2010 Project Abstract
For the Period Ending June 30, 2015

PROJECT TITLE:	Agricultural and Urban Runoff Water Quality Treatment Analysis
PROJECT MANAGER:	Craig Austinson
AFFILIATION:	Blue Earth County
MAILING ADDRESS:	Blue Earth County Drainage Authority, Blue Earth County Courthouse, 204 South Fifth Street
CITY/STATE/ZIP:	Mankato, MN 56001
PHONE:	(507) 304-4253
E-MAIL:	craig.austinson@blueeathcountymn.gov
WEBSITE: [If applicable]	www.co.blue-earth.mn.us
FUNDING SOURCE:	Environment and Natural Resources Trust Fund
LEGAL CITATION:	M.L. 2010, Chp. 362, Sec. 2, Subd. 5d M.L. 2014, Chapter 226, Section 2, Subdivision 19

APPROPRIATION AMOUNT: $485,000

Overall Project Outcomes and Results

This project provided proof to landowners and agencies that conditions for agricultural production were enhanced and water quality was improved by implementing a combination of Best Management Practices on Blue Earth County Ditch No. 57 (CD57) in the Mapleton area of south central Minnesota. These results surpassed expectations and overwhelmingly proved that water quality was improved by reducing sediment and nutrient loading throughout the system. Water storage and drainage capacity were increased, which reduced flooding and improved field conditions for crop yields.

A combination of BMPs included two water storage basins, buffer strips, two-stage ditch, and a rate control weir. The two storage basins significantly increased storage capacity, with the Klein Pond providing 26.3 acre-feet of storage and the City Pond providing 23 acre-feet. Peak flow rates were reduced with reductions ranging from 10% to 50% at Klein Pond and the rate control weir averaging 6% in reduction for monitored rain events.

Water quality results show dramatic improvements for Total Suspended Solids, Total Phosphorus and Nitrates. Reductions for each pollutant ranged between 15% and 50% for the Klein Pond, averaging nearly 25%. The two-stage ditch and rate control weir had reductions between 2% and 10%, averaging nearly 5%. The Klein Pond was most effective at removing trapped sediments: 230,000 pounds of sediment, 415 pounds of phosphorus, and 23,000 pounds of nitrogen. Of the three BMPs monitored, results showed they removed a total of 251,000 pounds of sediment, equivalent to nearly 75 dump truck loads. Unexpected baseflow water quality improvements include reductions in TSS by more than 33% and TP concentrations reduced by more than 16%. Baseflow water quality also improved and increased habitat for wildlife. This project had a significant improvement in water quality and makes the CD 57 system a thriving place for a variety of species to live.

Project Results Use and Dissemination

Communication and Outreach

The information from this project has been shared and disseminated in a variety of ways, including the following:

1. Event and Tour: Agricultural Drainage & the Future of Water Quality Workshop 2012
2. Event and Tour: Agricultural Drainage & the Future of Water Quality Workshop 2014 (165 in attendance)
3. Event: Agricultural Drainage & the Future of Water Quality Workshop 2015 (175 in attendance)
4. Multiple Site Visits: Blue Earth County, Minnesota Department of Agriculture, ISG and interested parties
5. Website: http://www.is-grp.com/ag
6. Presentations: By Chuck Brandel and/or Craig Austinson
    a. Minnesota State University Mankato, Department of Civil Engineering (2010)
    b. American Society of Civil Engineers (2011)
    c. Faribault County Drainage Authority (2013)
    d. Minnesota Water Resources Conference (2015)
    e. Iowa Water Conference (2014)
    f. Blue Earth County Soil and Water Conservation District (2014)
    g. Sibley County Drainage Authority (2015)
7. Article: Conservation Drainage article, DIRT Magazine (Gislason and Hunter Law Firm publication)
8. CD 57 Fun Facts Brochure: Distributed at various events and activities
9. Final Report: Summarizes the entire CD 57 project
10. Water Quality Report: Quantitative data and methods used in the water quality analysis and all results

Environment and Natural Resources Trust Fund (ENRTF)
2010 Work Plan Final Report

Date of Report: August 14, 2015
Date of Next Progress Report: Final Report
Date of Work Program Approval:
Project Completion Date: December 2014

I. PROJECT TITLE: Agricultural and Urban Runoff Water Quality Treatment Analysis

Project Manager: Craig Austinson
Affiliation: Blue Earth County
Mailing Address: Blue Earth County Drainage Authority, Blue Earth County Courthouse, 204 South Fifth St.
City /State / Zip: Mankato / MN / 56001
Telephone Number: (507) 304-4253
E-mail Address: craig.austinson@blueeathcountymn.gov
Fax Number: (507) 304-4344
Web Site Address: www.co.blue-earth.mn.us

Location: This project will occur within Mapleton and Beauford Townships in Blue Earth County. Specifically, water quality improvements are proposed for County Ditch No. 57 at a point approximately 0.5 miles to the southwest of the City of Mapleton through to its terminus at the Big Cobb River, approximately five miles to the northeast of the City of Mapleton. An exhibit is enclosed that identifies the project location within Blue Earth County.

Total ENRTF Project Budget:	ENRTF Appropriation:	$ 485,000.00
	Minus Amount Spent:	$ 482,042.15
	Equal Balance:	$ 2957.85

Legal Citation: M.L. 2010, Chp. 362, Sec. 2, Subd. 5d
M.L. 2014, Chapter 226, Section 2, Subdivision 19

Appropriation Language:
$485,000 is from the trust fund to the Board of Water and Soil Resources for an agreement with the Blue Earth County Drainage Authority to reduce soil erosion, peak water flows, and nutrient loading through a demonstration model evaluating storage and treatment options in drainage systems in order to improve water quality. This appropriation is available until June 30, 2014, by which time the project must be completed and final products delivered.
Carry forward: The availability of the appropriations for the following projects are extended to June 30, 2015: (10) Laws 2010, chapter 362, section 2, subdivision 5, paragraph (d), Agricultural and Urban Runoff Water Quality Treatment Analysis.

II. PROJECT SUMMARY AND RESULTS

This project is a model for future drainage projects across the state and represents a fundamental shift in the way rural drainage systems interact with the landscape. This is a community-based water quality and treatment demonstration project in which landowners, local government, and state agencies have developed a watershed approach to improving water quality and replacing outdated drainage systems. The project will improve water quality, improve wildlife habitat, and develop a process for future projects by constructing water quality features within the 6,000 acre watershed. The project focuses on Blue Earth County Ditch 57, part of the Le Sueur River Minor Watershed of the Minnesota River Basin. This watershed includes runoff from agricultural as well as urban sources.

ENRTF funding will provide assistance to construct two surge basins, in-channel treatment, native grass buffer strips, and a rate control weir at the outlet of the ditch. Nine monitoring stations are also proposed that will record flow and water quality data for three years. In addition, this project will provide documentation on how successful water quality treatments can be incorporated into Drainage Law. Once monitoring is completed, public education via site visits, presentations, and information posted to web sites will be provided to describe the effect of project features on water quality and how these features can be incorporated into other drainage projects.

III. PROGRESS SUMMARIES

Progress Summary as of January 15, 2011

The construction portion of the project stated in September one surge basin and in-channel and is approximately 15% complete. Work ceased in November due to the depth of the snow fall. Construction should be completed this summer with the planting of the native grass buffers starting after the earth work has been completed. The monitoring stations have not yet been constructed but we pulled grab samples before construction began.

Progress Summary as of July 15, 2011

Construction was delayed due to the wet spring and some difficulty in obtaining a permit from MnDOT. Construction on the 2nd surge basin is 85% complete and will be completed shortly. Construction on the first surge basin will resume as soon as we obtain the MnDOT permit. We will continue to pull grab samples until the monitoring stations are constructed.

Progress Summary as of January 15, 2012

The construction of the project is completed except for final stabilization and grass strips. Construction was difficult due to the large amount of snow and rain in the Winter of 2010/2011 and Spring/Summer 2011. This caused added expenses to dewater and regrade portions of the project that were previously constructed in November 2010. The dry fall of 2011 did help to get the project completed but change orders have added to the construction budget. Monitoring structures will be ordered in March 2012 for installation for the monitoring during the 2012 growing season. Minnesota State University Civil Engineering Students will be utilized to assist in monitoring and gathering data throughout the project.

Progress Summary as of July 15, 2013

The native grass seeding is progressing, with a mowing occurring anytime. Monitoring continuing, numerous rain events in 2013 have given significant amounts of data but also caused issues due to the prolonged high water levels. Some monitoring equipment has been damaged and needs to be replaced. MSU students are continuing to assist with monitoring and water quality sampling.

Progress Summary as of January 15, 2014

Monitoring is completed for 2013. Analysis for previous two years of monitoring is currently being completed. MSU students are continuing to assist with monitoring and water quality sampling.

Progress Summary as of July 15, 2014

The native grass is better than was in 2014 but needed to be replanted is some areas. A side inlet blew out during the spring rain events. The cause appears to be a redirection of the surface flow by a landowner. Monitoring is continuing. A workshop outlining 2013 results was presented to 180+ people on June 26, 2014.

Progress Summary as of January 15, 2015

The project construction and monitoring is complete. The final data from monitoring was completed in December 2014 and the final report is currently being reviewed for completion. The results of the project are very promising with significant reductions in peak flow, TSS, phosphorus and nitrogen reported for the BMPs.

Progress Summary as of July 1, 2015

The final data from monitoring has been completed and a full water quality analysis has also been completed on the collected data. The analysis includes data collected from the 3 years of post BMP installation (2012-2014) and 3 years of pre BMP installation (2009-2011). A final report has been completed summarizing the entire CD 57 project while a water quality report is complete which specifically addresses methods used in the water quality analysis. These reports are complete and are being formatted with graphics to make each report easier to read. The reports will be submitted to the LCCMR on July 15, 2015. The project was a success in that the monitoring has shown that the BMP's reduced peak flows, flooding, total suspended solids and phosphorus while providing drainage capacity for the adjacent farmland to increase productivity.

Final Summary

Overall Project Outcomes and Results

This project provided proof to landowners and agencies that conditions for agricultural production were enhanced and water quality was improved by implementing a combination of Best Management Practices on Blue Earth County Ditch No. 57 (CD57) in the Mapleton area of south central Minnesota. These results surpassed expectations and overwhelmingly proved that water quality was improved by reducing sediment and nutrient loading throughout the system. Water storage and drainage capacity were increased, which reduced flooding and improved field conditions for crop yields.

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IV. OUTLINE OF PROJECT RESULTS

Result 1: Provide storage and treatment for agricultural and urban runoff to improve water quality and improve habitat diversity.

Description: To provide storage for runoff from agricultural and urban sources, two surge basins will be designed and constructed that will have a combined capacity for storage of 40 acre-feet of runoff. These basins will be constructed adjacent to the existing and proposed ditch improvements. Trust fund dollars will be used to purchase permanent easements on 1 acre for one of the basins and the landowners will purchase the remaining land for that basin. The other basin will incorporate land already owned by the City of Mapleton. Trust fund dollars will also be utilized for the design, excavation and seeding for the basins including the expansion of an existing City Pond to provide additional storage in the system. To improve water quality, a two-stage ditch and sediment trap will be constructed that will provide in-channel treatment. This will be accomplished by widening and over excavating existing and proposed new portions of ditch that will be constructed with landowner funding. Trust Fund dollars will be used to purchase an easement on 4 acres of land to widen the ditch. Also trust fund dollars will be used for the additional excavation to widen the ditch and the additional native seeding required on the ditch benches.

Water quality will also be improved through the planting of native grass buffer strips along 4.1 miles of the ditch. The landowners will purchase the required 16.5 foot easements required by statute to complete this work, with a total of 17 acres being purchased for easement by the landowners. Trust funding will assist in funding planting of native grasses and purchasing easements for wider buffer areas up to 50 feet where necessary due to large amounts of flow and potential for erosion. The trust fund funding will also be utilized to provide maintenance of the native plantings during growth to provide an enhanced buffer for collection of the sediment that is entrained in overland flow before runoff reaches the ditch. The native plantings also represent an improvement in habitat diversity as compared to the monoculture typical of agricultural settings and the typically grasses planted in required buffers.

Finally, a weir will be placed at the outlet of the ditch near the confluence with the Big Cobb River. The purpose of the weir will be twofold. The weir will be designed to reduce peak flow along the ditch and also provide a means to divert runoff to US Fish and Wildlife (USFWS) property. The USFWS property is located to the north of the conjunction of the ditch with the Big Cobb River and will potentially utilize the diverted runoff to support a 40-acre wetland on USFWS property.

All of the water quality improvements that the trust fund is funding are not required by statute but are water quality features proposed by the landowners. The construction of these water quality improvements will occur on land under easements that will either be obtained by individual landowners or are already under the control of the Drainage Authority. All easements purchased will be permanent and the Blue Earth County Drainage Authority will be maintaining the easement and will monitor the condition of each of the water quality improvements. Any repairs to the

proposed improvements will be paid for by the landowners in the system through the ditch repair fund which is controlled by the Blue Earth County Drainage Authority. The Drainage Authority has over 100 years of experience obtaining and maintaining permanent easements on drainage infrastructure. Some of these easements have included surge basins, in-channel easements, dams for lakes and other water quality structures. All easements are utilizing $5,000 per acre for estimate purchase. This number is based on recent land purchases in the area and the amount estimated for land purchase for RIM/WRP projects in this area for 2009.

A budget for each item as well as a timeline is presented in the table below.

Summary Budget Information for Result 1: ENRTF BUDGET: $270,463
Amount Spent: $ 270,463
Balance: $268,505.15

Deliverable	Completion Date	Budget
Project Management, Hydrologic/Hydraulic Design, Construction Plans, and Onsite Project Management completed by I&S Group, Inc.	November 30, 2010	$80,562
Construct In Channel treatment in a new drainage ditch by widening 1610 feet of proposed new open ditch. Construction includes grading and seeding of benches with native seed.	November 30, 2010	$24,439
Easement Acquisition of 4 acres at $5000 per acre for widening of proposed and existing open ditch for construction of In-Channel Treatment by use of sediment basin and two stage ditch. Includes $1,000 for legal and appraisal services.	August 15, 2010	0
Construct two surge basins for storage and treatment of agricultural and urban runoff, including grading construction, outlet construction and seeding. Completed by grading contractor.	November 30, 2010	$156,000
Easement Acquisition of 1 acre at $5,000 per acre for Surge Basin Construction. Includes $1,000 for legal and appraisal services.	August 15, 2010	$0
Construct and Maintain Native Grass Buffer Strips on 4.1 Miles of Existing Open Ditch. 16.5 foot buffers will be purchased by landowners as required by statute. Seeding and wider buffers up to 50 feet in selected areas will be completed with trust funds. Also 3 years of maintenance will be performed to ensure establishment of buffers.	November 30, 2013	$9,462

Result Completion Date: November 30, 2013

Result Status as of January 15, 2011

Amendment Request: Due to a landowner backing out and declining the use land for one of the surge basins it is necessary to make some amendments to the project costs. We are able to relocate the basin to land owned by the City of Mapleton. The new location is less than 600 feet south east of the original location and is will treat water from the same sub-watershed so our deliverables will remain unchanged. We will need to shift some of the costs. Since easements on city owned land is unnecessary will be able to save the costs of purchasing easements which will offset most of the cost of re-engineering the basin. The bids for seeding of both basins are well under our estimate which is reflected in the lower seeding costs. Construction of the relocated basin will start in the spring of 2011.

Amendment approved:

100% of Hydraulic/Hydrologic Design Completed for Surge basins and In-Channel treatment, including preliminary and final reports, drainage authority hearings per statute, construction plans, construction specifications, and bidding. Project construction underway. 95% of In-channel Treatment completed. 20% of Surge Basin Construction Completed before winter freeze up. 50% of other work on system completed that is not part of LCCMR funding project
Amendment Approved: 5/9/14

Result Status as of July 15, 2011
Work on the 2nd surge basin is 85% completed. The MnDOT permit problem has delayed the outlet for the first surge basin so no additional work has been done other than mulching the site to prevent erosion.

Result Status as of January 15, 2012
Amendment Request: Due to large snow fall during the winter of 2010-2011 and rain during the spring/summer of 2011, and permit issues, the project was delayed and portions of the project needed to be re-graded, reworked, and dewatered multiple times. Also buried concrete debris was found below portions of the surge basin and needed to be removed and disposed of. These items caused the construction costs to exceed planned contingencies. All construction is completed except for final stabilization and seeding of grass buffers.

Amendment Approved: 5/9/14

Result Status as of July 15, 2013
All construction is completed except for maintenance of the seeding. A mowing is due at this time and will be completed shortly.

Result Status as of January 15, 2014
All construction is completed except for maintenance of the seeding. A mowing was completed in 2013 with one more in 2014. Amendment Request – seeding and maintenance lower than expected. Request funding shift to more monitoring in 2014.
Amendment Approved: 5/9/14

Result Status as of July 15, 2014
The native grass is better than was in 2014 but needed to be replanted is some areas. A side inlet blew out during the spring rain events. The cause appears to be a redirection of the surface flow by a landowner.

Progress Summary as of January 15, 2015
The project is complete. The final data from monitoring was completed in December 2014 and the final report is currently being reviewed for completion. The results of the project are very promising with significant reductions in peak flow, TSS, phosphorus and nitrogen reported for the BMPs. The system is working well and the native grasses need very little maintenance.

Progress Summary as of July 1, 2015 – Final Report Summary
The final data from monitoring has been completed and a full water quality analysis has also been completed on the collected data. The analysis includes data collected from the 3 years of post BMP installation (2012-2014) and 3 years of pre BMP installation (2009-2011). A final report has been completed summarizing the entire CD 57 project while a water quality report is complete which specifically addresses methods used in the water quality analysis. These reports are complete and are being formatted with graphics to make each report easier to read. The reports will be submitted to the LCCMR on July 15, 2015.

Result 2: Monitor and Analyze how the proposed strategies improve water quality and reduce peak flows

Description: This item includes the construction and installation of control and monitoring structures including the time to gather the data from each structure. The control structures will meter flow throughout the system. Control structures will be constructed at the end of the system, at the downstream end of the in-channel treatment area, at the inlet to the in-channel treatment area, and at the outlet of each surge basin. Monitoring structures will be also be located along with the control structures where feasible and along strategically placed locations in the watershed. These areas include a portion of the system that have no water quality treatment and is primarily agricultural flow, a portion of the system that has primarily urban flow and the outlet for the potential wetland restoration area.

Monitoring structures will monitor flow and allow for composite and grab samples to monitor Total Suspended Solids, Phosphorus, Nitrogen and other pollutants. Monitoring structures will be placed throughout the watershed to determine the effectiveness of each of the proposed water quality improvements. The flow will be monitored for a total of three years. After which, a monitoring report will be prepared to summarize the results and provide recommendations for future water quality improvements.

A budget for each item as well as a timeline is presented in the table below.

Summary Budget Information for Result 2: ENRTF BUDGET:$ 182,726
Amount Spent: $ 182,726
Balance: $ 0

Deliverable	Completion Date	Budget
Construction of Rate Control Structures including structures at inlet and outlet of in-channel treatment area, the outlet for both surge basins, the outlet of the southern improvement and the including Rate Reduction Weir at End of System	November 30, 2010	$50,750
Construct 9 monitoring structures including samplers and data loggers. All structures will monitor flow and 6 structures will also have samplers	November 30, 2010	$11,500
Project Management, Hydrologic/Hydraulic Analysis, Develop Base Flow Report, Complete assessment of multiple treatment options and how they benefit a diverse watershed and improve water quality. Complete Monitoring Report.	Request Extension to December 2014	$100,495
Testing Results of Samples estimated at $80 per sample with 125 samples taken over monitoring period	Request Extension to December 2014	$19,981

Result Completion Date: ~~June 30, 2014~~ – Request Extension to December 2014

Result Status as of January 15, 2011

Amendment Request: The bids for the control structures came in over our estimate so we will need to increase that cost in our budget. We are now going to partner with MSU Mankato for analysis and reporting so we are able to reduce this portion of the budget and allowing us to switch the costs to the additional costs of moving of the surge basin in result 1.
Amendment approved:

Pre-Construction Sampling in summer and fall 2010 completed to provide base line for watershed before construction of water quality improvements. Samples during rain events and rain gage data collected during this time. Samples analyzed by independent lab

Amendment Approved: 5/9/14

Result Status as of July 15, 2011
Samples continue to be collected during construction.

Result Status as of January 15, 2012
Amendment Request: More cost effective flow rate monitoring equipment which is currently being used by MSU Mankato has been found to allow more monitoring sites (12) at a much lower cost. This allows us to get more flow rate data and do more water quality testing. The result will be more data with less cost. This helps to make up for some of the overruns during construction. Also a contract with MSU Mankato will be utilized to assist with monitoring and utilizing some of the MSU Mankato equipment. This all results in a lower cost for the same monitoring result.

Monitoring continued during portions of construction. Monitoring equipment will be ordered for the newly constructed structures and installed in March 2012.

Result Status as of July 15, 2013
Amendment Request: The seeding cost has been reduced due to a portion of land previously seeded by landowners into CRP and a low bid price per acre. The amendment is requested due to the large amount of rain and the damage to equipment that more time is needed for monitoring. MSU has added their biology department to assist in water quality sampling and I&S has spent more time monitoring structures due to the large amount of flow and rain. Structures have been reset to higher ground and some equipment repurchased.

Result Status as of January 15, 2014
Amendment request: The seeding cost has been reduced including maintenance. Monitoring continued and was completed for 2013. Analysis of data is currently being completed. This amendment is to continue monitoring through the 2014 growing season utilizing MSU Engineering and Biology Departments and I&S for final analysis in December 2014.
Amendment Approved: 5/9/14

Result Status as of July 15, 2014
Monitoring is continuing for completion in 2014. Analysis for previous two years of monitoring is currently being completed. MSU students are continuing to assist with monitoring and water quality sampling. A workshop outlining 2013 results was presented to 180+ people on June 26, 2014. The different surge ponds, two stage ditch and the weir are working as expected in reducing the surge during rain events. We are also seeing significate reductions in TSS, Phosphorus and Nitrogen. A more detailed report of the 2013 results are attached. A complete report will be completed after we finish with the 2014 monitoring.

Progress Summary as of January 15, 2015
The project is complete. The final data from monitoring was completed in December 2014 and the final report is currently being reviewed for completion. The results of the project are very promising with significant reductions in peak flow, TSS, phosphorus and nitrogen reported for the BMPs. There is much interest in continuing the monitoring. Additional grants are being perused and the equipment for this project is being proposed to be utilized to continue monitoring in 2015 and beyond.

Progress Summary as of July 1, 2015 – Final Report Summary
The final data from monitoring has been completed and a full water quality analysis has also been completed on the collected data. The analysis includes data collected from the 3 years of post BMP installation (2012-2014) and 3 years of pre BMP installation (2009-2011). A final report has been completed summarizing the entire CD 57 project while a water quality report is complete which specifically addresses methods used in the water quality analysis.

The water quality monitoring and analysis for the CD 57 system showed several water quality benefits. Average peak flow reductions for the rate control weir and Klein Pond were 6 and 28 percent respectively. The rate control weir, Klein Pond, and two-stage ditch showed reductions between 5 and 25 percent for total suspended solids (TSS), phosphorus, and nitrogen. The Klein Pond removed 725 cubic yards of sediment over the 3 years of monitoring. Baseflow concentrations of TSS and TP were reduced on average of 30 percent compared to the pre BMP installation data. Overall, the BMPs installed in the CD 57 system showed significant water quality improvements for the three years of post BMP installation monitoring.

Result 3: Provide documentation on how the drainage/treatment system could be incorporated into Drainage Law

Description: A drainage law expert will be hired to assist with incorporating the drainage/treatment system into drainage law. The findings will also be presented in a report to the state legislature. It is anticipated that this will be completed by June 30, 2014.

Summary Budget Information for Result 3:

ENRTF BUDGET:	$13,811
Amount Spent:	$12,811
Balance:	$1,000

Deliverable	Completion Date	Budget
Provide Report to Legislature on how treatment/storage options could be incorporated into new Drainage Law completed by Drainage Authority, Engineer and drainage law expert.	June 30, 2014	$13,811

Result Completion Date: June 30, 2014

Result Status as of January 15, 2011
We are still in the construction phase of this project and have yet not started working on this result.

Result Status as of July 15, 2011
A draft of the preliminary data collected so far is almost complete and is being reviewed.

Result Status as of January 15, 2012
Preliminary data collected will be reviewed as part of the final report.

Result Status as of July 15, 2013
The data is still being collected. Minor analysis has been performed.

Result Status as of January 15, 2014
Amendment Request: Data is being collected. A June 2014 workshop is being planned to discuss some results. Extension to December 2014 requested to include 2014 growing season data. Additional analysis due to more data in 2014.

Result Status as of July 15, 2014
Monitoring is continuing for completion in 2014. Analysis for previous two years of monitoring is currently being completed. MSU students are continuing to assist with monitoring and water quality sampling. A workshop outlining 2013 results was presented to 180+ people on June 26, 2014.

Result Status as of January 15, 2015

The final report is almost completed and will be reviewed by project partners. Since others have reviewed drainage law, this report concentrates on how the individual practices fit into current drainage law. Also potential changes are suggested that would make implementation of the practices used here easier for landowners and drainage authorities to implement.

Progress Summary as of July 1, 2015 – Final Report Summary
The final data from monitoring has been completed and a full water quality analysis has also been completed on the collected data. The analysis includes data collected from the 3 years of post BMP installation (2012-2014) and 3 years of pre BMP installation (2009-2011). A final report has been completed summarizing the entire CD 57 project while a water quality report is complete which specifically addresses methods used in the water quality analysis. The final report addresses how BMPs can be incorporated into Minnesota drainage law and what parties should be involved. As of 2014, drainage projects need to acknowledge drainage and water quality when working on county ditch systems. While many BMPs have been suggested for these projects, as done similarly in CD 57, implementation has not been 100 percent for the suggested practices.

Result 4: Provide Outreach, Education, Field Days, and Website Development

Description: A final technical memorandum will be prepared to summarize the results of the monitoring. Field site presentations will be conducted to identify pertinent project features to interested parties including Drainage Authorities, Watershed Groups, Landowners, and State Agencies. In addition, presentations to organizations such as the annual Water Resources Conference are anticipated in order to demonstrate model effectiveness in other systems. Results, design, and other final products will then be posted to county, agency and firm websites. A budget for each item as well as a timeline is presented in the table below.

Summary Budget Information for Result 4:

ENRTF BUDGET:	$18,000
Amount Spent:	$18,000
Balance:	$0

Deliverable	Completion Date	Budget
Completion of Final Technical Memorandum by I&S and Blue Earth County Drainage Authority.	June 30, 2014	$7,000
Provide four field days at site during and after construction inviting county drainage authorities and landowners, items included are copies, onsite signage, facility rentals, and personnel time by I&S.	June 30, 2014	$4,000
Provide multiple presentations to County Drainage Authorities, Watershed Organizations, and other organizations to demonstrate how model can be duplicated on other drainage systems. Items included are copies, facility rentals and personnel time by I&S.	June 30, 2014	$5,000
Post Results, Design Model, and provide Technical Memorandum on Partner Websites including updates during monitoring timeframe.	June 30, 2014	$2,000

Result Completion Date: June 30, 2014

Result Status as of January 15, 2011
We are still in the construction phase of this project and have yet not started working on this result.

Result Status as of July 15, 2011
We are still in the construction phase of this project and have yet not started working on this result.

Result Status as of January 15, 2012
Amendment Request: I&S and MN Department of Agriculture will be sponsoring the first of 5 field days in June of 2012 with no assistance of the LCCMR funds. This will reduce the cost of future field days as the invite list and some of the marketing materials can be reused. Also since the field day will be on-site no facility rental will be needed.

Result Status as of July 15, 2013
A drainage workshop was completed in June of 2012 to display progress on the system. No LCCMR funds were used for this workshop.

Result Status as of January 15, 2014
Data is being collected. A June 2014 workshop is being planned to discuss some results. Extension to December 2014 requested to include 2014 growing season data.

Result Status as of July 15, 2014
A workshop outlining 2013 results was presented to 180+ people on June 26, 2014. This project is continuing to be used as an example for other projects. There have several groups meeting at the site to discuss alternatives to traditional drainage, including soybean and corn growers and watershed groups such as the Le Sueur watershed.

Result Status as of January 15, 2015
This project is continuing to be used as an example for other projects. The final results are proposed to be presented to multiple drainage authorities, workshops and conferences. There have been hundreds of people that have toured the BMP's and marketing of the project has been done in 2 workshops, at the Minnesota Water Resources Conference, and in trade magazines. There have several groups meeting at the site to discuss alternatives to traditional drainage, including soybean and corn growers and watershed groups such as the Le Sueur River Watershed. Continued monitoring and presentations are proposed including a presentation at the Iowa Water Conference in 2015

Progress Summary as of July 1, 2015– Final Report Summary
This project has continued its reputation for being a model for current and future drainage projects in Minnesota. Along with the three previous drainage workshops held relating to this project, a fourth workshop is scheduled for the fall of 2015. This workshop will be similar to the previous three and will discuss how BMPs can and should be incorporated into drainage systems.

Along with the 4 workshops, several other educational outreaches have been done for CD 57 including a publication in DIRT Magazine and several presentations to audiences such as other drainage authorities, watershed groups, water resources conferences, and local SWCD groups.

Overall Project Outcomes and Results
Agencies and landowners needed proof that conditions for agricultural production could be enhanced and water quality could be improved by implementing a combination of Best Management Practices on Blue Earth County Ditch No. 57 (CD 57) in the Mapleton area of south central Minnesota.

This project provided evidence that these goals can be accomplished using landowner contributions and the help of grant funding to support Minnesota Drainage Statute 103E. Water storage and drainage capacity were improved resulting in reduced flooding to improve field conditions for crop yields. Water quality was also improved by reducing sediment and nutrient loading throughout the system.

The CD 57 system is part of a river system that includes the Big Cobb River, Le Sueur River, Blue Earth River, Minnesota River, and eventually drains into Lake Pepin and then the Gulf of Mexico. The CD 57 Watershed encompasses 6,000 acres including the entire City of Mapleton. The Minnesota River and its tributaries are impaired water for turbidity, aquatic life, fecal coliform, aquatic recreation, and aquatic consumption. This project provided a reduction of total suspended solids, nitrogen and phosphorus runoff from this area. It improved water quality by providing water storage and treatment of urban and agricultural runoff while enhancing conditions for improved crop yields and reducing flooding in portions of the watershed.

A *Final Report* and a *Water Quality Report* include the project process, methods and results. It serves as a model that can, and should be incorporated into new Drainage Law and utilized on deteriorating drainage systems as they need to be updated. Other watersheds can now utilize similar treatment options on agricultural and urban systems. This project showcases how water quality improvements can and should be implemented along with improvement and repair projects for agricultural drainage systems using grant funding along with landowner contributions.

V. TOTAL ENRTF PROJECT BUDGET

Personnel: All personnel time by Blue Earth County is in Kind to the project – see Attachment B

Contracts: $477,200 Total:

$187,519 to I&S Group Inc. acting as Engineer for Blue Earth County Drainage Authority to assist Blue Earth County in the project management and completion of the hydrologic and hydraulic design for the water quality improvements, the construction plans and specifications, onsite project administration, environmental consultation and technical memorandums. I&S will also perform monitoring, including downloading of data and collection of grab and composite samples and analysis. As results are documented I&S will coordinate presentations and website development to promote the water quality improvements and how they can be incorporated into future projects.

$5,000 for a to be determined drainage law expert to assist in completing report to Legislature on how treatment/storage options could be incorporated into new Drainage Law.

$231,189 to a Grading Contractor to be determined by publically bidding the project. The selected contractor will complete the grading of the surge basins, the grading of in-channel treatment, installation of the rate reduction weir, and all control structures associated with the water quality improvements.

$9,505 to a Seeding Contractor to be determined by publically bidding the project. The selected contractor will complete the seeding of the native grass buffers along 4.1 miles of open ditch. The contractor will also perform routine maintenance of the plantings for 3 years to ensure establishment. This will include 20 acres of seeding with the seed, weed control, re-seeding, and maintenance estimated at $3,000 per acre.

$ (11,500) to a Monitoring Equipment Supplier to purchase ~~and install 9~~ 12 monitoring stations with equipment appropriate to each location. This equipment will include water samplers, flow monitoring and data loggers.

$19,981 to a Testing Lab to test the Grab and Composite Samples throughout the monitoring period. Testing of Samples with an estimated~~125~~ 294 samples taken over monitoring period.

Equipment/Tools/Supplies: $1,000 for project website development and postings to Blue Earth County, Minnesota Department of Agriculture, and other agency websites.

Acquisition (Fee Title or Permanent Easements): $ 0
Using LCCMR funds for the acquisition of easements is no longer necessary due to the switch the 2nd treatment basin to property owned by the City of Mapleton. We will be using the funds from the landowners to purchase the easement for the 1st basin.

Additional Budget Items:
$2,500 for 10 Facility Rentals at $300 each for presentations and field days. Based on current Blue Earth County Library Rates.

$3,000 for completion of mailings, notices, handouts for Field Days and for Presentations. This is estimated at $250 per field day or presentation.

$500 completion of onsite project signs for field days and public viewing

VI. PROJECT STRATEGY

A. Project Partners

Partner	Duties/Function	Appropriation Funding Amount
Blue Earth County Drainage Authority	• Project Management • Project Administration • Review and Approval of Project • Distribute ENRTF Funding for Drainage Improvements	$297,481[1]
Minnesota Department of Agriculture	• Co-Sponsor • Assist with Design, Monitoring, Technical Memorandum, and Presentations	$0 (All Time is in-kind)
Minnesota Department of Natural Resources (DNR)	• Provide Review of the Proposed System	$0 (all time is in-kind and required by Drainage Law)
Land Owners in Blue Earth County Ditch No. 57	• Funding source for majority of project costs • Recipients of project improvements	$0
I&S Group, Inc.[1]	• Provide Design • Assist with Project Administration, Monitoring, and Technical Memorandum • Presentations of Results	$187,519[1]
Blue Earth Soil and Water Conservation District	• Provide Review and Funding for 7 acre surge basin	$0
Greater Blue Earth River Basin Alliance (GBERBA)	• Provide Review and Funding for 7 acre surge basin	$0
Natural Resources Conservation Service (NRCS)	• Funding source for Wetland Restoration Project	$0

[1]I&S Group will be acting as engineer for the Blue Earth County Drainage Authority. Blue Earth County Drainage Authority will distribute $182,519 of funds to I&S Group for Design, Monitoring, Reports and Presentations. I&S will also complete project signs and printing, mailings and handouts for field days and presentations.

B. Project Impact and Long Term Strategy

The Blue Earth County Ditch No. 57 (BECD57) system drains into the Big Cobb River, which drains into the Le Sueur River, which drains into the Blue Earth River just before the Blue Earth River converges with the Minnesota River, which eventually drains into Lake Pepin and then the Gulf of Mexico. The BECD57 Watershed also encompasses 6,000 acres including the entire City of Mapleton (population 1,662). The Minnesota River and its tributaries are impaired water for turbidity, aquatic life, fecal coliform, aquatic recreation, aquatic consumption, etc. The project seeks to impact the area by improving water quality in the Minnesota River Basin by providing storage and treatment of both agricultural and urban runoff in the Big Cobb River Watershed while increasing yield and reducing flooding in portions of the watershed. The project will also develop a model that could be incorporated into new Drainage Law and utilized on deteriorating drainage systems as they need to be updated. A reduction of total suspended solids, nitrogen and phosphorus runoff from this area is expected. If results are positive this model utilizing a multiple treatment options could be utilized on other agricultural systems and could be incorporated into new ditch legislature.

In addition, after project completion, the monitoring of the system could continue indefinitely. This could be funded by others or taken up by another public entity or university program to determine the longer term effects of the system. If successful, this system could also be duplicated in other portions of the Minnesota River Basin and additional projects could be added in this watershed could be added.

C. Other Funds Proposed to be Spent during the Project Period

Land Owners will pay $30,000 to acquire permanent easement on 5 acres of land for one surge basin and temporary construction easements for excess material and land disturbance during construction. Land Owners will construct $726,105 of drainage improvements replacing 100 year old portions of the drainage system. These improvements include construction of 1610 feet of new open ditch, construction of1640 feet of 54-inch tile, construction of field crossings sized to control peak flow, 3.1 acres of permanent easement acquisition for open ditch construction, 16 acres of temporary easement acquisition for land disturbance and spoil placement, seeding of the open ditch, directional boring of tile under in place county roads, construction of 2290 feet of 24-inch tile, construction of 1250 feet of 18-inch tile, tile connections to the new tiles, drop intakes, design of the system, hiring viewers to view the ditch per statue, legal fees, and administration costs. Owners will acquire 17 acres of land for 16.5 foot wide buffer strips estimated at $85,000. Cobb River Watershed will contribute $26,700 (Pending) for additional excavation costs for the construction of one of the surge basins. NRCS will purchase easement and construct 40-acre wetland for $300,000 (Pending). I&S Group has donated approximately $15,000 for preliminary design, grant research, grant writing and other project work to obtain funds through the LCCMR and other sources.

Total estimated other funding is $1,182,805.

D. Spending History

Land Owners have spent approximately $800,000 on the preparation of surveys, preliminary designs, preliminary engineering reports, grants, ditch viewing, land owner meetings, and construction. Most of the construction is completed.

VII. DISSEMINATION

Blue Earth County, I&S Group and speakers from other agencies, potentially including Minnesota Department of Agriculture, Minnesota Department of Natural Resources, and others, will conduct as many as five field visits to the site to identify project features to interested parties. In addition, Blue Earth County and I&S Group will provide multiple presentations how the model can be replicated on other drainage systems. The results and design model will then be posted on partner and firm websites along with a technical memorandum. Websites include Blue Earth County (www.co.blue-earth.mn.us), Minnesota Department of Agriculture (www.mda.state.mn.us), and I&S Group (www.is-grp.com).

Final Report Summary

The information from this project has been shared and disseminated in a variety of ways including:

1. Event and Tour: Agricultural Drainage & the Future of Water Quality Workshop 2012
2. Event and Tour: Agricultural Drainage & the Future of Water Quality Workshop 2014 (165 in attendance)
3. Event: Agricultural Drainage & the Future of Water Quality Workshop 2015 (175 in attendance)
4. Multiple Site Visits: Blue Earth County, Minnesota Department of Agriculture, ISG and interested parties
5. Website: http://www.is-grp.com/ag
6. Presentations: By Chuck Brandel and/or Craig Austinson
    a. Minnesota State University Mankato, Department of Civil Engineering (2010)
    b. American Society of Civil Engineers (2011)
    c. Faribault County Drainage Authority (2013)

d. Minnesota Water Resources Conference (2015)
e. Iowa Water Conference (2014)
f. Blue Earth County Soil and Water Conservation District (2014)
g. Sibley County Drainage Authority (2015)

7. Article: Conservation Drainage article, DIRT Magazine (Gislason and Hunter Law Firm publication)
8. CD 57 Fun Facts Brochure: Distributed at various events and activities
9. Final Report: Summarizes the entire CD 57 project
10. Water Quality Report: Quantitative data and methods used in the water quality analysis and all results

VIII. REPORTING REQUIREMENTS

January 2015

Periodic work program progress reports will be submitted in January and July of each year between 2010 and 2014. A final Work Program report and associated products will be submitted by July 15, 2015 as requested by the LCCMR.

Final Attachment A: Budget Detail for 2010 Projects - **Summary and a Budget page**
Submital Date: December 27, 2010
Project Title: Mapleton Area Agricultural/Urban Runoff Water Quality Treatment Analysis

Project Manager Name: Craig Austinson, Blue Earth County

Trust Fund Appropriation: $ **485,000**

2010 Trust Fund Budget	Result 1 - Provide storage and treatment for agricultural and urban runoff to improve water quality	Result 1 Budget:	Revised Result 1 Budget (1/15/15)	Amount Spent (6/30/15)	Balance (6/30/15)	Result 2 - Monitor and Analyze how the proposed strategies improve water quality and reduce peak flows	Result 2 Budget:	Revised Result 2 Budget (1/15/14)	Amount Spent (6/30/15)	Balance (6/30/15)	Result 3 - Provide documentation on how the drainage/treatment system could be incorporated into Drainage Law	Result 3 Budget:	Revised Result 3 Budget (1/15/14):	Amount Spent (6/30/15)	Balance (6/30/15)	Result 4 - Provide Outreach, Education, Field Days, and Website Development	Result 4 Budget:	Revised Result 4 Budget (2/8/12)	Amount Spent (6/30/15)	Balance (6/30/15)	TOTAL BUDGET	TOTAL BALANCE
BUDGET ITEM	Design and Construction of Two Surge Basins, In-Channel Treatment, Control Structure on Outlet, and Seeding of Grass Strip with Native Buffers					Construct and Install Control Structures, and Monitoring Structures, Monitor Flow for 3 years, Complete Monitoring Report and Technical Memorandum					Completion of Report on Drainage Law					Provide five field days at site, Provide multiple presentations how model can be duplicated on other drainage systems, Post Results, Design Model, and provide Technical Memorandum on Partner Websites including updates during monitoring timeframe						
PERSONNEL: wages and benefits (ALL PERSONNEL TIME IS IN-KIND)																						
Contracts																						
Professional/technical	I&S Group, Inc - Project Management, Design, Specifications, Hydrology/Hydraulics, and Environmental Consultation	~~30,000~~	54,099	54,099	0	I&S Group, Inc - Project Management, Technical Writing, Hydrology/Hydraulics, Monitoring, Grab Samples, and Analysis	~~75,000~~	100,495	100,495	0	I&S Group, Inc - Project Management, Technical Writing, Hydrology/Hydraulics Analysis	~~4,000~~	7,811	7,811	0	I&S Group, Inc - Project Management, Technical Input, Coordination of Presentations and Completion of Technical Memorandum	~~15,000~~	11,000	11,000	0	173,405	0
	I&S Group, Inc - Project Management, Onsite Project Administration **		18,463	18,463	0																18,463	0
	I&S Group, Inc - Project Construction Staking		8,000	8,000	0						Hire a Drainage Law Expert to Review and Provide Documentation for report and to present report to Legilature**	5,000	5,000	4,000	1,000		0	0	0	0	13,000	1,000
Other contracts	Grading Contractor to build In-Channel Treatment Basins and Surge Basins	~~164,000~~	180,439	180,439	0	Grading Contractor to Furnish and Install Control Structures	~~50,000~~	50,750	50,750	0											231,189	0
	Seeding Contractor for Seeding and Maintainence of Vegative Strips along 4.1 Miles of Open Ditch with Native Buffers	~~60,000~~	9,462.00	7,504.15	1,957.85	Supplier for Monitoring Equipment to Furnish and Install Samplers and Data Loggers	~~36,000~~	11,500	11,500	0											20,962	1,957.85
		0		0		Testing Lab to Test Grab Samples estimated at $80 per sample with 125 samples taken over monitoring period	~~10,000~~	19,981	19,981	0				0					0		19,981	0
Non-capital Equipment / Tools																Website Development and Postings to Blue Earth County, Minnesota Department of Agriculture and other agency websites	1,000	1,000	1,000	0	1,000	0
Land acquisition																					0	0
Easement acquisition*	**~~0.64(4)~~ Acres for In-Channel Treatment**	~~20,000~~	0	0	0																0	0
	1 Acres for Surge Pond	~~5,000~~	0	0	0																0	0
Professional Services for Acq.*	**Realator/Apraiser to be Determined**	~~2,000~~	0	0	0																0	0
Facility Rental for Field Days and Presentations																10 Facility Rentals at $300 each (Based on Blue Earth County Library Rates) for Field Days and Presentations	3,000	3,000	3,000	0	3,000	0
Copying/Printing/Mailings											Mailings and Report Presentation Handouts	1,000	1,000	1,000	0	Mailings, Notices, Handouts for Field Days and for Presentations Estimated at $250 per field day or presentation	2,500	2,500	2,500	0	3,500	0
Onsite Signage																Provide Onsite Project Signage for Field Days	500	500	500	0	500	0
Travel expenses in Minnesota	**Blue Earth County Travel all In Kind**	0		0	0																	
COLUMN TOTAL		**~~$281,000~~**	**$270,463.00**	**$268,505.15**	**$1,957.85**		**~~$171,000~~**	**$182,726**	**$182,726**	**$0**		**~~$10,000~~**	**$13,811**	**$12,811**	**$1,000**		**~~$23,000~~**	**$18,000**	**$18,000**	**$0**	**$485,000.00**	**$2,957.85**

* All Easement Acquisition Paid for by Landowners with $30,000 contribution to Water Quality. City of Mapleton donated easement for use of surge pond wihich accounted for more storage. Professional Fees and Consturction Fees then moved from Landowner $30,000 contribution to LCCMR.