve its ability to treat drainage water before discharge into public waters. Some corrections will be minor, such as maintaining a consistent ditch width, which was difficult with the first bioreactor due to wet soils. The primary correction will be the use of a plastic liner on the bottoms and sides of the ditch to better control the influx of ground water.

The basic design of the bioreactor is a trench, 200 feet long and six feet deep. The trench is installed with tile and two water control structures, one at each end. The trench is then filled with 4' of wood chips, and covered over with 2' of topsoil. As water drains from the field, it is metered into the filter by the first control structure, and held in the filter for a residence time by the second structure. This residence time allows bacteria harbored in the wood chips enough time to digest the nitrate into nitrogen gas, which is able to escape through the soil pores over the top of the filter. The site is in Section 29 of Ashland Township, Dodge County, MN. The test area is an intensely tile-drained row cropped field. We can isolate a 17.6 acre piece of this field, adjacent to U.S.Hwy.14, to install a bioreactor. If installed near the road, access to the filter would be easy for water sampling, control structure modifications and field day events.

### II. DESCRIPTION OF PROJECT ACTIVITIES

**Activity 1: Bioreactor Pre-Installation Budget: \$ 880**

*Meet at bioreactor site with team members & technical advisors. Discuss filter design and necessary supplies.*

Outcome	Completion Date
1. Come to consensus on overall site viability & necessary prep. work	July 2011
2. Design filter and order supplies	August 2011

**Activity 2: Bioreactor Installation Budget: \$ 14,220**

Outcome	Completion Date
1. 200' ditch is dug; plastic liner installed by drainage company	Sept/Oct 2011
2. Tile connections & water control structures installed by drainage co.	Sept/Oct 2011
3. 4' woodchip layer and 2' topsoil layer added to ditch	Sept/Oct 2011

**Activity 3: Bioreactor Monitoring Budget: \$ 5900**

*Begin a regular schedule of nitrate monitoring by SWCD staff. SWCD staff will obtain before/after samples from water control structures on a bi-weekly schedule for 6 months a year. QA/QC samples will be gathered and lab sampled on a bi-monthly schedule.*

Outcome	Completion Date
1. Bi-weekly before & after nitrate samples for duration of project	June 2014
2. QA/QC samples on a bi-monthly schedule	June 2014
3. Laboratory fees for nitrate analysis	June 2014

**Activity 4: Bioreactor Coordination, Management & Reporting Budget: \$ 7040**

*Coordination and management are one of the primary budget items in this project. Media press releases will be written about the project, and information published in local agricultural newspapers. Informational flyers will be sent to nearby landowners in the watershed. A field day may also be scheduled.*

Outcome	Completion Date
1. Project coordination & management	June 2014
2. Publication of project designs & results	June 2014
3. Final report	June 2014

### III. PROJECT STRATEGY

#### A. Project Team/Partners

Dodge County Soil and Water Conservation District. They are principle leads on the previous bioreactor project, as well as this proposed project. They will be responsible for collection, shipment and nitrate measurement of water samples. Contact person: Jim Hruska, 507-374-6364 x3. (Receiving dollars)

Landowner Dan Welsh, has farmed in Dodge County his entire life. (Contributing resources and time)

MN Dept of Agriculture. Provides consultation on design of the overall filter. Contact person: Mark Dettrich, 651-201-6482. (Contributing resources and in-kind time)

Dodge County Environmental Services. Provides administrative support. Contact person: Dean Schrandt, 507-635-6273. (Contributing in-kind time)

#### B. Timeline Requirements

*This is designed to be a 3 year project. Installation of the bioreactor in the fall of 2011 will allow for 2 subsequent full seasons of monitoring, and adequate time for communication of results.*

#### C. Long-Term Strategy and Future Funding Needs

*This proposal is not part of a long term strategy, though it's likely that results will generate future design innovations and possible grant proposals.*

## 2011-2012 Detailed Project Budget

### INSTRUCTIONS AND TEMPLATE (1 PAGE LIMIT)

*Attach budget, in MS-EXCEL format, to your "2011-2012 LCCMR Proposal Submit Form".*

*(1-page limit, single-sided, 10 pt. font minimum. Retain bold text and DELETE all instructions typed in italics. ADD OR DELETE ROWS AS NECESSARY. If a category is not applicable write "N/A", leave it blank, or delete the row.)*

#### IV. TOTAL TRUST FUND REQUEST BUDGET - 3 years

<b>BUDGET ITEM</b> <i>(See list of Eligible &amp; Non-Eligible Costs, p. 13)</i>	<b>AMOUNT</b>
<b>Personnel:</b> 1) Dodge County SWCD Technician: Project management, coordination & sampling. \$44.00/hr - 70% salary, 30% benefits. Projected 400 hrs. over 3 yr grant period	\$ 17,600
<b>Contracts:</b> Ellingson Drainage, West Concord MN - Dig 200' ditch, supply & install liner, supply tile for bypass, haul away extra dirt.	\$ 3,640
<b>Equipment/Tools/Supplies:</b> 1) Root River Hardwoods, Preston MN - hardwood chips & delivery. 2) Agri-Drain Corp, Adair IA - Bioreactor control structures & freight	\$ 5,300
<b>Laboratory Fees:</b> For 9 QA/QC samples over 3 yr period	\$300
<b>Travel:</b> SWCD office to bioreactor site - 16 miles @\$0.50/mile x 75 trips over 3 years	\$ 1,200
<b>TOTAL ENVIRONMENT &amp; NATURAL RESOURCES TRUST FUND \$ REQUEST</b>	<b>\$ 28,040</b>

#### V. OTHER FUNDS

<b>SOURCE OF FUNDS</b>	<b>AMOUNT</b>	<b>Status</b>
<b>In-kind Services During Project Period:</b> 1) MN Dept. of Agriculture - Consultant for entire project, project design. 2) Dodge County Environmental Services - Administrative support for project 3) Landowner - Time & project support	\$ 7,600	Pending



**Dan Welsh - Landowner  
Proposed 2010 Woodchip Bioreactor Site**

**Claremont T107 R018 S23  
Dodge County MN**

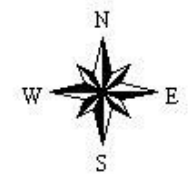
Prepared by Dodge County  
Environmental Quality Dept.

April 6, 2010

Illustration based on  
2007 aerial photo

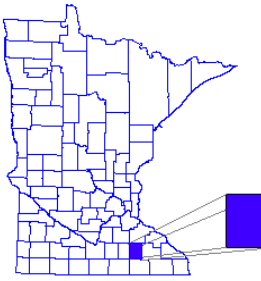


 **Tile System  
Sections**



**0 200 400 Feet**  


Information may be incorrect and maps may be inaccurate up to several hundred feet. They are to be used for broad examination of site conditions.



Project manager for the woodchip bioreactor proposal is District Technician Jim Hruska. Jim has been a district employee for 30 years, and is well acquainted with all aspects of the engineering planning and layout of conservation practices in the county. He also serves as the county ditch inspector.

Jim was the primary SWCD contact for the first Dodge County bioreactor erected in 2007. He was heavily involved in the design, management and sampling efforts for that bioreactor.

***The mission of the Dodge Soil and Water Conservation District is to provide leadership in natural resource protection through promotion and implementation of soil and water's best management practices.***

***The District is governed by a group of 5 district supervisors who meet monthly. The District currently has 2 full-time employees.***