ADAPTIVE MANAGEMENT PLAN

Dane-Iowa Wastewater Commission
Wastewater Treatment Plant

April 2017

TOWN & COUNTRY ENGINEERING, INC.
Madison ♦ Rhinelander ♦ Kenosha
2912 Marketplace Drive, Suite 103 • Madison, WI 53719 • (608) 273-3350 • tce@tcengineers.net

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1. INTRODUCTION AND BACKGROUND

1.1 Introduction

In 2010, the State of Wisconsin modified Wisconsin Administrative Code NR 102 and NR 217 to include new water quality based effluent limits for phosphorus. As a result, wastewater treatment facilities (WWTFs) have begun to receive water quality based phosphorus limits in their new or re-issued Wisconsin Pollutant Discharge Elimination System (WPDES) permits. As a part of the new rule, WWTF permits have a compliance schedule to evaluate compliance with these new effluent limits. The Dane-Iowa WWTF received a re-issued permit in August of 2012. The re-issued permit includes an interim phosphorus limit of 1.5 mg/L, a compliance schedule of nine (9) years with annual requirements, and a proposed future water quality based effluent limit (WQBEL) of 0.075 mg/L total phosphorus.

The Dane-Iowa Wastewater Commission, which oversees operation of the Dane-Iowa WWTF, is in the fourth year of their phosphorus compliance schedule, and has selected adaptive management as their compliance option. The purpose of this plan is to summarize how the Commission arrived at adaptive management, and to lay out how they plan to achieve a successful adaptive management program.

1.2 Existing Facilities

The Dane-Iowa WWTF is located west of the village of Mazomanie, WI along State Highway (STH) 14 and treats wastewater from the villages of Black Earth, Mazomanie, and Arena and from the Wisconsin Heights School District. The Village of Cross Plains also hauls their sludge to the Dane-Iowa WWTF for treatment. Treated effluent from the facility is discharged to Black Earth Creek in Dane County.

The WWTF, constructed in 1998, includes preliminary treatment (influent screening, flow metering, and sampling), an activated sludge oxidation ditch with enhanced biological phosphorus removal, final clarification, UV disinfection, re-oxygenation, and effluent flow metering and sampling. Waste activated sludge (WAS) is combined with hauled sludge from Cross Plains in sludge holding tanks, fed to a belt filter press for dewatering, and treated through lime stabilization to produce Class A exceptional quality biosolids. Filtrate from the belt filter press is equalized prior to pumping to the head of the WWTF.

Wastewater flowing to the WWTF comes from a combination of residential and commercial sources. The Department of Administration (DOA) census data and population projections for each of the entities served by the WWTF are summarized in Table 1-1. The WWTF has one significant industrial discharger, Cardinal Glass.

Table 1-1
Population Summary

Discharger	*2010 Population*	*DOA 2035 Population Projection*
Black Earth	1,338	1,400
Mazomanie	1,652	1,850
Arena	834	1,040
Cross Plains (sludge only)	3,538	4,230

Current flow, loadings, and sludge production based on data from the past 3 years are summarized in Table 1-2, along with the design values for the facility.

Table 1-2
Dane-Iowa WWTF Loading Conditions

Parameter	Range	2012-2015 Average	Design
Monthly Average Flow (MGD)	0.31 - 0.38	0.35	0.6925
Peak Hourly Flow (MGD)	n/a	n/a	2.196
BOD (lbs/day)	516 - 812	675	1,369
TSS (lbs/day)	642 - 830	741	1,501
TKN (lbs/day)			230
Total Phosphorus (lbs/day)	15.8 – 21.9	18.7	37
Sludge (lbs/month)			100,530

1.3 Phosphorus Compliance Evaluation

Per the requirements of the 2012 WPDES permit phosphorus compliance schedule, the Dane-Iowa Wastewater Commission conducted a phosphorus compliance evaluation for the treatment facility, which consisted of a series of annual reports.

The year one report consisted of generating an optimization plan for the facility. This optimization plan identified the following three “Action Plans” to improve (reduce) phosphorus discharges from the WWTF:

1. Address phosphorus loading from the belt filter press (BFP)
2. Address phosphorus loading from sludge storage decant
3. Address phosphorus loading from hauled in septic and holding tank waste

Starting in August of 2013, the WWTF staff began sampling phosphorus in the BFP filtrate, sludge storage decant, and waste receiving station to better understand these internal loadings.

The year two report consisted of a phosphorus planning update, which summarized the progress on the plant optimization, as well as identified the possible compliance options for the facility. The compliance alternatives included:

1. Mechanical upgrade to the existing facility
2. Consolidation with nearby sewerage system
3. Alternative discharge locations

4. Watershed based approaches
    a. Water Quality Trading
    b. Watershed Adaptive Management
5. Water quality variance
6. New statewide phosphorus variance

The year three report consisted of a phosphorus compliance alternatives plan. In this plan, the alternatives from the year two report were evaluated based on economic and non-economic factors. Economic evaluations considered capital and operational costs through a present worth analysis. Non-economic evaluation considered the feasibility, long term benefit to the Commission, and environmental benefits of each alternative.

The lowest cost, feasible alternative was found to be a combination of Watershed Adaptive Management and Water Quality Trading. The Dane-Iowa Wastewater Commission decided to pursue Watershed Adaptive Management to meet the conditions set forth in their permit.

According the WDNR's Adaptive Management factsheet, adaptive management is a compliance option that takes a watershed-based approach to control phosphorus. It is a process that allows point and nonpoint sources to work together to improve the water quality by managing phosphorus throughout the watershed. Adaptive management is based on partnerships between point sources and other landowners, municipalities, private and public entities. This process is often flexible for the WPDES permittee, as many different approaches can be undertaken to achieve the desired result of meeting the applicable water quality criteria in the receiving water.

The purpose of this Adaptive Management Plan is to outline how Dane-Iowa will work to achieve the water quality standard of 0.075 mg/L of phosphorus in Black Earth Creek, which is the receiving water for the facility.

1.4 Adaptive Management Eligibility

In order to be eligible for adaptive management, the Wis. Admin Code NR 217.18 states the facility in question must meet the following criteria:

1. The phosphorus concentration in the receiving water exceeds the applicable water quality criteria.
2. The amount of phosphorus coming from nonpoint sources (NPS) in the watershed exceeds the phosphorus loading from point sources or NPS must be controlled to comply with the water quality criteria.
3. Filtration or equivalent technology is required to meet the WQBEL.

The Dane-Iowa Wastewater Commission meets these eligibility criteria for to adaptive management as follows:

1. The median phosphorus concentration upstream of the effluent discharge is 0.085 mg/L, as calculated from sampling in 2013-2016. This exceeds the applicable water quality criterion of 0.075 mg/L for streams. A complete list of in-stream sampling data is attached in Appendix A.

2. Per the DNR's Pollutant Load Ratio Estimation Tool (PRESTO) model, the Dane-Iowa WWTF discharges to a nonpoint source dominated receiving stream. The point to nonpoint source phosphorus ratio is 2:98.
3. In 2013, the Dane-Iowa WWTF staff developed and implemented an Optimization Action Plan that identified operational changes at the facility to better handle peak phosphorus loading events, and thus additional optimization will not likely yield a significant reduction in effluent phosphorus level. The WWTF effluent phosphorus concentration averaged for the past three years was 0.51 mg/L. Consequently, filtration would be required to achieve an effluent concentration of 0.075 mg/L of phosphorus.

Since all three criteria were met, it was determined that Dane-Iowa was eligible for adaptive management.

1.5 Adaptive Management Plan Components

The DNR has created a guideline for a successful Adaptive Management Program, and are outlined and addressed in the subsequent chapters. The components to develop a successful management plan include:

1. Identify Partners
2. Describe the watershed and set load reduction goals
3. Conduct a watershed inventory
4. Identify where reductions will occur
5. Describe management measures
6. Estimate load reductions expected by permit term
7. Measuring success
8. Financial security
9. Implementation schedule with milestones

A schedule of where these components will be addressed is included in Table 1-4.

Table 1-4
DNR Adaptive Management Components

Component	Addressed in
Identify Partners	Section 4.1
Describe the watershed and set load reduction goals	Sections 2 & 3
Conduct a watershed inventory	Section 3
Identify where reductions will occur	Section 4.2
Describe management measures	Section 4.3
Estimate load reductions expected by permit term	Section 3.4
Measuring success	Section 5.8 & 5.9
Financial security	Section 6
Implementation schedule with milestones	Section 5.10

2. WATERSHED DESCRIPTION

The Dane-Iowa WWTF is located in the Black Earth Creek (BEC) watershed. This section presents general information about the BEC watershed characteristics, which are important when evaluating phosphorus loading conditions and modeling future phosphorus reduction strategies. Data were collected from on-line tools and geographic information systems (GIS), such as the DNR Surface Water Data View, and the National Resources Conservation Service (NRCS) Web Soil Survey. The data included watershed boundaries, soil data, land use, land cover, and temperature and precipitation statistics.

2.1 HUC and Watershed Information

The BEC watershed upstream of the Dane-Iowa WWTF lies within HUC 10 #0707000505, and consists of approximately 97% of the HUC 10 watershed. The BEC watershed area upstream of the outfall is roughly 65,000 acres, or approximately 100 square miles. Figure 2-1 shows both the BEC and HUC 10 watersheds, for clarification. A map of the HUC 10 watershed, with permitted surface water outfalls shown as triangles, is provided below in Figure 2-2, and included in Appendix B.

Figure 2-1: HUC 10 and BEC Watersheds

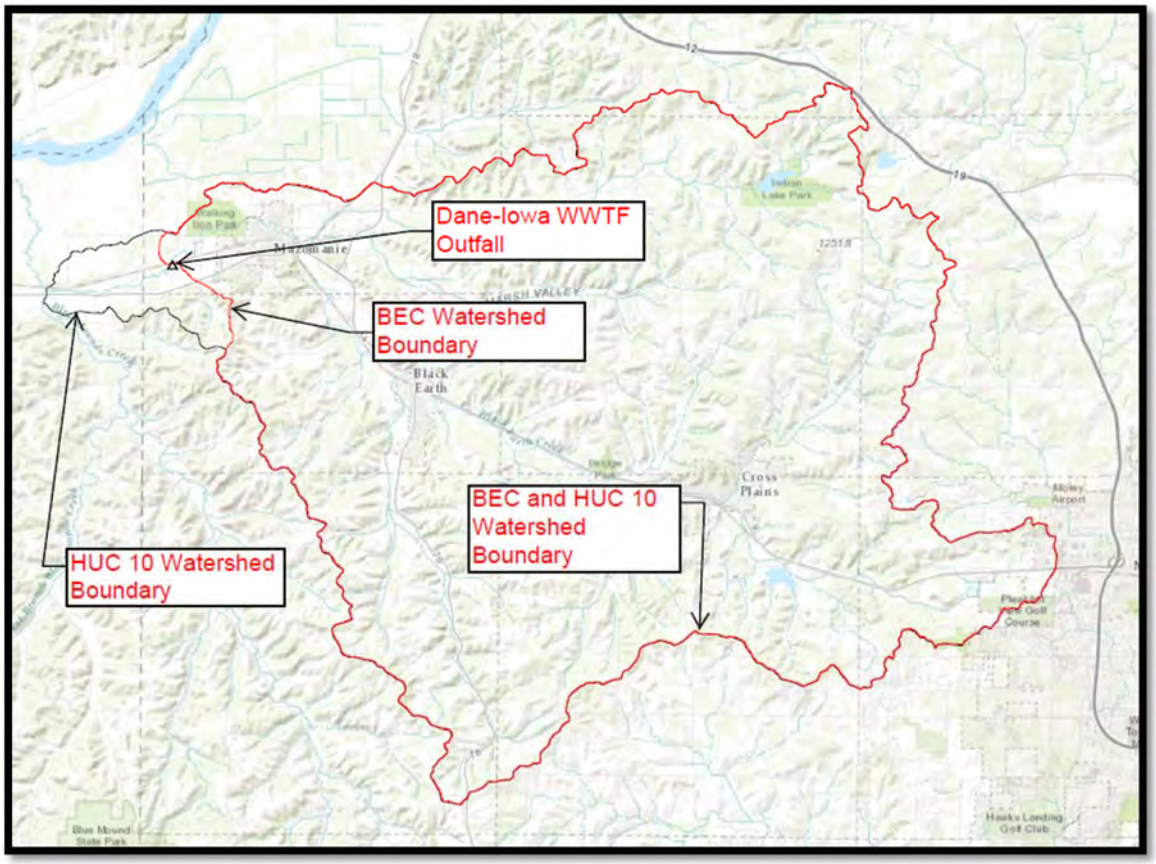
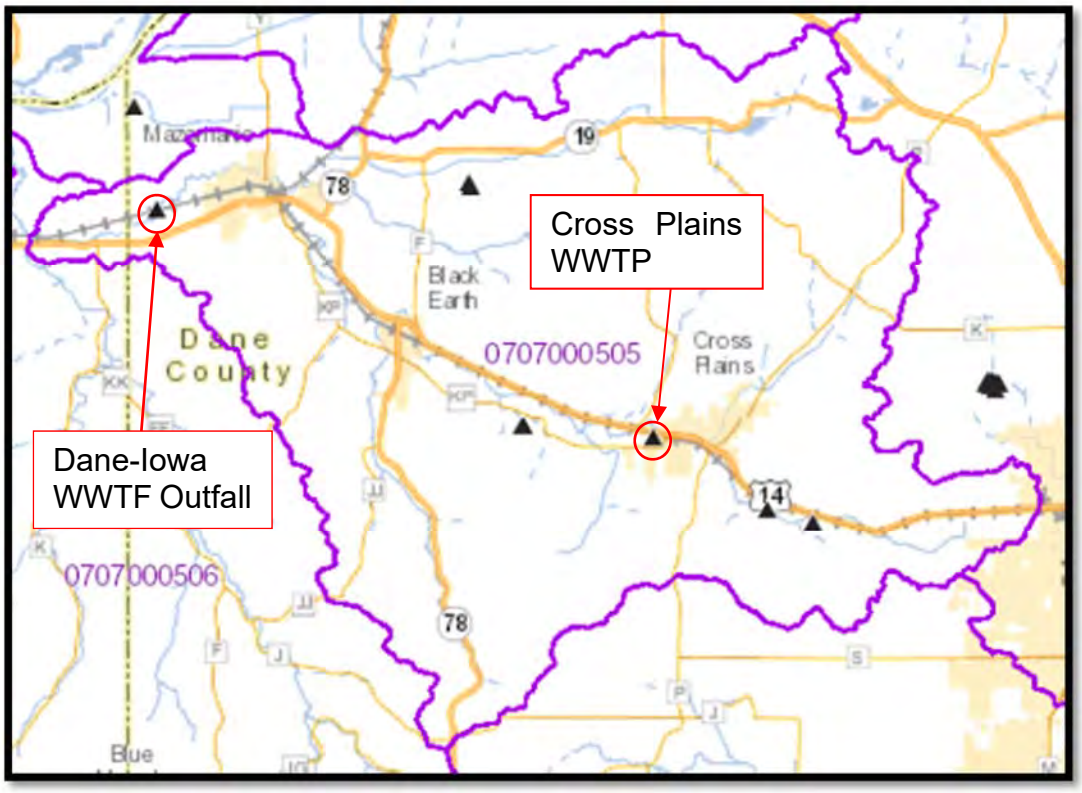


Figure 2-2: HUC 10 Watershed



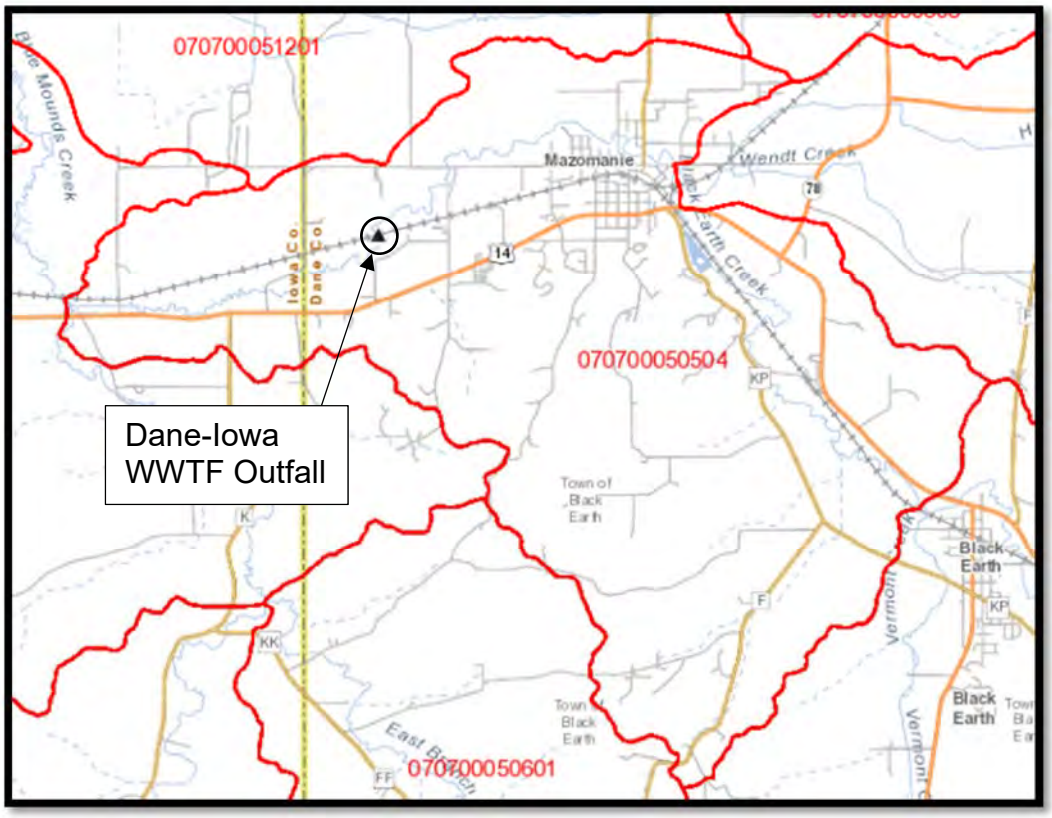
This figure was provided by the DNR's Surface Water Data Viewer Application.

In addition to the Dane-Iowa WWTF, there are 6 other surface water outfalls within the HUC 10; one for the Village of Cross Plains WWTF, one industrial outfall belonging to Capitol Sand & Gravel Co, Inc., and the remaining four are Concentrated Animal Feeding Operations (CAFOs) located in rural areas of the watershed. Each of these CAFOs is permitted under NR 243 and are defined as follows: "A Wisconsin animal feeding operation with 1,000 animal units or more is a large Concentrated Animal Feeding Operation (CAFO). The DNR may designate a smaller-scale animal feeding operation (fewer than 1,000 animal units) as a CAFO if it has pollutant discharges to navigable waters or contaminates a well."

Per the DNR's PRESTO model, the Dane-Iowa WWTF discharges to a nonpoint source dominated receiving stream. The point to nonpoint source phosphorus ratio is 2:98.

According to the DNR's adaptive management guidance document, the adaptive management action area should be limited to the HUC 12 subwatershed where the point source is located. However, if the HUC 12 does not have a sufficient area to target for the required load reduction, areas upstream in the HUC 10 can be targeted. This HUC 12 for the Dane-Iowa WWTF is #070700050504 and is approximately 9,300 acres in size. A map of the HUC 12 subwatershed is shown below in Figure 2-3, and included in Appendix B.

Figure 2-3: HUC 12 Subwatershed



This figure was provided by the DNR's Surface Water Data Viewer Application.

2.2 Receiving Water Description

As mentioned previously, the Dane-Iowa WWTF discharges to Black Earth Creek. Black Earth Creek is classified as a warm water sport fishery at the point of discharge, although a large portion of the upstream waters are considered cold water Class 1 trout fisheries and either exceptional or outstanding resource waterways. A complete map of the stream designations in the BEC watershed is included in Appendix C. Per NR 102.60 Section (3) Paragraph (a), Black Earth Creek is not listed as having a total phosphorus criterion of 0.1 mg/L, so it shall meet a total phosphorus criterion of 0.075 mg/L.

2.3 Climate and Precipitation

Climatological information can play an important role when modeling phosphorus loads in runoff and calculating phosphorus reductions. Climate and precipitation data for the BEC watershed from 2002 to 2015 was obtained from the National Oceanic and Atmospheric Administration (NOAA). Although the BEC watershed consists of approximately 100 square miles and encompasses Mazomanie, Black Earth, and Cross Plains, data from Mazomanie was selected to represent the watershed as it is within the same HUC 12 and adaptive management action area. Average monthly temperatures range from a high of 72.6°F in July to a low of 20°F in January. Average monthly precipitation (both rainfall and snowfall) ranged from a high of 5.24 inches in June to a low of 0.96 inches in January. The average

annual precipitation over the 13 years reported was 34.41 inches. Table 4 represents average monthly data for the reporting period.

Table 2-1
NOAA Climate Data

Month	Average Monthly Temperature			Average Monthly Precipitation		
	Min (°F)	Max (°F)	Average (°F)	Min (inches)	Max (inches)	Average (inches)
Jan	9.4	31.3	20.0	0.23	2.22	0.96
Feb	13.7	29.1	22.5	0.28	2.58	1.33
Mar	26.7	49.3	34.3	0.52	4.60	1.93
Apr	42.6	52.9	46.6	1.44	7.05	4.04
May	49.0	64.7	57.9	1.36	11.53*	4.30
June	57.9	69.3	66.6	1.60	9.80*	5.24
July	65.8	77.2	72.6	1.27	6.71	3.46
Aug	63.1	75.7	70.6	1.36	14.92*	3.76
Sept	58.8	66.1	62.0	0.90	5.57	2.64
Oct	43.3	58.2	49.7	0.95	5.11	2.49
Nov	32.3	42.6	38.3	0.22	8.10	2.51
Dec	17.3	35.0	24.3	0.42	3.28	1.75

(*) The three largest monthly precipitation amounts occurred in August of 2007, May of 2004, and June of 2010.

It is important to recognize the impact of extreme weather events on erosion and subsequent transport of sediment, including phosphorus, into surface water. Extreme precipitation can result in excessive loads of phosphorus entering surface water, carried by runoff.

2.4 Soil Types

Data on soil types was available through the NRCS's Web Soil Survey (WSS) and Soil Survey Geographic Database (SSURGO). The predominant soil types in the BEC watershed were silt loam and sandy loam. Soil data was used in conjunction with additional data, such as land cover, in several modeling applications. Soil data will assist with calculating the Phosphorus Index (PI) of the land, selecting locations for phosphorus reducing projects, and modeling future phosphorus reductions. A complete map and table of soil types for the watershed, and the immediate area around the treatment plant is attached in Appendix D.

2.5 Land Use

Land use data was obtained through Purdue University's long Term Hydrologic Impact Analysis (L-THIA) model. As with soil type, land use was used in the modeling of phosphorus loads and reduction, as well as to help determine where management measures should take place.

The BEC watershed consists of approximately 23,000 acres of forested land, 20,000 acres of agricultural land, and 17,000 acres of grass and pasture land. These major land use types make up 35%, 30%, and 26% of the watershed, respectively. A complete breakdown of land use for the BEC watershed is included in Appendix E.

The HUC 12 is composed of 3,500 acres of agricultural land and 2,800 acres of forested land; which make up 38% and 30% of the total area, respectively. The remaining land use is comprised of a combination of pasture, forrests, open space, and residential and industiral uses. A complete list of L-THIA's land use for the HUC 12 action area is included in Appendix E.

2.6 Wetlands

Due to its proximity to the Wisconsin River, the BEC watershed contains either documented wetlands or wetland indicators. A complete map of the wetland and potential wetlands within the watershed identified on the WDNR Surface Water Data Viewer is attached in Appendix F. It is important to remember that wetlands can be both a source of phosphorus or can aid in phosphorus reduction. For these reasons, wetland areas should be evaluated closely before starting any wetland restoration projects.

3. WATERSHED INVENTORY

This watershed inventory for the BEC watershed expands on the watershed characteristics from the previous section to provide insight into where phosphorus management measures could be implemented.

3.1 Point Sources of Phosphorus

The EPA defines point sources as "any single identifiable source of pollution from which pollutants are discharged, such as a pipe, ditch, ship or factory smokestack." With respect to water pollution, common point sources are municipal WWTFs and industries/factories. Both of these point source types are present in the BEC watershed.

3.1.1 Municipal WWTFs

Both the Dane-Iowa WWTF and the Cross Plains WWTF discharge to Black Earth Creek, with the Cross Plains outfall located in the adjacent HUC 12 upstream of the Dane-Iowa outfall. Current effluent phosphorus data for the Dane-Iowa WWTF and Cross Plains WWTF are summarized in Table 3-1. Values for the daily loads were calculated by using annual averages. A complete summary of effluent phosphorus data for Dane-Iowa and Cross Plains can be found in Appendix G.

Table 3-1
Effluent Phosphorus Summary

Year	Dane-Iowa WWTF				Cross Plains WWTF			
	Flow	Phos. Conc.	Phos. Loading	Phos. Loading	Flow	Phos. Conc.	Phos. Loading	Phos. Loading
	MGD	mg/L	pounds/ day	pounds/ year	MGD	mg/L	pounds/ day	pounds/ year
2009	0.44	0.59	2.15	785	0.41	0.42	1.49	545
2010	0.39	0.66	2.17	791	0.37	0.17	0.49	178
2011	0.38	0.55	1.79	653	0.39	0.25	0.79	289
2012	0.31	0.79	2.09	761	0.28	0.25	0.58	213
2013	0.37	0.54	1.66	605	0.40	0.34	1.14	414
2014	0.36	0.27	0.75	276	0.29	0.19	0.48	175
2015	0.31	0.72	1.90	692	0.25	0.30	0.62	226

3.1.2 Industries/Factories

There is one industrial surface water outfall with a WPDES permit in the BEC watershed, belonging to Capitol Sand & Gravel Co, Inc. This outfall is permit # 0033286, and was issued on November 29th, 2013 and expires on September 30th, 2018. The waste type for this outfall is listed as "Industrial", and the outfall description is "Gravel Pit Effluent." The DNR's Surface Water Data Viewer Application shows one sampling station (Station ID 10043254),

just downstream of the confluence, with phosphorus data. One sample was tested for phosphorus in May 2015, and resulted in a concentration of 0.0745 mg/L. It is important to note that the DNR does not consider this industrial outfall to be a source of phosphorus.

3.1.3 Phosphorus Point Source Summary

The combined phosphorus loading coming from point sources originates from the Dane-Iowa WWTF and the industrial outfall. In order to lower the in-stream phosphorus concentration, point source loading must be reduced. Steps are currently being taken to reduce the phosphorus loading originating from the WWTF, and the surface water downstream of the industrial outfall met the WQBEL criteria for the one sample collected.

3.2 Nonpoint Sources of Phosphorus

According to the EPA, “Nonpoint source pollution generally results from land runoff, precipitation, atmospheric deposition, drainage, seepage or hydrologic modification. Nonpoint source (NPS) pollution, unlike pollution from industrial and sewage treatment plants, comes from many diffuse sources. NPS pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters and ground waters.”

In the BEC watershed, typical NPS pollution originates from erosion of farmland and streambanks, as well as runoff from barnyards.

3.2.1 Areas of High Erosion Potential

One way to prioritize areas within a watershed which may be vulnerable to water erosion is with the DNR Erosion Vulnerability Assessment for Agricultural Lands (EVAAL) tool; which is used in correlation with soil, land cover and watershed data. This tool allows for the identification of areas that may be most vulnerable to erosion. The EVAAL tool results in a graphic and tabular data set that depicts areas of high erosion vulnerability and can be used to prioritize and focus efforts by identifying fields with high nutrient and sediment transportation.

In order to use the EVAAL tool, the following datasets were obtained: LiDAR-based Digital Elevation Model, Watershed Boundary, USDA-NRCS Soil Survey Geographic, and Culvert Lines. Using these datasets and the DNR’s EVAAL tool, EVAAL maps for the BEC watershed and subbasins were created and are attached in Appendix H. These results can be used by the Dane-Iowa Wastewater Commission to target and prioritize areas for phosphorus management measures throughout the adaptive management permit terms.

The results of the EVAAL tool revealed the highest vulnerability areas to be a ridge that runs north of Black Earth Creek, and steep sloping areas on the

hills south west of Mazomanie. Although areas that may be vulnerable to erosion should be targeted for management measures, the accessibility of the land and cooperation of the landowners ultimately determines which areas can be targeted.

3.2.2 CAFOs

CAFOs (Concentrated Animal Feeding Operations) may generate a substantial amount of manure, which naturally contains phosphorus. This manure is typically disposed of by land applying it as fertilizer. This fertilizer can subsequently be washed off after a large storm event and enter surface water. The fact that the fertilizer is land applied played a large part in the U.S. Court of Appeals case that led to the EPA creating its 2008 CAFO rule. This rule states that agricultural stormwater is exempted from being considered a point source, but the EPA may treat the land application of excessive manure as a point source. This result of the rule is that while CAFOs are not considered a point source, they may have to apply for a NPDES permit, or in Wisconsin, a WPDES permit.

Currently in the BEC watershed, there are five farms defined as CAFOs with a WPDES permit. All five farm outfalls share the same permit, belonging to Wagner Dairy Farm. The animal type for this permit is listed as “Dairy” and the current number of animal units was 3,905, as of October 18th, 2013. This permit, #0058751, was effective on January 1st 2014, and will expire on December 31st, 2018. According to the DNR, these permitted CAFOs have zero discharge from production areas and are not considered a source of phosphorus. A summary of the outfalls is listed in Table 3-2.

Table 3-2
CAFO Outfall Summary

Outfall Number	Outfall Description
014	Bollenbeck-Solid manure
016	Beuthin Farm-Solid manure
017	Beuthin Farm-Feedlot Runoff
018	Zander Farm-Solid manure
019	Zander Farm-Runoff Control

3.2.3 Barnyards

Outdoor dairy and beef cattle lots can be a significant source of phosphorus entering into surface water. Since Wisconsin has a large beef and dairy industry, it is important that barnyards be examined as a possible target area to reduce phosphorus concentrations.

In 1989, the BEC watershed was the subject of a nonpoint source project by the WDNR. The Priority Watershed Project identified and addressed sources of nonpoint pollution. As part of this project, barnyard pollution

problems were reduced by the installation of diversion structures, settling basins, filter walls and vegetated filter strips. According to data from the Dane County Land Conservation Department, a loading of 3,752 pounds of phosphorus originated from barnyards prior to implemented measures. After implementation, the phosphorus loading was reduced by 3,198 pounds, an 85% reduction.

Since major efforts to improve barnyards have already taken place, current barnyards may not be a significant source of phosphorus reduction, but will be evaluated during site inspections to determine their status.

3.2.4 Streambanks

Streambank erosion can be a source of sediment and nutrients entering into surface water, as well as having a damaging effect on the habitat. Sedimentation can fill pore spaces, reduce oxygen content, and increase turbidity. Excessive phosphorus loading can lead to eutrophication.

Black Earth Creek is an important asset to the community, as is demonstrated by the numerous streambank restoration projects that have taken place in its watershed. The Natural Heritage Land Trust (NHLT), in partnership with Dane County, restored over one mile of Black Earth Creek in September of 2014, which was the 10th completed project in the Black Earth Creek Valley by the NHLT. Additional projects in the watershed have been completed by Trout Unlimited along with the Black Earth Creek Watershed Association.

3.2.5 Phosphorus Non-Point Source Summary

According to the DNR PRESTO model results, non-point sources are estimated to contribute 98% of the phosphorus load with the BEC watershed. While the quantities of phosphorus contributed from each of the non-point sources listed above are not known, it is recognized that erosion of land and streambanks and runoff from barnyards and feedlots are all potential targets for phosphorus management measures.

3.3 Black Earth Creek Monitoring Program

3.3.1 Historical Phosphorus Data

Background phosphorus data for Black Earth Creek was obtained from the DNR's Surface Water Data Viewer mapping software. Nine (9) samples had been taken downstream of the WWTF outfall (Station 253198) at Morrill Road. This station has a median phosphorus concentration of 0.084 mg/L. Samples were collected between July of 2005 and September of 2006, with the sampling taking place only between May and October. Because these samples were taken 8 – 9 years ago, they may not be representative of existing conditions due to changes within the watershed. Six samples were taken upstream of the WWTF outfall (Station 133398) at the intersection of

Highway 14 and Park Street in Black Earth, once a month in 2002 (May-October.) This station has a median phosphorus concentration of 0.061 mg/L. This sampling point, however, is likely not representative of stream conditions at the WWTF as many tributaries join the main stream prior to the WWTF outfall.

3.3.2 In-Stream Sampling Program

To obtain a better idea of in-stream conditions, the Dane-Iowa staff began sampling upstream and downstream of the WWTF outfall in May 2013. They continue to take samples two times per month from May through October, every other Friday In 2013–2016 forty-five (45) samples were taken upstream of the WWTF outfall at the Hudson Road Bridge and had a median phosphorus concentration of 0.085 mg/L (based on the protocol defined in NR 217.12(2) (d) of the Administrative Code). Forty-Five (45) samples were taken downstream of the WWTF at the Morrill Road Bridge and had a median phosphorus concentration of 0.100 mg/L. This information is included in Appendix A. A map of sampling points is located in Appendix C, and sampling point information in included in Table 3-3.
Samples are collected from the center of the stream then placed into preserved sample bottles for future analysis by (method SM4500P-E 20 ed.). Care is taken while sampling to avoid disturbing the sampling site. The samples are analyzed by the Dane-Iowa WWTF lab (#313002470) with a total phosphorus limit of detection/limit of quantification (LOD/LOQ) of 0.011/0.036 mg/L in 2013, 0.026/0.085 mg/L in 2014 and 0.03/0.11 mg/L in 2015.

In addition to in-stream phosphorus sampling, the Dane-Iowa WWTF staff also collects composite effluent phosphorus samples at the outfall three times a week, in accordance with the WPDES permit.

The only required monitoring parameters are in-stream phosphorus and flow, and the only required sampling area is at the point of compliance under Adaptive Management.

3.3.3 Future Stream Monitoring Program

To demonstrate compliance under Adaptive Management, the only required in-stream monitoring parameters are total phosphorus and flow, and the only required in-stream sampling area is at the point of compliance. The point of compliance is the furthest downstream point of the adaptive management action area. Since the planned action area for the BEC watershed is upstream of the Dane-Iowa WWTF outfall, the outfall location will serve as the point of compliance.

In order to verify compliance with in-stream phosphorus criteria and assess trends/improvements in water quality over time and the effectiveness of phosphorus management measures, in-stream monitoring will be continued

both upstream and downstream of the WWTF outfall as described in the previous section. Additional sampling at various sites upstream of the outfall may be added to stream monitoring program in the future. Additionally, plant effluent sampling will be continued to demonstrating compliance with interim and final WQBELs.

The DNR strongly advises the collection of phosphorus and flow data in tributaries upstream of the point of compliance to observe and analyze the results of phosphorus management efforts. Sampling will be conducted for the tributaries Halfway Prairie Creek, Vermont Creek, and Garfoot Creek. The proposed future sampling points were identified using the Surface Water Data Viewer in areas that can be accessed through publicly owned lands. Site visits will be conducted to ensure that these sampling areas will provide an adequate representation of the stream quality. Sampling areas should have a steady stream flow and be free of debris and pooling. Sampling at these points will be conducted once a month (May-October) and will use the grab sample method described in the previous section. A map of future sampling areas is attached in Appendix I, and sampling location is included in Table 3-3. As additional sites are sampled, the annual Adaptive Management reports will indicate the addition of these sampling locations and the results collected

Table 3-3
Sampling Locations Summary

Location Type	Location Description	Latitude/Longitude	Sampling Frequency
Downstream	Morrill Road Bridge	43.164310, -89.843144	Every other Friday, May- October
Upstream	Hudson Road bridge	43.176550, -89.818615	Every other Friday, May- October
Tributary	Halfway Prairie/ Wendt Creek	Exact location TBD	Last Friday of the month, May-October
Tributary	Vermont Creek	Exact location TBD	Last Friday of the month, May-October
Tributary	Garfoot Creek	Exact location TBD	Last Friday of the month, May-October

3.4 Required Phosphorus Load Reduction

Following the guidance for Adaptive Management, phosphorus reductions were calculated for the first permit term. Although the calculation will be for the minimum reduction per permit term, it would be advantageous to offset more than the minimum reduction required to improve the chances of success for adaptive management.

Variables for calculations:

- Average flow (2012-2015) of the Dane-Iowa treatment plant= **0.35 MGD**
- 3-year (2012-2015) monthly average effluent phosphorus concentration = **0.51 mg/L**
- Average flow of Black Earth Creek (from DNR) at the point of Compliance= **47.0 MGD**
- Median phosphorus concentration of Black Earth Creek (as stated in Section 3.3) = **0.085 mg/L**
- 8.34= unit conversion
- Water Quality Criterion for phosphorus= **0.075 mg/L**

Term1:

Step 1: Calculate the current discharge as an annual load.

$$0.35\ MGD x\ 0.51 \frac{mg}{L} x\ 8.34\ x\ 365 \frac{days}{year} = \mathbf{543} \frac{\boldsymbol{pounds}}{\boldsymbol{year}}$$

Step 2: Calculate the current load in the receiving water just downstream from the discharge

$$543\ \frac{pounds}{year} + \left(47.0\ MGD * 0.085 \frac{mg}{L} * 8.34 * 365 \frac{days}{year}\right) = \mathbf{12,704} \frac{\boldsymbol{pounds}}{\boldsymbol{year}}$$

Step 3: Calculate the applicant's percent contribution of load.

$$\frac{543 \frac{pounds}{year}}{12{,}704 \frac{pounds}{year}} * 100 = \mathbf{4.3}\%$$

Step 4: Calculate the allowable load in the receiving water.

$$(47.0\ MGD + 0.35\ MGD) * 0.075 \frac{mg}{L} * 8.34 * 365 \frac{days}{year} = \mathbf{10,810} \frac{\boldsymbol{pounds}}{\boldsymbol{year}}$$

Step 5: Calculate the needed reduction in the receiving water

$$12{,}704 \frac{pounds}{year} - 10{,}810 \frac{pounds}{year} = \mathbf{1,894} \frac{\boldsymbol{pounds}}{\boldsymbol{year}}$$

Step 6: Calculate the applicant's proportional share of the needed reduction.

$$1{,}894 \frac{pounds}{year} * 4.3\% = \mathbf{81} \frac{\boldsymbol{pounds}}{\boldsymbol{year}}$$

For the first permit term of 5 years, the Dane-Iowa WWTF needs to reduce at least 81 pounds of phosphorus a year. This will be accomplished by a combination of management measures, associated with this adaptive management program. In order to calculate the expected phosphorus load reductions, modeling tools (such as SNAP-Plus and BARNY) will be employed. If measures employed during the first permit term of Adaptive Management do not show water quality improvement,

the adaptive management plan will be modified in subsequent permit terms to offset more of the phosphorus load than required for the first permit term.

To calculate the phosphorus load reduction for the second term, the phosphorus load of the receiving water will be monitored and recorded. Once the new load is determined, the phosphorus target of the receiving water will be subtracted from the new phosphorus loading, and the remaining phosphorus load will be the reduction needed for Permit Term 2. A projection of phosphorus reduction by permit term is included in Table 3-4.

Table 3-4
Phosphorus Reduction by Permit Term

Permit Term	Pounds of P Reduction/Year
1	81
2	988
3	1894

3.5 Sensitivity Analysis for Required Acreage

In order to estimate the total acreage needed for management measures, a sensitivity analysis was constructed. For each acre of land, varying loads of phosphorus reduction were assumed in order to calculate total acreage. Table 3-3 shows the total acreage needed to meet the minimum reduction needed for the Dane-Iowa WWTF's first permit term of Adaptive Management if only field-based practices are utilized.

Table 3-5
Phosphorus Reduction Sensitivity Analysis

Pounds of P reduction/ acre	Acres needed for Permit Term 1
0.5	162.0
1	81.0
2	40.5
3	27.0

For the first permit term, between 27 and 162 acres would be needed for management measures, assuming between 0.5 and 3 pounds per acre reduction. These numbers are based on previous experience with phosphorus reduction in Wisconsin, but soil testing and additional modeling will be completed by the Dane County LWRD to determine the actual reductions from management measures.

4. PROJECT PLANNING

4.1 Partners

The success of adaptive management depends of the joint effort of many partners, and it is import to identify the roles and responsibilities of each partner at the onset of the project. For the Dane-Iowa Adaptive Management Plan, the following governmental, professional, and local partners have been identified:

4.1.1 WPDES Permit Holder

The Dane-Iowa WWTF treats wastewater from the Villages of Arena, Black Earth and Mazomanie and the Wisconsin Heights School. The WWTF was constructed in 1998, and has only needed minor upgrades since it began operating.

The Dane-Iowa WWTF is the only point source and WPDES permit holder in the watershed currently eligible for adaptive management at this time. The Village of Cross Plains WWTF is the other WPDES permit holder that may be eligible for adaptive management, but due to timing of their WPDES permit issuance, the Village of Cross plans will not have to select a final phosphorus compliance plan until September 2019.

The Dane-Iowa WWTF is operated by the Dane-Iowa Wastewater Commission, which is a board composed of members from the three Villages that it serves. The Dane-Iowa Wastewater Commission will be responsible for financial matters, sampling, verification of implemented practices, stream monitoring, meeting the facility's interim phosphorus limits, and generating annual reports.

4.1.2 Town & Country Engineering

Town & Country Engineering is a consulting firm that was organized in 1981, and works with municipalities in Wisconsin. They have experience in wastewater treatment analysis and design, as well as the design and analysis of water and sewer systems, wells and water treatment facilities, stormwater management, and general municipal engineering.

Town & Country Engineering designed the Dane-Iowa WWTF in 1997, and since then has assisted with upgrades and operations. Town & Country works with the Commission to ensure that the treatment plant is operating most efficiently, and has assisted the Commission with its phosphorus compliance evaluations.

With respect to adaptive management, Town & Country's role will include modeling, mapping, budget review, Adaptive Management Plan development, and evaluation of effluent and stream data.

4.1.3 Dane County Land and Water Resources Department

The Land and Water Resources Department (LWRD) is a governmental agency committed to ensuring the protection and enhancement of Dane County's natural, cultural, and historical resources. The LWRD supports citizens, communities, and local governments in their resource management and protection activities.

Dane County LWRD has worked with other communities with respect to agricultural conservation practices, and was contacted by the Dane-Iowa Wastewater Commission to assist with several aspects of the adaptive management process.

Dane County LWRD will act as the broker between the Commission and landowners in establishing cost sharing agreements and will assist in field-verifying adaptive management practices. Their responsibilities will include modeling with SNAP-Plus and BARNY (and any other models required), assisting with grants, mapping, estimating load reductions, and conducting site inspections. A letter indicating this commitment is provided in Appendix J and a service agreement will be developed in the future.

4.1.4 Local Landowners and Agricultural Producers

Farmers in the BEC watershed are typically dairy farmers or cash croppers raising corn and soybeans for sale. According to the land use data presented in Section 2.5, agricultural land makes up approximately 30% of the land in the BEC watershed.

Local land owners were contacted based on their existing relationships with the Dane-Iowa WWTF. Currently, the Dane-Iowa WWTF produces a Class A sludge and allows for local farmers to access the sludge free of charge. Of the farmers that receive this sludge, several have expressed interest in participating in the adaptive management program, but site visits need to be conducted to see which plots have the potential for successful management measures.

The Dane-Iowa Wastewater Commission will establish contracts with landowners to install or implement management measures. It will be up to the landowners and farmers to maintain the management measures outlined in their contract, with verification and inspection of the management measures being conducted by the Commission or the Dane County LWRD.

4.1.5 Other Stakeholders/Partners

There are several other organizations that could have interest or play a role in future adaptive management projects, including:

- *Black Earth Creek Watershed Association (BECWA):* was formed in the early 1980's to unite citizens for the protection of the watershed. BECWA acts within the community to conserve land and water resources of the BEC watershed.

- *Natural Heritage Land Trust*: is a non-profit, community-based organization that conserves land and protects natural areas, wildlife habitat, working farms, healthy lakes and streams, and recreation land in Dane County, Wisconsin.

- *Gathering Waters Conservancy*: helps land trusts, landowners and communities by advocating for funding and policies that support land conservation, and fostering a community of practices that promotes land trust excellence and advancement.

- *Trout Unlimited*: the Southern Wisconsin Chapter of Trout Unlimited was founded in 1969, and its mission is conservation, protection, and improvement of trout and salmon habitat.

- *Natural Resources Conservation Service (NRCS):* is the federal agency that works with landowners on private lands to conserve natural resources. NRCS is part of the U.S. Department of Agriculture. They were formerly called the Soil Conservation Service or "SCS".

- *Farm Service Agency (FSA):* is a federal agency that administers farm commodity, crop insurance, credit, environmental, conservation, and emergency assistance programs for farmers and ranchers.

- *United States Geological Survey (USGS):* is a scientific agency of the United States government. The USGS works in cooperation with more than 2,000 organizations across the country to provide reliable, impartial scientific information to resource managers, planners, and other customers.

Currently, there is no association between these organizations and the projects for the Dane-Iowa Adaptive Management Plan.

4.1.6 Summary of Partners

The current partners for the Dane Iowa Adaptive Management plan, along with their roles and responsibilities are summarized in Table 4-1.

Table 4-1
Roles and Responsibilities

Party	Roles/Responsibilities
Dane-Iowa Wastewater Commission	• Financial matters • Stream and Wastewater Sampling • Verification of implemented practices • Stream monitoring • Meeting the facility's interim P limits • Annual Reporting
Town & Country Engineering	• Modeling • Mapping • Budget review • Adaptive Management Plan development • Assisting with grants • Data evaluation (effluent and stream)
Dane County Land and Water Resources Department	• Modeling • Assisting with grants • Mapping • Estimating load reductions • Conducting site inspections • Negotiating cost-share agreements • Verification of implemented practices
Landowners and Agricultural Producers	• Maintaining management measures

4.2 Areas of Phosphorus Reduction

For the BEC watershed, both point source and non-point source phosphorus reductions will occur. Traditional point source reductions will occur at the Dane-Iowa WWTF, by maximizing the efficiency of the current biological phosphorus removal, in conjunction with supplemental chemical additions when needed. By optimizing the current phosphorus removal, Dane-Iowa hopes to meet the interim limits assigned to them for each permit term, which are 0.60 mg/L, 0.5 mg/L and 0.5 mg/L for the first, second, and third term, respectively.

As the Dane-Iowa WWTF is not currently achieving compliance with the adaptive management interim effluent limit of 0.6 mg/L, a compliance schedule needs to be generated by the DNR for the first permit term.

The remaining phosphorus reductions will be achieved through non-point source reductions within the BEC watershed, as described in the following sections.

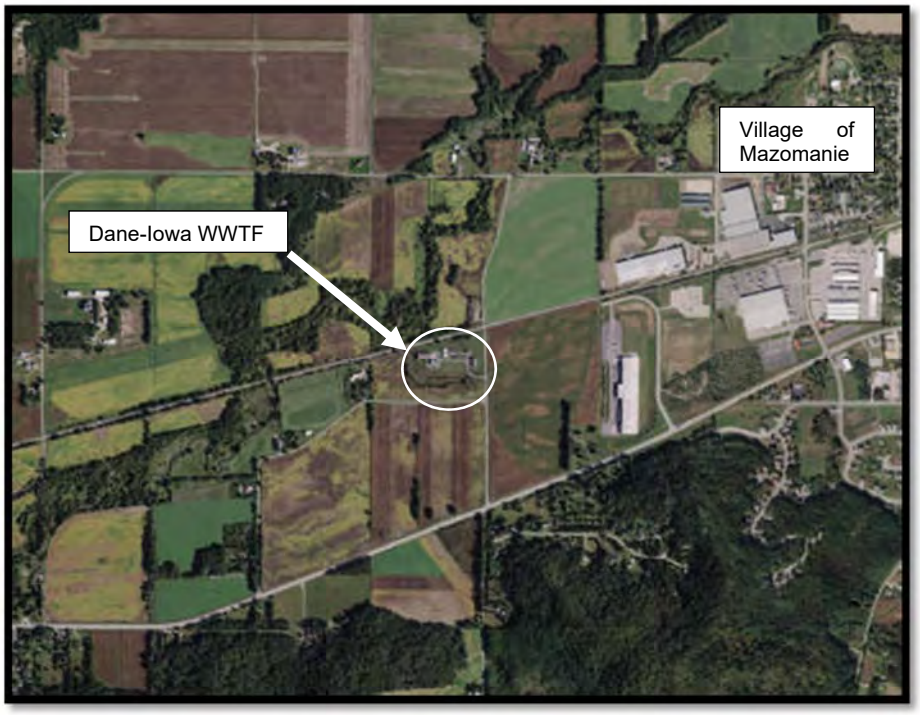
4.2.1 Potential Nonpoint Source Projects

The Dane-Iowa WWTF is located west of Mazomanie, and is surrounded by farm fields, as shown on Figure 4-1. Over the years, the Dane-Iowa Wastewater Commission has developed a relationship with the owners of the surrounding parcels, as the farmers have been hauling Class A sludge from the facility to use on their farms. The initial adaptive management projects will focus on these agricultural parcels located near the Dane-Iowa

WWTF. Some of these land owners have stated an interest in participating with projects for the Adaptive Management program during a prior meeting with the Dane-Iowa Wastewater Commission, Town & Country Engineering, and the Dane County LWRD.

Currently, the parcels that have been identified for potential projects total 720 acres, compared to the estimated 45 to 272 acres needed for the minimum reductions as presented in Table 3-3. This should provide a significant area of land to be used and should allow the Commission to meet the goals of the Adaptive Management Plan for the for the first permit term. These parcels will be inspected during site visits to determine feasibility and applicability of phosphorus management measures.

Figure 4-1: Dane-Iowa WWTF Location



While Black Earth Creek is a well-known trout fishing destination, there are no current projects that the Commission is aware of to work with special interest groups within this watershed. Dane County Land Conservation Division, which is part of the LWRD, is also active in this area, but no specific watershed projects have been identified at this time. The Commission may be willing to partner with potential conservation projects on Black Earth Creek as a method to improve water quality and gain phosphorus loading reductions in the BEC watershed.

4.2.2 Prioritization of Management Measures

Dane-Iowa has a relatively small amount of management measures that are needed to meet the minimum reductions required during the first permit

term, so prioritization was determined by ease of access to projects. Projects will be implemented on local parcels first, with outreach and education in the future afterwards to expand the Adaptive Management Plan and target additional load reductions within the BEC watershed.

It is recommended that phosphorus reductions target “critical source areas” or CSAs, which are areas that contribute a disproportional amount of phosphorus to the receiving water. These areas typically store and transport phosphorus, and both factors come into play when locating CSAs. In the process of identifying CSAs, the EVAAL tool was used to find areas of high erosion vulnerability within the proposed project parcels. Site visits will be conducted to assess these CSAs and identify source factors and transport factors. Source factors include phosphorus soil tests, application rate of phosphorus fertilizer and manure, and application method of phosphorus fertilizer and manure. Transport factors include erosion potential (visual observations to be used in conjunction with EVAAL data), runoff, and connectivity to the receiving water.

A representative from the Dane County LWRD, as well as a member of Town & Country Engineering, will conduct site visits with each of the land owners to gather data and assess options for each parcel. Following the enrollment of the initial project partners, the process of identifying CSAs and conducting site visits will be repeated as the adaptive management program is expanded.

4.3 Nonpoint Source Management Measures

Agricultural nonpoint reductions will be obtained using a combination of agricultural Best Management Practices (BMPs) that are described in the following sections. Information about BMPs was obtained from the NRCS website. All practices used in the Adaptive Management plan will be installed and maintained per NRCS technical standards. Where applicable, installed management measures will conform to NR 151 performance standards. This compliance will be determined by members of the LWRD staff.

4.3.1 Nutrient Management Planning

Nutrient management plans match nutrient inputs to crop demand, in order to maximize the return on nutrients while simultaneously limiting the nutrient loss. Typically, in Wisconsin, nutrient management plans are devised using analysis from SNAP-Plus modeling. After initial meeting with landowners, it was learned that many farmers are already utilizing nutrient management plans, so nutrient management may not currently be a viable option for phosphorus reduction. In the future nutrient management plans will be evaluated as an opportunity to reduce phosphorus loadings.

4.3.2 Cover Crops

According to the USDA NRCS factsheet, “A cover crop is grasses, legumes, forbs or other herbaceous plants that are established for seasonal cover and conservation purposes. Cover crops are planted in the late summer or fall around harvest and before spring planting of the following year’s crops. Common cover crops used in Wisconsin include winter hardy plants such as barley, rye and wheat.”

Cover crops are used after harvesting, when the soil is loose and vulnerable to erosion. Roots from the cover crop increase the stability of the soil, while the additional vegetation can act as a filter to separate out suspended soils from stormwater runoff. Additional benefits of cover crops include increased soil porosity and infiltration, reduction of soil compaction, and improved soil health.

For the BEC watershed, cover crops may be used at any locations where cover crops are not currently being utilized. Determination of feasibility for this management measure will be made on a case-by-case basis, following initial site inspections.

4.3.3 Conservation Buffers

Referring to the USDA NRCS factsheet, “Conservation buffers are small areas of land in permanent vegetation, designed to intercept pollutants and manage other environmental concerns. Types of buffers include riparian buffers, filter strips, grassed waterways, contour grass strips, field borders, and vegetative barriers. Strategically placed buffer strips in the agricultural landscape can effectively mitigate the movement of sediment, nutrients, and pesticides within farm fields and from farm fields. When coupled with appropriate upland treatments buffer strips should allow farmers to achieve a measure of environmental sustainability in their operations.

Buffers slow water runoff, trap sediment, and enhance filtration within the buffer. Buffers also trap fertilizers, pesticides, pathogens, and heavy metals, and they help trap snow and cut down on blowing soil in areas with strong winds.”

Several types of conservation buffers may be implemented within the BEC watershed. These buffers include grassed waterways, contour grass strip, and a harvestable buffer. Details about these buffers and how each of these buffers may be utilized in the BEC watershed are provided below.

Grassed Waterways

Grassed waterways are broad, shallow channels designed to move surface water across farmland without causing soil erosion. The vegetative cover in waterways slows the water flow and protects the channel surface from rill and gully erosion. Grassed waterways can be used in conjunction with

harvestable buffers and cover crops to increase phosphorus reductions. The current use of grassed waterways and their potential use for the future will be assessed during the site visits.

Contour Grass Strips

Contour grass strips are strips of recurrent vegetation alternated down the slope with wider cultivated strips that are farmed on the contour. These strips are usually narrower than the cultivated strips. Vegetation in these strips consists of species of grasses or a mixture of grasses and legumes. Grass strips established on the contour can significantly reduce sheet and rill erosion, as well as slow runoff and trap sediment. Some farm parcels in the BEC watershed are located on fairly flat ground, so contour grass strips may not be a viable option for these parcels. Farm parcels located on steeper slopes in the eastern portion of the watershed may be evaluated to determine the effectiveness of contour grass strips.

Harvestable Buffer Strips

Harvestable buffers are planted between cultivated areas and streams or water features to create soil stability and reduce pollutants entering surface water. They are designed to intercept sediment and other pollutants before they enter the stream. The Dane County LWRD has established the Yahara River Watershed Harvestable Buffer Program that allows farmers to establish a perennial grass cover that can be harvested for profit or use on site.

The Commission plans to create a similar program for the BEC watershed, and will meet with the Dane County LWRD to discuss the cost-share prices for the buffers and how to model the subsequent reduction in phosphorus loadings. Eligible cropland would include fields adjacent to perennial or intermittent streams, and end rows around cropped fields for access to buffers. The buffer strips would have a minimum width of 30 ft, with a maximum width to be determined based on phosphorus reductions. These buffers could consist of native-prairie grass mixes. Additionally, in order to calculate phosphorus reductions, the soil should be sampled and have a Phosphorus Index (PI) value calculated with SNAP-Plus. It is expected that a portion of the phosphorus reductions required for the first permit term will occur using the Harvestable Buffer Cost-share practice.

4.3.4 Tillage Changes

Changing tillage practices can provide effective erosion and can improve soil properties and soil quality. A common option is no till practices, which allows a farmer to plant the crop and control weeds without turning the soil. Traditional plowing reduces the farm's long-term productivity by exposing organic-matter-rich top soil to the surface and breaking up clods that slowly and naturally form in the soil.

A high organic matter and good clod formation are both crucial aspects of fertile soil. Organic matter attracts and holds onto water, and its slow breakdown releases vital nutrients into the soil. When soil is turned, the organic matter is exposed to the atmosphere and oxidized into carbon dioxide. Less organic matter in the soil means less water retention, less nutrient release and less clod formation. The broken up clods are exposed to rainfall, which further breaks down the clods and forms a soil crust on the field surface, causing surface runoff and soil erosion.

No-till agriculture uses a disk or chisel plow to prepare the field for seeding. These plows create a narrow furrow, just large enough for the seed to be injected. After the seed and fertilizer is injected, an attachment closes up the furrow, this way the farm field can be seeded with minimal soil disturbance.

As with other management measures, the potential for no till practices will be evaluated during the preliminary site visits.

4.3.5 Manure Management

Phosphorus is present naturally in animal manure, and when subsequently applied to agricultural land, can be a primary source of phosphorus to surface and groundwater. This phosphorus reaches surface waters by being carried in runoff if the manure is not properly stored. In order to reduce the amount of manure, and therefore phosphorus, entering surface water, runoff control practices should be installed. The most common practices for manure management include improved collection and storage, as well as optimizing application rates.

4.3.6 Runoff Control from Barnyards

Barnyards and feedlots can be a substantial source of phosphorus. This is due to the presence of manure and the phosphorus naturally occurring in it, as well as the phosphorus in the soil. If not managed correctly, manure that accumulates in barnyards can be carried via runoff to surface waters from storm events. These storm events can cause erosion and carry a significant amount of soil in the runoff, which is an additional source of phosphorus in the surface water. In order to reduce phosphorus pollution, it is important to manage the runoff coming through barnyards.

Runoff management allows for the direction of rainwater and other runoff water away from manure storage facilities. Additionally, the barnyard should be on a surface that can be cleaned so that manure may be removed, limiting the quantity of manure that can potentially be washed off. Additionally, roof gutters, surface water diversions and drip trenches can keep water clean, and away from the barnyard. The current state of barnyards, and their prospective improvements will be considered for feasibility and efficiency of phosphorus reductions during site visits.

4.3.7 Streambank Restoration

A popular option among many land owners is streambank restoration, which is accomplished by reinforcing the streambank and reestablishing the general structure and function of the stream. Streambank restoration reduces erosion, but is a costly management measure. Previous projects to restore Black Earth Creek, and its streambank, have taken place; so it is likely that additional restoration will take place under the first permit term of Dane-Iowa's Adaptive Management Plan. The need for streambanks restorations will be assessed during site visits.

5. PROJECT IMPLEMENTATION

This section presents the steps that will be taken to implement phosphorus reduction projects during the first permit term of adaptive management. As the Dane-Iowa Wastewater Commission and its partners develop experience with adaptive management implementation in the BEC watershed, these project implementation steps may be refined or revised.

5.1 Preliminary Site Visits

Following the identification of potential project areas, the first step to implementation is conducting site visits to evaluate options and feasibility. Prior to any site visit, a relationship should be established with the land owner and the WWTF, so they are informed about adaptive management, and how they could play a role in the plan. Site visits should occur in the spring or fall, when the land cover will be more easily identifiable. Site visits will be arranged through members of the Dane-Iowa WWTF, and will include members of the WWTF staff, Town & Country Engineering, Dane County LWRD, and the land owners themselves.

A typical site visit will usually take approximately 1-2 hours and consist of a general assessment of areas of concern. These concerns could include streambank erosion, gully erosion, tillage, crop rotations, or nutrient management. General site information and observations will be documented.

5.2 Identification of Reasonable Measures

During the site visits, the most suitable measures for each site will be identified and discussed. Possible management measures are described in Section 4.3. As appropriate, additional management measures may be selected to result in further phosphorus reductions. The reasonable and feasible management measures will depend on the needs for the land owner and the physical properties of the land. These properties include soil type, slope, current land use/cropping practices, and proximity to water bodies/streams.

5.3 Data Collection for Modeling

Following the initial site visit, once optional management measures have been identified, there may be a need for additional data. Data collected by the Dane County LWRD will be based on the model being utilized and the resource concern that is being assessed. Typical models used include SNAP-Plus, BARNY, Phosphorus Index, gully erosion calculator, and streambank erosion calculator. Data could include soil samples, survey data, crop information, etc.

5.4 Modeling

Once all the pertinent data has been collected, the Dane County LWRD will perform all the necessary modeling to determine the load reduction from each management measure. Modeling tools will include SNAP-Plus and BARNY among others.

5.4.1 SNAP-Plus

SNAP-Plus (soil nutrient application planner) was designed as a means to streamline the preparation of Comprehensive Nutrient Management Plans (CNMP) for CAFOs. These CNMPs consist of five components: a conservation plan, a nutrient management plan, a record-keeping program, a manure manager, and feed management. Typically, several software programs were needed to generate these components, so SNAP-Plus was designed to incorporate these programs into one software package. SNAP-Plus is able to prepare nutrient management plans in accordance with Wisconsin's Nutrient Management Standard Code 590.

SNAP-Plus can be used to calculate crop nutrient recommendations for all fields on a farm, a potential tradable phosphorus (PTP) value for all fields t, and a rotational phosphorus balance for using soil test P as the criteria for phosphorus management. The SNAP-Plus model results in a P-Trade Report, which calculates the amount of PTP for the fields by year, assuming the fields are installed and maintained with practices consistent with NRCS technical standards. .

For this application, SNAP-Plus will be used to calculate the expected phosphorus reductions for field-based management measures compared to the baseline for current practices. All SNAP-Plus modeling will be completed by the Dane County LWRD.

5.4.2 BARNY

Then Wisconsin Barnyard Runoff Model (BARNY) is used to estimate loads of phosphorus and chemical oxygen demand in stormwater runoff from individual barnyards. It can also evaluate the impacts of buffers on reducing these loads. The main use of the BARNY model is to evaluate phosphorus transportation from barnyards and evaluate phosphorus load reductions due to barnyard management activities.

If it is determined that barnyard improvements could be an efficient source of phosphorus reductions, the Dane Country LWRD will run BARNY modeling to estimate the reduction in phosphorus loads.

5.5 Determine Load Reduction

Load reductions will be determined using the modeling previously discussed. Once the modeling has been completed, the LWDR will be able to determine the total load reduction expected by the planned management measures. As stated in Section 3.4, the Commission is required to provide a reduction of at least 81 pounds/year of phosphorus during the first permit term of Adaptive Management. If the calculated reductions for the planned management measures are less than the required amount, the Commission will seek additional project partners. After the first permit term of Adaptive Management, the Commission may need to install

additional management measures if the initial measures do not provide a sufficient reduction in phosphorus loading to Black Earth Creek.

5.6 Cost-Share Agreements

Cost share agreements or contracts will be established between the landowners and the Dane-Iowa Wastewater Commission for the management measures to be installed. Contracts will be drafted by the Dane County LWRD and made with landowners for a term of 5, 10, or 15 years. Once the contract is signed, the landowner will be paid with annual payments for the length of the contract.

It will be up to the Dane-Iowa Wastewater Commission to determine the rates for each management measure. These rates will be based on typical cost-share models from the Yahara WINS Adaptive management Project which is focused in the adjacent Yahara River Watershed, as well as other cost-share programs. Cost-share rates that have not been previously established will be estimated based on demand, local land rental rates, and crop yields.

These cost-share agreements could serve as trade agreements to allow for the ability to transition to Water Quality Trading (WQT). Additionally, practices will be registered upon implementation to further ease the transition from Adaptive Management to WQT. Example cost share contracts from the LWRD are included in Appendix K.

5.7 Installation of Management Measures

Once the cost share agreements have been signed between the landowner and the Commission, it will be the responsibility of the landowner to install and maintain the agreed upon management measures. These measures will consist of one or more of the practices described in Section 4.3.

5.8 Verification of Installed Management Measures

Dane County LWRD and the Dane-Iowa WWTF staff will verify the status of the practices installed for management measures. These practices will be verified once per permit term after initial establishment has been verified. In addition, in-stream phosphorus monitoring will be conducted by the WWTF staff as an approach to monitor the progress toward the water quality criterion.

Records and data for these practices will be cataloged by Town and County, with practices recorded spatially though GIS software along with LWDR's Conservation Planning System software.

Inspection of the installed management measures will include various steps to ensure that these measures are valid, and that the phosphorus reductions can be claimed for the adaptive management program. The steps for these inspections are as follows.

1. *Determine status of management measure*
2. *Issue status determination to landowner*

3. *Take corrective measures as needed*
4. *Document that required corrective measures (if any) are completed*
5. *Update data for modeling, as needed*

5.9 Annual Reporting

In order to ensure the Commission's accountability, the WDNR requires annual reporting on adaptive management progress. These reports should evaluate the monitoring data that has been collected (including instream phosphorus loadings as well as effluent loadings), describe the management measures that have been installed in the prior year, and describe any outreach and education that has been completed. Annual reporting will be completed by the Commission, with assistance from Town & Country Engineering and the Dane County LWRD, as needed.

These annual reports can also be used to help adjust adaptive management actions, such as any changes that would require permit modifications. Changes that would require permit modification would include changes to the action area size, adjustments to the minimum monitoring requirements, and changes to the amount of phosphorus being offset in the current permit term. In summary, these reports will be used as a line of communication between the Commission and the WDNR.

5.10 Implementation Schedule

In order to ensure that the Commission meets the minimum required phosphorus loading reduction for the first Adaptive Management permit term, they will follow the implementation schedule in Table 5-1. This schedule will ensure that any management measures installed will be verified and inspected. Additionally, annual reporting will be performed to maintain communication between the Commission and the WDNR, as well as to reinforce accountability.

Table 5-1
Permit Term 1 Implementation Schedule

Action	Date
Site Inspections	Fall 2016
Data Collection and Modeling	Spring 2017
Cost Share Agreements Signed	Fall 2017
Management Measures Installed	Spring 2018
Begin Monthly Tributary Sampling	Spring 2017
Annual Adaptive Management Report	January 31, 2018
Annual Adaptive Management Report	January 31, 2019
Annual Adaptive Management Report	January 31, 2020
Annual Adaptive Management Report	January 31, 2021
End of Permit Term 1	June 30, 2022

6. FINANCIAL EVALUATION

The section presents the projected costs for implementation of Adaptive Management for the first permit term and well as certification of the financial security of the Adaptive Management Program.

6.1 Cost Estimate

Table 6-1 presents a breakdown of estimated annual costs associated with Adaptive Management in the BEC watershed for the next permit term. Costs include the implementation of nonpoint source management measures, optimizing the treatment plant to meet interim limits, outreach and education, modeling, sampling, and other administrative duties. Factors relating to these costs and the responsible parties are described in Table 6-1.

6.2 Funding Sources

Currently, the Dane-Iowa Wastewater Commission will assume sole financial responsibility for adaptive management in the BEC watershed and will fund these costs through user fees and cash on hand, but additional sources of funding will be explored. Grants and other funding opportunities will be researched to see if they are applicable to programs for Dane-Iowa's Adaptive Management program. Possible grant sources include the following:

- NRCS Regional Conservation Partnership Program (RCPP),
- Dane County Lakes and Watershed Commission,
- Department of Agriculture, Trade and Consumer Protection (DATCP), Producer-Led Watershed Protection Grants
- Wisconsin DNR Targeted Runoff Management (TRM) Grants.

The Dane County LWRD will assist the Commission with identifying and applying for applicable grants.

6.3 Financial Security

As required by the DNR, this Adaptive Management Plan contains a written statement from the Dane-Iowa Wastewater Commission validating that the financial needs to implement adaptive management are feasible. This statement is provided in Appendix J.

Table 6-1
Adaptive Management Cost Estimate

	Permit Year	Responsible	0	1	2	3	4	5
	Year	Party	2016	2017	2018	2019	2020	2021
Treatment Upgrades Capital Cost		D-I	$0	$20,000	$0	$0	$0	$75,000
Treatment Operating and Maintenance Costs								
	Additional Sludge Hauling	D-I		$2,000	$2,000	$2,000	$2,000	$2,000
	Additional Chemicals	D-I		$3,000	$3,000	$3,000	$3,000	$3,000
Adaptive Management Planning								
	Report Preparation/Revision	T&C	$20,000			$2,000	$3,000	$5,000
	Site Visits and Practice Identification	T&C	$5,000	$5,000	$5,000	$2,000	$3,000	$5,000
Modeling and Technical Support								
	Dane County Modeling Costs	County	$5,000	$10,000	$5,000		$2,000	$10,000
	Engineering Support	T&C		$2,500	$2,500	$2,500	$2,500	$2,500
BMP Implementation Costs								
	Practice Brokering	County		$10,000	$5,000	$2,500	$2,500	$5,000
	Practice Brokering/Implementation Support	T&C		$5,000	$2,500		$1,000	$5,000
	Cost Share Rates	D-I		$20,000	$20,000	$25,000	$25,000	$30,000
	Other Misc. Implementation Costs	D-I	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000
Outreach and Education								
	Meetings with Public/Stakeholders	T&C		$5,000	$1,000	$1,000	$1,000	$5,000
	Communication about AM in watershed	D-I	$500	$500	$500	$500	$500	$1,000
In-Stream and Effluent Sampling								
	Sample Collection	D-I	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000
	Sample Analysis	D-I	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000
Compliance Checking								
	Practice Verification	County		$5,000	$2,500	$2,500	$5,000	$5,000
	Compliance Notifications	D-I		$1,000	$1,000	$1,000	$1,000	$1,000
Administration								
	Annual Reports	D-I		$5,000	$5,000	$5,000	$5,000	$5,000
	Meetings/Correspondence with DNR	T&C	$2,000	$2,000	$2,000	$2,000	$2,000	$5,000
Total			**$38,500**	**$102,000**	**$63,000**	**$57,000**	**$64,500**	**$170,500**

Appendix A

In-Stream Phosphorus Data

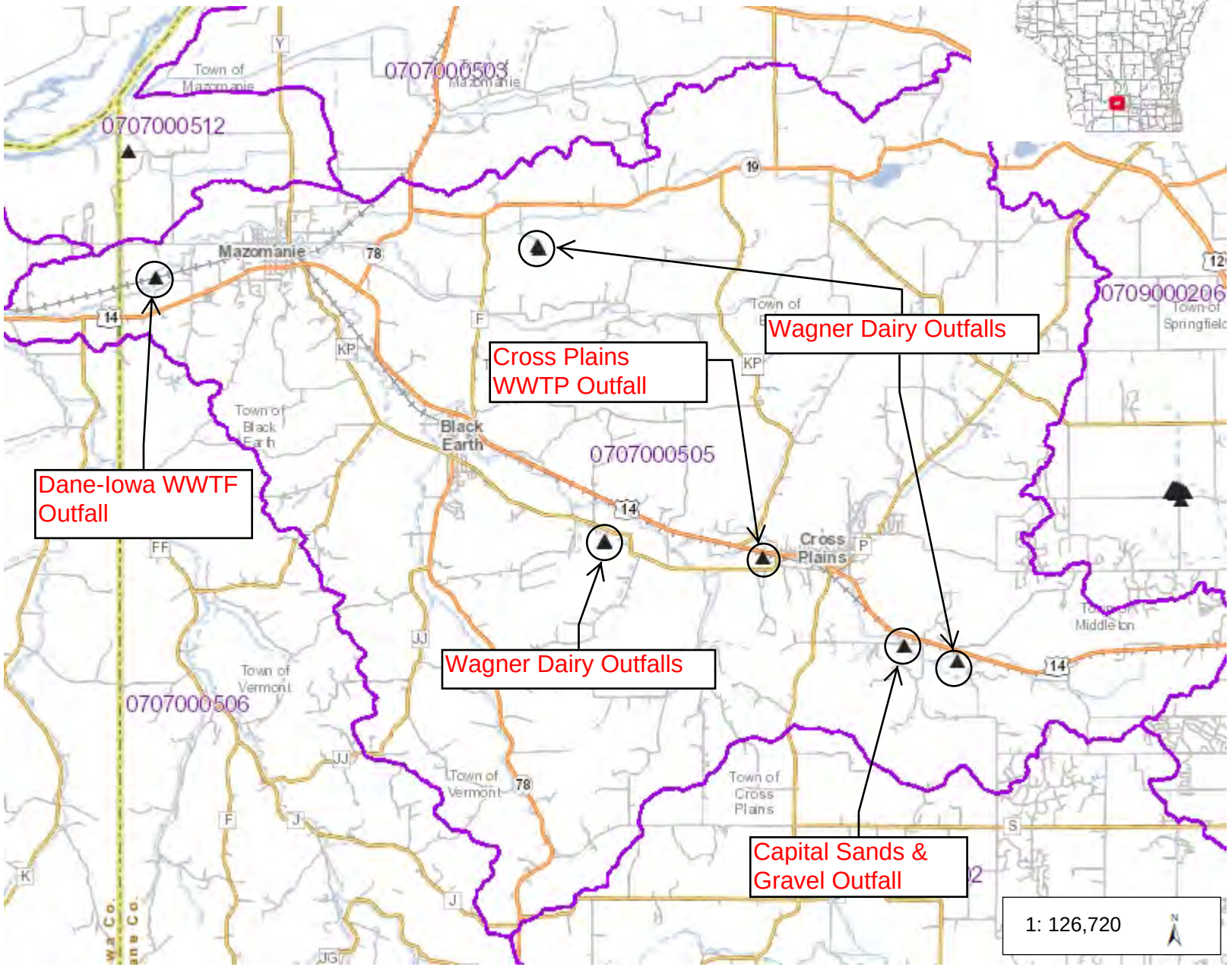
Dane-Iowa Wastewater Commission
In-Stream Phosphorus Monitoring Data

Date	2097 Upstream Phosphorus Concetratio mg/l	Averaged 28-day values	2098 Downstream Phosphorus concentration mg/l	Averaged 28-day values	
04/09/2013	0.13		0.20		Not used as before May 1st
04/24/2013	0.09		0.08		Not used as before May 1st
05/01/2013	0.08	0.080	0.07	0.070	
05/29/2013	0.15	0.150	0.19	0.190	
06/07/2013	0.14	0.145	0.10	0.145	
07/10/2013	0.08	0.080	0.05	0.050	
07/30/2013	0.03	0.055	0.03	0.040	
08/05/2013	0.02	0.043	0.04	0.040	
08/26/2013	0.10	0.050	0.12	0.063	
09/05/2013	0.07	0.085	0.10	0.110	
09/27/2013	0.02	0.045	0.03	0.065	
10/07/2013	0.07	0.045	0.04	0.035	
10/22/2013	0.02	0.037	0.02	0.030	
05/07/2014	0.04	0.040	0.03	0.030	
05/20/2014	0.06	0.050	0.05	0.040	
06/03/2014	0.25	0.117	0.28	0.120	
06/24/2014	0.15	0.200	0.18	0.230	
07/11/2014	0.06	0.105	0.07	0.125	
07/31/2014	0.08	0.070	0.06	0.065	
08/08/2014	0.10	0.090	0.12	0.090	
08/26/2014	0.31	0.163	0.28	0.153	
09/11/2014	0.15	0.230	0.16	0.220	
09/29/2014	0.05	0.100	0.07	0.115	
10/13/2014	0.03	0.040	0.01	0.040	
10/31/2014	0.04	0.035	0.05	0.030	
5/8/2015	0.07	0.070	0.07	0.070	
5/22/2015	0.08	0.075	0.08	0.080	
6/13/2015	0.10	0.090	0.15	0.150	
6/25/2015	0.08	0.090	0.12	0.120	
7/10/2015	0.03	0.055	0.07	0.070	
7/24/2015	0.09	0.060	0.08	0.080	
8/6/2015	0.08	0.085	0.08	0.080	
8/20/2015	0.10	0.090	0.12	0.120	
9/4/2015	0.10	0.100	0.10	0.100	
9/18/2015	0.19	0.145	0.13	0.130	
10/16/2015	0.04	0.115	0.04	0.040	
10/30/2015	0.13	0.085	0.17	0.170	
05/06/2016	0.06	0.060	0.11	0.110	
05/25/2016	0.05	0.055	0.10	0.105	
06/03/2016	0.04	0.045	0.08	0.090	
06/16/2016	0.12	0.080	0.15	0.115	
07/14/2016	0.07	0.095	0.06	0.105	
07/26/2016	0.17	0.120	0.20	0.130	
08/09/2016	0.08	0.125	0.09	0.145	
08/23/2016	0.07	0.075	0.11	0.100	
09/09/2016	0.40	0.235	0.42	0.265	
09/22/2016	0.19	0.295	0.19	0.305	
2013 MEDIAN		0.055		0.063	
2014 MEDIAN		0.095		0.103	
2015 MEDIAN		0.088		0.090	
2016 MEDIAN		0.088		0.113	
MEDIAN VALUE		0.085		0.100	
AVERAGE VALUE		0.096		0.106	

Appendix B

Watershed Maps

Dane-Iowa HUC 10



Legend

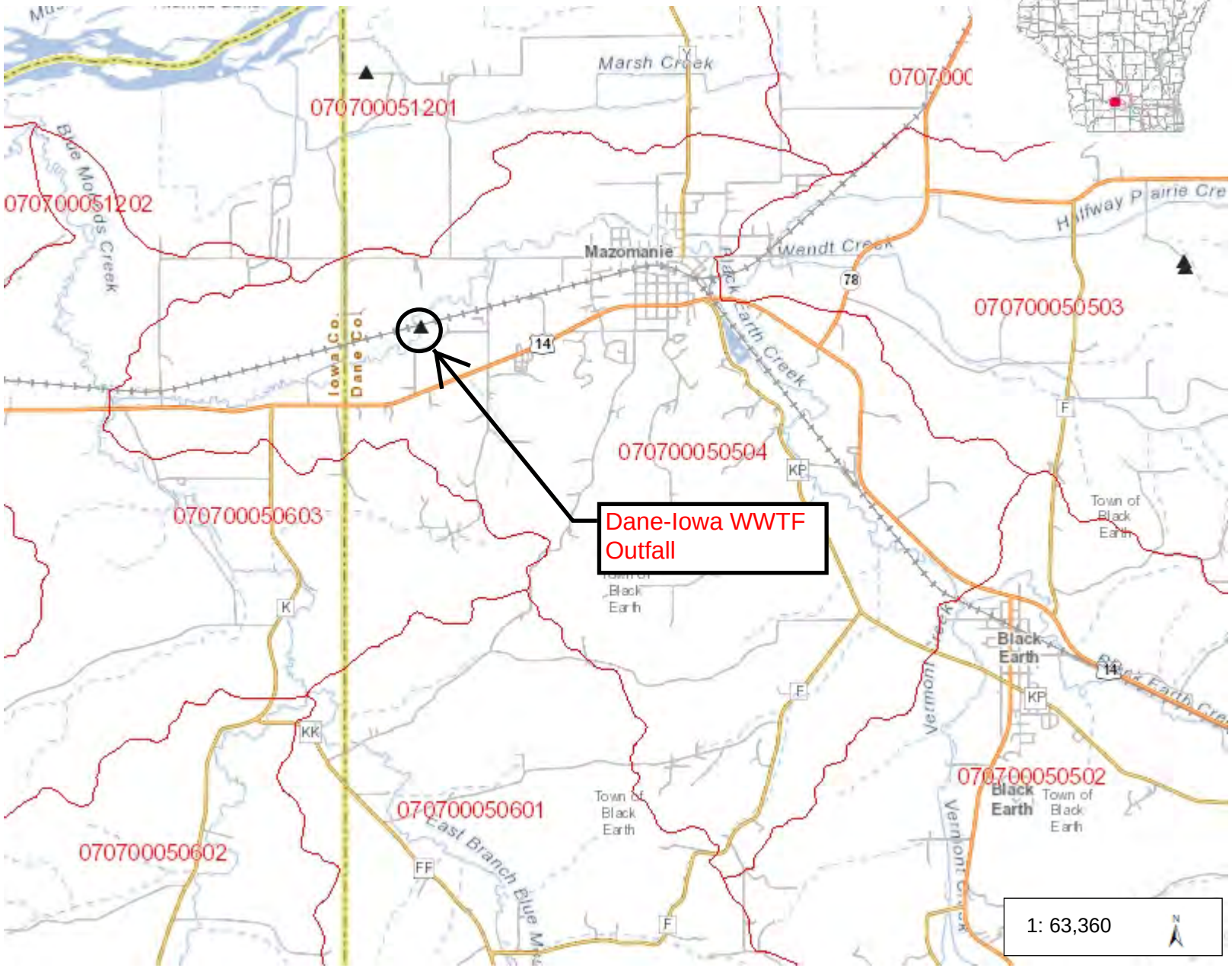
- Surface Water Outfalls
- 10-digit HUCs (Watersheds)
- Municipality
- State Boundaries
- County Boundaries
- Major Roads
  - Interstate Highway
  - State Highway
  - US Highway
- County and Local Roads
  - County HWY
  - Local Road
- Railroads
- Tribal Lands
- Rivers and Streams
- Intermittent Streams
- Lakes and Open water

Notes

4.0 0 2.00 4.0 Miles

NAD_1983_HARN_Wisconsin_TM

Dane-Iowa HUC 12



1: 63,360

2.0 0 1.00 2.0 Miles

NAD_1983_HARN_Wisconsin_TM

Legend

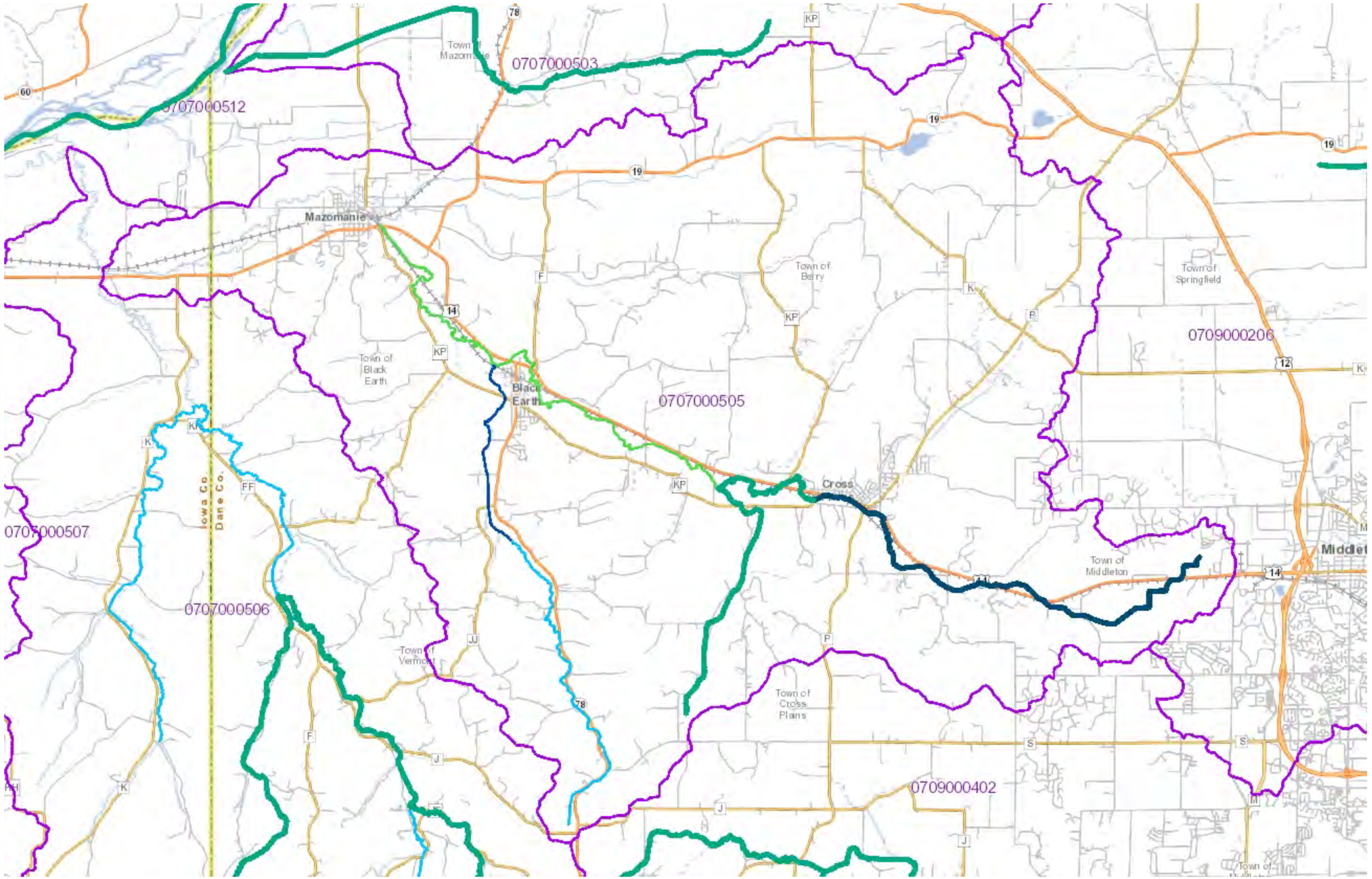
- Surface Water Outfalls
- 12-digit HUCs (Subwatersheds)
- Municipality
- State Boundaries
- County Boundaries
- Major Roads
  - Interstate Highway
  - State Highway
  - US Highway
- County and Local Roads
  - County HWY
  - Local Road
- Railroads
- Tribal Lands
- Rivers and Streams
- Intermittent Streams
- Lakes and Open water

Notes

Appendix C

Receiving Water Information

Black Earth Creek Watershed Trout Streams and Exceptional or Outstanding Resource Waterways



Legend

- Outstanding and Exceptional Streams
  - Exceptional
  - Outstanding
- Locational Information (line)
  - COMPLETE
  - CONFLICT
- Outstanding and Exceptional Lakes
  - Exceptional
  - Outstanding
- Locational Information (area)
  - COMPLETE
  - CONFLICT
- Trout Stream Lines
  - Class 1
  - Class 2
  - Class 3
- Trout Spring Ponds
  - Class 1
  - Class 2
  - Class 3
- 10-digit HUCs (Watersheds)
- Municipality
- State Boundaries
- County Boundaries
- Major Roads
  - Interstate Highway
  - State Highway
  - US Highway
- County and Local Roads
  - County HWY
  - Local Road
- Railroads
- Tribal Lands
- Rivers and Streams
- Intermittent Streams
- Lakes and Open water

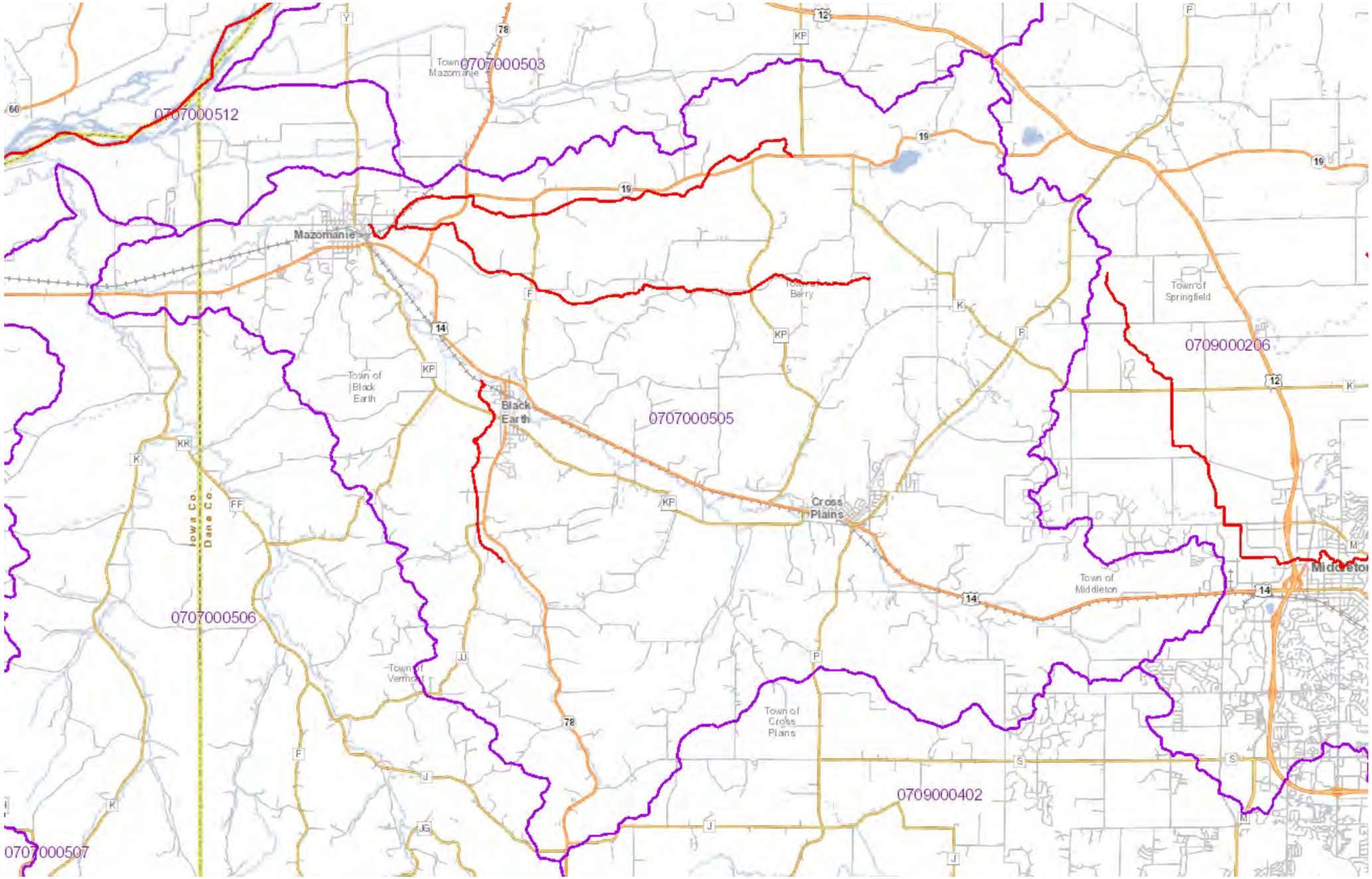
3.0 0 1.50 3.0 Miles

1:95,040

NAD_1983_HARN_Wisconsin_TM

Notes

Black Earth Creek Watershed Impaired Waters



Legend

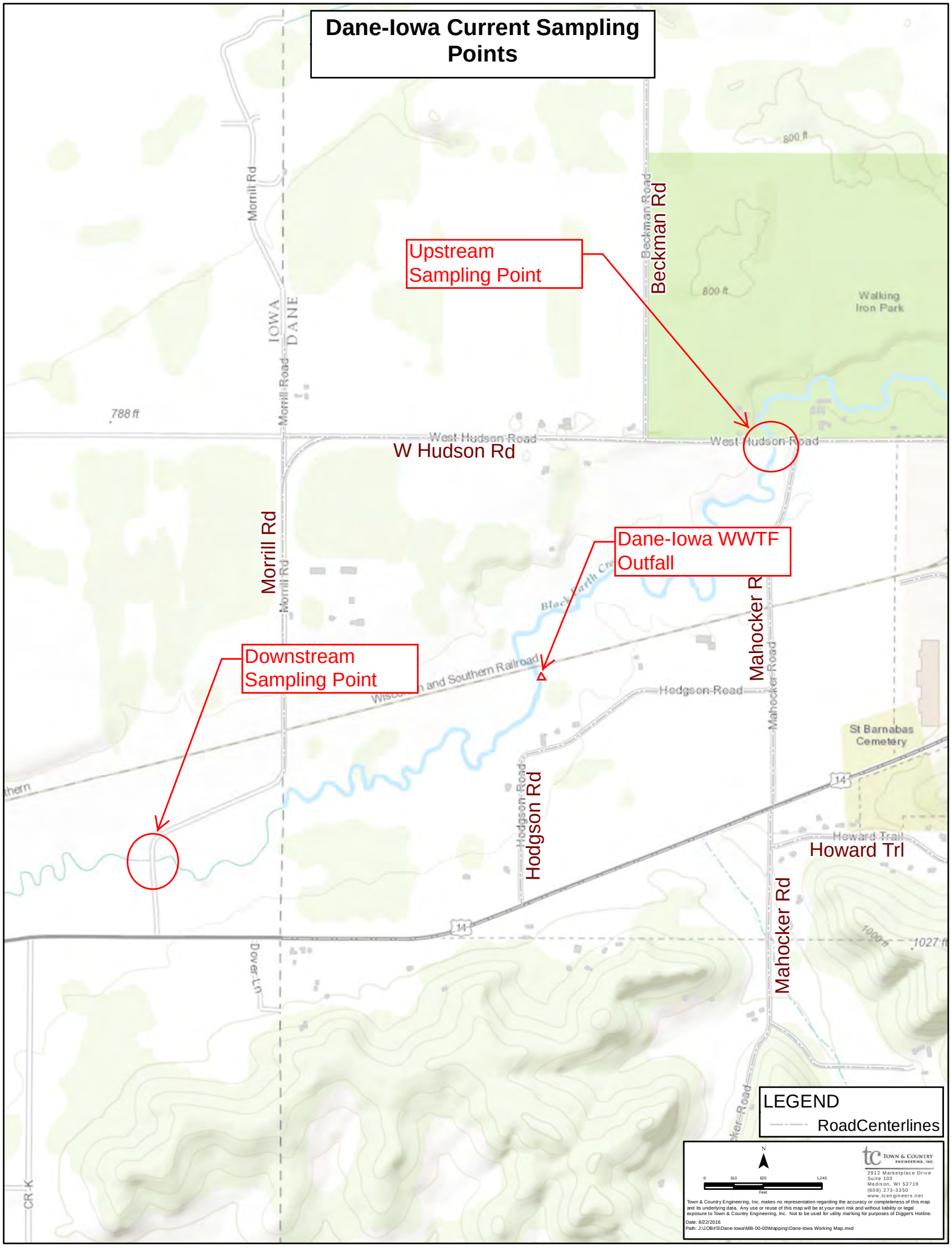
- Impaired Rivers and Streams
- Impaired Lakes
- 10-digit HUCs (Watersheds)
- Municipality
- State Boundaries
- County Boundaries
- Major Roads
  - Interstate Highway
  - State Highway
  - US Highway
- County and Local Roads
  - County HWY
  - Local Road
- Railroads
- Tribal Lands
- Rivers and Streams
- Intermittent Streams
- Lakes and Open water

3.0 0 1.50 3.0 Miles

1:95,040

NAD_1983_HARN_Wisconsin_TM

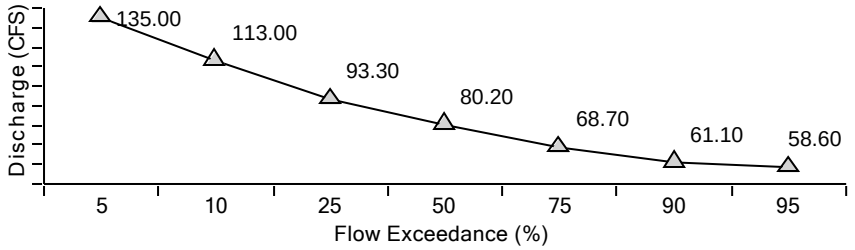
Notes


Dane-Iowa Current Sampling Points
Upstream Sampling Point
Dane-Iowa WWTF Outfall
Downstream Sampling Point
Beckman Rd
Morrill Rd
W Hudson Rd
Mahocker Rd
Hodgson Rd
Howard Trl
Walking Iron Park
St Barnabas Cemetery
IOWA
DANE
800 ft
788 ft
1027 ft
LEGEND
RoadCenterlines
Town & Country Engineering, Inc.
2912 Marketplace Drive
Suite 103
Madison, WI 53719
(608) 273-3350
www.tcengineers.net
Town & Country Engineering, Inc. makes no representation regarding the accuracy or completeness of this map and its underlying data. Any use or reuse of this map will be at your own risk and without liability or legal exposure to Town & Country Engineering, Inc. Not to be used for utility marking for purposes of Digger's Hotline.
Date: 8/22/2016
Path: J:\JOB#'s\Dane-Iowa\MB-00-00\Mapping\Dane-Iowa Working Map.mxd

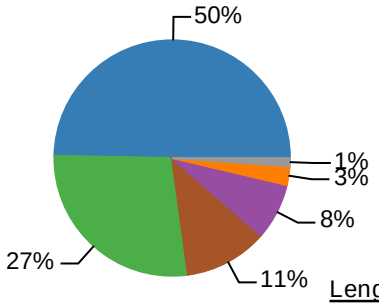
PRESTO-Lite Watershed Delineation Report

Reach ID: 200028938
Watershed Name: Lower Black Earth Creek
Waterbody Name: Black Earth Creek
HUC08: Lower Wisconsin River
Watershed Area: 105.56 mi²
Average Annual Precipitation: 33.62in

Stream Flow

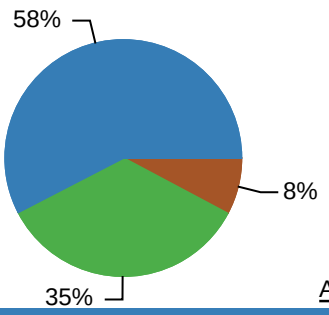


Tributary Stream Type



Type	Length
Coldwater	147160 ft
Cool-Cold Headwater	81260 ft
Cool-Cold Mainstem	33828 ft
Macroinvertebrates	22976 ft
Cold Headwater	7587 ft
Warm Headwater	3291 ft
Cold Mainstem	0 ft
Large River	0 ft
Warm Mainstem	0 ft

Landcover



Type	Area
Agriculture	58.76 mi²
Forest	35.37 mi²
Urban	7.93 mi²
Barren	1.58 mi²
Wetland	1.01 mi²
Grassland	0.54 mi²

PRESTO Phosphorus Load Estimate

Avg. Annual Nonpoint Phosphorous Load (80% Confidence Interval)	27,389 (13,626 - 55,055) lbs
Number of Facilities (Individual Facility Information below)	2
Avg. Annual Point-source Phosphorous Load (2010 - 2012 total of all facilities)	1,073lbs
Most Likely Point : Nonpoint Phosphorous Ratio	4% : 96%
Low Estimate Point : Nonpoint Phosphorous Ratio (Adaptive Management)	7% : 93%

Adaptive Management Results

Facilities Discharging to the Lower Black Earth Creek Watershed:

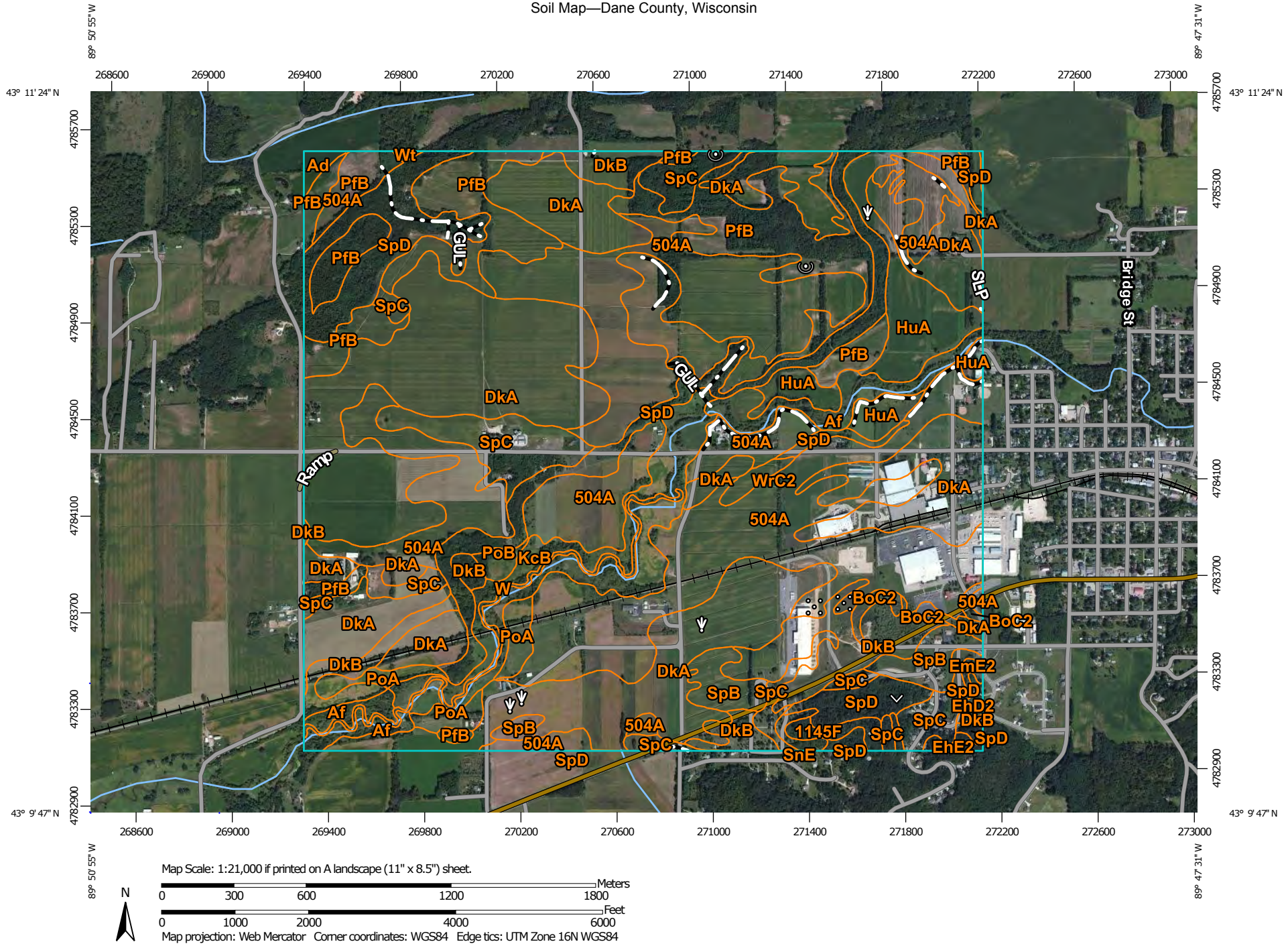
Facility Name	Permit #	Outfall #	Waste Type	Receiving Water	Avg. Phosphorus Load (lbs.) (2010 - 2012)
DANE IOWA WASTEWATER COMMISSION WWTF	0049816	001	Municipal	Black Earth Creek	751
CROSS PLAINS WASTEWATER TREATMENT FACILITY	0020788	001	Municipal	Black Earth Creek	322

Watershed Analysis Limitations

- This analysis relies on pre-defined catchments from the Wisconsin Hydrography Data-Plus and may not delineate from the exact location required. When assessing phosphorus loads for specific facility in support of efforts such as adaptive management, care should be taken to ensure that additional downstream point sources do not exist. For adaptive management information related to specific facilities please reference the PRESTO website http://dnr.wi.gov/topic/surfacewater/presto.html
- Delineation of watersheds is based on a topographic assessment and therefore do not account for modified drainage networks such as stormwater sewer systems and ditched agriculture.
- If a watershed requires delineation from an exact location the user may use the desktop version of PRESTO that requires ESRI ArcGIS. The PRESTO tool and default datasets can be downloaded at http://dnr.wi.gov/topic/surfacewater/presto.html
- Data sources for this report originate from the WDNR's Wisconsin Hydrography Data-Plus value-added dataset and the point and non-point source loading information including in the WDNR's PRESTO model.
- If you have questions about the report generated from the PRESTO-Lite application please contact: DNRWATERQUALITYMODELING@wisconsin.gov

Appendix D

Watershed Soils Data


89° 50' 55" W
89° 47' 31" W
43° 11' 24" N
43° 9' 47" N
268600
269000
269400
269800
270200
270600
271000
271400
271800
272200
272600
273000
4785700
4785300
4784900
4784500
4784100
4783700
4783300
4782900
Ad
Wt
PfB
504A
DkB
SpC
DkA
SpD
GUL
SLP
Bridge St
HuA
Af
Ramp
WrC2
PoB
KcB
W
PoA
BoC2
EmE2
EhD2
1145F
SnE
Map Scale: 1:21,000 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0
300
600
1200
1800
Feet
0
1000
2000
4000
6000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Dane County, Wisconsin
Survey Area Data: Version 14, Sep 25, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 29, 2011—Sep 10, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Dane County, Wisconsin (WI025)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
504A	Sparta loamy fine sand, 0 to 3 percent slopes	457.7	26.3%
1145F	Gaphill-Rockbluff complex, 30 to 60 percent slopes	7.0	0.4%
Ad	Adrian muck	3.7	0.2%
Af	Alluvial land, wet	39.1	2.2%
BoC2	Boyer sandy loam, 6 to 12 percent slopes, eroded	8.1	0.5%
DkA	Dickinson sandy loam, 0 to 2 percent slopes	489.8	28.2%
DkB	Dickinson sandy loam, 2 to 6 percent slopes	85.3	4.9%
EhD2	Eleva sandy loam, 12 to 20 percent slopes, eroded	3.1	0.2%
EhE2	Eleva sandy loam, 20 to 30 percent slopes, eroded	2.9	0.2%
EmE2	Elkmound sandy loam, 20 to 30 percent slopes, eroded	1.7	0.1%
EmF	Elkmound sandy loam, 30 to 60 percent slopes	1.1	0.1%
HuA	Huntsville silt loam, 0 to 2 percent slopes	69.0	4.0%
KcB	Kickapoo fine sandy loam, 2 to 6 percent slopes	71.3	4.1%
PfB	Plainfield sand, 1 to 6 percent slopes	196.4	11.3%
PoA	Plano silt loam, gravelly substratum, 0 to 2 percent slopes	21.9	1.3%
PoB	Plano silt loam, gravelly substratum, 2 to 6 percent slopes	4.8	0.3%
SnE	Seaton fine sandy loam, loamy variant, 20 to 30 percent slopes	3.8	0.2%
SpB	Spinks and Plainfield loamy sands, 2 to 6 percent slopes	33.7	1.9%
SpC	Spinks and Plainfield loamy sands, 6 to 12 percent slopes	85.8	4.9%
SpD	Spinks and Plainfield loamy sands, 12 to 25 percent slopes	136.1	7.8%
W	Water	10.7	0.6%

Dane County, Wisconsin (WI025)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
WrC2	Warsaw silt loam, 6 to 12 percent slopes, eroded	5.0	0.3%
Wt	Watseka loamy sand	0.8	0.0%
Totals for Area of Interest		**1,738.9**	**100.0%**

Appendix E

Land Use Data

Dane-Iowa HUC 10 Land Use

Land Use	Soil Type	Area (acres)	Total Acres	Percentage of Watershed
Water	A	21.4	779	1.2%
Water	B	96.8		
Water	C	43.4		
Water	D	617.4		
Commercial	A	26.9	202	0.3%
Commercial	B	147.9		
Commercial	C	6.9		
Commercial	D	20.7		
Agriculture	A	1088.2	19,878	30.5%
Agriculture	B	12949.7		
Agriculture	C	985.7		
Agriculture	D	4854.2		
HD-Residential	A	173.8	1,556	2.4%
HD-Residential	B	1145.3		
HD-Residential	C	34.3		
HD-Residential	D	202.5		
LD-Residential	A	153.3	2,827	4.3%
LD-Residential	B	1859.9		
LD-Residential	C	192.1		
LD-Residential	D	621.2		
Grass/Pasture	A	423.1	16,768	25.7%
Grass/Pasture	B	11628.5		
Grass/Pasture	C	876.8		
Grass/Pasture	D	3839.6		
Forest	A	375.6	23,117	35.4%
Forest	B	11147.6		
Forest	C	1062.1		
Forest	D	10531.3		
Industrial	A	33.5	114	0.2%
Industrial	B	68.4		
Industrial	C	5.4		
Industrial	D	7.1		
Total Area:		**65240.6**		

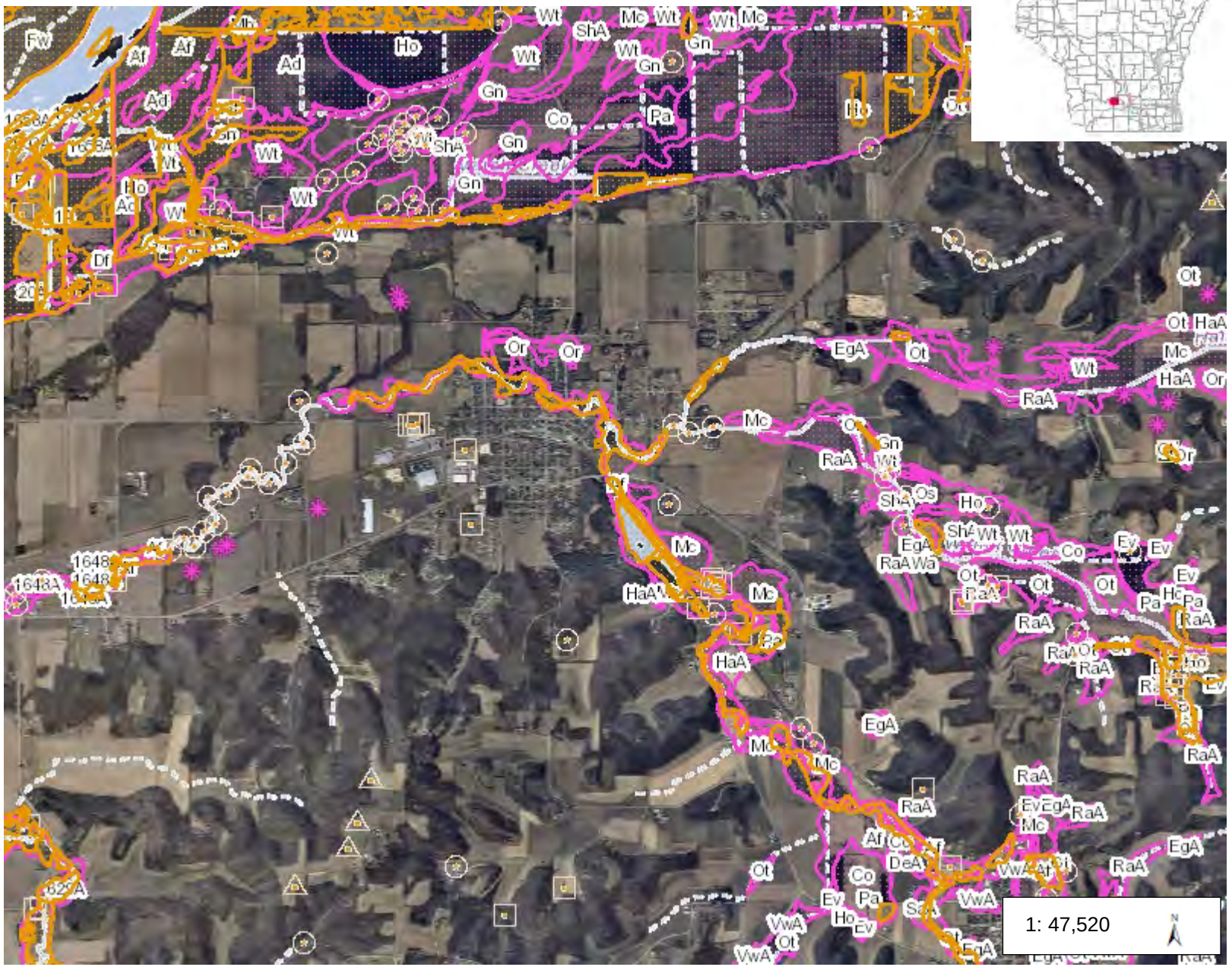
Dane-Iowa HUC 12 Land Use

Land use	Soil group	Area (acres)	Combined Acres	% of Total Acres
Open Water	B	21.35	27.8	0.3%
Open Water	D	6.45		
Open Space/Park	A	156.12	531.75	5.7%
Open Space/Park	B	282.89		
Open Space/Park	C	21.35		
Open Space/Park	D	71.39		
Low-Density Residential (general 1/3 - 2 ac lots)	A	174.14	394.31	4.2%
Low-Density Residential (general 1/3 - 2 ac lots)	B	181.03		
Low-Density Residential (general 1/3 - 2 ac lots)	C	5.78		
Low-Density Residential (general 1/3 - 2 ac lots)	D	33.36		
High-density Residential (townhomes to 1/4 ac lots)	A	25.13	50.03	0.5%
High-density Residential (townhomes to 1/4 ac lots)	B	24.46		
High-density Residential (townhomes to 1/4 ac lots)	D	0.44		
Commercial/Industrial/Transportation	A	20.46	24.69	0.3%
Commercial/Industrial/Transportation	B	4.23		
Barren Land	A	9.79	14.46	0.2%
Barren Land	B	4.67		
Deciduous Forest	A	455.02	2680.3	28.8%
Deciduous Forest	B	916.93		
Deciduous Forest	C	213.28		
Deciduous Forest	D	1095.07		
Evergreen Forest	A	29.13	107.19	1.2%
Evergreen Forest	B	3.11		
Evergreen Forest	D	74.95		
Mixed Forest	A	0.67	34.47	0.4%
Mixed Forest	B	7.56		
Mixed Forest	D	26.24		
Shrub; Scrub	A	47.37	114.53	1.2%
Shrub; Scrub	B	36.47		
Shrub; Scrub	C	5.78		
Shrub; Scrub	D	24.91		
Grassland; Herbaceous	A	25.58	56.27	0.6%
Grassland; Herbaceous	B	19.79		
Grassland; Herbaceous	C	3.56		
Grassland; Herbaceous	D	7.34		
Pasture/Hay	A	326.48	1586.57	17.1%
Pasture/Hay	B	916.93		
Pasture/Hay	C	123.43		
Pasture/Hay	D	219.73		
Cropland generalized agriculture	A	1094.63	3539.86	38.1%
Cropland generalized agriculture	B	1835.42		
Cropland generalized agriculture	C	145		
Cropland generalized agriculture	D	464.81		
Woody Wetlands (swamp)	A	8.01	41.37	0.4%
Woody Wetlands (swamp)	B	6.45		
Woody Wetlands (swamp)	C	0.22		
Woody Wetlands (swamp)	D	26.69		
Emergent Wetlands (marsh)	A	12.68	94.08	1.0%
Emergent Wetlands (marsh)	B	28.47		
Emergent Wetlands (marsh)	C	0.89		
Emergent Wetlands (marsh)	D	52.04		
Total		*9297.66*		

Appendix F

Wetlands Information

Dane-Iowa Surface Water Data Viewer Map



Legend

Wetland Class Points
- Dammed pond
- Excavated pond
- Filled excavated pond
- Filled/drained wetland
- Wetland too small to delineate

Filled Points

Wetland Class Areas
- Wetland
- Upland

Filled Areas

NRCS Wetspots

Wetland Indicators

Special Wetland Planning Streams
- Coastal Wisconsin Wetland Waters
- Special Area Management Plan
- Special Wetland Inventory Study

Special Wetland Planning Areas
- Coastal Wisconsin Wetland Waters
- Special Area Management Plan
- Special Wetland Inventory Study

Wild Rice Streams

Wild Rice Areas

2010 Air Photos (WROC)

Notes

1.5 0 0.75 1.5 Miles

NAD_1983_HARN_Wisconsin_TM

Appendix G

WWTF Effluent Phosphorus Data

Dane Iowa Wastewater Comission
Annual Loading Summary

	WWTP Effluent				
	Flow *MGD*	BOD *lbs/d*	TSS *lbs/d*	Total P *lbs/d*	Total P *mg/L*
2009	0.44	12.6	24.5	2.151	0.59
2010	0.39	13.4	26.1	2.2	0.66
2011	0.38	13.2	20.5	1.8	0.55
2012	0.31	8.6	17.6	2.1	0.79
2013	0.37	10.1	17.3	1.7	0.54
2014	0.36	4.9	8.2	0.8	0.27
2015	0.31	4.09	8.67	1.896	0.72
AVG	0.35	8.15	14.46	1.64	0.57
Max	0.38	13.16	20.53	2.09	0.79
Min	0.31	4.09	8.18	0.75	0.27
Highest Three Month Averages					
2009	0.55	26.0	43.6	5.9	1.29
2010	0.56	27.9	52.1	3.4	1.35
2011	0.44	30.4	41.6	2.5	0.83
2012	0.33	16.0	29.0	3.4	1.26
2013	0.44	18.6	27.0	3.5	1.15
2014	0.45	9.9	18.5	1.5	0.55
2015	0.34			3.2	1.21
AVG	**0.46**	**21.5**	**35.3**	**3.4**	**1.1**
MAX	**0.56**	**30.4**	**52.1**	**5.9**	**1.4**

Dane Iowa Wastewater Comission
Loading Summary

2009

	WWTP Effluent				
	Flow *MGD*	BOD *lbs/d*	TSS *lbs/d*	Total P *lbs/d*	Total P *mg/L*
Jan	0.50	16.9	41.4	1.2	0.30
Feb	0.53	24.1	42.2	1.5	0.34
Mar	0.59	35.2	47.2	5.3	1.04
Apr	0.52	18.8	37.9	6.7	1.53
May	0.52	17.7	22.5	5.8	1.31
Jun	0.44	9.3	19.5	1.5	0.39
Jul	0.39	5.4	10.1	0.5	0.15
Aug	0.36	2.5	10.2	0.5	0.15
Sep	0.34	2.0	8.6	0.4	0.12
Oct	0.35	3.3	12.4	0.6	0.19
Nov	0.35	4.2	17.2	0.6	0.21
Dec	0.34	12.2	26.4	1.2	0.45
Average Loading	0.44	12.6	24.6	2.1	0.6
Maximum	0.59	35.2	47.2	6.7	1.5
Minimum	0.34	2.0	8.6	0.4	0.1
High Month 1	0.59	35.21	47.19	6.69	1.53
High Month 2	0.53	24.07	42.17	5.82	1.31
High Month 3	0.52	18.76	41.40	5.29	1.04
Average of 3 High Values	0.55	26.02	43.59	5.93	1.29

Dane Iowa Wastewater Comission
Loading Summary

2010

	WWTP Effluent				
	Flow *MGD*	BOD *lbs/d*	TSS *lbs/d*	Total P *lbs/d*	Total P *mg/L*
Jan	0.35	28.0	48.5	2.3	0.70
Feb	0.33	30.8	59.5	3.8	1.35
Mar	0.31	24.9	48.2	3.2	1.26
Apr	0.26	7.9	12.1	3.1	1.44
May	0.22	7.7	12.4	1.3	0.67
Jun	0.29	4.0	4.7	0.6	0.21
Jul	0.54	2.5	10.1	1.2	0.27
Aug	0.64	0.0	12.8	1.1	0.33
Sep	0.51	2.8	13.7	3.0	0.68
Oct	0.46	9.2	22.3	2.7	0.70
Nov	0.41	20.8	28.4	1.6	0.47
Dec	0.35	24.3	41.1	2.0	0.66
Average Loading	0.39	13.6	26.1	2.2	0.66
Maximum	0.64	30.8	59.5	3.8	1.44
Minimum	0.22	0.0	4.7	0.6	0.21
High Month 1	0.64	30.79	59.52	3.81	1.44
High Month 2	0.54	27.97	48.55	3.22	1.35
High Month 3	0.51	24.91	48.16	3.15	1.26
Average of 3 High Values	0.56	27.89	52.08	3.39	1.35

Dane Iowa Wastewater Comission
Loading Summary

2011

	WWTP Effluent				
	Flow *MGD*	BOD *lbs/d*	TSS *lbs/d*	Total P *lbs/d*	Total P *mg/L*
Jan	0.34	34.2	49.8	1.6	0.57
Feb	0.36	27.5	45.0	1.7	0.57
Mar	0.42	29.5	30.1	1.6	0.47
Apr	0.44	13.1	14.8	0.9	0.24
May	0.44	4.8	10.6	2.4	0.67
Jun	0.45	10.4	15.8	2.2	0.58
Jul	0.42	3.9	5.9	0.6	0.19
Aug	0.39	2.7	7.5	2.2	0.66
Sep	0.34	1.1	7.4	2.9	1.02
Oct	0.33	9.6	19.2	2.3	0.79
Nov	0.34	7.5	15.8	1.2	0.42
Dec	0.32	13.9	25.6	1.4	0.53
Average Loading	0.38	13.2	20.6	1.8	0.55
Maximum	0.45	34.2	49.8	2.9	1.02
Minimum	0.32	1.1	5.9	0.6	0.19
High Month 1	0.45	34.19	49.77	2.92	1.02
High Month 2	0.44	29.53	45.04	2.42	0.79
High Month 3	0.44	27.55	30.05	2.29	0.67
Average of 3 High Values	0.44	30.42	41.62	2.54	0.83

Dane Iowa Wastewater Comission
Loading Summary

2012

	WWTP Effluent				
	Flow *MGD*	BOD *lbs/d*	TSS *lbs/d*	Total P *lbs/d*	Total P *mg/L*
Jan	0.31	16.4	30.9	1.8	0.64
Feb	0.30	13.8	28.9	1.2	0.47
Mar	0.31	11.3	23.3	1.4	0.50
Apr	0.31	7.6	15.0	2.1	0.81
May	0.31	4.7	12.2	1.2	0.45
Jun	0.31	0.9	7.6	0.8	0.30
Jul	0.32	0.4	6.8	0.7	0.25
Aug	0.30	1.2	7.9	2.8	1.04
Sep	0.29	2.9	10.2	3.3	1.35
Oct	0.30	12.8	22.4	2.5	1.03
Nov	0.31	18.0	27.3	3.2	1.19
Dec	0.35	12.6	18.3	3.6	1.24
Average Loading	0.31	8.6	17.6	2.1	0.79
Maximum	0.35	18.0	30.9	3.6	1.35
Minimum	0.29	0.4	6.8	0.7	0.25
High Month 1	0.35	17.95	30.92	3.64	1.35
High Month 2	0.32	16.37	28.92	3.34	1.24
High Month 3	0.31	13.77	27.28	3.16	1.19
Average of 3 High Values	0.33	16.03	29.04	3.38	1.26

2012

	WWTP Influent						
	Flow *MGD*	BOD *lbs/d*	TSS *lbs/d*	Total P *lbs/d*	Total P *mg/L*	NH3-N *lbs/d*	TKN *lbs/d*
Jan	0.32	810.4	743.5	20.4			
Feb	0.29	790.4	725.8	19.1			
Mar	0.30	885.0	690.8	19.5			
Apr	0.31	799.0	740.1	20.4			
May	0.31	899.0	794.0	22.4			
Jun	0.31	742.2	925.2	20.6			
Jul	0.30	699.2	780.3	24.5			
Aug	0.30	777.4	791.3	23.0			
Sep	0.29	838.1	864.4	22.3			
Oct	0.30	775.8	902.3	26.2			
Nov	0.30	938.2	1,160.6	24.4			
Dec	0.30	788.3	840.3	19.7			
Average Loading	0.30	811.9	829.9	21.9	#DIV/0!		
Maximum	0.32	938.2	1,160.6	26.2	0.00		
Minimum	0.29	699.2	690.8	19.1	0.00		
High Month 1	0.32	938.15	######	26.19	#NUM!		
High Month 2	0.31	899.05	925.23	24.47	#NUM!		
High Month 3	0.31	885.02	902.32	24.37	#NUM!		
Average of 3 High Va	0.32	907.41	996.04	25.01	#NUM!		

Dane Iowa Wastewater Comission
Loading Summary

2013

	WWTP Effluent				
	Flow *MGD*	BOD *lbs/d*	TSS *lbs/d*	Total P *lbs/d*	Total P *mg/L*
Jan	0.32	21.6	28.1	3.0	1.13
Feb	0.31	19.3	26.8	1.1	0.44
Mar	0.34	12.5	23.1	0.9	0.32
Apr	0.42	13.8	24.1	1.0	0.25
May	0.40	10.4	11.6	0.8	0.23
Jun	0.45	2.5	11.9	0.6	0.15
Jul	0.44	1.4	8.8	1.1	0.30
Aug	0.39	1.3	6.6	4.2	1.27
Sep	0.37	1.1	10.5	3.3	1.05
Oct	0.33	7.8	10.6	1.4	0.49
Nov	0.33	13.3	21.0	1.0	0.37
Dec	0.31	15.0	26.0	0.8	0.32
Average Loading	0.37	10.0	17.4	1.6	0.54
Maximum	0.45	21.6	28.1	4.2	1.27
Minimum	0.31	1.1	6.6	0.6	0.15
High Month 1	0.45	21.62	28.11	4.24	1.27
High Month 2	0.44	19.29	26.79	3.28	1.13
High Month 3	0.42	15.02	26.04	3.05	1.05
Average of 3 High Values	0.44	18.64	26.98	3.52	1.15

2013

	WWTP Influent						
	Flow *MGD*	BOD *lbs/d*	TSS *lbs/d*	Total P *lbs/d*	Total P *mg/L*	NH3-N *lbs/d*	TKN *lbs/d*
Jan	0.33	814.9	776.9	23.1	8.32		
Feb	0.32	743.7	691.5	18.0	6.81		
Mar	0.35	741.6	810.7	18.0	6.23		
Apr	0.43	850.2	977.8	23.6	6.64		
May	0.37	727.4	793.9	20.6	6.73		
Jun	0.43	824.9	915.0	22.2	6.23		
Jul	0.43	793.7	920.1	25.3	7.00		
Aug	0.40	749.8	813.3	22.0	6.60		
Sep	0.39	696.4	811.0	21.6	6.65		
Oct	0.37	701.2	857.8	19.3	6.25		
Nov	0.34	772.8	818.6	19.8	6.90		
Dec	0.29	655.4	703.4	17.1	7.01		
Average Loading	0.37	756.0	824.2	20.9	6.78		
Maximum	0.43	850.2	977.8	25.3	8.32		
Minimum	0.29	655.4	691.5	17.1	6.23		
High Month 1	0.43	850.22	977.79	25.32	8.32		
High Month 2	0.43	824.91	920.11	23.61	7.01		
High Month 3	0.43	814.94	915.01	23.06	7.00		
Average of 3 High Va	0.43	830.02	937.64	24.00	7.44		

Dane Iowa Wastewater Comission
Loading Summary

2014

WWTP Effluent

	Flow MGD	BOD lbs/day	TSS lbs/day	Total P lbs/day	Total P mg/l
Jan 2014	0.32	10.7	17.4	0.6	0.21
Feb 2014	0.45	10.9	23.2	0.6	0.15
Mar 2014	0.50	8.0	14.8	0.4	0.10
Apr 2014	0.39	6.8	9.6	0.4	0.12
May 2014	0.35	3.6	5.6	0.5	0.16
Jun 2014	0.35	3.8	3.4	0.3	0.10
Jul 2014	0.36	1.0	1.8	0.7	0.25
Aug 2014	0.33	1.1	2.4	1.5	0.53
Sep 2014	0.33	2.6	3.3	2.0	0.74
Oct 2014	0.31	2.9	4.5	0.9	0.36
Nov 2014	0.30	3.4	6.6	0.4	0.17
Dec 2014	0.30	3.9	5.6	0.7	0.28
Average	0.36	4.4	7.3	0.8	0.27
Minimum	0.30	1.0	1.8	0.3	0.10
Maximum	0.50	10.9	23.2	2.0	0.74
High Month 1	0.50	10.9	23.2	2.0	0.74
High Month 2	0.45	10.7	17.4	1.5	0.53
High Month 3	0.39	8.0	14.8	0.9	0.36
Average of 3 High Values	0.45	9.9	18.5	1.5	0.55

2014

WWTP Influent

	Flow MGD	BOD lbs/day	TSS lbs/day	Total P lbs/day	Total P mg/l
Jan 2014	0.29	513.7	477.1	12.8	5.31
Feb 2014	0.42	668.0	662.0	15.6	4.49
Mar 2014	0.47	637.0	630.7	15.0	3.85
Apr 2014	0.36	661.8	639.0	15.9	5.28
May 2014	0.34	718.0	724.1	17.1	5.95
Jun 2014	0.34	669.7	650.8	17.6	6.29
Jul 2014	0.34	607.4	603.4	18.3	6.41
Aug 2014	0.33	623.4	727.1	18.9	6.82
Sep 2014	0.29	571.7	591.0	15.4	6.42
Oct 2014	0.26	540.1	581.8	14.7	6.80
Nov 2014	0.25	544.5	657.6	14.8	7.07
Dec 2014	0.25	520.5	596.4	14.3	6.90
Average	0.33	614.7	642.2	16.1	6.03
Minimum	0.25	513.7	477.1	12.8	3.85
Maximum	0.47	718.0	727.1	18.9	7.07
High Mont	0.47	718.0	727.1	18.9	7.07
High Mont	0.42	669.7	724.1	18.3	6.90
High Mont	0.36	668.0	662.0	17.6	6.82
Average o	0.41	685.2	704.4	18.2	6.93

Dane Iowa Wastewater Comission
Loading Summary

2015

WWTP Effluent

	Flow MGD	BOD lbs/day	TSS lbs/day	Total P lbs/day	Total P mg/l
Jan-15	0.29	12.72	22.82	2.9	1.19
Feb-15	0.30	8.41	15.47	2.9	1.17
Mar-15	0.31	5.84	11.15	2.8	1.05
Apr-15	0.34	3.02	7.61	3.7	1.28
May-15	0.33	0.52	6.65	1.4	0.49
Jun-15	0.34	1.46	4.72	0.5	0.17
Jul-15	0.33	0.00	5.27	0.5	0.17
Aug-15	0.31	0.89	2.63	0.4	0.17
Sep-15	0.24	2.20	2.16	0.5	0.23
Oct-15	0.30	2.31	6.36	1.6	0.67
Nov-15	0.33	4.77	8.36	2.5	0.93
Dec-15	0.34	6.99	10.85	3.1	1.13
Average	0.31	4.1	8.7	1.9	0.72
Minimum	0.24	0.0	2.2	0.4	0.17
Maximum	0.34	12.7	22.8	3.7	1.28
High Month 1	0.34	12.7	22.8	3.7	1.28
High Month 2	0.34	8.4	15.5	3.1	1.19
High Month 3	0.34	7.0	11.1	2.9	1.17
Average of 3 High Values	0.34	9.4	16.5	3.2	1.21

2015

WWTP Influent

	Flow MGD	BOD lbs/day	TSS lbs/day	Total P lbs/day	Total P mg/l
Jan-15	0.22	393.07	451.14	12.4	6.60
Feb-15	0.21	328.80	397.91	10.5	6.09
Mar-15	0.26	527.51	585.23	15.6	7.24
Apr-15	0.28	552.28	691.70	15.1	6.52
May-15	0.29	589.46	868.35	17.5	7.23
Jun-15	0.28	514.67	765.88	16.0	6.78
Jul-15	0.28	538.19	638.72	15.7	6.83
Aug-15	0.28	584.33	731.06	16.5	7.13
Sep-15	0.28	534.82	791.19	17.6	7.68
Oct-15	0.27	542.01	797.12	17.7	7.99
Nov-15	0.30	595.43	799.98	17.6	7.00
Dec-15	0.31	493.99	505.38	16.6	6.49
Average	0.27	516.2	668.6	15.7	6.97
Minimum	0.21	328.8	397.9	10.5	6.09
Maximum	0.31	595.4	868.3	17.7	7.99
High Month 1	0.31	595.4	868.3	17.7	7.99
High Month 2	0.30	589.5	800.0	17.6	7.68
High Month 3	0.29	584.3	797.1	17.6	7.24
Average of 3 High Val	0.30	589.7	821.8	17.6	7.64

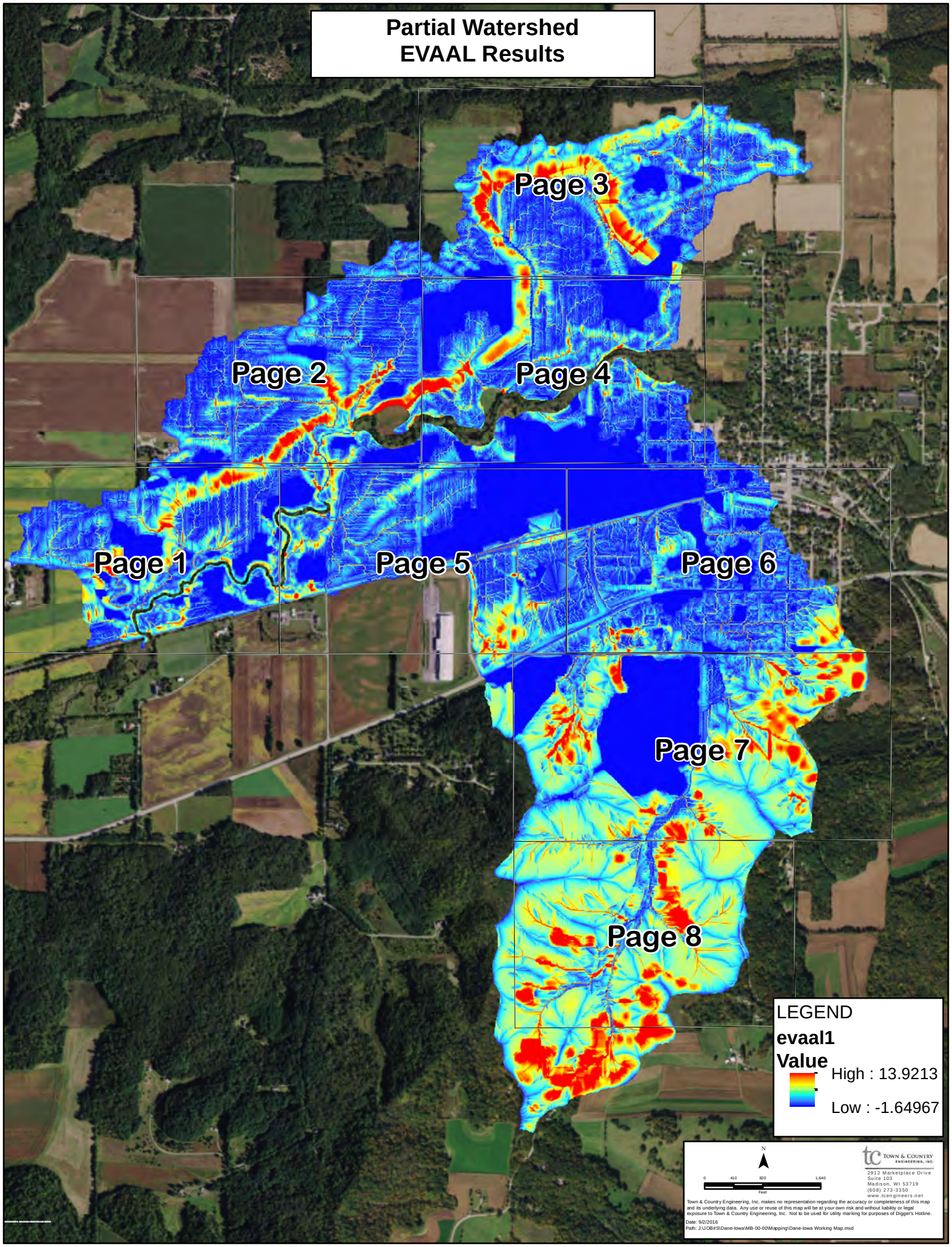
Cross Plains Effluent Phosphorus Summary

Year	Influent Flow MGD	Phosphorus Conc mg/l	Phosphorus Loading pounds/ day	Phosphorus Loading pounds/year
2009	0.41	0.42	1.49	545
2010	0.37	0.17	0.49	178
2011	0.39	0.25	0.79	289
2012	0.28	0.25	0.58	213
2013	0.40	0.34	1.14	414
2014	0.29	0.19	0.48	175
2015	0.25	0.30	0.62	226
Average	**0.34**	**0.27**	**0.80**	**291**
Maximum	**0.41**	**0.42**	**1.49**	**545**
Minimum	**0.25**	**0.17**	**0.48**	**175**

Appendix H

EVAAL Results

Partial Watershed EVAAL Results



Town & Country Engineering, Inc.
2912 Marketplace Drive
Suite 103
Madison, WI 53719
(608) 273-3350
www.tcengineers.net

Date: 9/2/2016
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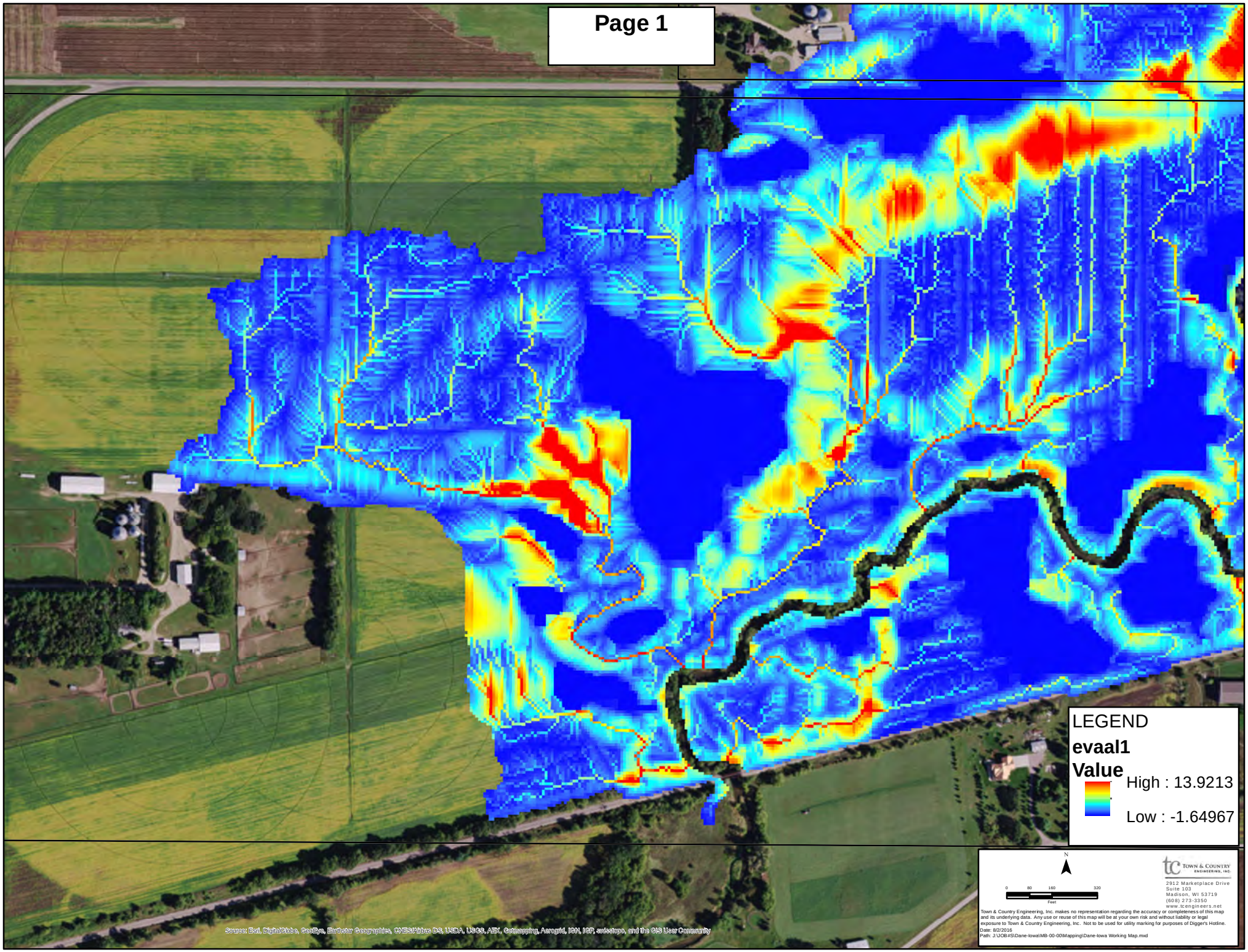

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Date: 8/2/2016
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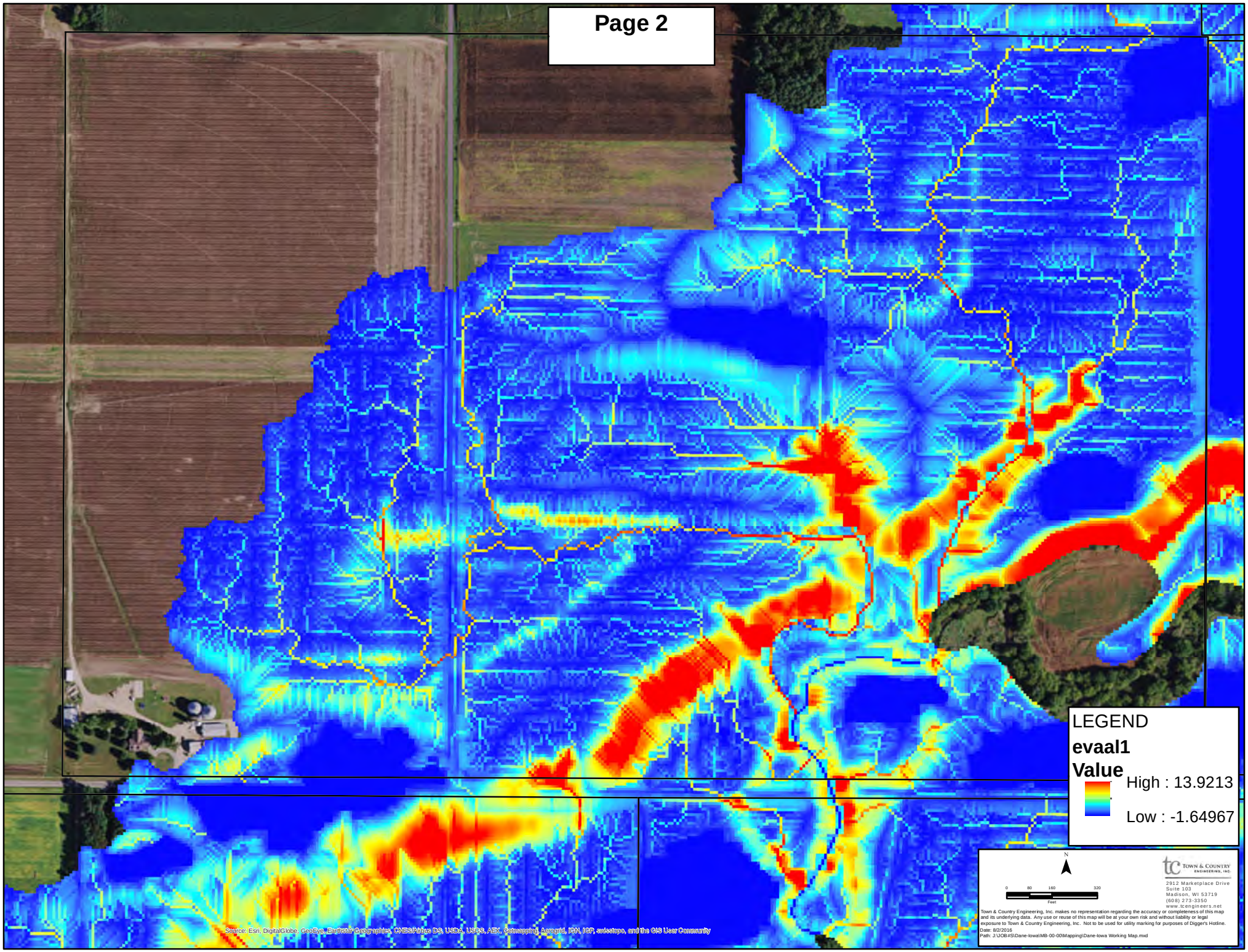

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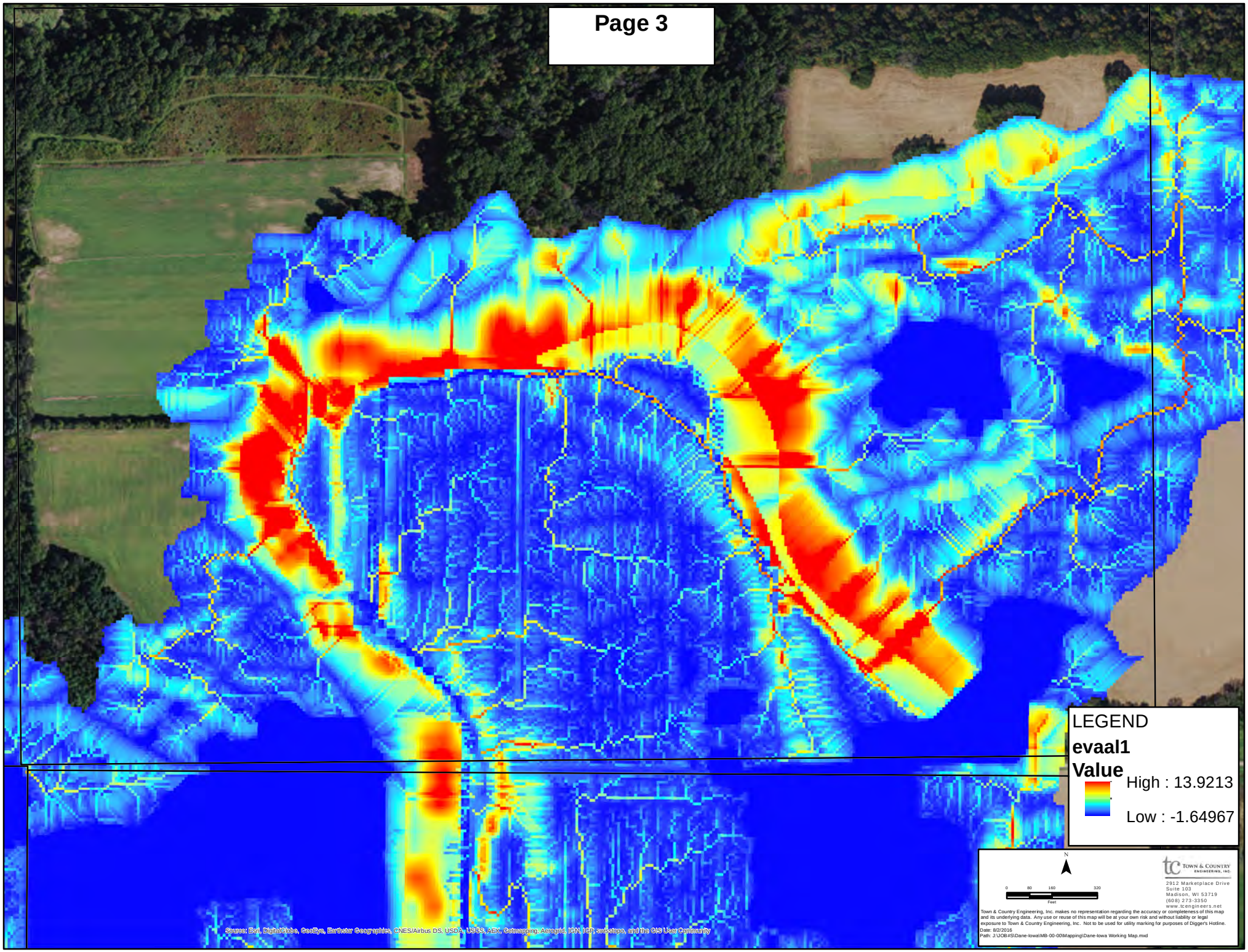
Path: J:\JOB#S\Dane-Iowa\MB-00-00\Mapping\Dane-Iowa Working Map.mxd



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Madison, WI 53719
(608) 273-3350
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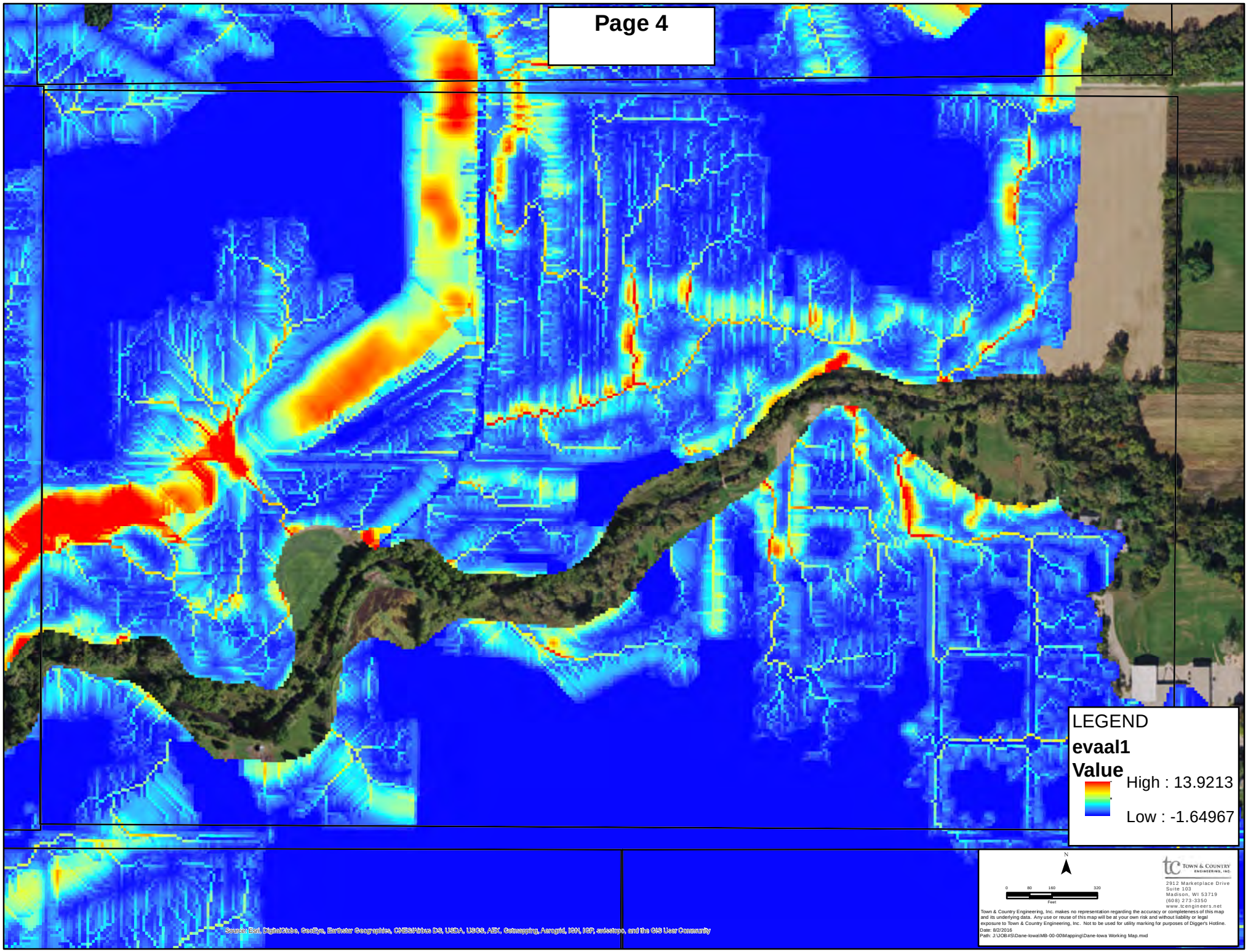

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2912 Marketplace Drive
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Date: 8/2/2016
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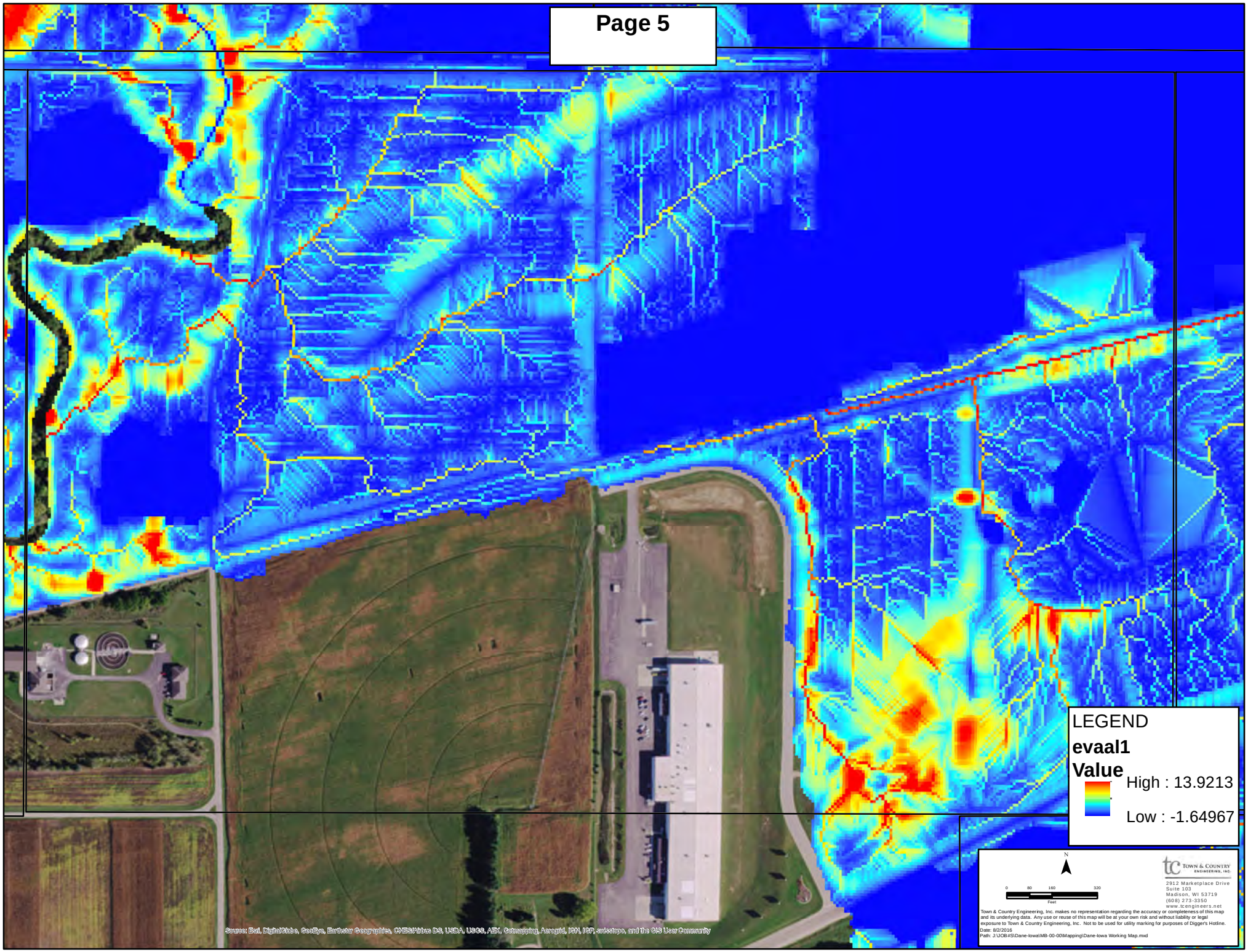

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Madison, WI 53719
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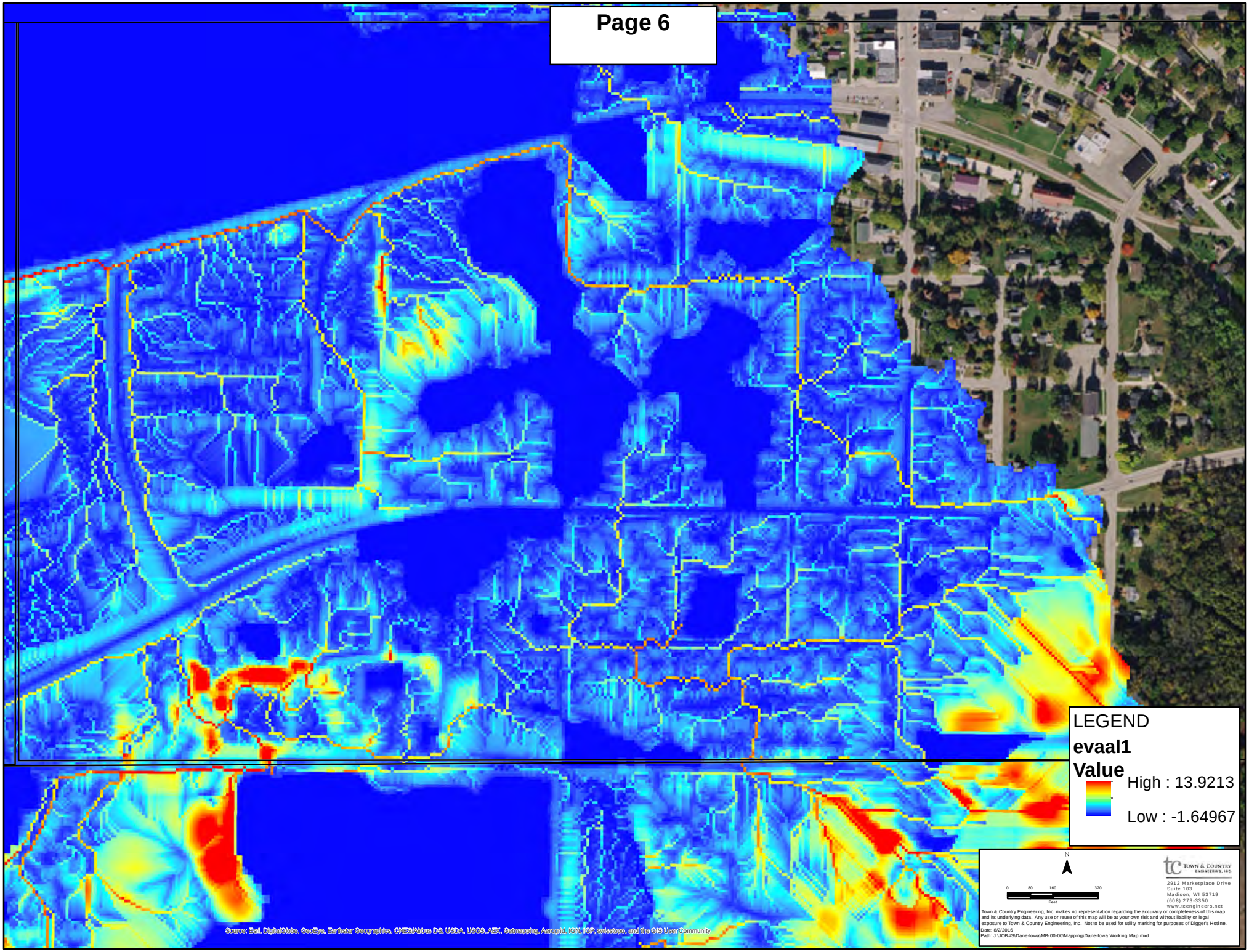

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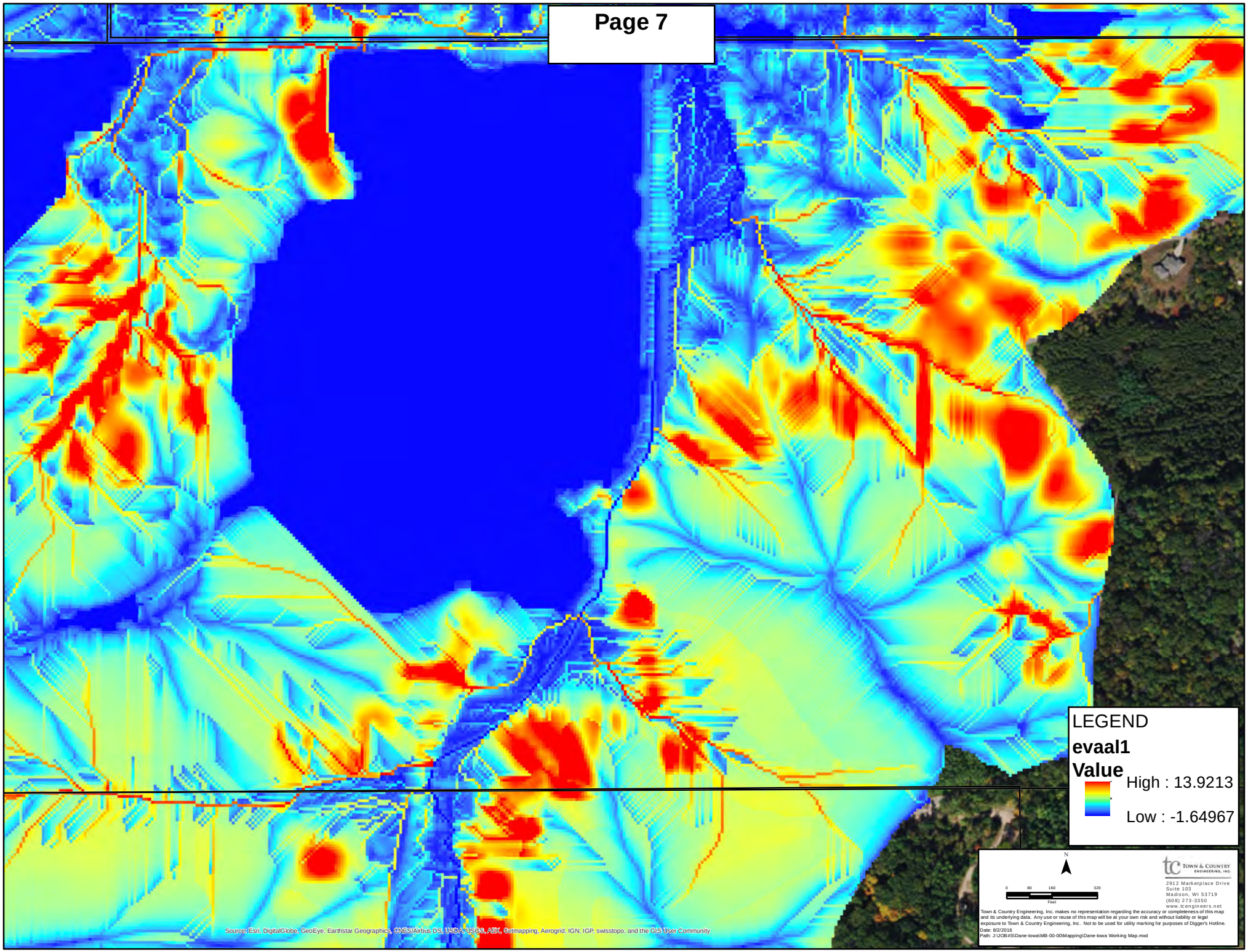
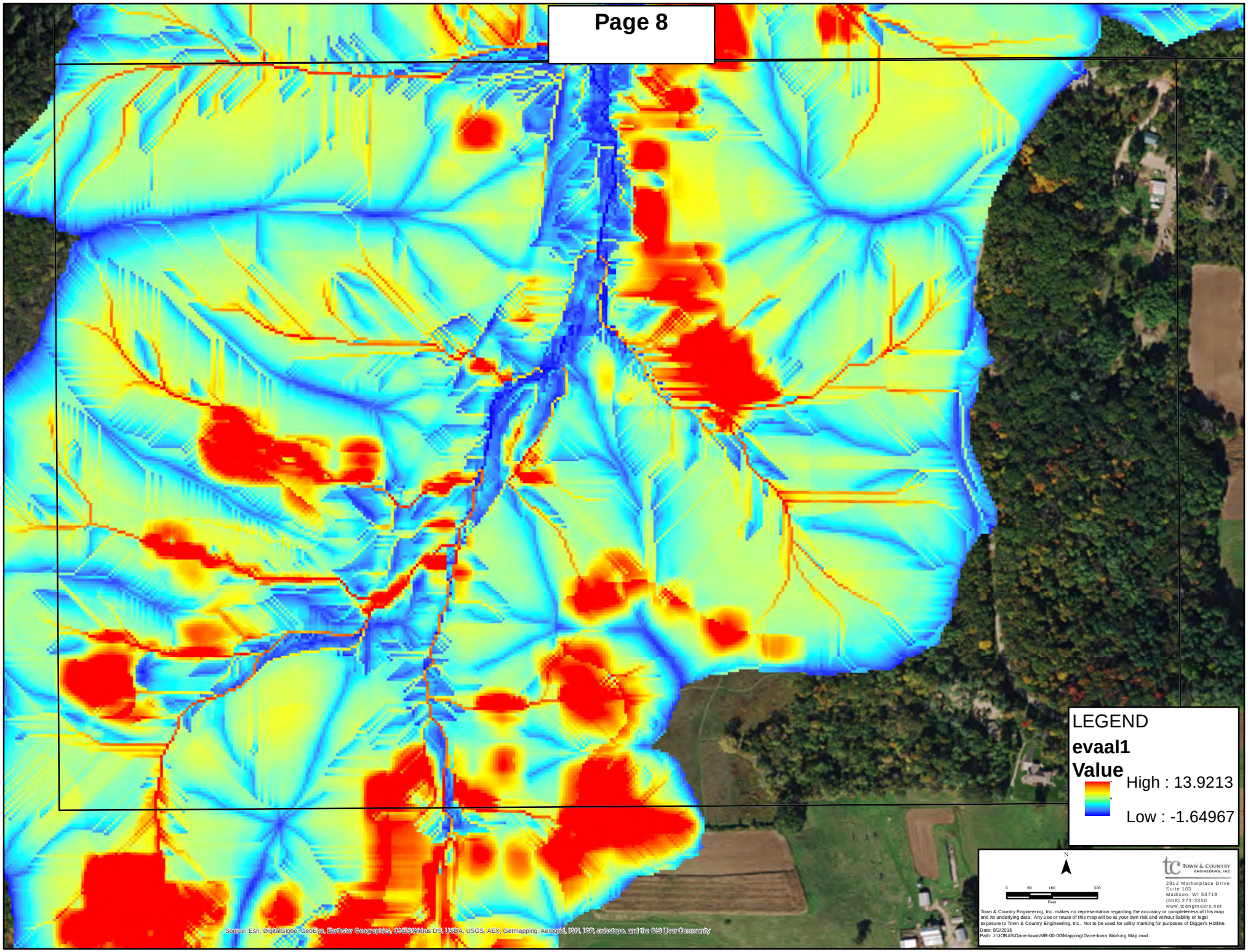


TOWN & COUNTRY ENGINEERING, INC.
2912 Marketplace Drive
Suite 103
Madison, WI 53719
(608) 273-3350
www.tcengineers.net

Date: 8/2/2016
Path: J:\JOB#S\Dane-Iowa\MB-00-00\Mapping\Dane-Iowa Working Map.mxd



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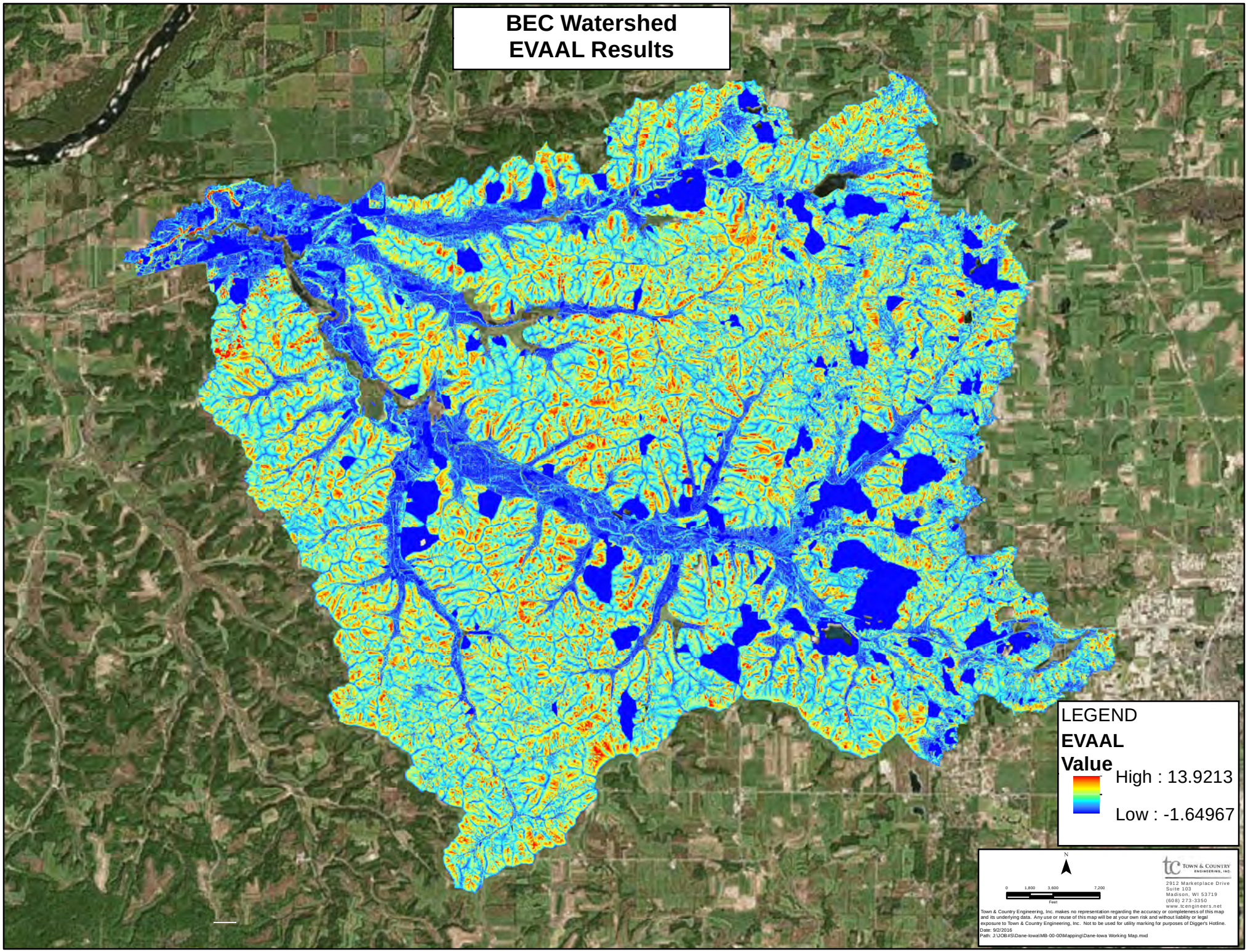
Date: 8/2/2016
Path: J:\JOB#S\Dane-Iowa\MB-00-00\Mapping\Dane-Iowa Working Map.mxd


BEC Watershed
EVAAL Results
LEGEND
EVAAL
Value
High : 13.9213
Low : -1.64967
N
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1,800
3,600
7,200
Feet
Town & Country Engineering, Inc. makes no representation regarding the accuracy or completeness of this map and its underlying data. Any use or reuse of this map will be at your own risk and without liability or legal exposure to Town & Country Engineering, Inc. Not to be used for utility marking for purposes of Digger's Hotline.
Date: 9/2/2016
Path: J:\JOB#S\Dane-Iowa\MB-00-00\Mapping\Dane-Iowa Working Map.mxd
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2912 Marketplace Drive
Suite 103
Madison, WI 53719
(608) 273-3350
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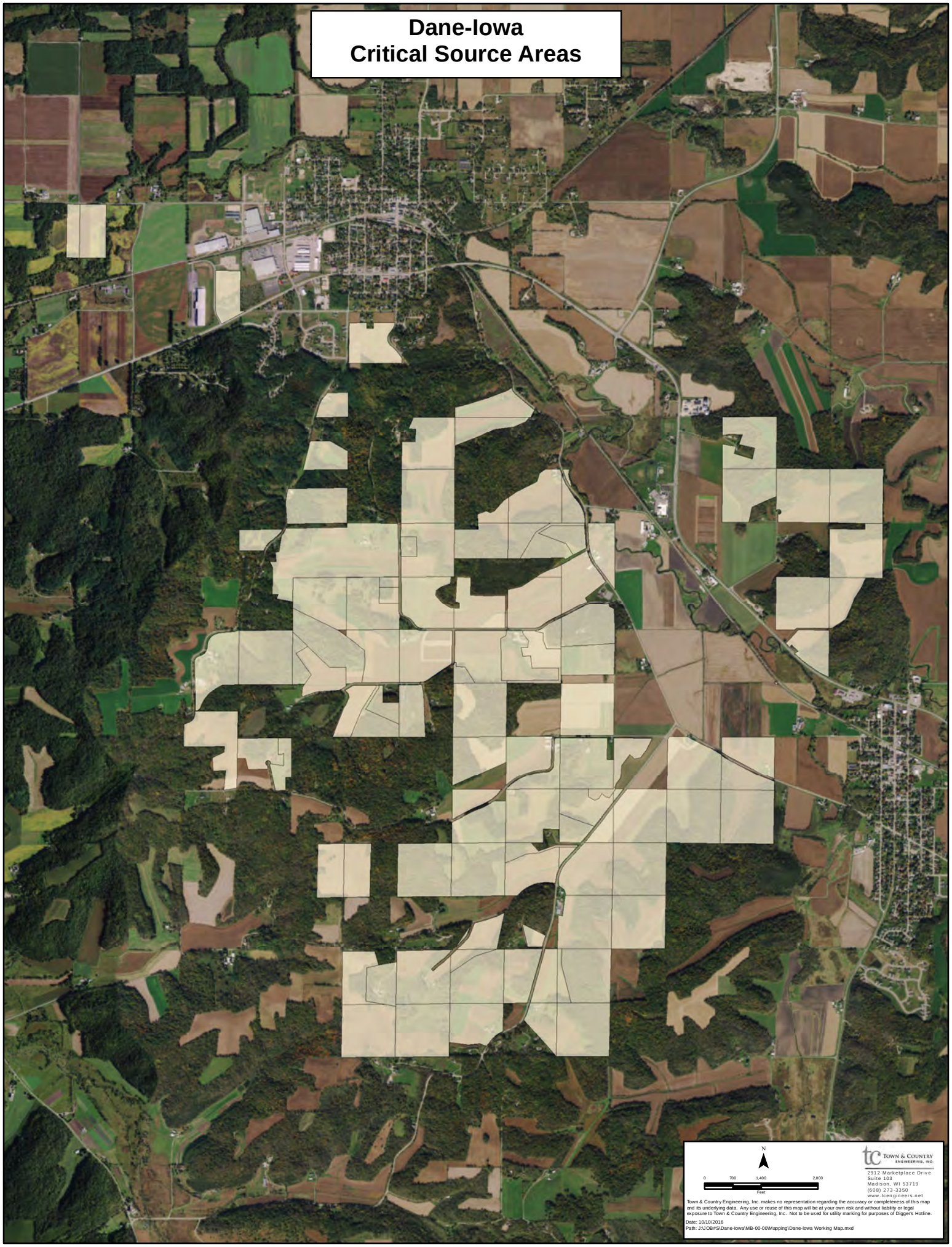
Dane-Iowa
Critical Source Areas



N

0 700 1,400 2,800

Feet

TOWN & COUNTRY ENGINEERING, INC.
2912 Marketplace Drive
Suite 103
Madison, WI 53719
(608) 273-3350
www.tcengineers.net

Date: 10/10/2016
Path: J:\JOB#'s\Dane-Iowa\MB-00-00\Mapping\Dane-Iowa Working Map.mxd

Appendix I

Proposed Sampling Locations

Dane-Iowa Possible Sampling Points

Possible Sampling Site for Tributary Halfway Prairie/ Wendt Creek

Possible Sampling Site for Tributary Garfoot Creek

Possible Sampling Site for Tributary Vermont Creek

LEGEND

N

0 800 1,600 3,200

Feet

TOWN & COUNTRY ENGINEERING, INC.
2912 Marketplace Drive
Suite 103
Madison, WI 53719
(608) 273-3350
www.tcengineers.net

Date: 9/22/2016
Path: J:\JOB#S\Dane-Iowa\MB-00-00\Mapping\Dane-Iowa Working Map.mxd

Appendix J

Commitment Letter from Dane County LWRD

DANE COUNTY LAND&WATER RESOURCES DEPARTMENT

Kevin F. Connors, Director
Joe Parisi, Dane County Executive

Land Conservation • Office of Lakes & Watersheds • Parks • Water Resource Engineering

April 27, 2017

Ms. Cassie Elmer
Town & Country Engineering, Inc.
2912 Marketplace Drive, Suite 103
Madison, Wisconsin 53719

SUBJECT: Dane-Iowa Adaptive Management Plan

Dear Ms. Elmer:

Dane County Land & Water Resources Department (LWRD) intends to assist the Dane-Iowa Wastewater Treatment Plant and Commission with implementation of their proposed adaptive management plan within the scope of the services typically provided by LWRD to landowners. A service agreement is proposed be developed between Dane-Iowa WWTP and Dane County and approved by the appropriate boards and commissions identifying services to be provided by LWRD as a broker for the Dane-Iowa adaptive management plan.

If you have additional questions, please contact me at (608) 224-3740 or callis.amy@countyofdane.com.

Sincerely,

Amy S. Callis, County Conservationist
Land Conservation Division
Dane County Land & Water Resources Department

cc: Brian Sroda, Dane-Iowa Wastewater Treatment Facility
Amy Garbe, Wisconsin Department of Natural Resources

Appendix K

Example Cost Share Contracts

COST-SHARE CONTRACT NO.:

SOIL AND WATER RESOURCE MANAGEMENT GRANT PROGRAM

Sec. 92.14, Wis. Stats

COST-SHARE CONTRACT

(DATCP approval required for cost-share amounts over $50,000)

This contract is made and entered into by and between **Dane** County Land Conservation Committee, and landowner(s) _____ and grant recipient(s) **N/A**. **This contract is complete and valid as of the date signed by the county representative.**

In consideration of the terms and conditions herein, the parties agree to this contract as set forth in the following Sections 1, 2, and 3, and any addenda that are annexed and made a part hereof.

NOTE 1: It is **not** necessary to notarize the spouse's signature unless this contract will be recorded. However, the spouse must sign his or her own name. If there are additional landowners or any grant recipients, check here ☐ and attach Exhibit A1. **NOTE 2:** Only properly authorized person(s) can sign in a representative capacity and must sign in such capacity if the landowner is a corporation, trust, estate, partnership, limited partnership, or limited liability company.

Recording Area

Agency Name & Return Address
Dane County Land & Water Resources
5201 Fen Oak Drive, Room 208
Madison, WI 53718

Parcel Identification Number

_____ _____
LANDOWNER/REPRESENTATIVE **DATE**
PRINT OR TYPE NAME: JAMES M. LUNDE

State of Wisconsin)
) ss.
_____County)

This instrument was acknowledged before me on _____ (date)

by_____
(name of landowner or representative)

as _____
(representative's position or type of authority, if applicable)

for _____
(name of entity on behalf of whom instrument was executed, if applicable)

_____ _____
SIGNATURE **PRINT NAME**
Notary Public, State of Wisconsin
My commission expires _____ (is permanent).

_____ _____
LANDOWNER/REPRESENTATIVE **DATE**
PRINT OR TYPE NAME: SHARON LUNDE

State of Wisconsin)
) ss.
_____County)

This instrument was acknowledged before me on _____ (date)

by _____
(name of landowner or representative)

as _____
(representative's position or type of authority, if applicable)

for_____
(name of entity on behalf of whom instrument was executed, if applicable)

_____ _____
SIGNATURE **PRINT NAME**
Notary Public, State of Wisconsin
My commission expires _____ (is permanent).

_____ _____
SIGNATURE OF COUNTY REPRESENTATIVE **DATE**
PRINT OR TYPE NAME: _____

State of Wisconsin)
) ss.
_____County)
This instrument was acknowledged before me on _____ (date)

by _____
(name of county representative)

as_____of _____

_____ _____
SIGNATURE **PRINT NAME**
Notary Public, State of Wisconsin
My commission expires _____ (is permanent)

This document was drafted by the Wisconsin Department of Agriculture, Trade and Consumer Protection.

Personal information you provide may be used for purposes other than that for which it was originally collected (Sec. 15.04(1) (m), Wis. Stats.)

COST-SHARE CONTRACT NO.:

SECTION 1A. COUNTY INFORMATION	PAGE 2 of 5
NAME OF COUNTY AGENCY **Dane County Land & Water Resources**	**TELEPHONE NUMBER** **608-224-3730**
ADDRESS **5201 Fen Oak Drive, Room 208**	**CITY, STATE, ZIP CODE** **Madison WI 53718**
NAME OF AUTHORIZED REPRESENTATIVE **Amy Callis – County Conservationist**	

SECTION 1B. LANDOWNER and GRANT RECIPIENT INFORMATION

TOTAL DATCP COST-SHARE AMOUNT (refer to page 5)	**NON-DATCP FUNDING BY SOURCE (refer to page 5)** ☐ **County $** ☐ **Other State Agency $** ☐ **Federal $** ☐ **Non-Profit or Other $**
NAME OF LANDOWNER (Check the description that best applies: ☒ **Individual (Note: Spouse must be included)** ☐ **Corporation** ☐ **Limited Liability Company** ☐ **Trust, Estate or Partnership** ☐ **Local Unit of Government)**	
ADDRESS	
CITY, STATE, ZIP CODE **WI**	**TELEPHONE NUMBER**

LOCATION OF COST-SHARED PRACTICE(S) (Locate by providing parcel numbers(s) or coordinates below or attach required information as Exhibit B)

Parcel Identification Number(s):

Latitude and longitude (degrees and minutes):
° . ' N ° ' W

Note: If this document will be recorded, attach a legal description of the location of the cost-shared practice(s) that meets the requirements of ss. 706.05(2m)(a) and 66.0217(1)(c), Wis. Stats.

NAME OF GRANT RECIPIENT, if different than above. NOTE: SPOUSE MUST BE INCLUDED **N/A**	
ADDRESS	
CITY, STATE, ZIP CODE	**TELEPHONE NUMBER**

INSTALLATION PERIOD

Each practice must be installed, and all costs associated with the practice must be incurred, by December 31st of the cost-share contract year, or December 31st of the year of an approved extension. This contract may provide cost-sharing for more than one year for the following items as long as the parties record the number of years of cost-sharing in the appropriate column in Section 3:

a. To install and maintain contour farming, cover and green manure crop, nutrient management, pest management, residue management, and strip-cropping (up to 4 years).

b. For land taken out of production for 10 years or other period specified in Section 3.

c. For riparian land taken out of production for 15 years or in perpetuity as specified in Section 3.

Disclosure of non-DATCP funding: By signing this contract, the landowner or grant recipient agrees to disclose all information related to any non-DATCP funding that has been or will be obtained to pay for practices described in this contract, and to authorize the county and DATCP to access files related to this funding, including release of county and federal files in accordance with the provisions of 16 U.S.C. 3844(b) (2) (D) (i).

Appeal Rights: The landowner or grant recipient may appeal to the county, in writing, any decision of the county land conservation department regarding this grant. The county will determine if the grantee is eligible for a hearing under Chapter 68, Wis. Stats.

Landowner Initials	Date	Spouse Initials	Date	Grant Recipient Initials	Date	Spouse Initials	Date	County Reps. Initials	Date

ADDENDA MAY BE ATTACHED TO THIS DOCUMENT TO RECORD SPECIAL CONDITIONS

A. The landowner/grant recipient agrees:

1. To install and maintain cost-shared practice(s) listed in Section 3, consistent with the plans and specifications referenced in Section 3, during periods identified in Section 3.
2. To make all payments for which the landowner/grant recipient (hereinafter referred to as "landowner") is obligated under this contract, as specified in Section 3. Landowners are responsible for all payments for state or local administrative permit fees.
3. To provide the county with evidence of payment, as applicable, for services, supplies, and practices performed or installed pursuant to this contract. Proof of payment may be in the form of a statement or invoice, or receipts or cancelled checks with the related vendor contract. For services provided by the landowner, the landowner shall submit a detailed invoice or cost-estimate for those services.
4. To maintain the cost-shared practice for at least 10 years from the date of installation, except for these "soft" practices: contour farming, cover and green manure crop, nutrient management, pest management, residue management, and strip-cropping. Soft practices must be maintained for each year cost-share funds are provided, as specified in Section 3. Extended maintenance periods apply if land is taken out of production for more than 10 years, as specified in Section 3.
5. To operate and maintain each cost-shared practice for the required maintenance period following the certification of installation or replace it with an equally effective practice. To refrain, during the maintenance period, from actions that may reduce a practice's effectiveness, or result in water quality problems. The landowner agrees to follow an operation and maintenance (O&M) plan or other maintenance requirements including those in ATCP 50.62, Wis. Admin. Code. All nutrient management plans must comply with s. ATCP 50.04(3), Wis. Admin. Code.
6. To repay cost-share funds immediately, upon demand by the county, if the landowner fails to operate and maintain the cost-shared practice according to the contract. Repayment of grant funds shall not be required if a practice(s) is rendered ineffective during the required maintenance period due to circumstances beyond the control of the landowner.
7. To the recording of this contract, including the legal description of the subject property, with the deed to the subject property, if cost-sharing exceeds $14,000 unless this contract cost-shares only practices listed in s. ATCP 50.08 (5) (b). This contract shall be recorded before the county makes any cost-share payment to the landowner. Upon recording, this contract constitutes a covenant running with the land described in Section 1B, and is binding on subsequent owners, heirs, executors, administrators, successors, trustees, and assigns, and users of the land for the period set forth in Section 3.
8. To comply with (i) the performance standards, prohibitions, conservation practices and technical standards under s. 281.16, Stats., (ii) plans approved under ss. 92.14, 92.15 (1985 Stats.), 92.10 and 281.65, Stats., and (iii) the practices necessary to meet the requirements of this contract, and to continue such compliance after the term of this contract, without further cost-sharing, if the landowner has received cost-sharing for compliance at least equal to the cost-sharing required under s. ATCP 50.08, Wis. Admin. Code. There is no requirement for continuing compliance for land that is taken out of production unless cost-sharing is provided.
9. To acknowledge receipt of a notice provided by the county explaining continuing compliance requirements arising out of the installation of specific cost-shared practices. (Initial here _____, _____, _____, _____.)
10. Not to discriminate against contractors because of age, race, religion, color, handicap, gender, physical condition, developmental disability, or national origin, in the performance of responsibilities under this contract.
11. To make any changes to this contract, including changes in project components and costs, according to the procedures set forth in Section 2.C.3.
12. To the county's right to stop work, or withhold cost-share grant funds, if it is found that the landowner, grant recipient, or construction contractor in their employ has violated ch. 92, Wis. Stats., ch. ATCP 50, Wis. Admin. Code, or has breached this contract.

Landowner Initials	Date	Spouse Initials	Date	Grant Recipient Initials	Date	Spouse Initials	Date	County Reps. Initials	Date

B. The county agency agrees:

1. To enter this cost-share contract only after the Land Conservation Committee has authorized the cost-sharing of this project.
2. To provide technical assistance for the design, construction, and installation of cost-shared practice(s) according to applicable standards in ch. ATCP 50, Wis. Admin. Code. The county agrees to provide written notice, when applicable, to inform each landowner and grant recipient of the full ramifications of a cost-share contract, including future compliance obligations. The county further agrees to ensure that cost-shared practices are maintained as required in II. A. 4 by securing O&M plans and performing site checks as needed.
3. To use the most cost-effective methods to address the water quality concerns of this project, and apply cost containment procedures, consistent with ch. ATCP 50, Wis. Admin. Code, when estimating and paying for cost-shared practice(s).
4. To provide cost-share funds to the landowner, in the amounts specified in Section 3 and any amendments, upon proof that (i) the landowner has made all payments for which the landowner is responsible under the contract, (ii) the practice(s) are designed and installed according to standards in ch. ATCP 50, Wis. Admin. Code and this contract, including compliance with applicable construction site erosion control standards, and (iii) nutrient management plans comply with s. ATCP 50.04(3) Wis. Admin. Code. The county may make payments to third parties as provided in s. ATCP 50.40(13), Wis. Admin. Code.
5. To collect and retain all contract-related documents regarding operation and maintenance, proof of certification of design and installation, change orders, receipts and payments, and other referenced materials for a minimum of three years after making the last cost-share payment to the landowner, or for the duration of the maintenance period of this contract, whichever is longer. Records may be retained longer to demonstrate that a landowner meets the cost-sharing exemption under s. ATCP 50.08(5), Wis. Admin Code. Payment records from the landowner and county must provide proof of payment in full for all cost-shared practices installed. Copies of records shall be made available to DATCP upon request.
6. To record this contract, including the legal description of the subject property, with the deed to the subject property, as required under Section 2.A.7. Contracts may be recorded if not required under Section 2.A.7.
7. To coordinate eligibility for DATCP cost-share funding, and to follow required reimbursement procedures to facilitate timely cost-share payment(s) to the landowner, including the submission of certification forms to DATCP documenting that cost-shared practice(s) have been properly installed in accordance with this contract and paid for.

C. General conditions of the contract

1. State cost-share reimbursement amounts in Section 3 are contingent on receiving DATCP funding. The county may cancel this contract, in whole or in part, due to non-availability of DATCP funds. A county is responsible for contract grant amounts when the county makes cost-share commitments beyond the amount of its DATCP annual allocation or the county fails to obtain DATCP approval required under 2.C.2.
2. Written approval from DATCP shall be obtained before this contract is executed or amended if the DATCP cost-share amount exceeds $50,000, and such approval shall be attached to, and made part of, this contract.
3. This contract may be amended, by mutual written agreement of the parties, during the installation or maintenance periods, if the proposed changes will provide equal or greater control of water pollution. For any changes in practice components or costs, the county will determine eligibility and whether to approve such changes. Counties must use a "Cost-Share Contract Change Order" form (ARM-LR-166) for changes prior to or during the installation and maintenance periods. Except as otherwise provided in the "Change Order" form, any completed "Change Order" form must be attached to, and made part of, this contract. Changes to this contract that increase the DATCP cost-share amount over $14,000 or $50,000 are subject to requirements in Sections 2.A.7., regarding recording and 2.C.2., regarding DATCP approval, respectively.
4. This contract is void if, prior to installation, the county determines that due to a material change in circumstances the proposed practices will not provide cost-effective water quality benefits.

Landowner Initials	Date	Spouse Initials	Date	Grant Recipient Initials	Date	Spouse Initials	Date	County Reps. Initials	Date

COST-SHARE CONTRACT NO.: LWRM #2 (2017)

SECTION 3. PRACTICES, COST, COST-SHARE AMOUNTS, AND INSTALLATION SCHEDULE

The parties agree to the following related to the conservation practices, technical design and specifications, eligible costs, cost-share rates and amounts, and rate set forth below.

Name of Person Preparing Technical Design: **Representing:** (COUNTY OR PRIVATE ENGINEERING FIRM) **Dane County Land & Water Resources**	**Technical Standards Used in the Design:** (LIST NAME AND DATE OF NRCS, DNR OR OTHER STANDARDS EMPLOYED IN THE DESIGN)	**USE OF THE 3 BOXES BELOW IS OPTIONAL** **REPRESENTING:** / **DATE OF APPROVAL:** **AMOUNT OF COST-SHARE CONTRACT APPROVED: $**

*	**Cost-Shared Item Description** ss. ATCP 50.62 to 50.98, 50.40 (15) & (18), & 50.08 (3) and (4)	**Yrs of CS****	**Quantity (Use Standard Units)**	**Unit Cost or Flat Rate $**	**Estimated Total Cost $**	**COST-SHARE RATE**			**ESTIMATED COST-SHARE AMOUNTS**		
						State %***	**Grantee %**	**County/ other %**	**DATCP $**	**Grantee $**	**County/other $**
☐											
☐											
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				TOTALS							

* Must check if the 50% maximum rate applies based on the installation of a practice after January 1, 2014 under one of these two conditions:
a. The practice is installed on land owned by a local governments
b. Cost-sharing is provided for access roads (ATCP 50.65) , roof runoff system (ATCP 50.85), stream bank or shoreline protection (ATCP 50.88), stream crossing (s. ATCP 50.885), or wetland development or restoration (ATCP 50.98) and the practice does not implement a farm performance standard.
** Enter the number of years the practice is cost-shared only if the contract provides for (a) more than one year of cost-sharing for soft practices (contour farming, cover and green manure crop, nutrient management, pest management, residue management, and strip-cropping), (b) land taken out of production for more than one year, or (c) CREP equivalent payments for riparian land taken out of production. For "soft practice" payments, the landowner receives the full contract amount after the practice is certified, and has a contractual obligation to maintain the practice for the number of years cost-shared. For "land out of production" payments under ATCP 50.08(3) (d), the landowner receives the sum of the landowner's annual cost for the period specified in the contract. A landowner's annual cost equals the number of affected acres multiplied by the per-acre weighted average soil rental rate in the county on the date of the cost-share contract. For CREP equivalent payments authorized under ATCP 50.08(4), the landowner receives an amount equal to the amount that would be offered under the CREP program if the affected lands were enrolled in that program. To receive a CREP- equivalent payment, a landowner must keep riparian land out of production for 15 years, or in perpetuity, and must agree to contract terms similar to those imposed by the CREP program. Insert "P" if the land is taken out of production in perpetuity. Cost-share practices must be operated and maintained in accordance with O&M plans and other requirements that may apply
*** May exceed 70 percent only if the farm landowner qualifies for economic hardship.

Landowner Initials	Date	Spouse Initials	Date	Grant Recipient Initials	Date	Spouse Initials	Date	County Rep. Initials	Date

Appendix L

Financial Security Statement

DANE-IOWA WASTEWATER COMMISSION
STATEMENT OF FINANCIAL SERCURITY

WHEREAS, the Dane-Iowa Wastewater Commission, Dane County, Wisconsin (the "Commission") owns and operates a municipal wastewater treatment system; and

WHEREAS, the Commission intends to implement an Adaptive Management Program (the "Project"); to comply with the water quality based effluent limits for phosphorus established by NR 102 and NR 217 and its Wisconsin Pollutant Discharge Elimination System (WPDES) permit; and

WHEREAS, the Commission expects to finance the Project with existing funds and user charges;

NOW, THEREFORE, the Dane-Iowa Wastewater Commission, Dane County, Wisconsin confirms that the Commission has the financial means to implement the project during the next WPDES permit term, beginning in July 2017.

Signed this 20th day of October, 2016.

Dane-Iowa Wastewater Commission President