

**Environment and Natural Resources Trust Fund  
2017 Request for Proposals (RFP)**

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**Project Title:**

Crystal Lake Watershed Nutrient Removal Practices

**ENRTF ID: 075-B**

**Category:** B. Water Resources

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**Total Project Budget:** \$ 996,500

**Proposed Project Time Period for the Funding Requested:** 3 years, July 2017 - June 2020

**Summary:**

This water quality project includes a nutrient removal wetland, woodchip bioreactor, and an iron-sand filter to remove sediment, nitrogen, and phosphorus from an impaired public water and lake.

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**Name:** Craig Austinson

**Sponsoring Organization:** Blue Earth County Drainage Authority

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Mankato MN 56002

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**Web Address** http://www.blueearthcountymn.gov/index.aspx?nid=327

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**Location**

**Region:** Southeast

**County Name:** Blue Earth

**City / Township:** Lake Crystal/Garden City Township

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**Alternate Text for Visual:**

Located near Mankato, this rural agricultural area is less than one mile from Crystal Lake and the City of Lake Crystal.

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

**Environment and Natural Resources Trust Fund (ENRTF) 2017 Main Proposal**  
**Project Title: Crystal Lake Watershed Nutrient Removal Practices**

**PROJECT TITLE:** *Crystal Lake Watershed Nutrient Removal Practices*

The Crystal Lake Watershed is targeted as a priority based on degraded water quality (Phosphorus, Nitrogen, Total Suspended Solids & Turbidity) & significant impairments in Crystal Lake. The swimming beach is closed, danger signs are posted at the beach, fishing pier & boat landing, & large, blue-green algal blooms put a stench in the air that drivers smell as they pass through Lake Crystal on Highway 60, just south of Mankato. This water quality project includes a nutrient removal wetland (sedimentation), woodchip bioreactor (to remove nitrates), & an iron-sand filter (to remove phosphorus). A full inventory of the watershed resulted in a Multi-Purpose Drainage Management Plan (MDM) identifying areas where Best Management Practices (BMPs) would improve water quality. This project will implement the prioritized practices that were identified as having the most significant impact on water quality.

**Goal:** Reduce loading from the watershed into the lake of phosphorus, nitrates and sediment to increase water quality & reduce the frequency of algal blooms in Crystal Lake to enhance fish & wildlife habitat, human health & recreational opportunities like swimming. There are many factors that need to be implemented to make this happen. In-field (source) practices are now being addressed by the Blue Earth County Soil & Water Conservation District (SWCD) and landowners in a separate project. This project is the next highest priority is to address channelized runoff entering the lake from the watershed.

The BMPs will provide treatment to over 8,500 acres of primarily agricultural watershed and this site was identified through water quality sampling from the Minnesota Pollution Control Agency (MPCA) & SWCD to contain the highest concentrations of sediment, phosphorus, & nitrogen within the system.

**Benefits:** This project will positively impact human health and wildlife habitat by improving water quality in Crystal Lake. It will increase swimming and recreation opportunities, overall aesthetics of the lake, and reduce the stench from the algal blooms.

**Activity 1: Easement Acquisition (11.5 acres)**

**Budget: \$143,750**

Acquire easement for wetland, woodchip bioreactor & iron-sand filter. Two landowners, Ken & Barb Sorenson, & Delphin Urban support this project. BEDA will manage easements to provide ongoing maintenance to the system. The criteria used to select these parcels included the full inventory, analysis & development of the MDM Plan. These parcels are located along the alignment of the public water & underground tiles, which provide the best access for treatment.

<b>Outcome: 11.5 Acres of Permanent Easement Acquired</b>	<b>Completion</b>
1. Landowner meetings, Sign permanent easement.	Dec. 1, 2017
2. <i>Acquire 10 acre easement on Wetland (Parcel: R361208100002) \$125,000;</i>	Dec. 1, 2017
3. <i>Acquire 1 acre easement on Woodchip Bioreactor \$12,500 (Parcel: R472101300002)</i>	Dec. 1, 2017
4. <i>Acquire 0.5 easement on Iron-Sand Filter \$6,250 (Parcel: R472101300002)</i>	Dec. 1, 2017

**Activity 2: Design of Nutrient Removal Practices**

**Budget: \$113,900**

Design includes topographic survey, hydrologic/hydraulic modeling, engineering plan & specifications, and all required permitting. This includes proper sizing, nutrient & sediment removal, & maintenance for long-term efficiency. These practices are measurable. Design of woodchip bioreactor and iron-sand filter is based on treating 20-25% of the peak flow from the underground tile, and 30-40% of the peak flow for the wetland. 90-100% of base flow will be treated by all three BMPs.

**Environment and Natural Resources Trust Fund (ENRTF) 2017 Main Proposal**  
**Project Title: Crystal Lake Watershed Nutrient Removal Practices**

<b>Outcome:</b> Design BMPs to reduce nitrates by 40-60% (woodchip bioreactor); reduce Phosphorus by 10-30% (Iron Sand Filter); and total suspended solids (TSS) by 25-35%, nitrogen and phosphorus by 15-25% (wetland).	<b>Completion Date</b>
1. <i>Constructed Wetland</i> \$76,000	March 1, 2018
2. <i>Woodchip Bioreactor</i> \$21,000	March 1, 2018
3. <i>Iron-Sand Filter</i> \$11,900	March 1, 2018
4. <i>SWCD Reviews &amp; approves design</i> \$5,000	March 1, 2018

**Activity 3: Construction of Nutrient Removal Practices** **Budget: \$713,850**

Once plans are approved and bid, the construction process will begin. *Construction includes grading & excavation, tile rerouting, water control structures, BMPs (erosion control, SWPPP), & final stabilization.*

<b>Outcomes:</b> Grading and earthwork, control structures, seeding of the Constructed Wetland. Control structures & tile connections, grading and earthwork, installation of woodchips for bioreactor. Construction of iron-sand filter & all piping.	<b>Completion Date</b>
1. <i>Constructed Wetland</i> \$504,250	December 31, 2018
2. <i>Woodchip Bioreactor</i> \$151,000	October 31, 2018
3. <i>Iron-Sand Filter</i> \$58,600	October 31, 2018

**Activity 4: Water Quality Monitoring** **Budget: \$10,000**

Monitoring conducted by SWCD via grab sampling methods from channel and tile will continue at the inlet and outlet of each BMP to measure effectiveness. Results will be used to promote practices.

<b>Outcome:</b> Grab sample results will be compared to the anticipated reductions identified during the design phase.	<b>Completion Date</b>
1. <i>Water Quality Sampling: Ongoing SCWD grab sampling to verify improvements are occurring. Will continue beyond the life of the grant. (\$7,000)</i>	July 1, 2020
2. <i>Data Analysis &amp; Reporting (\$3,000)</i>	July 1, 2020

**III. PROJECT STRATEGY**

**A. Project Team/Partners: Blue Earth County Drainage Authority (BEDA):** Craig Austinson, Ditch Manager; will serve as project manager. BEDA will serve as fiscal agent and will receive \$15,000 for services. **Landowners:** Ken & Barb Sorenson, & Delphin Urban: will sell easements for woodchip bioreactor, iron-sand filter, and wetland. Landowners will receive ENTRF funding in proportion to the size and cost ratio for their land. **Blue Earth County Soil and Water Conservation District (SWCD):** Jerad Bach will review and provide input on design and engineering. He will continue to share grab sampling results so they can be compared to determine effectiveness of Best Management Practices. He will also provide consultation for ongoing maintenance of BMPs.

**B. Project Impact and Long-Term Strategy:** This project will show how pollutants and impaired waters can be addressed by combining BMPs, and builds on lessons learned from another successful previous LCCMR/ENTRF project (Mapleton, MN). The results of this project will be used for future projects with similar impairments.

**C. Timeline Requirements: Year 1:** Easement Acquisition; **Year 2:** Design and Construction; **Year 3:** Construction Maintenance and Sampling. The MDM plan identifies other BMPs to implement in the future and will require funding for installation. Future maintenance of acquisition areas will be funded by BEDA. To continue monitoring and analysis beyond the grant, additional funding will be required. The next phase will be in-lake, in-town treatment, followed by ongoing maintenance.

## 2017 Detailed Project Budget

**Project Title: Crystal Lake Watershed Nutrient Removal Practices**

### IV. TOTAL ENRTF REQUEST BUDGET 3 years

<u>BUDGET ITEM</u>	<u>AMOUNT</u>
<b>Personnel:</b> County Administration Costs \$5,000 for each: woodchip bioreactor, iron-sand filter, constructed wetland to be paid to Blue Earth County Drainage Authority. The Blue Earth County Soil and Water Conservation District will receive \$5,000 for reviewing and commenting on designs.	\$ 20,000
<b>Professional/Technical/Service Contracts:</b> Proposed contracts: Engineering and Design, Bidding, Construction Staking, Construction Administration (\$76,000 constructed wetland), (\$11,900 iron-sand filter), (\$21,000 woodchip bioreactor).	\$ 108,900
<b>Construction of Nutrient Removal Practices:</b> Construction will be bid out to contractors including grading, infrastructure, seeding, and erosion control (\$504,250 constructed wetland), (\$58,600 iron-sand filter), (\$151,000 woodchip bioreactor).	\$ 713,850
<b>Monitoring Equipment (Tools and Supplies) and Data Analysis:</b> Water quality grab sampling at the inlet and outlet of each BMP. At minimum once per month and after rain events larger than one inch. Results will be compared to the anticipated reductions during the design phase.	\$10,000
<b>Acquisition (Fee Title or Permanent Easements):</b> Blue Earth County Drainage Authority will hold the permanent easements. Constructed Wetland 10 acres (\$125,000); Iron-Sand Filter .5 acres (\$6,250); Woodchip Bioreactor 1 acre (\$12,500)	\$ 143,750
<b>Travel:</b> No travel costs will be incurred.	N/A
<b>Additional Budget Items:</b>	N/A
<b>TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =</b>	<b>\$ 996,500</b>

### V. OTHER FUNDS *(This entire section must be filled out. Do not delete rows. Indicate "N/A" if row is not applicable.)*

<u>SOURCE OF FUNDS</u>	<u>AMOUNT</u>	<u>Status</u>
<b>Other Non-State \$ To Be Applied To Project During Project Period:</b>	N/A	N/A
<b>Other State \$ To Be Applied To Project During Project Period:</b>	N/A	N/A
<b>In-kind Services To Be Applied To Project During Project Period:</b>	N/A	N/A
<b>Funding History:</b>	N/A	N/A
<b>Remaining \$ From Current ENRTF Appropriation:</b>	N/A	N/A

**Environment and Natural Resources Trust Fund  
2017 Proposed Acquisition/Restoration List**

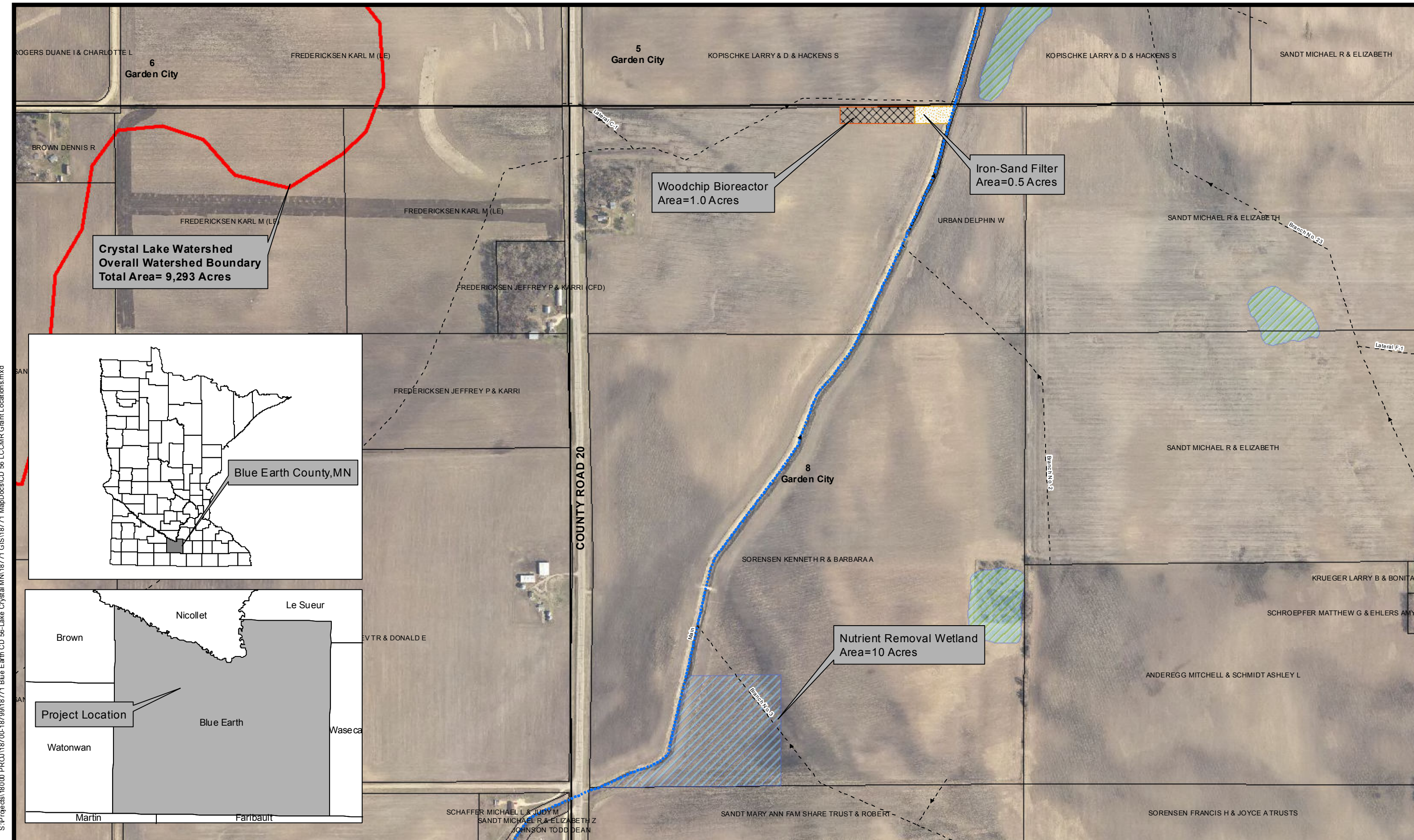
Project Title: Crystal Lake Watershed Nutrient Removal Practices

Project Manager Name: Craig Austinson

Organization: Blue Earth County Drainage Authority

ENRTF \$ Request: \$996,500

#	Acquisition or Restoration Parcel Name	Geographic Coordinates Format: [Deg.]° [Min.]' [Sec.]" [Hemis.]		Estimated Cost	County	Ecological Significance	Activity Description	# of Acres	# of Shoreline Miles	Type of Landowner	Proposed Fee Title or Easement Holder (if applicable)
		Latitude	Longitude								
1	Ken and Barb Sorenson - R361208100002	44.087132	-94.223651	\$125,000	Blue Earth	Prairie pothole area. Low elevation.	Wetland Restoration	10	0	Private Individual	Blue Earth County Drainage Authority
2	Delphin Urban - R472101300002	43.924809	-94.267917	\$18,750	Blue Earth	Prairie pothole area. Low elevation.	Woodchip Bioreactor and Iron-Sand Filter	1.5	0	Private Individual	Blue Earth County Drainage Authority
Wetland Restoration, 10 acres @ \$12,500/acre. Woodchip Bioreactor, 1 acre @ \$12,500/acre. Iron-Sand Filter, 0.5 acre @ \$12,500/acre.											



**Crystal Lake Watershed  
Overall Watershed Boundary  
Total Area= 9,293 Acres**

**Woodchip Bioreactor  
Area=1.0 Acres**

**Iron-Sand Filter  
Area=0.5 Acres**

**Nutrient Removal Wetland  
Area=10 Acres**

**Blue Earth County, MN**

**Project Location**

**Legend:**

- Watershed
- Open Channel
- Iron Sand Filter
- Nutrient Removal Wetland
- Parcels
- NWI
- Woodchip Bioreactor
- Sections
- State Easements
- Underground Tiles

**05/07/2016**

**Scale:**

0 500 Feet

1 inch = 500 feet

**Crystal Lake Watershed  
LCCMR Grant  
Blue Earth County, MN  
ENRTF ID: 075-B**

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DATE: 3/18/2016

**ISG** Architecture  
Engineering  
Environmental  
Planning

**I+S GROUP**

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PN: 15-17619  
Source: 2013 BEC Orthophotograph

**Project Title:** *Crystal Lake Watershed Nutrient Removal Practices*

Project Manager Qualifications and Organization Description

**Responsibilities Pertaining to Project:**

- Coordinate communication with landowners, partners and agencies
- Review and approve planning, design and engineering documents
- Process land acquisition
- Oversee construction schedule and process
- Conduct ongoing water sampling
- Provide required reporting documentation
- Share lessons learned and information with others

**Blue Earth County Drainage Authority**

Approximately 50% of all the land in Blue Earth County drains to a county ditch. The remaining land drains to natural drainage systems such as rivers or streams. Ditch documents and drainage system information can be found on the [DrainageDB web-based portal](#) that provides 24/7 online access to historical and present documents for the public to view.

Blue Earth County's Drainage Authority is the County Board of Commissioners. Others involved with ditch proceedings include: County Ditch Manager, County Attorney, Ditch owners' attorneys, Engineers, Interested landowners, state and federal agencies. The County Board's Drainage Committee includes two county commissioners, the County Administrator and the county-employed ditch manager.

**Ditch Manager: Craig Austinson (1998 – Present)**

Craig Austinson serves as Blue Earth County's full-time ditch manager who is responsible for much of the day-to-day tasks associated with managing the County's ditch system. The ditch manager is part of the Taxpayer Services Department as he works closely with many of the other offices in the department to complete his work. Annual activities related to the county's ditches include: Inspections of ditch systems, repair and improvement projects, and erosion control.

Duties include maintaining all county ditches, requiring thorough knowledge of current Minnesota ditch law, working with landowners, legislators and county commissioners, contracting professionals for ditch assessment and repair and working closely with the county attorney. He is responsible for maintaining, revising and updating ditch records and property assessments, and communicates effectively with all affected parties. Craig often presents at statewide conferences, legislative meetings and to landowner groups on innovative strategies for sustainable agricultural drainage practices. He reports directly to the County Board.

A 2016 BWSR Targeted Watershed grant for \$95,000 was awarded to BEDA to inventory and assess four targeted areas in the County. Based on conditions of the public water, the Crystal Lake Watershed was the most in need of water quality practices. As a result of this grant a multi-purpose management plan was developed and is ready to be implemented if funding is secured.

