WATERSHED ADAPTIVE MANAGEMENT PLAN

Cuba City Wastewater Treatment Facility
City of Cuba City, Wisconsin

February 2019

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1. INTRODUCTION AND BACKGROUND

1.1 Introduction

In 2010 the State of Wisconsin modified NR 102 and NR 217 to include new water quality based effluent limits for phosphorus. As a result, wastewater treatment facilities (WWTF) have begun to receive water quality based phosphorus limits in their new or re-issued Wisconsin Pollutant Discharge Elimination System (WPDES) permits from the Department of Natural Resources (DNR). As a part of the new rule, WPDES permits include a compliance schedule to evaluate compliance with these new effluent limits. The Cuba City WWTF received a re-issued permit in September of 2014. The current permit includes an interim phosphorus limit of 1.0 mg/L for monthly averages, a compliance schedule of 7-9 years with annual requirements, and target effluent limits of 0.075 mg/L for a 6-month average and 0.225 mg/L for monthly averages.

The City of Cuba City evaluated compliance options in the September 2017 Phosphorus Compliance Alternatives Plan and had previously selected to use RE-100 (SorbX) to chemically precipitate phosphorus to meet the new effluent phosphorus limits. Due to the escalating cost of these chemicals and the recent exploration of moving the City's point of phosphorus compliance for Watershed Adaptive Management, the City has decided to pursue Adaptive Management in lieu of utilizing SorbX.

1.2 Existing Facilities

While most of Cuba City is located in Grant County, the City's WWTF is located in Lafayette County and discharges to the Coon Branch of the Galena River (Galena (Fever) River, GP01-Grant-Platte River Basin). The WWTF was constructed in 1982, and the City has added sludge storage capacity in 1994, upgraded the aeration system in 1996, and upgraded the headworks, piping and electrical gear in 2000. The WWTF was last upgraded in 2009 when aeration and SCADA improvements were made at the facility, including the addition of DO and ORP probes as well as VFDs to improve process control and nutrient removal. The site plan is provided in Appendix A.

Wastewater treatment is achieved through preliminary and secondary processes. Preliminary treatment processes include mechanical screening only. Secondary treatment is achieved through the use of a single channel oxidation ditch and final clarifiers. Phosphorus removal is accomplished through a biological treatment process within the oxidation ditch only, with no facilities for chemical addition provided. A process flow diagram is provided in Appendix A.

The treatment process is set up to achieve biological nutrient removal (BNR) through the arrangement of anaerobic, anoxic and aerobic zones within the oxidation ditch. The anaerobic zone promotes the production of volatile fatty acids (VFAs) and the initial release of phosphorus into the mixed liquor. In addition the configuration of these different zones promotes the growth of phosphorus accumulating organisms (PAOs) which have been identified as being crucial to the biological nutrient removal mechanism.

These PAOs release stored polyphosphates while in the anaerobic environments and when they are in contact with VFAs. These PAOs then take up phosphorus while in the aerobic zone, which includes not only the previously released polyphosphates, but additional phosphorus in the influent wastewater. This is termed luxury uptake of phosphorus and results in a net decrease in the amount of soluble phosphorus in the liquid stream. Phosphorus is permanently removed from the liquid process through wasting of settled bio-mass from the final clarifiers and land applied.

Wastewater flowing to the WWTF comes from a combination of residential and commercial sources within the City. The population of Cuba City is 2,086 based on the 2010 census. Based upon the Department of Administration's estimates, the City is expected to grow slowly or retain a relatively stable population. The WWTF has no significant industrial dischargers.

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

Table 1-1
Cuba City WWTF Loadings Summary

Parameter	Current	Design	% Design
Average Flow (MGD)	0.197	0.300	66%
BOD (lbs/day)	308	1,050	29%
TSS (lbs/day)	267	1,050	25%

1.3 Phosphorus Compliance Evaluation

Per the requirements of the 2014 WPDES permit Phosphorus Compliance Schedule, the City of Cuba City 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 "Action Plans" to improve (reduce) phosphorus discharges from the WWTF:

1. Contact Major Industrial Contributors
    a. Update them on the new requirements for the WWTF
    b. Confirm continued land application of high strength wastes by industry
2. Collect Influent Phosphorus Data
3. Collect Recycle Loading Data
4. Collect Hauled Waste Data

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 options included:

1. New treatment technologies-alternate chemical addition
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. 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 City, and environmental benefits of each alternative.

The lowest cost, feasible alternative was found to be advanced treatment using SorbX®, followed by Water Quality Trading. As stated above, Watershed Adaptive Management had not been evaluated in the year three report. After discussions with the DNR regarding the limited data available at the discharge location, the point of compliance will now be located where the Coon Branch stream crosses Roaster Road. Adaptive Management is the most feasible alternative for the next permit term. The use of Watershed Adaptive Management for subsequent permit terms will depend on the success of Adaptive Management. The City may opt to switch to another compliance option, such as Water Quality Trading, following the first permit term.

1.4 Adaptive Management Eligibility

A permittee is eligible for Watershed Adaptive Management as long as the following three requirements are met:

- The receiving water is exceeding the applicable water quality criterion (WQC) for phosphorus, which is 0.075 mg/L for the Coon Branch.
- An upgrade to the existing facility would be required to comply with the new final effluent limit. It is expected that tertiary filtration (or similar means) in conjunction with chemical coagulation and/or polymer additions will be required to reach these levels. Tertiary treatment technologies include deep bed, continuously backwashing filters, cloth media disc filtration, and tertiary membrane filtration.
- Nonpoint sources contribute at least 50% of the total phosphorus entering the receiving water.

Based on these requirements, the City of Cuba City is potentially eligible for WAM. Only one data point for Coon Branch in-stream phosphorus concentrations is available from the DNR's Surface Water Data Viewer mapping software, at Station 333118 Coon Branch at Dump Road, which is approximately 3 miles downstream of the WWTF compliance point. The total phosphorus concentration at this point was 0.317 mg/L when sampled in July 2013. This point provides limited data for evaluation of the total phosphorus concentration in Coon Branch, so additional sampling has been conducted at Roaster Road and State Highway 11. Sampling will continue as described in Section 3.3.2.

The sampling results from July 18th to September 6th, 2018 had an average total phosphorus concentration at the point of compliance of 2.12 mg/L, provided in Appendix B. The sampling results determine that at the point of compliance, the stream is well above the 0.075 mg/L criterion. It is expected that tertiary filtration (such as deep bed, continuously backwashing sand filtration, cloth media filtration, or membrane filtration) or an equivalent technology, in conjunction with chemical coagulation and/or polymer additions, would be required to meet the 0.075 mg/L limit.

Per the DNR's PRESTO-Lite report, Appendix C, the point to non-point source phosphorus ratio is 31:69 for the one square mile watershed area at the point of compliance. According to these results the Cuba City WWTF meets all three requirements for the WAM program at the point of compliance.

The Cuba City WWTF will add chemical addition to their facility in order to meet the interim limit of 0.60 mg/L for the first permit term. The City plans on meeting the interim phosphorus limit by September 30, 2022, and will submit an abbreviated facilities plan to the DNR for the phosphorus treatment upgrade prior to the beginning of the project.

1.5 Adaptive Management Plan Components

The DNR has created a guideline for a successful Adaptive Management Program, which is outlined below 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 1-2.

Table 1-2
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	Sections 3.2.2, 5.8 & 5.9
Financial security	Section 6
Implementation schedule with milestones	Section 5.10

2. WATERSHED DESCRIPTION

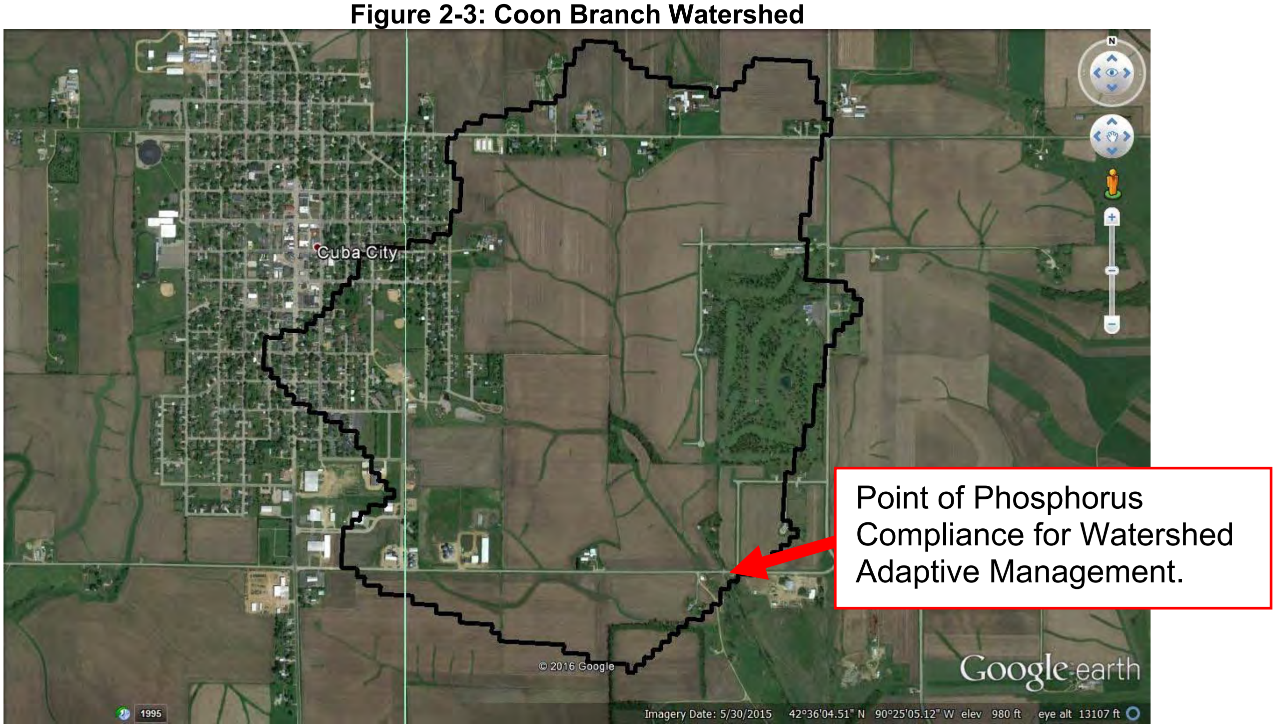
The Cuba City WWTF is located in the Galena River Watershed of the Grant-Platte River Basin. The WWTF discharges to an unnamed tributary of the Coon Branch of the Galena River, which then discharges to the Galena River. The DNR has agreed that the point of compliance for watershed-based programs like Adaptive Management would be where the Coon Branch meets Roaster Road. Throughout this report, the term “Coon Branch watershed” will be used to refer to the watershed upstream of this compliance point, and will be considered the action area for this adaptive management plan.

This section presents general information about the Coon Branch 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 Viewer, and the Nations 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

Maps of the HUC 10 (# 0706000503) and HUC 12 (# 070600050306) watersheds for the Cuba City WWTF are provided in Appendix D. Figure 2-3 shows the Coon Branch watershed area, which is approximately 1 square miles.

Figure 2-3: Coon Branch Watershed



2.2 Receiving Water Description

As mentioned previously, the Cuba City WWTF discharges to a tributary of the Coon Branch. At the point of discharge, the Coon Branch is classified as a LAL (Limited Aquatic Life) system. A complete map of the impaired waters in the Coon Branch watershed is included in Appendix D. Per NR 102.06 Section (3) Paragraph (a), Coon Branch is not listed as having a total phosphorus criterion of 0.1 mg/L, so it shall meet a total phosphorus WQC 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. Precipitation data (2008-2017) and climate data (2014-2018) for the Coon Branch were obtained from the National Oceanic and Atmospheric Administration (NOAA). Data from the Cuba City weather station were selected to represent the watershed. Average monthly temperatures range from a high of 67.4°F in July to a low of 18.4°F in January. Average monthly precipitation (both rainfall and snowfall) ranged from a high of 5.29 inches in July to a low of 1.29 inches in January. The average annual precipitation over the 10 years reported was 37.83 inches. Table 2-1 presents average monthly data for the reporting period.

Table 2-1
NOAA Climate Data

	Temperature			Precipitation		
	Min	Max	Ave	Min	Max	Ave
Month	(°F)	(°F)	(°F)	(inches)	(inches)	(inches)
Jan	-14	47	18.4	0.42	2.51	1.29
Feb	-12	51	20.4	0.42	3.11	1.45
Mar	-5	55	30.9	0.60	4.18	2.04
Apr	16	65	41.0	1.35	7.24	4.06
May	37	81	56.0	0.61	6.35	4.21
June	47	80	65.1	1.34	8.15	5.24
July	52	81	67.4	0.81	9.86	5.29
Aug	52	76	64.4	1.78	6.83	3.62
Sept	38	75	59.7	0.29	10.36	3.27
Oct	28	70	46.9	1.51	8.52	3.55
Nov	10	59	36.7	0.62	5.05	2.06
Dec	-10	58	25.7	0.53	4.56	2.11

(*) The three largest precipitation amounts occurred in September of 2018, July of 2011, and October of 2018.

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 Coon Branch watershed were Tama Silt Loam and Ashdale Silt Loam. Soil data was used in conjunction with additional data, such as land cover, in several modeling applications. Soil data can be used in calculating the Phosphorus Index (PI) of the land, selecting locations for phosphorus reducing projects, and modeling future phosphorus reductions. A soils report for the Coon Branch watershed is attached in Appendix E.

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 Coon Branch watershed is primarily made up of agricultural land, low-density residential, and grass/pasture. These major land use types make up 60%, 26%, and 11% of the watershed, respectively. A complete breakdown of land use for the Coon Branch watershed, as well as the HUC 12 watershed, is included in Appendix F.

2.6 Wetlands

The HUC 12 is spotted with few emergent and woody wetlands. These wetlands each make up 0.2% of the watershed by area. A complete map of the wetland results from the Surface Water Data Viewer is attached in Appendix G. A localized wetland map for the point of compliance is show in Figure 2-4. It is important to remember that wetland can be both a source of phosphorus or can aid in phosphorus reduction. For these reasons, wetland areas should be evaluated before starting any wetland restoration projects.

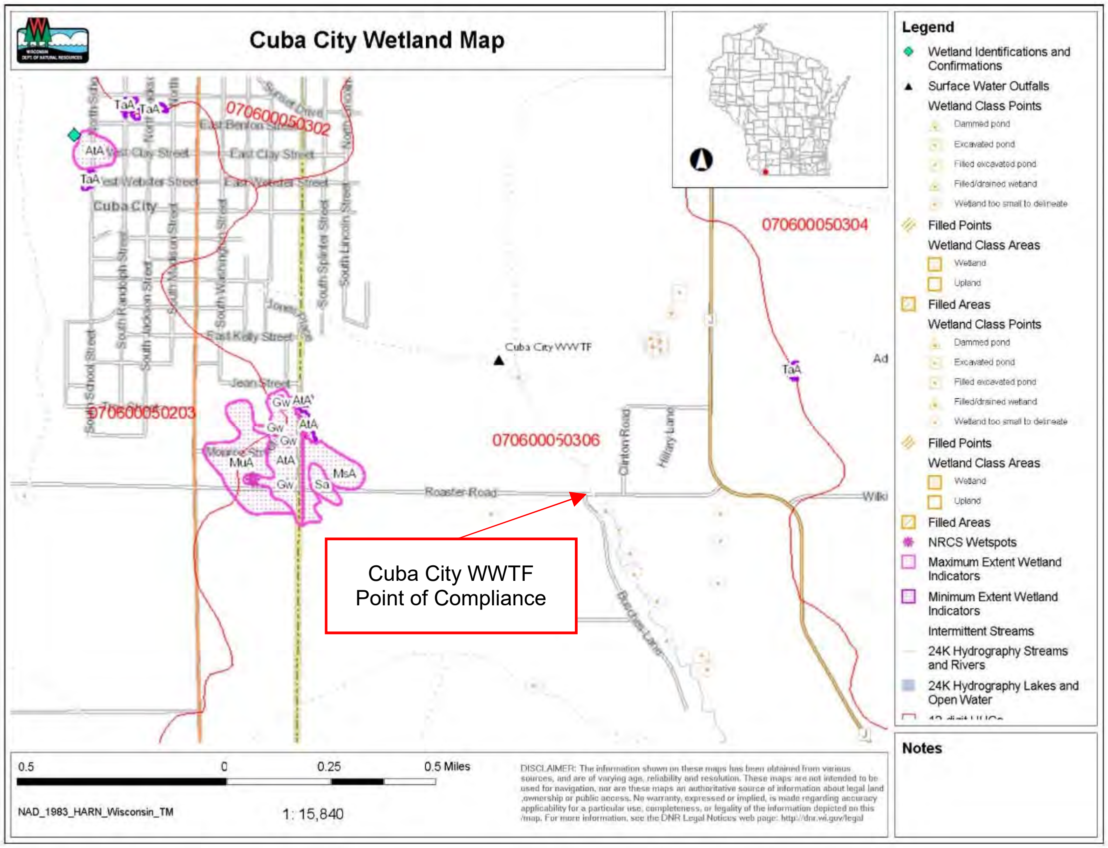


Figure 2-4: Cuba City Point of Compliance Wetland Map

3. WATERSHED INVENTORY

This watershed inventory for the Coon Branch is included to provide insight into where phosphorus management measures could be implemented.

3.1 Point Sources-Current Phosphorus Loads

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. In the Coon Branch watershed, there are no other point sources besides the Cuba City WWTF.

3.1.1 Municipal WWTFs

Current effluent phosphorus data for the Cuba City WWTF are provided in Appendix H and summarized in Table 3-1. Values for the daily and annual loads were calculated by using annual averages for flow and phosphorus concentration.

Table 3-1
Effluent Phosphorus Summary

Year	Annual Average Flow	Annual Average Phosphorus Concentration	Daily Phosphorus Loading	Annual Phosphorus Loading
	MGD	mg/L	lbs/day	lbs/year
2012	0.120	5.24	4.91	1,792
2013	0.150	5.11	5.80	2,117
2014	0.152	5.15	5.88	2,146
2015	0.147	5.69	6.41	2,340
2016	0.165	4.16	5.96	2,175
2017	0.158	3.63	4.46	1,628
2018	0.182	3.52	4.24	1,548

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 Coon Branch watershed, typical NPS pollution originates from erosion of farmland and streambanks, as well as runoff from barnyards.

3.2.1 Areas of High Erosion

One way to prioritize areas within a watershed that may be vulnerable to water erosion is with the DNR Erosion Vulnerability Assessment for Agricultural Lands (EVAAL) tool, which was 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 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 had to be obtained: LiDAR-based Digital Elevation Model, Area of Interest Boundary (Coon Branch Watershed), USDA-NRCS Soil Survey Geographic, and Culvert Lines. Using these datasets and the DNR's EVAAL tool, an EVAAL map for the watershed was created and is provided in Appendix I.

The results of the EVAAL tool revealed the highest vulnerability areas to be various farm fields throughout the watershed where gully erosion is evident. Although areas that may be vulnerable to erosion should be targeted for management measures, the accessibility of the land ultimately determines which areas can be targeted. Additionally, areas vulnerable to erosion that are located close to surface water will have a higher priority than more distant areas.

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. The 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 Coon Branch watershed, there are no outfalls defined as CAFOs with a WPDES permit.

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.

Barnyards are present in the Coon Branch watershed, but a barnyard inventory has not yet been performed. An initial inventory using aerial photography was conducted and identified 4 barnyards. One barnyard is located within 50 feet of the point of compliance in the Coon Branch. In addition another barnyard located within 300 feet of the Coon Branch with the other two just over 1,500 feet to the west of the Coon Branch. The Barnyard Inventory can be viewed in Appendix J.

These barnyards are considered to be possible Critical Source Areas.

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 to streams can lead to eutrophication.

The Coon Branch and its tributaries were inspected using aerial photography to attempt to identify areas that are in need of streambank repair, such as oxbows and steep banks. Due to the minimal flow volume through the Coon Branch and its tributaries, there were no obvious CSAs in the aerial photography. Areas of high erosion identified in the EVAAL model are potential CSAs and additional inspections of these CSAs will need to be conducted to determine their state of erosion.

3.2.5 Cole Acres Golf Course

A potential location for phosphorus runoff is the Cole Acres Golf Course. The golf course is located approximately 1,500 feet northeast of the point of compliance. The EVAAL Model displays the areas of potential high erosion near the Coon Branch tributary fed by the golf course. Additional information about the fertilizer applied at the golf course was needed to determine the significance of phosphorus runoff from this location. The City met with Cole Acres Golf Course and identified the current fertilizer being applied is 16-28-12. The golf course estimated 150 pounds per acre are applied annually. Therefore, the total annual phosphorus applied to the golf course is as follows:

$$0.28\,percent\ phosphorus\ x\ 3\,\frac{bags}{year}\ x\ 50\,\frac{pounds}{bags} = \mathbf{42}\,\frac{\frac{\boldsymbol{pounds}}{\boldsymbol{acre}}}{\boldsymbol{year}}$$

3.2.6 Phosphorus Nonpoint Source Summary

According to the DNR PRESTO-Lite model results, non-point sources are estimated to contribute approximately 69% of the phosphorus load within the Coon Branch watershed. The PRESTO-Lite watershed delineation report for the point of compliance in the Coon Branch watershed is provided in Appendix C. The PRESTO-Lite results for the Cuba City WWTF, provided by the DNR, is attached in Appendix K. While the quantities of phosphorus contributed from each of the nonpoint 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. In addition, a nearby golf course, Cole Acres, is a potential for phosphorus management measures.

3.3 Stream Monitoring Program

3.3.1 Historic Phosphorus Data

Only one data point for Coon Branch in-stream phosphorus concentrations is available from the DNR's Surface Water Data Viewer mapping software, at Station 333118 Coon Branch at Dump Road, which is approximately 3 miles downstream of the WWTF compliance point. The total phosphorus concentration at this point was 0.317 mg/L when sampled in July 2013. This point provides limited data for evaluation of the total phosphorus concentration in Coon Branch, so additional sampling has been taken downstream of the discharge location where the Coon Branch meets Roaster Road and where the Coon Branch meets State Highway 11.

The sampling results from July 18th to September 6th, 2018 had an average total phosphorus concentration at the point of compliance of 2.12 mg/L, provided in Appendix B. Additional sample collection at the Roaster Road location will continue bi-monthly starting in May 2019 to October 2019.

Table 3-2
In-Stream Phosphorus Analysis

Sample Date 2018	**Roaster Road Phosphorus Conc. (mg/L)**	**State Highway 11 Phosphorus Conc. (mg/L)**
July 18	4.60	0.30
July 25	1.56	0.27
August 1	0.24	0.06
August 8	2.65	0.28
August 14	3.15	0.44
August 23	1.85	0.25
August 28	2.33	0.30
September 6	0.56	0.26
Average	**2.12**	**0.27**

3.3.2 In-Stream Sampling Program

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

One sampling point is proposed for monitoring in-stream phosphorus concentrations at the point of compliance. Samples will be taken where the Coon Branch meets Roaster Road, located at 42°35'41.01"N and 90°24'44.06"W. There is no SWIMS ID currently associated with this point. Appendix L includes a map of the point of compliance sampling location along with the State Highway 11 location previously considered.

In addition to in-stream phosphorus sampling, the Cuba City WWTF staff will continue to collect composite effluent phosphorus samples at the outfall three times a week, in accordance with the WPDES permit. Samples will be sent to LV Laboratory in Lancaster, where the stream samples will be analyzed for phosphorus using SM 4500 PE - 1999, and the effluent samples will be analyzed using EPA method 365.1. Stream samples will be collected every other Wednesday by the Cuba City WWTF staff, from May to October Samples will be collected from the center of the stream (or the portion of the stream with the strongest flow) at a depth of 3 to 6 inches below the surface, and then placed into preserved sample bottles for future analysis by (method SM4500-PE 20 ed.). Phosphorus samples will meet the preservation requirements in ch. NR 219, Wis. Adm. Code, Table F, by having acidified sample bottles and a cooler with ice present for sample collection. Care will be taken while sampling to avoid disturbing the sampling site.

In-stream flow measurements will be taken at Roaster Road. Town and Country has contacted the USGS in order to establish a stage-flow relationship for this point in the stream. Once established, the City will measure the stage of the creek during sampling events to determine the flow.

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 may be advantageous to offset more than the minimum reduction required to improve the chances of success for Adaptive Management.

Variables for calculations:

- Average flow (2016-2018) of the Cuba City WWTF= **0.160 MGD**
- Permit Term 1 interim limit monthly average effluent phosphorus concentration =**0.60 mg/L**

- Annual mean flow of Coon Branch (from DNR's SWDV) at the Point of Compliance= **0.44 MGD**
- Mean phosphorus concentration of Coon Branch at the point of compliance **=2.12 mg/L**

$$0.44\ MGD x\ 2.12\ \frac{mg}{L} x\ 8.34\ x\ 365 \frac{days}{year} = \mathbf{2,840} \frac{\mathbf{pounds}}{\mathbf{year}}$$

- 8.34= unit conversion
- Water Quality Criterion for phosphorus= **0.075 mg/L**

Term1:
Step 1: Calculate the current discharge as an annual load.

$$0.160\ MGD x\ 0.60\ \frac{mg}{L} x\ 8.34\ x\ 365 \frac{days}{year} = \mathbf{293}\ \frac{\mathbf{pounds}}{\mathbf{year}}$$

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

$$293 \frac{pounds}{year} + 2{,}840 \frac{pounds}{year} = \mathbf{3,133} \frac{\mathbf{pounds}}{\mathbf{year}}$$

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

$$\frac{293 \frac{pounds}{year}}{3{,}133 \frac{pounds}{year}} * 100 = 9.35\%$$

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

$$(0.160MGD +\ 0.44MGD) * 0.075 \frac{mg}{L} * 8.34 * 365 \frac{days}{year} = 137 \frac{\mathbf{pounds}}{\mathbf{year}}$$

Step 5: Calculate the needed reduction in the receiving water

$$3{,}133 \frac{pounds}{year} - 137 \frac{pounds}{year} = \mathbf{2,996} \frac{\mathbf{pounds}}{\mathbf{year}}$$

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

$$2{,}996 \frac{pounds}{year} * 9.35\% = \mathbf{280} \frac{\mathbf{pounds}}{\mathbf{year}}$$

For the first permit term of 5 years, the Cuba City WWTF needs to reduce at least 280 pounds of phosphorus a year throughout the Adaptive Management program. However, in order to meet water quality goals in Coon Branch, a higher level of reduction should be targeted during the first permit term. Ideally, 30-50% of the overall needed reduction (2,996 lbs) will be targeted within the first 5 years. These reductions will be accomplished by a combination of management measures as described in Section 4.3. In order to calculate the expected phosphorus load reductions, modeling tools (such as EVAAL, SnapPlus 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 allowable load 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. Currently, the City of Cuba City is planning to have a phosphorus reduction of approximately 2,250 pounds a year (75% of total required reduction) by the end of the second term.

To calculate the phosphorus load reduction for the third permit term, any remaining phosphorus load above the water quality criterion will be the reduction needed for Permit Term 3. The ultimate goal of Permit Term 3 will be to get the receiving water to a phosphorus concentration of 0.075 mg/L. Currently, Cuba City is planning to have the full quantity of phosphorus reductions required to result in the allowable load of phosphorus in the receiving water, which is 2,996 pounds a year.

3.5 Sensitivity Analysis

In order to estimate the total acreage needed for management measures, a sensitivity analysis was constructed. For each acre of land, varying amounts 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 Cuba City WWTF's first permit term of Adaptive Management if only field-based practices are utilized.

Table 3-3
Phosphorus Reduction Sensitivity Analysis

Pounds of P reduction/ acre	Acres needed for Permit Term 1
0.5	560
1	280
2	140
3	93

For the first permit term, 93 to 560 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 City and Lafayette County Land Conservation Department to determine the actual reductions from management measures.

4. PROJECT PLANNING

4.1 Partners

The success of Adaptive Management depends on the joint effort of many partners, and it is important to identify the roles and responsibilities of each partner at the onset of the project. For the Cuba City Adaptive Management Plan, the following governmental, professional, and local partners have been identified:

4.1.1 WPDES Permit Holder

The Cuba City WWTF is operated by the City of Cuba City and treats domestic wastewater from the City with no significant industries. The WWTF has ample capacity for current and future loads. Wastewater treatment is achieved through preliminary and secondary processes. Treatment includes raw wastewater screening, oxidation ditch with biological phosphorus removal process, and final clarifiers. The WWTF will be adding chemical precipitation facilities in the next few years.

The City of Cuba City will be responsible for financial matters, sampling, stream monitoring, meeting the facility's interim phosphorus limits, generating annual reports, and working with landowners to establish management practices.

4.1.2 Town and Country Engineering

Town and 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 and Country designed the Cuba City WWTF upgrades in 2000 and 2009, and has since assisted with upgrades and operations. Town & Country works with the City to ensure that the treatment plant is operating most efficiently, and has assisted the City 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 Lafayette County Land Conservation Department

The Land Conservation Department's (LCD) main duty pertains to soil and water conservation along with Farmland Preservation. Other duties involve conservation of native plant communities, invasive species management and an annual tree sale. The LDC also coordinate with other agencies for locally led, county, state, and federal conservation programs and initiatives.

Lafayette County LCD has worked with other communities with respect to agricultural conservation practices, and was contacted by Cuba City to assist with several aspects of the adaptive management process.

For non-urban practices Lafayette County LCD will act as the broker between the City and landowners in establishing cost sharing agreements and will assist in field-verifying adaptive management practices. Their responsibilities will include modeling with SnapPlus and BARNY (and any other models required), assisting with grants, mapping, estimating load reductions, and conducting site inspections. A service agreement will be developed in the future for any projects requiring Lafayette Country LCD's assistance. A letter of support included in Appendix M.

4.1.4 Local Landowners and Agricultural Producers

Farmers in the Coon Branch watershed are typically cash croppers or raise livestock. According to the land use data obtained by L-THIA, Cropland generalized agriculture makes up approximately 60% of land in the Coon Branch watershed.

Cuba City and the Lafayette County LCD will establish contracts with landowners to install or implement management measures. If established in the contract, 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 being conducted by the Lafayette County LCD.

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:

- *Gathering Waters Conservancy*: is an alliance that 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.

- *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 Cuba City Adaptive Management Plan.

4.1.6 Summary of Partners

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

Table 4-1
Roles and Responsibilities

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

4.2 Areas of Phosphorus Reduction

For the Coon Branch watershed, both point and nonpoint source phosphorus reductions will occur. Traditional point source reductions will occur at the Cuba City WWTF, by maximizing the efficiency of the current biological phosphorus removal, in combination with chemical additions when needed. Currently, Cuba City is averaging 3.07 mg/L to 5.69 mg/L of effluent phosphorus from 2012-2018, but they are confident they will be able to meet the interim limits assigned to them for each permit term, which are 0.60 mg/L for the first term and second term, and 0.50 mg/L for the third term. Nonpoint source reductions are described in the following sections.

4.3 Nonpoint Source Management Measures

Nonpoint reductions will be obtained using a combination of Best Management Practices (BMPs) that are described in the following sections. Information about BMPs was obtained from the NRCS website. Most of these BMP's apply only to agricultural land, but some may also be used in urban areas.

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, nutrient management plans are devised using analysis from SnapPlus modeling. Currently, many farmers are already utilizing nutrient management plans, so there may not be many opportunities to reduce phosphorus loading further with this method. The Lafayette County LCD will help identify target areas for nutrient management planning.

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 Coon Branch 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 Coon Branch watershed. These buffers include grassed waterways, contour grass strips, and buffer strips. Details about these buffers and how each of these buffers may be utilized in the Coon Branch 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 perennial 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. Contour grass strips established on the contour can significantly reduce sheet and rill erosion, as well as slow runoff and trap sediment. Since the Coon Branch watershed has some areas of steep slopes, contour grass strips may be a viable option for these parcels. Farm parcels will be evaluated during site visits to determine the effectiveness of contour grass strips.

Buffer Strips

Buffer strips create soil stability between areas that are utilized for crops and streams or water features. They are designed to intercept sediment and other pollutants before they enter the stream. One program that has been used in Lafayette County is the FSA Conservation Reserve Enhancement Program (CREP) that allows farmers to establish a perennial grass cover in return for an annual payment. Eligible land must have a crop history (been planted with a commodity crop in 2 out of the last 5 years) or meet the qualifications of marginal pastureland. Potential buffer strip areas will be assessed for eligibility during site visits.

4.3.4 Tillage Changes

Changing the tillage practices on cropland can provide effective control to 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.

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 and less potential for runoff and nutrient loss. 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. Runoff control practices can be installed to reduce the amount of manure, and therefore phosphorus, entering surface water. The most common practices for manure management include improved collection and storage, as well as optimizing application rates. The need for and feasibility of manure management will be assessed on a case-by-case basis upon recommendations by the Lafayette County LCD.

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 that has accumulated 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. Roof gutters, surface water diversions and drip trenches can also keep water clean, and away from the barnyard. The need for and feasibility of barnyard runoff management will be assessed on a case-by-case basis upon recommendations by the Lafayette County LCD.

4.3.7 Streambank Restoration

Streambank restoration is accomplished by reinforcing the streambank and reestablishing the general structure and function of the stream. Streambank restoration reduces erosion and phosphorus loading from soil loss, but can be a costly management measure. However, restoration can have other benefits such as improvements of fish habitats and aesthetic improvements that may be desirable to landowners and watershed stakeholders. Streambank restoration can be used in both urban and rural areas and may be feasible for parts of the Coon Branch watershed.

4.3.8 Check Dams and Stormwater Ponds

A check dam is a small, sometimes temporary, dam that is constructed across a swale or a drainage ditch to counter erosion by slowing the velocity of runoff. These check dams can be constructed of rock, gravel bags, sand bags or even logs. Check dams can also improve the water quality of runoff by trapping sediment in the structure, or causing the sediment to settle out in the ponding conditions created behind the check dam.

Runoff can also be collected in stormwater detention or infiltration basins, which are typically installed in urban settings. The most beneficial type of basin for phosphorus reduction is a wet detention basin or pond, which is constructed to collect, detain, treat and release stormwater runoff. A wet detention basin consists of a permanent pool of water with designed dimensions, inlets, outlets and storage capacity.

Potential locations for check dams and ponds will be identified during site visits.

4.4 Prioritization of Management Measures

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 and site visits will be used to find areas of high erosion and significant sources of phosphorus.

During the site visits, source factors and transport factors will be identified. 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 (identified visually to be used in conjunction with EVAAL data), runoff, and connectivity to receiving water.

Due to the relatively small area in the Coon Branch Watershed, the City will target projects in all areas of the watershed. These projects include taking land out of production, conservation buffers throughout the area, barnyard runoff control, and potential check dams.

4.5 Potential Nonpoint Source Projects

Based on preliminary modeling, the following practices have been identified as the most likely types of projects for the initial implementation of Adaptive Management in the Coon Branch watershed:

- Buffer strips
- Taking agricultural land out of production
- Drainage control runoff from Cole Acres
- Barnyard runoff control

The City intends to begin conducting site visits to identify interested landowners and potential projects in early 2019. The City has been focusing conversations with farmers and the golf course located within the watershed.

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 City and its partners develop experience with Adaptive Management implementation in the Coon Branch 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 by the City or Lafayette County LCD, 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 by the City, and could include members of the City and WWTF staff, Town & Country Engineering, Lafayette County LCD, and the land owners themselves.

A typical site visit will usually take approximately 1-2 hours, depending on the size, and consist of a general assessment of areas of concern. These concerns could include streambank erosion, gully erosion, tillage, crop rotations, or nutrient management, or barnyard assessments. 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 of 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. Additional priority may be placed on larger parcels, or parcels with a greater expected phosphorus reduction. This would minimize the initial number of projects in order to gain the same total pounds of phosphorus reduction.

5.3 Data Collection for Modeling

Following the initial site visit, once possible management measures have been identified, there may be a need for additional data. Data collected by the Lafayette County LCD will be based on the model being utilized and the resource concern that is being assessed. Typical models used include SnapPlus, BARNY, WinSLAMM, P-8 Urban Catchment Model, Phosphorus Index, gully erosion calculator, and streambank erosion calculator. Data could include soil samples, survey data, crop practices and other information.

5.4 Modeling

Modeling will be used to estimate expected phosphorus reductions for various management measures that are being considered. The models that will most commonly be used are described below.

5.4.1 SnapPlus

SnapPlus (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 SnapPlus was designed to incorporate these programs into one software package. SnapPlus is used to prepare nutrient management plans in accordance with Wisconsin's Nutrient Management Standard Code 590.

SnapPlus can be used to calculate crop nutrient recommendations for all fields on a farm, a rotational Phosphorus Index (PI) value for all fields as required for using the PI for phosphorus management, and a rotational phosphorus balance using soil test P as the criteria for phosphorus management. The PI is calculated by estimating average runoff phosphorus delivery from each field to the nearest surface water in a year given the field's soil conditions, crops, tillage, manure and fertilizer applications, and long-term weather patterns. The higher the PI number, the greater the likelihood that that field is contributing phosphorus to local water bodies.

For this application, SnapPlus will be used to calculate the expected phosphorus reductions for field-based management measures compared to the baseline for current practices. All SnapPlus modeling will be completed by the Town and Country Engineering staff with assistance provided by Lafayette County.

5.4.2 BARNY

The 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 Town and Country Engineering will run BARNY modeling to estimate the reduction in phosphorus loads.

5.4.3 WinSLAMM

WinSLAMM (Source Loading and Management Model for Windows) was developed to evaluate nonpoint source pollutant loadings in urban areas using small storm hydrology. The model determines the runoff from a series of normal rainfall events and calculates the pollutant loading created by these rainfall events. The user is also able to apply a series of control devices, such as infiltration/biofiltration, street sweeping, wet detention ponds, grass swales, porous pavement, or catch basins to determine how effectively these devices remove pollutants.

If urban stormwater practices are planned within the City, WinSLAMM may be used by Town & Country Engineering to estimate phosphorus reductions.

5.4.4 P-8 Urban Catchment Model

P-8 is a model for predicting the generation and transport of storm water runoff pollutants in urban watersheds. The model has been developed for use in designing and evaluating runoff treatment schemes for existing or proposed urban developments. Simulated BMP types include detention ponds (wet, dry, extended), infiltration basins, swales, and buffer strips. The model is used to examine the water quality implications of alternative treatment objectives.

If urban stormwater practices are planned within the City, P-8 may be used by Town & Country Engineering to estimate phosphorus reductions.

5.5 Determine Load Reduction

Once the planned management measures have been identified, the load reductions will be determined using the modeling previously discussed. Then the City and Lafayette County LCD will be able to determine the total load reduction expected for each project area. As stated in Section 3.4, the City is required to provide a reduction of at least 280 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 City will seek out additional project partners. After the first permit term of Adaptive Management, the City may need to install additional management measures if the initial measures do not provide a sufficient reduction in phosphorus loading to the Coon Branch.

5.6 Cost-Share Agreements

Cost share agreements or contracts will be established between the landowners and the City for the management measures to be installed. Contracts will be drawn up by the City or Lafayette County LCD and made with landowners for a term 15 years or perpetuity. Once the contract is signed, the landowner will be paid with a lump sum incentive and annual payments for the length of the contract.

It will be up to the City to determine the rates for each type of management measure. These rates will be based on typical cost-share models and information provided by the Lafayette County LCD. 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 LCD are included in Appendix N.

5.7 Installation of Management Measures

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

5.8 Verification of Installed Management Measures

Lafayette County LCD will verify the status of rural practices installed for management measures. The City will be responsible for verifying urban management measures installed within City limits. These practices will be verified once per year after initial establishment has been verified. Annual inspections will be conducted by landowners, in which they will report and photograph the condition of the management measure to the City. Annual inspection forms will be created by Lafayette County LCD and the City for use by landowners. In addition, in-stream phosphorus monitoring will be conducted by the WWTF staff to monitor the progress toward meeting the WQC, as described in Section 3.3.2.

Records and data for these practices will be cataloged by Town and County, with practices recorded spatially though GIS software along with LCD'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 City's accountability, the DNR 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 City, with assistance from Town & Country Engineering and the Lafayette County LCD, 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 City and the DNR.

5.10 Implementation Schedule

In order to ensure that the City 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 will be installed, verified, and inspected during the first permit term. Additionally, annual reporting will be performed to maintain communication between the City and the DNR, as well as to reinforce accountability.

Table 5-1
Permit Term 1 Implementation Schedule

Action	Date
Site Inspections	Fall 2018
Begin Monthly In-stream Sampling	Summer 2018
Data Collection and Modeling	Fall 2018
Cost Share Agreements Signed	Spring 2019
Management Measures Installed	Spring 2019-2023
Annual Adaptive Annual Report	September 30, 2020
Annual Adaptive Annual Report	September 30, 2021
Cuba City WWTF meets interim limits for effluent phosphorus	September 30, 2022
Annual Adaptive Annual Report	September 30, 2022
Annual Adaptive Annual Report	September 30, 2023
Minimum Phosphorus Reduction of 280 lbs/year	September 30, 2024
End of Permit Term 1	September 30, 2024

Permit Term 2 Implementation Schedule

Action	Date
Data Collection and Modeling	Spring 2024 – Fall 2029, as needed
Cost Share Agreements Signed	Fall 2024 – Fall 2029, as needed
Management Measures Installed	Spring 2025, 2026, and as needed
Annual Adaptive Annual Report	September 30, 2025
Annual Adaptive Annual Report	September 30, 2026
Annual Adaptive Annual Report	September 30, 2027
Annual Adaptive Annual Report	September 30, 2028
Total Phosphorus Reduction of 2,250 lbs/year	September 30, 2029
End of Permit Term 2	September 30, 2029

Permit Term 3 Implementation Schedule

Action	Date
Data Collection and Modeling	Spring 2029 - Fall 2034, as needed
Cost Share Agreements Signed	Fall 2029 - Fall 2034, as needed
Management Measures Installed	Spring 2030, 2031, and as needed
Annual Adaptive Annual Report	September 30, 2030
Annual Adaptive Annual Report	September 30, 2031
Annual Adaptive Annual Report	September 30, 2032
Annual Adaptive Annual Report	September 30, 2033
Total Phosphorus Reduction of 2,996 lbs/year	September 30, 2034
Coon Branch meets in stream criteria of 0.075 mg/L of phosphorus	September 30, 2034
End of Permit Term 3	September 30, 2034

6. FINANCIAL EVALUATION

The section presents the projected costs for implementation of Adaptive Management for the first permit term as 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 Coon Branch watershed for the next permit term. Costs include the implementation of nonpoint source management measures, outreach and education, modeling, sampling, and other administrative duties. Factors relating to these costs and the responsible parties are listed in Table 6-1.

6.2 Funding Sources

Currently, the Cuba City WWTF will assume sole financial responsibility for Adaptive Management in the Coon Branch 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 Cuba City's Adaptive Management program. Possible grant sources include the following:

- NRCS Regional Conservation Partnership Program (RCPP),
- NRCS Environmental Quality Incentives Program (EQIP),
- Department of Agriculture, Trade and Consumer Protection (DATCP), Producer-Led Watershed Protection Grants
- Wisconsin DNR Targeted Runoff Management (TRM) Grants,
- FSA Conservation Reserve Enhancement Program (CREP).

The Lafayette County LCD will assist the City 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 City validating that the financial needs to implement Adaptive Management are feasible. This statement is provided in Appendix O.

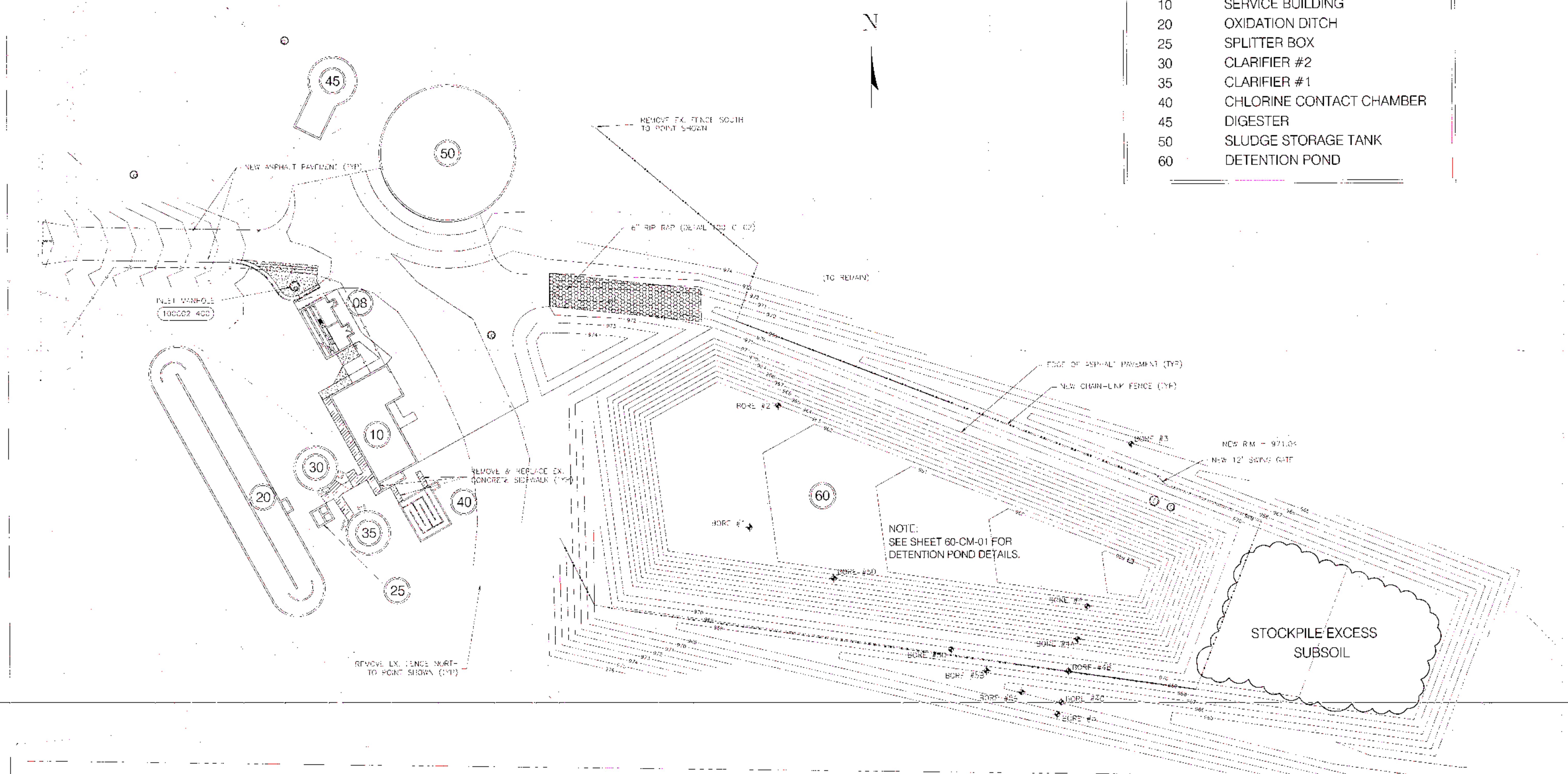
Table 6-1
Adaptive Management Cost Estimate

Permit Year Year	Responsible Party	0 2018	1 2019	2 2020	3 2021	4 2022	5 2023
Treatment Upgrades Capital Cost	City						
Treatment Operating and Maintenance Costs							
Additional Sludge Hauling	City						
Additional Chemicals	City						
Adaptive Management Planning							
Report Preparation/Revision	T&C	$15,000					
Site Visits and Practice Identification	T&C		$3,000	$3,000	$3,000	$3,000	$5,000
Modeling and Technical Support							
Lafayette County Modeling Costs	County		$3,000	$2,000	$2,000	$2,000	$2,000
Engineering Support	T&C		$3,000	$2,000	$2,000	$2,000	$2,000
BMP Implementation Costs							
Practice Brokering	County		$3,000	$1,000	$1,000	$1,000	$1,000
Practice Brokering/Implementation Support	T&C		$2,000	$1,000	$1,000	$1,000	$1,000
Cost Share Rates	City		$20,000	$20,000	$20,000	$20,000	$20,000
Outreach and Education							
Meetings with Public/Stakeholders	T&C		$1,000	$1,000	$1,000	$1,000	$1,000
Communication about AM in watershed	City		$1,000	$1,000	$1,000	$1,000	$1,000
In-Stream and Effluent Sampling							
Sample Collection	City	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000
Sample Analysis	City	$2,000	$3,000	$3,000	$3,000	$3,000	$3,000
Compliance Checking							
Practice Verification	County		$5,000	$5,000	$5,000	$5,000	$5,000
Compliance Notifications	City		$1,000	$1,000	$1,000	$1,000	$1,000
Administration							
Annual Reports	City		$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
Total		**$18,000**	**$53,000**	**$48,000**	**$48,000**	**$48,000**	**$50,000**

Appendix A
Site Plan and Process Flow

Record Drawings
March, 2002

STR. #	STRUCTURE DESCRIPTION
08	SCREENING BUILDING
10	SERVICE BUILDING
20	OXIDATION DITCH
25	SPLITTER BOX
30	CLARIFIER #2
35	CLARIFIER #1
40	CHLORINE CONTACT CHAMBER
45	DIGESTER
50	SLUDGE STORAGE TANK
60	DETENTION POND



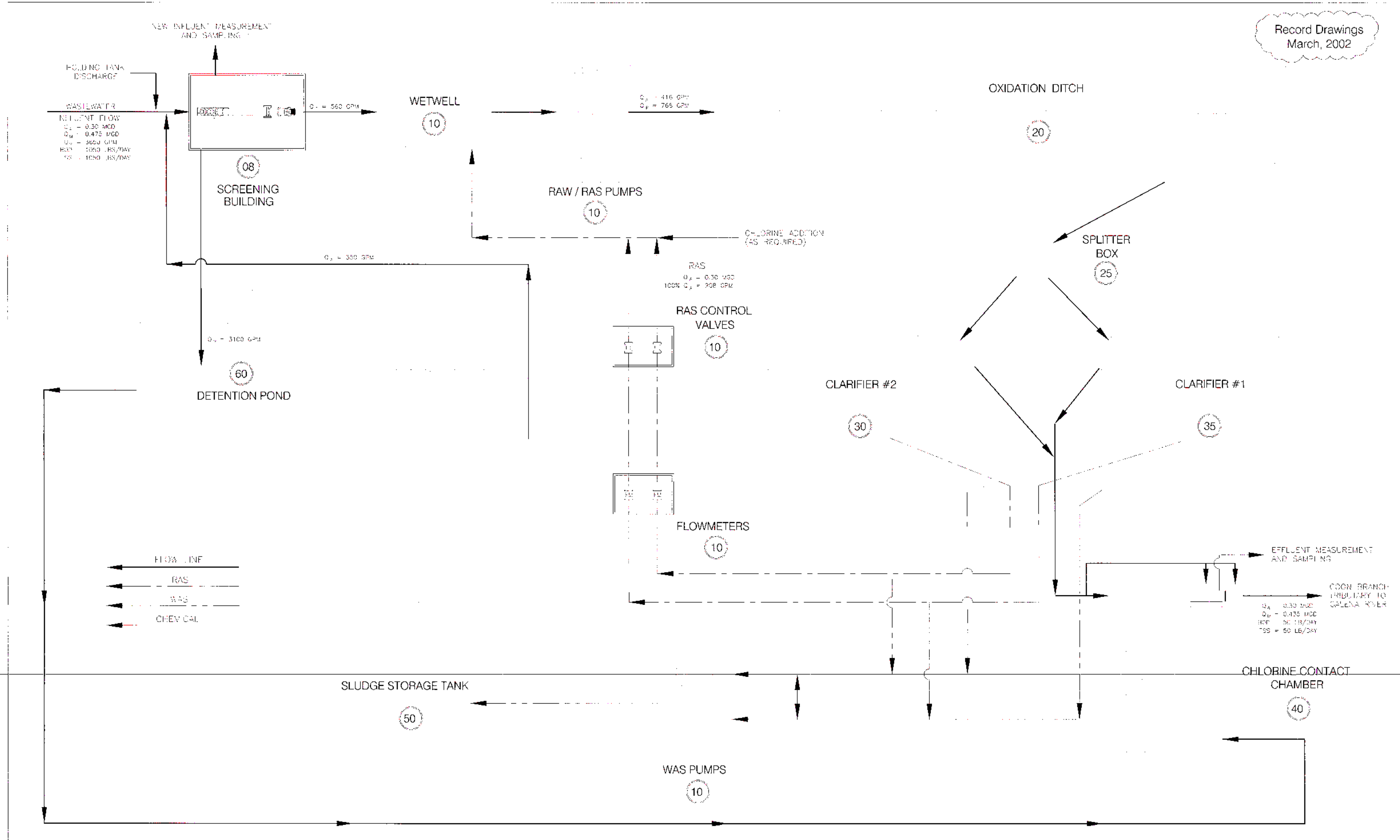
DRAWN BY: C.J.D.	REVISIONS: 5/00	PROJECT: 2000 Wastewater Treatment Plant Modifications and Lift Stations Project, Cuba City, Wisconsin
CHECKED BY: E.A.L.	DATE: 5/00	
PROJ. NO: 00 08/10	SCALE: 1" = 30'-0"	

Town & Country Engineering, Inc.
5225 VERONA ROAD, BUILDING NO. 4
P.O. BOX 44451 MADISON, WI 53744
(608) 273-3350

SHEET DESCRIPTION: SITE GRADING PLAN
SITE PLAN

GRAPHIC SCALE: 0' 15' 30' 45' 60'

SHEET NO: 05-C-02



DRAWN BY: C.J.D.	REVISIONS: 5/03	PROJECT: 2000 Wastewater Treatment Plant Modifications and Lift Stations Project, Cuba City, Wisconsin	Town & Country Engineering, Inc. 5225 Verona Road, Building No. 4, P.O. Box 44451, Madison, WI 53744 (608) 273-3350	SHEET DESCRIPTION: QUANTITATIVE FLOW DIAGRAM GENERAL	SHEET NO. 00-G-05
CHECKED BY: T.A.T.	DATE: 5/03				
PROJ. NO.: CC 03/10	SCALE: N.T.S.				

Appendix B
In-Stream Phosphorus
Sampling Results

Cuba City In-Stream Sampling Results

Sample Type	Collection Date	Test	Results	LOD/LOQ	Method	Analyzed Date	Location
stream	7/18/2018	T. Phos	0.30	0.03-0.11	SM 4500 PE - 1999	7/20/2018	State Highway 11
stream	7/25/2018	T. Phos	0.27	0.03-0.11	SM 4500 PE - 1999	7/26/2018	State Highway 11
stream	8/1/2018	T. Phos	0.06	0.03-0.11	SM 4500 PE - 1999	8/4/2018	State Highway 11
stream	8/8/2018	T. Phos	0.28	0.03-0.11	SM 4500 PE - 1999	8/9/2018	State Highway 11
stream	8/14/2018	T. Phos	0.44	0.03-0.11	SM 4500 PE - 1999	8/25/2018	State Highway 11
stream	8/23/2018	T. Phos	0.25	0.03-0.11	SM 4500 PE - 1999	8/25/2018	State Highway 11
stream	8/28/2018	T. Phos	0.30	0.03-0.11	SM 4500 PE - 1999	9/8/2018	State Highway 11
stream	9/6/2018	T. Phos	0.26	0.03-0.11	SM 4500 PE - 1999	9/8/2018	State Highway 11
Average			**0.27**				

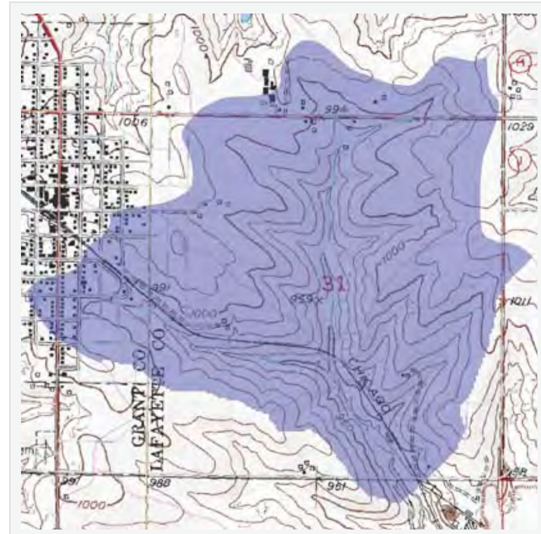
stream	7/18/2018	T. Phos	4.60	0.03-0.11	SM 4500 PE - 1999	7/21/2018	Roaster Road*
stream	7/25/2018	T. Phos	1.56	0.03-0.11	SM 4500 PE - 1999	7/26/2018	Roaster Road*
stream	8/1/2018	T. Phos	0.24	0.03-0.11	SM 4500 PE - 1999	8/4/2018	Roaster Road*
stream	8/8/2018	T. Phos	2.65	0.03-0.11	SM 4500 PE - 1999	8/11/2018	Roaster Road*
stream	8/14/2018	T. Phos	3.15	0.03-0.11	SM 4500 PE - 1999	8/25/2018	Roaster Road*
stream	8/23/2018	T. Phos	1.85	0.03-0.11	SM 4500 PE - 1999	8/25/2018	Roaster Road*
stream	8/28/2018	T. Phos	2.33	0.03-0.11	SM 4500 PE - 1999	9/8/2018	Roaster Road*
stream	9/6/2018	T. Phos	0.56	0.03-0.11	SM 4500 PE - 1999	9/8/2018	Roaster Road*
Average			**2.12**				

*The location where the Coon Branch meets Roaster Road is the point of compliance.

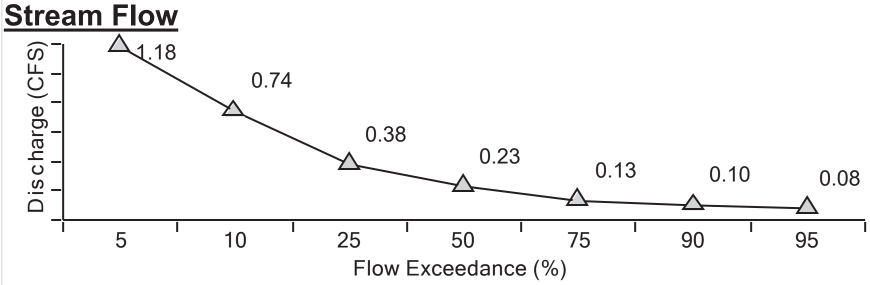
Appendix C
PRESTO-Lite Watershed Delineation Report

PRESTO-Lite Watershed Delineation Report

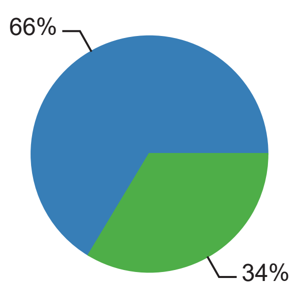
Reach ID: 200003983	
Watershed Name: Kelsey Branch-Galena River	
Waterbody Name: Coon Br	
HUC08: Apple-Plum Rivers	
Watershed Area: 1 mi²	
Average Annual Precipitation: 36.06in	



Stream Flow

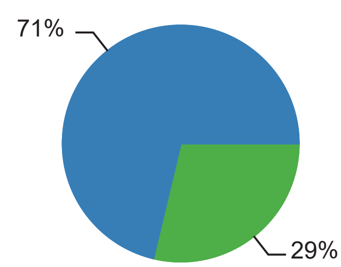


Tributary Stream Type



Type	Length
Cool-Cold Headwater	2248 ft
Macroinvertebrates	1139 ft
Coldwater	0 ft
Cool-Cold Mainstem	0 ft
Cold Headwater	0 ft
Cold Mainstem	0 ft
Large River	0 ft
Warm Headwater	0 ft
Warm Mainstem	0 ft

Landcover



Type	Area
Agriculture	0.71 mi²
Urban	0.29 mi²
Forest	0.01 mi²

PRESTO Phosphorus Load Estimate

Avg. Annual Nonpoint Phosphorous Load (80% Confidence Interval)	4,899 (1,066 - 22,503) lbs
Number of Facilities (Individual Facility Information below)	1
Avg. Annual Point-source Phosphorous Load (2010 - 2012 total of all facilities)	2,178lbs
Most Likely Point : Nonpoint Phosphorous Ratio	31% : 69%
Low Estimate Point : Nonpoint Phosphorous Ratio (Adaptive Management)	9% : 91%

Adaptive Management Results

Facilities Discharging to the Kelsey Branch-Galena River Watershed:

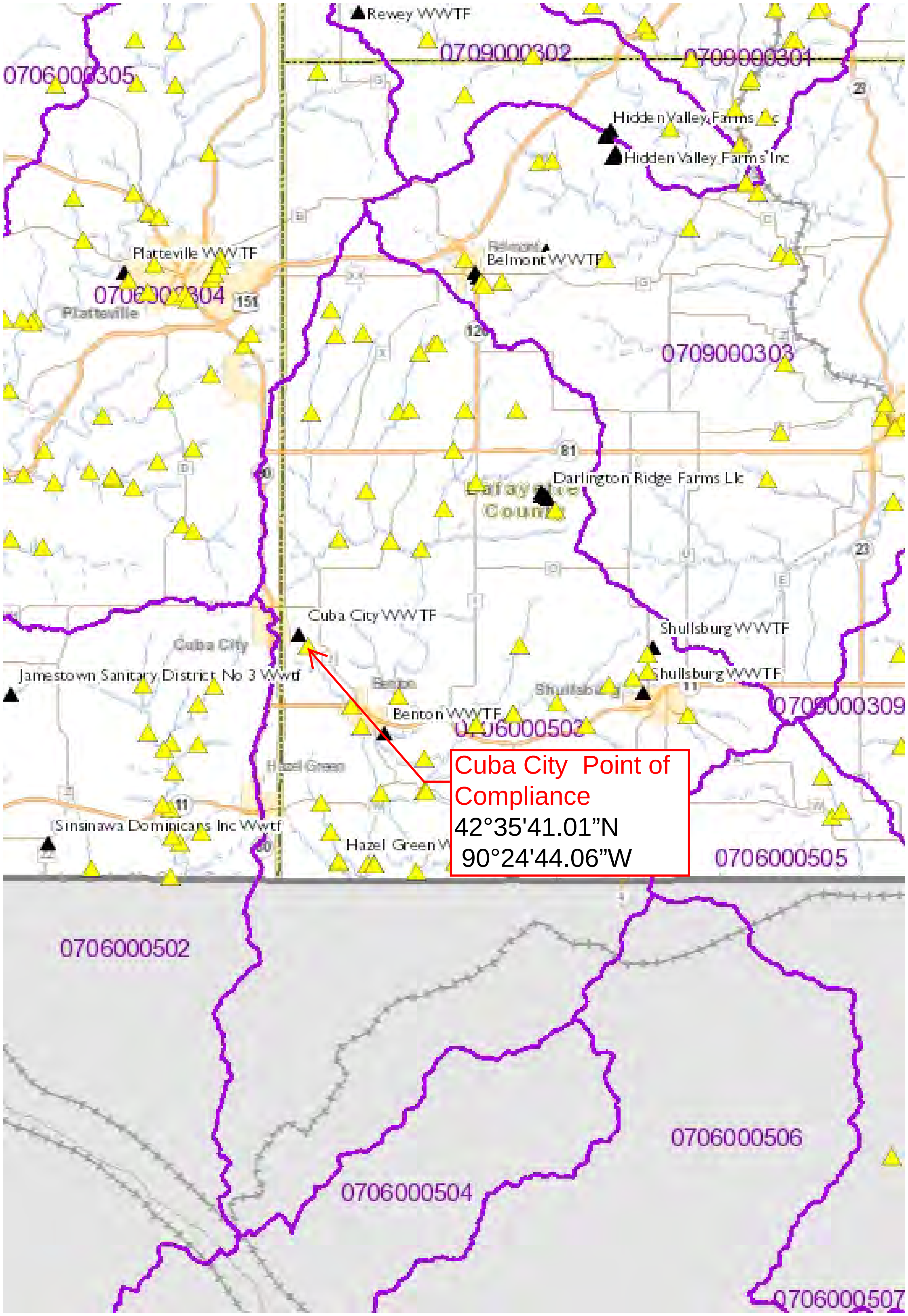
Facility Name	Permit #	Outfall #	Waste Type	Receiving Water	Avg. Phosphorus Load (lbs.) (2010 - 2012)
CUBA CITY WASTEWATER TREATMENT FACILITY	0022217	001	Municipal	Coon Branch	2178

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 Maps

Cuba City HUC 10 Map



Legend

- Station Points with Recent Data (10 years)
- 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

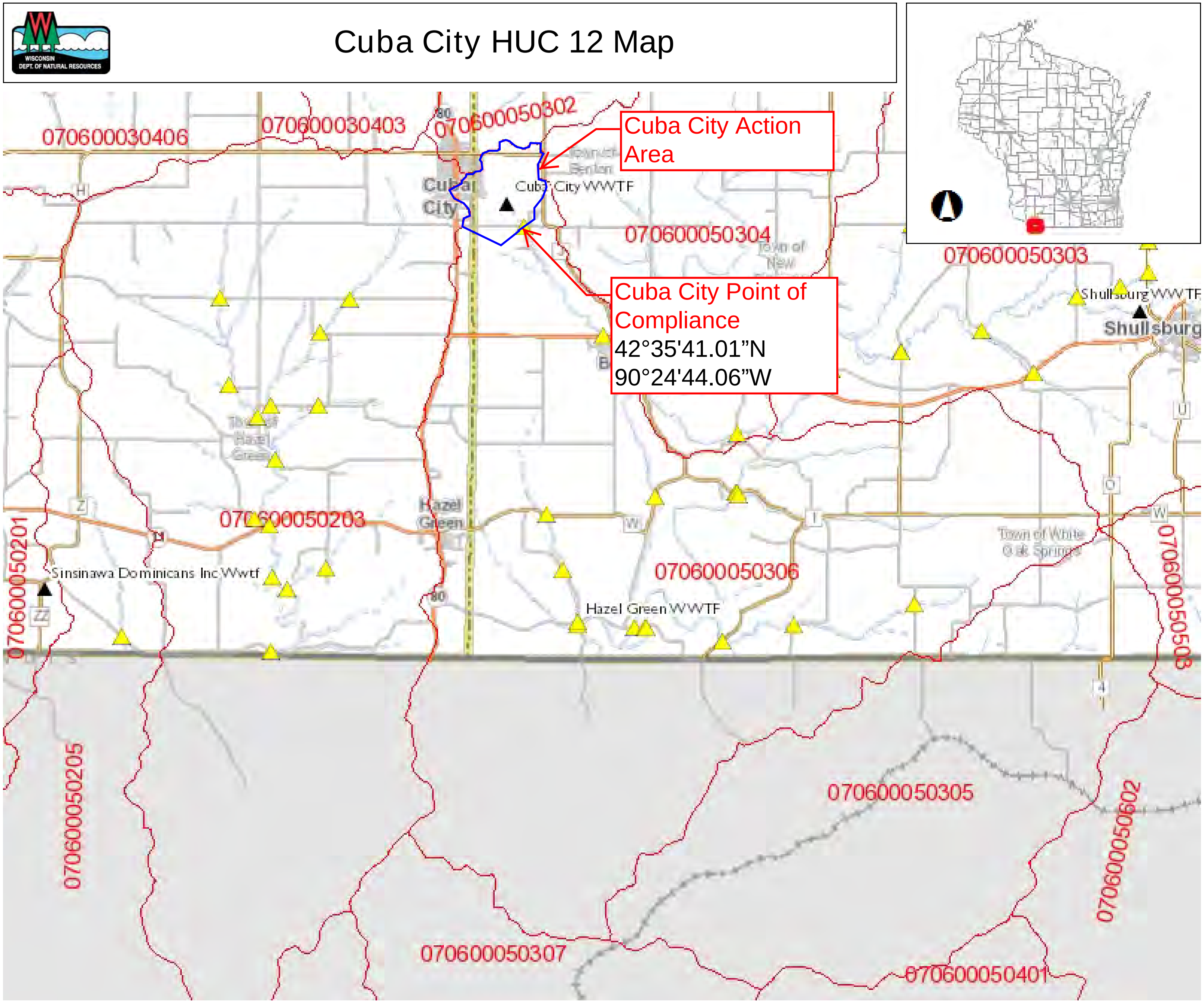
8.0 0 4.00 8.0 Miles

1: 253,440

NAD_1983_HARN_Wisconsin_TM

Notes

Cuba City HUC 12 Map



Legend

- Station Points with Recent Data (10 years)
- 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

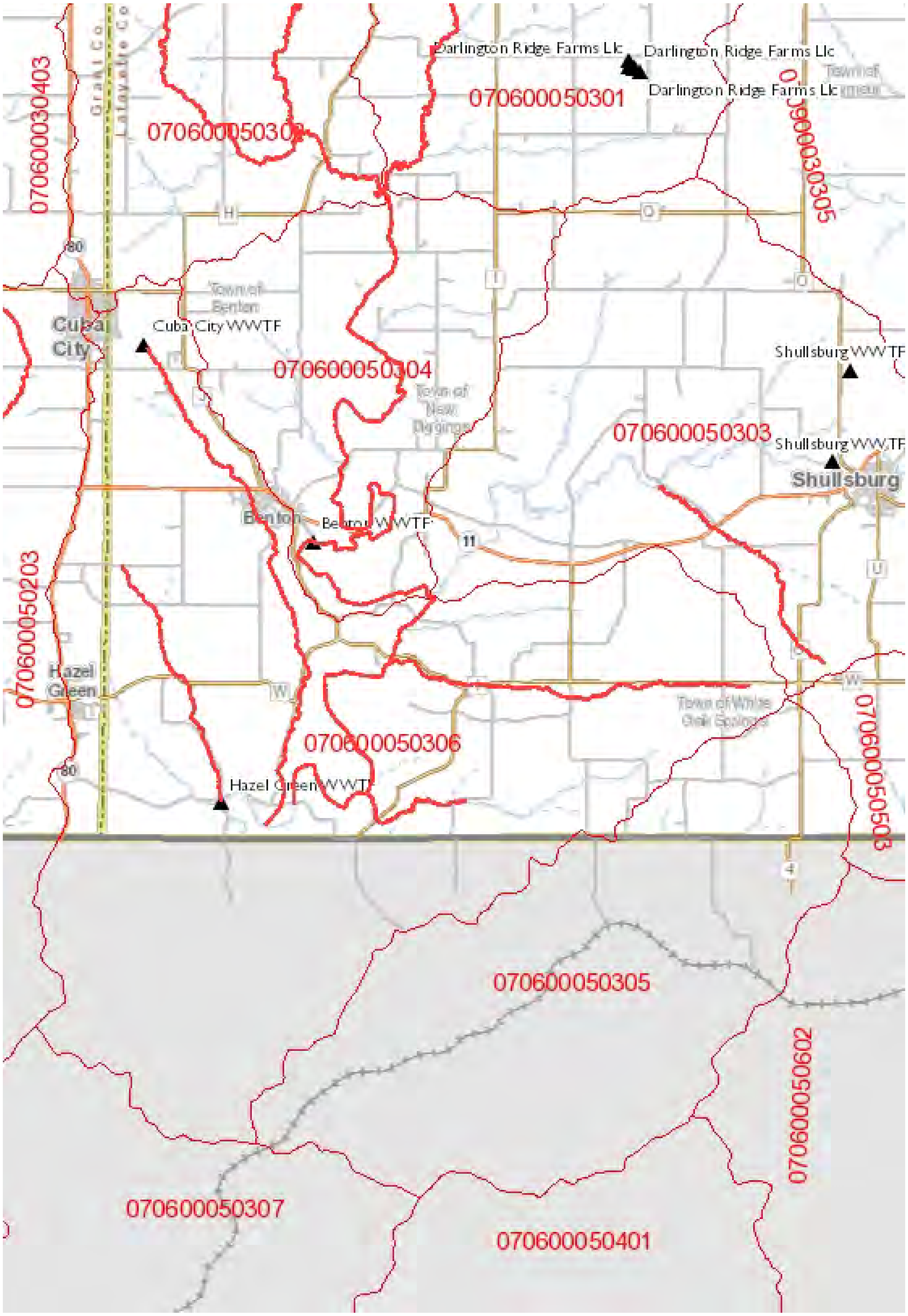
Notes

4.0 0 2.00 4.0 Miles

NAD_1983_HARN_Wisconsin_TM

1: 126,720

Cuba City HUC 12 Impaired Waters Map



Legend

Impaired Waters Status Rivers

- Other or Multiple TMDLs
- Proposed for List
- 303d Listed
- Addition
- TMDL Development
- TMDL Approved
- TMDL Implementation
- Deletion
- Delist
- Water Delisted
- EAP Project

Impaired Waters Status Lakes

- Other or Multiple TMDLs
- Proposed for List
- 303d Listed
- Addition
- TMDL Development
- TMDL Approved
- TMDL Implementation
- Deletion
- Delist
- Water Delisted
- EAP Project

- 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

4.0 0 2.00 4.0 Miles

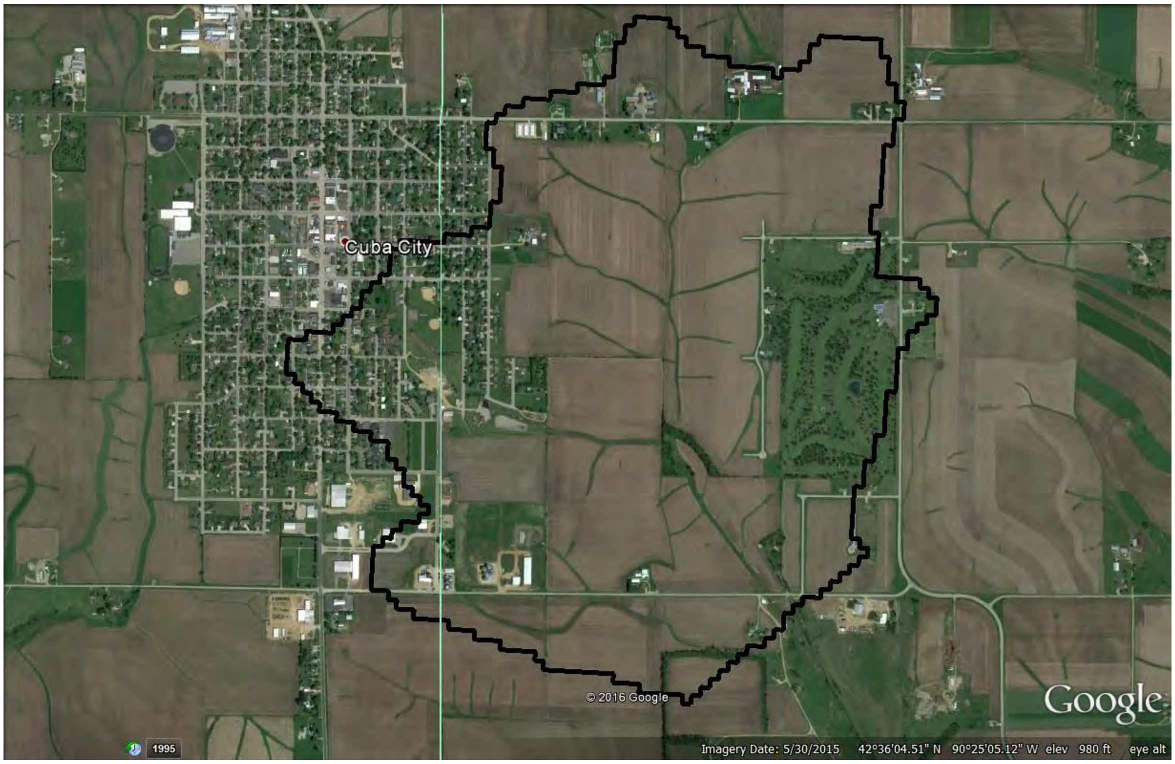
1: 126,720

NAD_1983_HARN_Wisconsin_TM

Notes

Cuba City WWTF Point of Compliance

Coon Branch Watershed



Appendix E
Coon Branch Watershed
Soils Report

United States Department of Agriculture

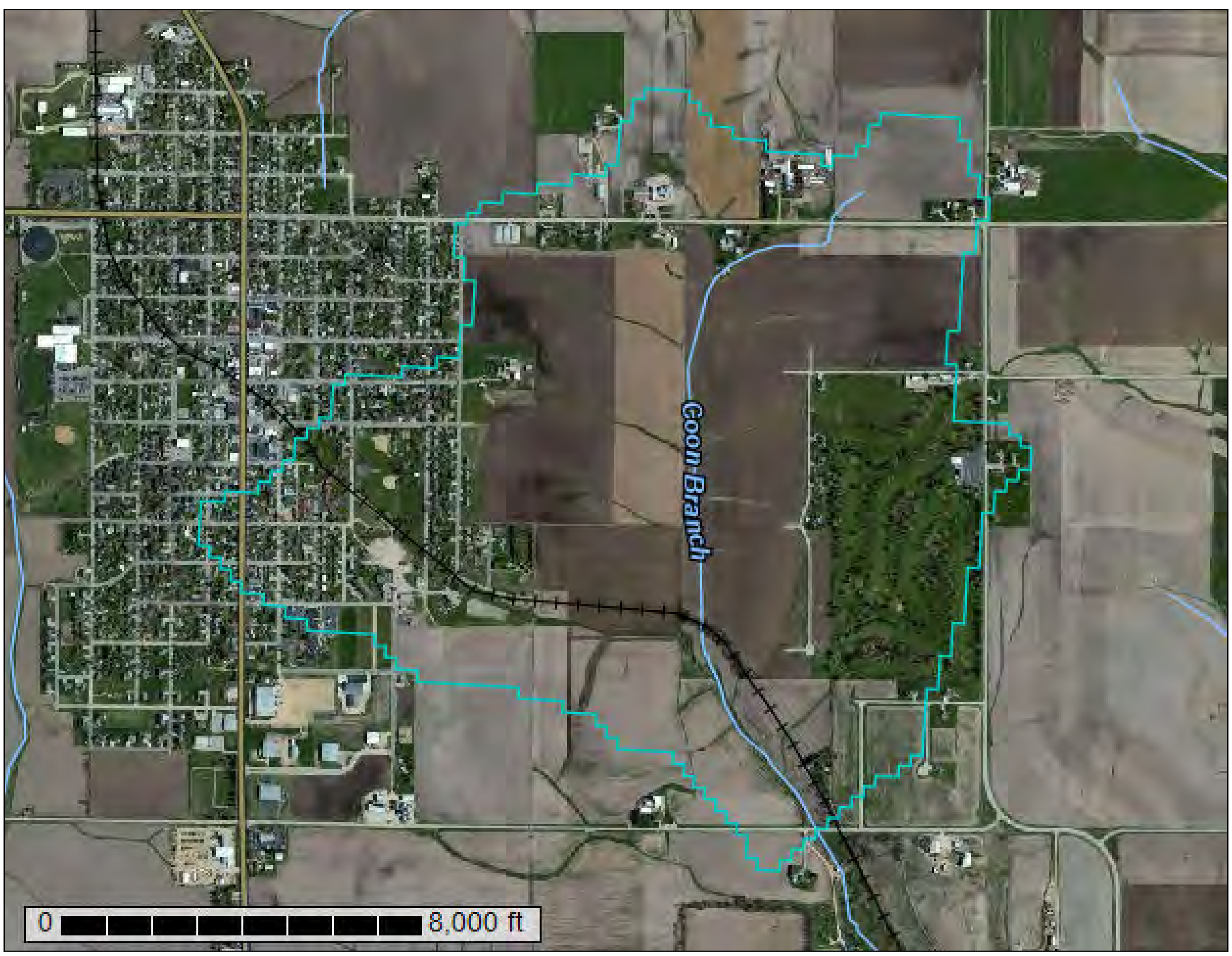
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Grant County, Wisconsin, and Lafayette County, Wisconsin



October 18, 2018

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

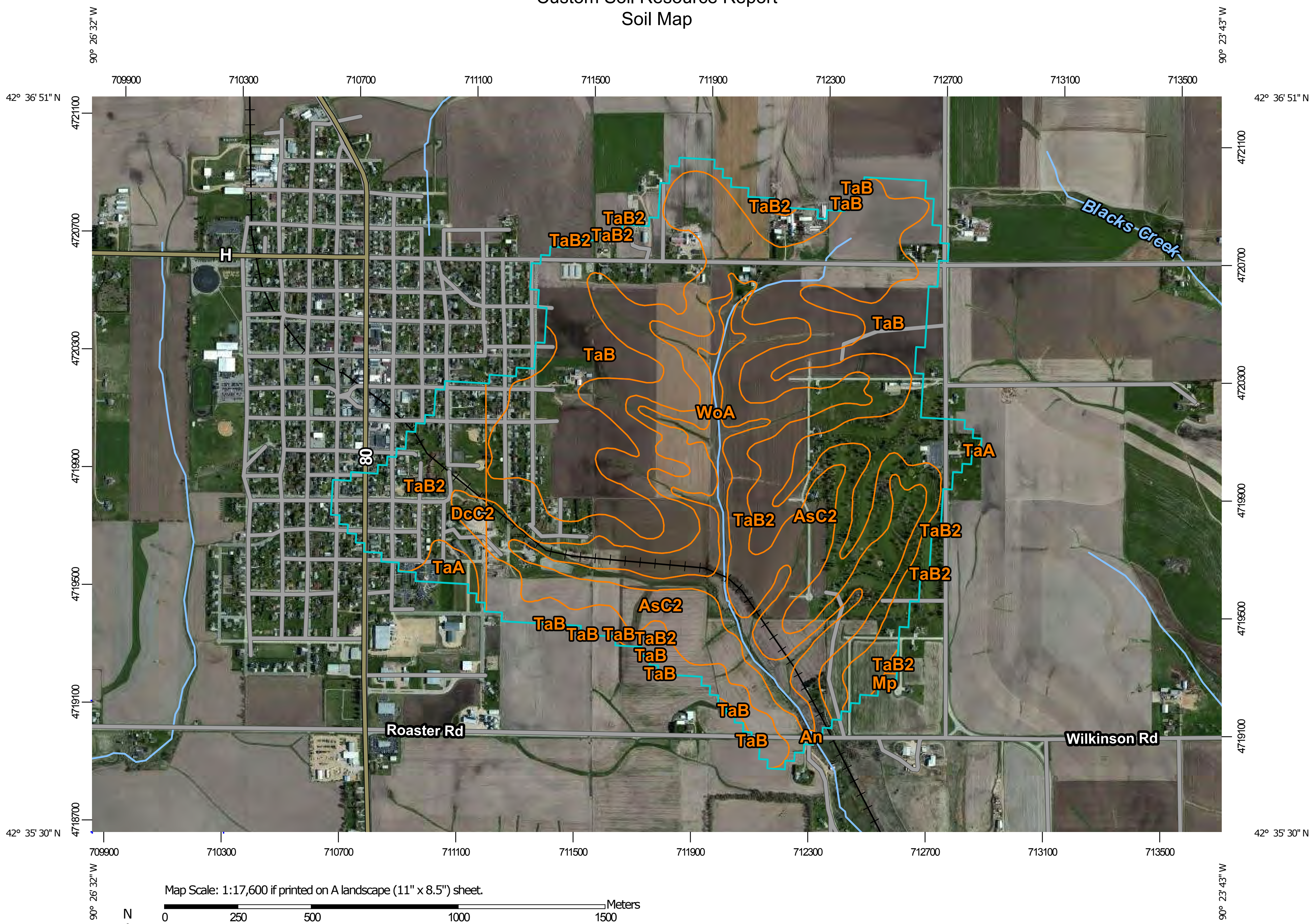
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

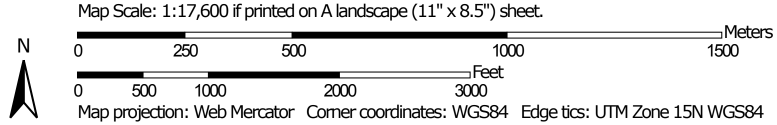
Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map



Map Scale: 1:17,600 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N 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 scales ranging from 1:15,800 to 1:20,000.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
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: Grant County, Wisconsin
Survey Area Data: Version 13, Sep 11, 2018

Soil Survey Area: Lafayette County, Wisconsin
Survey Area Data: Version 15, Sep 11, 2018

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: May 2, 2011—Aug 21, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND	MAP INFORMATION
	imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
DcC2	Dodgeville silt loam, deep, 6 to 10 percent slopes, moderately eroded	3.5	0.5%
TaA	Tama silt loam, driftless, 0 to 2 percent slopes	5.7	0.9%
TaB2	Tama silt loam, driftless, 2 to 6 percent slopes, moderately eroded	50.5	7.8%
Subtotals for Soil Survey Area		**59.7**	**9.3%**
Totals for Area of Interest		**644.3**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
An	Arenzville silt loam, 0 to 3 percent slopes, occasionally flooded	0.3	0.0%
AsC2	Ashdale silt loam, 6 to 12 percent slopes, moderately eroded	152.3	23.6%
Mp	Mine pits and dumps	0.5	0.1%
TaA	Tama silt loam, driftless, 0 to 2 percent slopes	0.1	0.0%
TaB	Tama silt loam, driftless, 2 to 6 percent slopes	170.9	26.5%
TaB2	Tama silt loam, driftless, 2 to 6 percent slopes, moderately eroded	222.1	34.5%
WoA	Worthen silt loam, 0 to 2 percent slopes	38.4	6.0%
Subtotals for Soil Survey Area		**584.6**	**90.7%**
Totals for Area of Interest		**644.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Grant County, Wisconsin

DcC2—Dodgeville silt loam, deep, 6 to 10 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: g7cl
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Dodgeville, deep, and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dodgeville, Deep

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty loess over clayey pedisediment over residuum weathered from dolomite

Typical profile

H1 - 0 to 12 inches: silt loam
H2 - 12 to 28 inches: silty clay loam
H3 - 28 to 44 inches: clay
3R - 44 to 80 inches: weathered bedrock

Properties and qualities

Slope: 6 to 10 percent
Depth to restrictive feature: 24 to 44 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Forage suitability group: High AWC, adequately drained (G105XY008WI)
Hydric soil rating: No

TaA—Tama silt loam, driftless, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2tc54
Elevation: 560 to 1,740 feet
Mean annual precipitation: 31 to 39 inches
Mean annual air temperature: 41 to 50 degrees F
Frost-free period: 120 to 190 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Tama and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tama

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 6 inches: silt loam
A - 6 to 14 inches: silty clay loam
BA - 14 to 18 inches: silty clay loam
Bt - 18 to 45 inches: silty clay loam
BC, C - 45 to 79 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 12.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: C
Forage suitability group: High AWC, adequately drained (G105XY008WI)

Hydric soil rating: No

Minor Components

Garwin

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Dinsdale

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Muscatine

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

TaB2—Tama silt loam, driftless, 2 to 6 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: 2tc55
Elevation: 560 to 1,740 feet
Mean annual precipitation: 31 to 39 inches
Mean annual air temperature: 41 to 50 degrees F
Frost-free period: 120 to 190 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Tama, moderately eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tama, Moderately Eroded

Setting

Landform: Ridges

Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 6 inches: silt loam
BA - 6 to 9 inches: silty clay loam
Bt - 9 to 35 inches: silty clay loam
BC, C - 35 to 79 inches: silt loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Forage suitability group: High AWC, adequately drained (G105XY008WI)
Hydric soil rating: No

Minor Components

Muscatine

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Dinsdale

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Lafayette County, Wisconsin

An—Arenzville silt loam, 0 to 3 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 2wtqs
Elevation: 560 to 1,740 feet
Mean annual precipitation: 31 to 39 inches
Mean annual air temperature: 41 to 50 degrees F
Frost-free period: 120 to 190 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Arenzville, occassionally flooded, and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Arenzville, Occassionally Flooded

Setting

Landform: Drainageways, flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, talf, rise
Down-slope shape: Linear, convex
Across-slope shape: Linear
Parent material: Silty alluvium

Typical profile

A - 0 to 10 inches: silt loam
C - 10 to 25 inches: stratified silt loam
Ab - 25 to 40 inches: silt loam
C' - 40 to 79 inches: stratified silt loam to very fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: About 48 to 72 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 12.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B
Forage suitability group: High AWC, adequately drained (G105XY008WI)
Hydric soil rating: No

Minor Components

Orion, occassionally flooded

Percent of map unit: 3 percent
Landform: Flood plains, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Ettrick, frequently flooded

Percent of map unit: 2 percent
Landform: Depressions on flood plains
Landform position (three-dimensional): Dip
Microfeatures of landform position: Swales
Down-slope shape: Concave, linear
Across-slope shape: Linear
Hydric soil rating: Yes

AsC2—Ashdale silt loam, 6 to 12 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: g7z9
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Ashdale and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ashdale

Setting

Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Silty loess over clayey pedisediment over residuum weathered from limestone

Typical profile

H1 - 0 to 16 inches: silt loam
H2 - 16 to 33 inches: silty clay loam
H3 - 33 to 55 inches: clay
H4 - 55 to 60 inches: weathered bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 42 to 60 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Forage suitability group: High AWC, adequately drained (G105XY008WI)
Hydric soil rating: No

Mp—Mine pits and dumps

Map Unit Setting

National map unit symbol: g82z
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Mine pits and dumps: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mine Pits And Dumps

Setting

Landform: Hills
Parent material: Thin scattered silty loess over sandstone and loamy residuum weathered from dolomite

Typical profile

H1 - 0 to 10 inches: variable

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydrologic Soil Group: A
Hydric soil rating: No

TaA—Tama silt loam, driftless, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2tc54
Elevation: 560 to 1,740 feet
Mean annual precipitation: 31 to 39 inches
Mean annual air temperature: 41 to 50 degrees F
Frost-free period: 120 to 190 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Tama and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tama

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 6 inches: silt loam
A - 6 to 14 inches: silty clay loam
BA - 14 to 18 inches: silty clay loam
Bt - 18 to 45 inches: silty clay loam
BC, C - 45 to 79 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 12.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: C
Forage suitability group: High AWC, adequately drained (G105XY008WI)

Hydric soil rating: No

Minor Components

Garwin

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Dinsdale

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Muscatine

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

TaB—Tama silt loam, driftless, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2tc56
Elevation: 560 to 1,740 feet
Mean annual precipitation: 31 to 39 inches
Mean annual air temperature: 41 to 50 degrees F
Frost-free period: 120 to 190 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Tama and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tama

Setting

Landform: Ridges
Landform position (two-dimensional): Summit

Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 6 inches: silt loam
A - 6 to 14 inches: silty clay loam
BA - 14 to 18 inches: silty clay loam
Bt - 18 to 45 inches: silty clay loam
BC, C - 45 to 79 inches: silt loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 12.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Forage suitability group: High AWC, adequately drained (G105XY008WI)
Hydric soil rating: No

Minor Components

Muscatine

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Dinsdale

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

TaB2—Tama silt loam, driftless, 2 to 6 percent slopes, moderately eroded

Map Unit Setting

National map unit symbol: 2tc55
Elevation: 560 to 1,740 feet
Mean annual precipitation: 31 to 39 inches
Mean annual air temperature: 41 to 50 degrees F
Frost-free period: 120 to 190 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Tama, moderately eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tama, Moderately Eroded

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 6 inches: silt loam
BA - 6 to 9 inches: silty clay loam
Bt - 9 to 35 inches: silty clay loam
BC, C - 35 to 79 inches: silt loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C

Forage suitability group: High AWC, adequately drained (G105XY008WI)
Hydric soil rating: No

Minor Components

Muscatine

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Dinsdale

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

WoA—Worthen silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: g84w
Elevation: 340 to 1,360 feet
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Worthen and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Worthen

Setting

Landform: Drainageways
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Silty alluvium

Typical profile

H1 - 0 to 16 inches: silt loam
H2 - 16 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 48 to 72 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Available water storage in profile: Very high (about 12.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: B
Forage suitability group: High AWC, adequately drained (G105XY008WI)
Hydric soil rating: No

Minor Components

Orion, wet variant

Percent of map unit:
Landform: Depressions, drainageways
Hydric soil rating: Yes

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Appendix F
Watershed Land Use

Cuba City WWTP - HUC 12 Land Usage

Land use	Soil group	Area (acres)	Combined Acres	% of Total Acres
Open Water	B	1	1	0.0%
Open Space/Park	A	11		
Open Space/Park	B	1,249	1,334	
Open Space/Park	C	25		
Open Space/Park	D	50		4.1%
Low-Density Residential (general 1/3 - 2 ac lots)	A	7		
Low-Density Residential (general 1/3 - 2 ac lots)	B	504		
Low-Density Residential (general 1/3 - 2 ac lots)	C	2		
Low-Density Residential (general 1/3 - 2 ac lots)	D	4	517	1.6%
High-density Residential (townhomes to 1/4 ac lots)	A	1		
High-density Residential (townhomes to 1/4 ac lots)	B	71		
High-density Residential (townhomes to 1/4 ac lots)	D	0	72	0.2%
Commercial/Industrial/Transportation	B	6	6	0.0%
Barren Land	B	4	4	0.0%
Deciduous Forest	A	60		
Deciduous Forest	B	3,085		
Deciduous Forest	C	34		
Deciduous Forest	D	516	3,695	11.4%
Evergreen Forest	A	2		
Evergreen Forest	B	63		
Evergreen Forest	D	6	71	0.2%
Mixed Forest	B	6		
Mixed Forest	D	2	7	0.0%
Shrub; Scrub	A	8		
Shrub; Scrub	B	227		
Shrub; Scrub	C	2		
Shrub; Scrub	D	30	268	0.8%
Grassland; Herbaceous	A	2		
Grassland; Herbaceous	B	159		
Grassland; Herbaceous	C	1		
Grassland; Herbaceous	D	15	177	0.5%
Pasture/Hay	A	42		
Pasture/Hay	B	6,639		
Pasture/Hay	C	82		
Pasture/Hay	D	539	7,302	22.5%
Cropland generalized agriculture	A	240		
Cropland generalized agriculture	B	18,067		
Cropland generalized agriculture	C	124		
Cropland generalized agriculture	D	406	18,837	58.1%
Woody Wetlands (swamp)	B	63		
Woody Wetlands (swamp)	C	5		
Woody Wetlands (swamp)	D	8	76	0.2%
Emergent Wetlands (marsh)	B	36		
Emergent Wetlands (marsh)	C	14	50	0.2%
	Total	32,418		

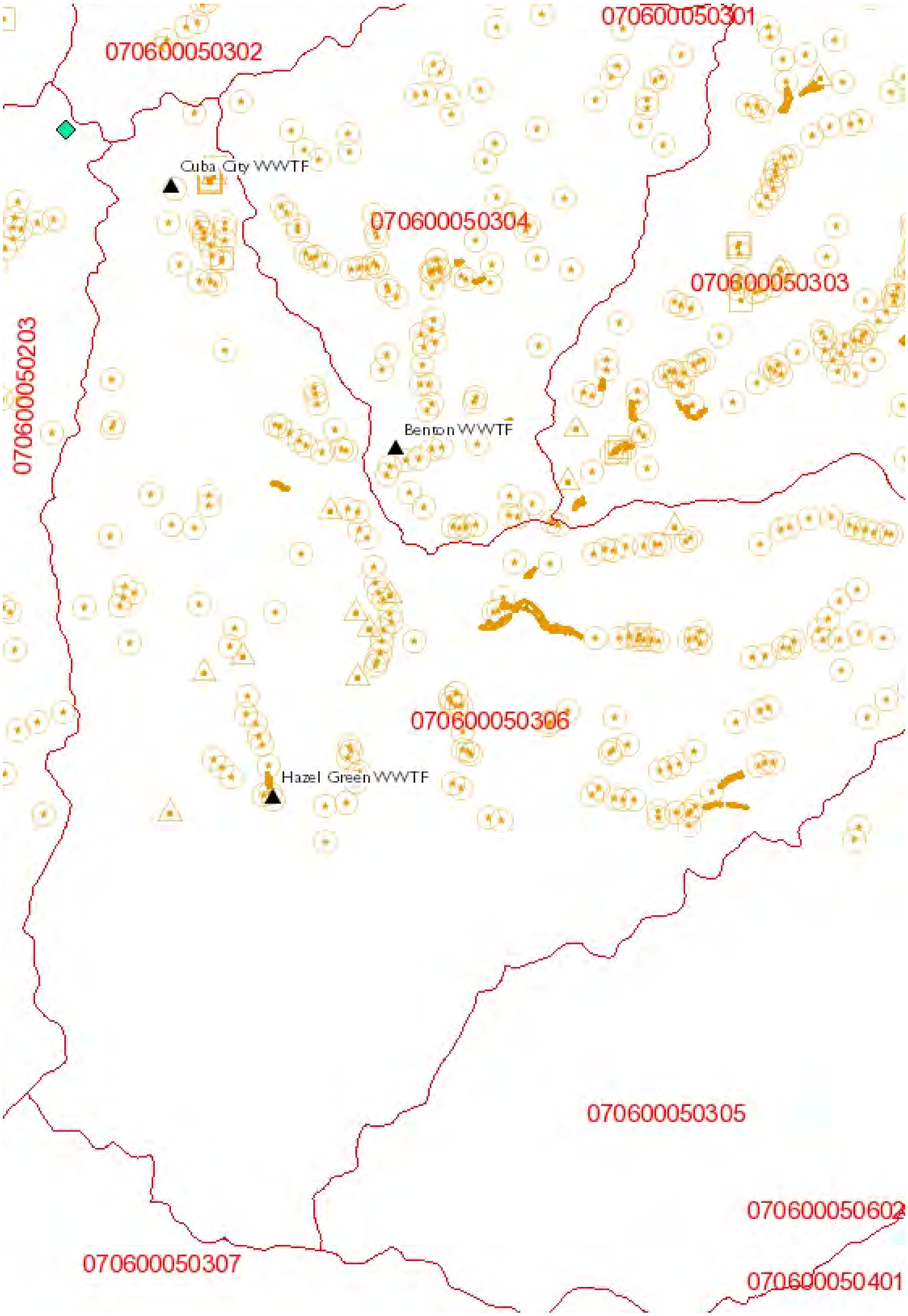
Cuba City WWTF - Coon Branch Land Usage

Land use	Soil group	Area (acres)	Combined Acres	% of Total Acres
Low-Density Residential (general 1/3 - 2 ac lots)	A	0.44	168	25.8%
Low-Density Residential (general 1/3 - 2 ac lots)	B	167.90		
High-density Residential (townhomes to 1/4 ac lots)	B	15.57	16	2.4%
Forest	B	4.23	4	0.6%
Grass/Pasture	B	72.28	72	11.1%
Agricultural	A	4.45	393	60.1%
Agricultural	B	388.30		
	Total	653	653	100.0%

Results taken from Purdue University's Long Term Hydrologic Impact Analysis (L-THIA) Model.

Appendix G
Wetlands Maps

Cuba City HUC 12 Wetland Map



Legend

- Wetland Identifications and Confirmations
- Surface Water Outfalls
- 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
- 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
- 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

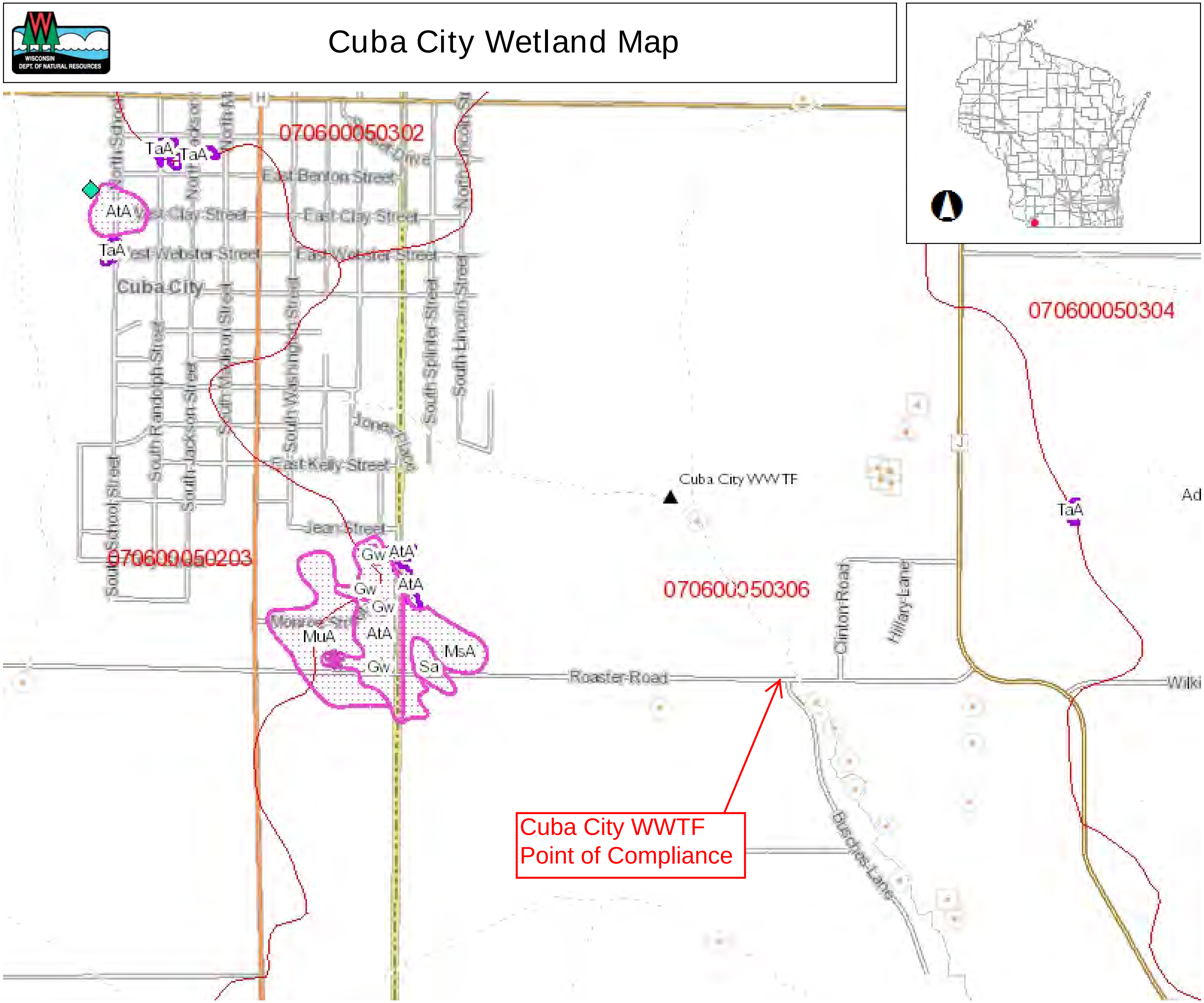
3.0 0 1.50 3.0 Miles

1: 95,040

NAD_1983_HARN_Wisconsin_TM

Notes

Cuba City Wetland Map



Legend

- Wetland Identifications and Confirmations
- Surface Water Outfalls
- 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
- 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
- Maximum Extent Wetland Indicators
- Minimum Extent Wetland Indicators
- Intermittent Streams
- 24K Hydrography Streams and Rivers
- 24K Hydrography Lakes and Open Water

Notes

0.5 | 0 | 0.25 | 0.5 Miles

NAD_1983_HARN_Wisconsin_TM

1: 15,840

Appendix H
WWTF Flow Data

Cuba City WWTF
Effluent Summary

2012	Effluent Flow (MGD)	Phos (mg/L)	Phos (lbs/day)
January	0.136	3.45	3.78
February	0.132	3.83	4.11
March	0.191	3.27	5.01
April	0.138	4.14	4.47
May	0.133	5.52	5.72
June	0.102	5.81	4.72
July	0.098	7.03	6.01
August	0.105	9.25	7.84
September	0.103	6.10	5.40
October	0.106	5.67	4.73
November	0.099	4.68	3.75
December	0.102	4.12	3.34
Average	**0.120**	**5.24**	**4.91**

2013	Effluent Flow (MGD)	Phos (mg/L)	Phos (lbs/day)
January	0.108	3.77	3.45
February	0.114	3.65	3.36
March	0.171	3.12	3.66
April	0.364	3.44	11.03
May	0.181	4.37	6.15
June	0.183	5.38	
July	0.129	8.04	8.84
August	0.116	6.99	6.65
September	0.116	6.74	6.44
October	0.105	6.82	5.80
November	0.108	4.59	4.41
December	0.106	4.48	4.01
Average	**0.150**	**5.11**	**5.80**

2014	Effluent Flow (MGD)	Phos (mg/L)	Phos (lbs/day)
January	0.107	4.17	3.62
February	0.124	4.35	4.80
March	0.292	2.51	6.17
April	0.263	3.36	4.98
May	0.141	5.08	6.00
June	0.196	5.59	9.37
July	0.159	5.85	6.87
August	0.109	7.10	6.52
September	0.104	6.40	5.92
October	0.110	6.46	6.23
November	0.107	5.87	5.56
December	0.108	5.07	4.50
Average	**0.152**	**5.15**	**5.88**

2015	Effluent Flow (MGD)	Phos (mg/L)	Phos (lbs/day)
January	0.099	5.10	4.35
February	0.097	5.12	4.21
March	0.127	5.67	6.25
April	0.129	6.20	6.95
May	0.150	7.18	9.70
June	0.178	6.25	8.37
July	0.133	7.01	7.89
August	0.118	6.73	6.10
September	0.123	6.75	6.92
October	0.113	5.98	6.13
November	0.194	4.30	5.84
December	0.306	1.98	4.23
Average	**0.147**	**5.69**	**6.41**

2016	Effluent Flow (MGD)	Phos (mg/L)	Phos (lbs/day)
January	0.142	3.93	4.66
February	0.145	4.74	5.46
March	0.236	3.41	6.39
April	0.176	3.75	5.52
May	0.177	6.06	8.95
June	0.260	3.77	7.56
July	0.186	3.78	4.94
August	0.140	4.11	4.70
September	0.155	3.86	5.43
October	0.116	N/A*	N/A*
November	0.122	N/A*	N/A*
December	0.126	N/A*	N/A*
Average	**0.165**	**4.16**	**5.96**

*Months not included due to chemical addition pilot tests

2017	Effluent Flow (MGD)	Phos (mg/L)	Phos (lbs/day)
January	0.158	1.99	2.76
February	0.143	3.02	3.92
March	0.155	2.91	3.78
April	0.212	2.37	4.12
May	0.198	2.96	4.91
June	0.157	4.78	5.89
July	0.291	2.80	5.55
August	0.120	4.28	4.46
September	0.105	5.87	5.33
October	0.151	4.57	5.51
November	0.109	4.13	3.89
December	0.100	3.90	3.36
Average	**0.158**	**3.63**	**4.46**

2018	Effluent Flow (MGD)	Phos (mg/L)	Phos (lbs/day)
January	0.109	4.02	3.81
February	0.132	3.46	3.39
March	0.110	3.96	3.79
April	0.116	4.86	4.69
May	0.138	3.67	4.15
June	0.136	4.38	4.55
July	0.138	4.25	4.21
August	0.155	4.27	4.78
September	0.362	2.01	5.29
October	0.475	1.73	5.04
November	0.167	2.82	3.66
December	0.149	2.88	3.53
Average	**0.182**	**3.52**	**4.24**

Cuba City WWTF
Influent Summary

2012	Influent Flow (MGD)	BOD (lbs/day)	TSS (lbs/day)	Phos (mg/L)	Phos (lbs/day)
January	0.152	391	425		
February	0.169	407	419	5.9	8.8
March	0.221	465	525	4.0	7.8
April	0.170	388	382		
May	0.162	422	445		
June	0.138			6.9	
July	0.128	336	360	8.3	8.4
August	0.127	329	281		
September	0.136	325	318		
October	0.143	378	366		
November	0.135	314	314		
December	0.135	370	306		
Average	**0.151**	**375**	**376**	**6.3**	

2013	Influent Flow (MGD)	BOD (lbs/day)	TSS (lbs/day)	Phos (mg/L)	Phos (lbs/day)
January	0.142	367	346		
February	0.147	380	337		
March	0.204	413	352		
April	0.352	802	872		
May	0.219	386	363		
June	0.206				
July	0.157	413	459		
August	0.145	323	352		
September	0.140	353	314		
October	0.133	385	355		
November	0.143	429	363		
December	0.160				
Average	**0.179**	**425**	**411**		

2014	Influent Flow (MGD)	BOD (lbs/day)	TSS (lbs/day)	Phos (mg/L)	Phos (lbs/day)
January	0.126	334	240		
February	0.154				
March	0.336	337	390		
April	0.284	383	429		
May	0.171				
June	0.228				
July	0.194	435	406		
August	0.137		219		
September	0.136		649		
October	0.142	443	407		
November	0.134	375	267		
December	0.136				
Average	**0.181**	**385**	**376**		

2015	Influent Flow (MGD)	BOD (lbs/day)	TSS (lbs/day)	Phos (mg/L)	Phos (lbs/day)
January	0.128	342	260		
February	0.126				
March	0.158				
April	0.160	351	264		
May	0.182	414	349		
June	0.204	321	250		
July	0.156	347	280		
August	0.141	362	288		
September	0.154			5.81	8.83
October	0.146	365	265	6.79	9.14
November	0.232	388	284	5.19	8.19
December	0.346			3.75	8.32
Average	**0.178**	**361**	**280**	**5.38**	**8.62**

2016	Influent Flow (MGD)	BOD (lbs/day)	TSS (lbs/day)	Phos (mg/L)	Phos (lbs/day)
January	0.171	373	281	4.82	6.62
February	0.171			6.79	8.85
March	0.268		305	4.37	8.33
April	0.212	306	274	3.51	5.79
May	0.207	386	277	4.16	7.01
June	0.287			3.19	6.63
July	0.215	307	281	3.46	5.67
August	0.169	286	271	5.19	6.78
September	0.181		311	5.30	7.91
October	0.154	281	276	6.88	8.81
November	0.161			4.95	6.67
December	0.167		300	5.38	7.06
Average	**0.197**	**323**	**286**	**4.83**	**7.18**

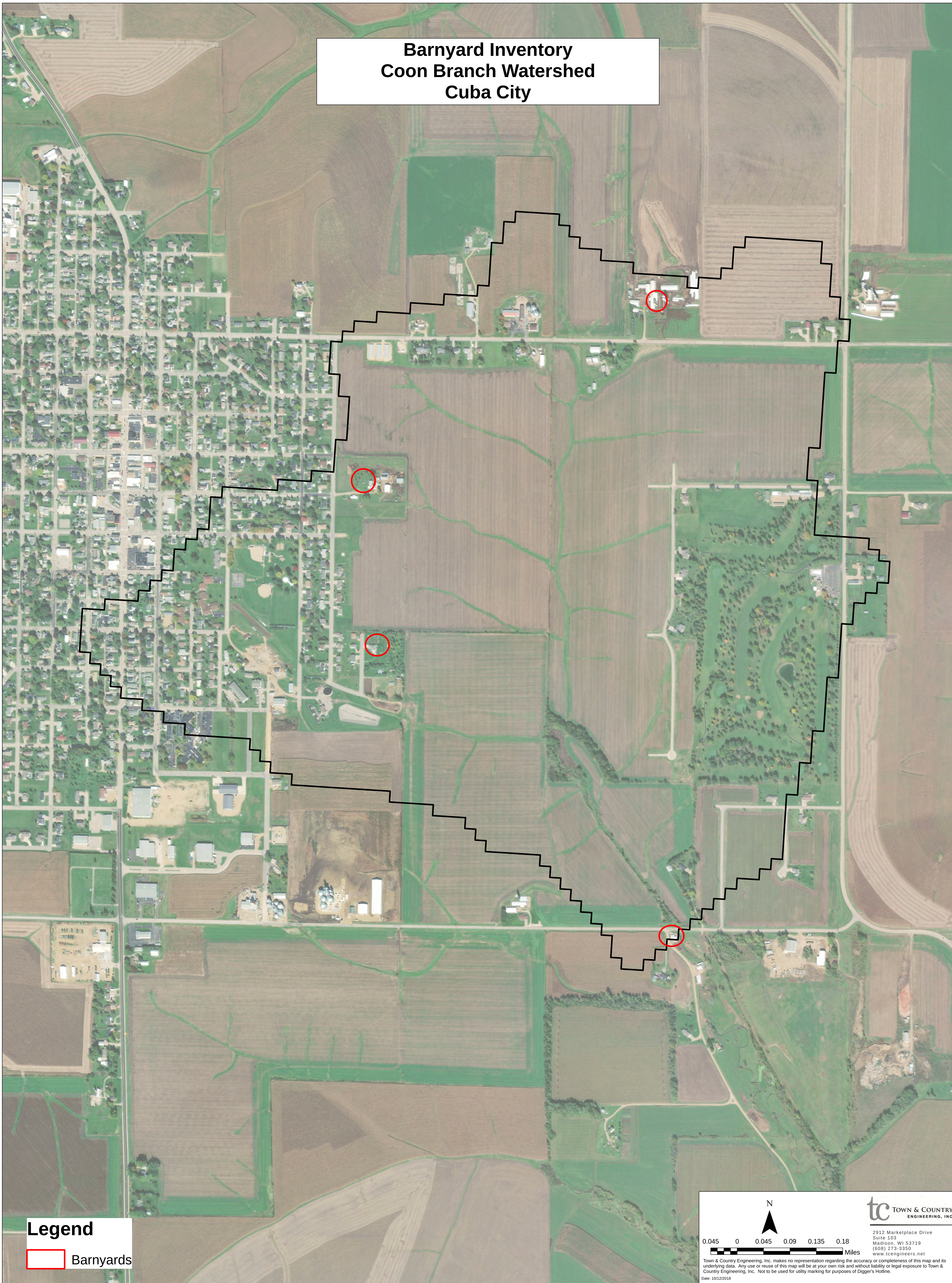
2017	Influent Flow (MGD)	BOD (lbs/day)	TSS (lbs/day)	Phos (mg/L)	Phos (lbs/day)
January	0.192	287	267	4.12	6.99
February	0.177			4.95	7.53
March	0.200			4.29	6.75
April	0.255	357	279	4.44	8.85
May	0.249			3.51	7.64
June	0.200			5.19	6.95
July	0.299			4.20	9.34
August	0.157			5.04	6.88
September	0.143			6.39	7.75
October	0.197	323	273	6.04	9.40
November	0.148	312	249	5.51	6.89
December	0.141			6.21	7.29
Average	**0.196**	**319**	**267**	**4.99**	**7.69**

2018	Influent Flow (MGD)	BOD (lbs/day)	TSS (lbs/day)	Phos (mg/L)	Phos (lbs/day)
January	0.145	253	232	5.02	5.98
February	0.172	267	221	6.33	8.42
March	0.146			6.30	7.57
April	0.154	319	235	6.24	7.73
May	0.178			4.12	6.22
June	0.170			5.57	7.56
July	0.179	250	207	5.84	7.57
August	0.190			5.04	7.36
September	0.431			3.47	12.06
October	0.436			2.55	7.07
November	0.221			4.71	8.43
December	0.205			5.13	8.69
Average	**0.219**	**272**	**224**	**5.0**	**7.89**

Appendix I
EVAAL Model


EVAAL Model
Coon Branch Watershed
Cuba City
Legend
EVAAL
Value
High : 47.5606
Low : 0
N
0.03 0 0.03 0.06 0.09 0.12
Miles
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: 10/12/2018
Document Path: H:\Cuba_City\EVAAL\EVAAL_GIS.mxd
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Appendix J
Potential Barnyard Inventory


Barnyard Inventory
Coon Branch Watershed
Cuba City
Legend
Barnyards
N
0.045 0 0.045 0.09 0.135 0.18
Miles
TOWN & COUNTRY ENGINEERING, INC.
2912 Marketplace Drive
Suite 103
Madison, WI 53719
(608) 273-3350
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Date: 10/12/2018
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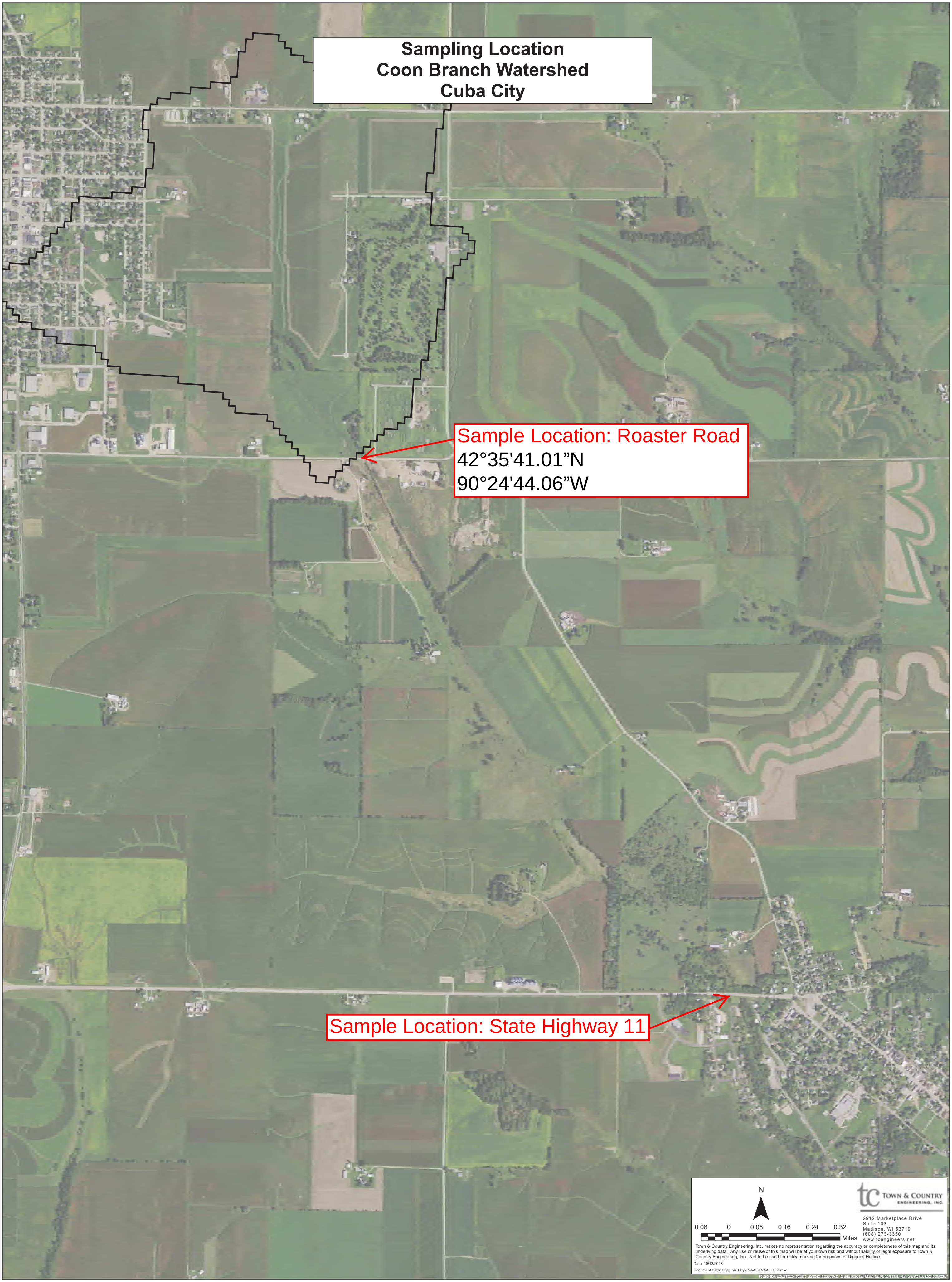
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Appendix K
PRESTO-Lite WWTF Results

Sample Point ID	Permit No.	Facility Name	Receiving Water	Major Basin	Watershed Area	Nonpoint Load *	2009-2011 Avg. Upstream Point Source Load	2009-2011 Avg. Point Source Load	Total Load *	Point : Nonpoint Source Ratio *	Nonpoint Source Dominated?	Model Flag
					(mi^2)	(lbs)	(lbs)	(lbs)	(lbs)	(%)		**
47833	20851	SILVER LAKE VILLAGE	Fox River	Fox (IL)	832.4	149157	48229	425	197811	25:75	Yes	
47713	20559	SUSSEX WASTEWATER TREATMENT FACILITY	Unnamed	Fox (IL)	7.9	283	0	2855	3138	91:9	Speak with WDNR Basin Engineer	
48154	21695	TWIN LAKES WASTEWATER TREATMENT FAC	Unnamed	Fox (IL)	1.0	14	0	866	880	98:2	Speak with WDNR Basin Engineer	
49961	30856	V I P SERVICES INC	Unnamed	Fox (IL)	0.3	126	0	11	137	8:92	Yes	
49763	29971	WAUKESHA CITY	Fox River	Fox (IL)	127.1	23077	22689	7998	53764	57:43	Speak with WDNR Basin Engineer	
49528	28754	WESTERN RACINE COUNTY SEWERAGE DISTRICT	Fox River	Fox (IL)	447.3	70705	34132	2328	107165	34:66	Yes	
49988	31011	WHEATLAND ESTATES MHP	Fox River	Fox (IL)	791.5	137983	47232	105	185320	26:74	Yes	
50154	31887	WI DNR RICHARD BONG RECREATION AREA	Peterson Creek	Fox (IL)	2.3	153	0	26	179	15:85	Yes	
57807	49131	WISCONSIN ELECTRIC POWER CO -TN OF PARIS	Unnamed	Fox (IL)	0.0	4	0	0	4	0:100	Yes	EC
52073	60771	BAGLEY WASTEWATER TREATMENT FACILITY	Glass Hollow Creek	Grant - Platte	7.7	6629	0	719	7348	10:90	Yes	
47760	20672	BENTON WASTEWATER TREATMENT FACILITY	Galena River	Grant - Platte	71.6	116710	0	831	117541	1:99	Yes	
48631	23400	BLOOMINGTON WASTEWATER TREATMENT FACILITY	Blake Fork	Grant - Platte	18.0	34563	338	396	35297	2:98	Yes	
48070	21423	CASSVILLE WASTEWATER TREATMENT FACILITY	Mississippi River	Grant - Platte				1367			No Result	
48320	22217	CUBA CITY WASTEWATER TREATMENT FACILITY	Coon Branch	Grant - Platte	0.6	85	0	2434	2519	97:3	Speak with WDNR Basin Engineer	
48712	23817	DICKEYVILLE WASTEWATER TREATMENT FACILITY	Unnamed	Grant - Platte	0.2	90	0	1097	1187	92:8	Speak with WDNR Basin Engineer	
48755	23981	FENNIMORE WASTEWATER TREATMENT FACILITY	Gregory Branch	Grant - Platte	0.6	328	0	598	926	65:35	Speak with WDNR Basin Engineer	
48784	24210	HAZEL GREEN WASTEWATER TREATMENT FACILITY	Galena River	Grant - Platte				1156			No Result	
49893	30627	JAMESTOWN SANITARY DISTRICT NO 2 WWTF	Menominee River	Grant - Platte	12.5	19383	12	64	19459	0:100	Yes	
50125	31755	JAMESTOWN SANITARY DISTRICT NO 3 WWTF	Louisburg Creek	Grant - Platte	2.3	3481	0	12	3493	0:100	Yes	
49637	29289	KIELER SANITARY DISTRICT NO 1 WWTF	Sinnipee Creek	Grant - Platte	0.1	17	0	474	491	97:3	Speak with WDNR Basin Engineer	
48819	24503	LANCASTER WASTEWATER TREATMENT FACILITY	Unnamed	Grant - Platte	0.4	53	0	1453	1506	96:4	Speak with WDNR Basin Engineer	
48314	22187	LIVINGSTON WASTEWATER TREATMENT FACILITY	Little Platte River	Grant - Platte	0.5	91	0	959	1050	91:9	Speak with WDNR Basin Engineer	
47860	20907	MOUNT HOPE WASTEWATER TREATMENT FACILITY	Little Grant River	Grant - Platte	0.7	625	0	113	738	15:85	Yes	
49876	30503	ORCHARD MANOR WASTEWATER TREATMENT FACILITY	Austin Branch	Grant - Platte	0.4	202	0	275	477	58:42	Speak with WDNR Basin Engineer	
48442	22705	PATCH GROVE WASTEWATER TREATMENT FACILITY	Unnamed	Grant - Platte	1.3	717	0	338	1055	32:68	Yes	
47656	20435	PLATTEVILLE WASTEWATER TREATMENT FACILITY	Rountree Branch	Grant - Platte	12.4	20243	0	1625	21868	7:93	Yes	
48109	21547	POTOSI-TENNYSON SEWAGE COMMISSION WWTF	Unnamed	Grant - Platte	3.2	735	0	1430	2165	66:34	Speak with WDNR Basin Engineer	
49452	28321	SHULLSBURG WASTEWATER TREATMENT FACILITY	Shullsburg Branch	Grant - Platte	7.8	8679	0	1804	10483	17:83	Yes	
49880	30520	SINSINAWA DOMINICANS INC WWTF	Unnamed	Grant - Platte	0.1	20	0	333	353	94:6	Speak with WDNR Basin Engineer	
50385	36285	STITZER SANITARY DISTRICT WWTF	Gregory Branch	Grant - Platte	6.5	3974	598	145	4717	16:84	Yes	
47006	2381	WISCONSIN POWER & LIGHT NELSON DEWEY GEN STATIO	Mississippi River	Grant - Platte				225			No Result	
55549	49859	ABRAMS SANITARY DISTRICT 1	Pensaukee River	Green Bay	113.5	74627	730	507	75864	2:98	Yes	
50143	31852	AURORA SANITARY DISTRICT # 1	Menominee River	Green Bay				294			No Result	
48283	22080	COLEMAN WASTEWATER TREATMENT FACILITY	Little Peshtigo River	Green Bay	45.7	8227	0	922	9149	10:90	Yes	
51972	60372	CRIVITZ WASTEWATER TREATMENT FACILITY	Peshtigo River	Green Bay	659.4	80515	1477	1435	83427	3:97	Yes	
48273	22063	GILLETT WASTEWATER TREATMENT FACILITY	Oconto River	Green Bay	682.1	75914	2032	1768	79714	5:95	Yes	
46872	1732	GRAF CREAMERY INC	Pensaukee River	Green Bay	6.5	4600	0	24	4624	1:99	Yes	
46387	540	KIMBERLY CLARK CORPORATION MARINETTE	Menominee River	Green Bay				138			No Result	
49417	28169	KRAKOW SANITARY DISTRICT WWTF	Pensaukee River	Green Bay	46.3	48055	24	706	48785	1:99	Yes	
55351	49841	LAKEWOOD SANITARY DISTRICT NO 1	McCaslin Brook	Green Bay	58.0	3417	0	503	3920	13:87	Yes	
49515	28592	LAONA SANITARY DISTRICT #1	Rat River	Green Bay	38.1	2320	0	273	2593	11:89	Yes	
52188	61361	LENA WASTEWATER TREATMENT FACILITY	Jones Creek	Green Bay	0.9	98	0	336	434	77:23	Speak with WDNR Basin Engineer	
72506	31968	LITTLE SUAMICO SANITARY DISTRICT NO 1	Little Suamico River	Green Bay	60.1	50075	0	255	50330	1:99	Yes	
49131	26182	MARINETTE WASTEWATER UTILITY	Menominee River	Green Bay				3915			No Result	
46487	752	NEWPAGE CORPORATION NIAGARA MILL	Menominee River	Green Bay				61			No Result	
49677	29467	NIAGARA WASTEWATER TREATMENT FACILITY	Menominee River	Green Bay				482			No Result	
48532	22870	OCONTO FALLS WASTEWATER TREATMENT FACILITY	Oconto River	Green Bay	713.7	80525	5442	417	86384	7:93	Yes	
48526	22861	OCONTO UTILITY COMMISSION WWTF	Oconto River	Green Bay	956.3	155967	6295	589	162851	4:96	Yes	
49904	30651	PESHTIGO JOINT WASTEWATER TREATMENT FACILITY	Peshtigo River	Green Bay	1113.4	147818	3834	1352	153004	3:97	Yes	
50856	44628	PROVIMI FOODS INC	Unnamed	Green Bay	0.1	78	0	33	111	30:70	Yes	
49299	27308	SAPUTO CHEESE USA LENA	Jones Creek	Green Bay	0.9	101	336	100	537	81:19	Speak with WDNR Basin Engineer	
44781	345	SENECA FOODS CORPORATION GILLETT	Christie Brook	Green Bay	8.0	810	0	108	918	12:88	Yes	
46369	531	ST PAPER LLC	Oconto River	Green Bay	713.5	80497	3908	1534	85939	6:94	Yes	
47839	20877	SURING WASTEWATER TREATMENT FACILITY	Oconto River	Green Bay	602.4	60605	1497	535	62637	3:97	Yes	
50802	43699	THYSSENKRUPP WAUPACA INC MARINETTE	Menominee River	Green Bay				210			No Result	
46699	1040	TYCO FIRE SUPPRESSION & BP - ANSUL LLC	Menominee River	Green Bay				185			No Result	
48254	22012	WABENO SANITARY DISTRICT #1	North Branch Oconto River	Green Bay	31.2	2458	0	640	3098	21:79	Yes	
51879	60011	WAUSAUKEE WASTEWATER TREATMENT FACILITY	Menominee River	Green Bay				678			No Result	
48456	22721	WI DNR LAKEWOOD REARING STATION	Unnamed	Green Bay	4.2	382	0	129	511	25:75	Yes	
48459	22748	WI DNR LANGLADE REARING STATION	Dalton Creek	Green Bay	11.0	430	0	225	655	34:66	Yes	0
48445	22713	WI DNR THUNDER RIVER REARING STATION	South Fork Thunder River	Green Bay	21.1	3145	0	1204	4349	28:72	Yes	
49208	26808	AMNICON FOUNDATION	Wetland	Lake Superior	0.0	0	0	2	2	97:3	Speak with WDNR Basin Engineer	EC
49938	30767	ASHLAND SEWAGE UTILITY	Lake Superior	Lake Superior				1862			No Result	
52186	61336	BELL SANITARY DISTRICT 1	Lake Superior	Lake Superior				116			No Result	
52248	70726	BURLINGTON NORTHERN SANTA FE RAILWAY COMPANY	Unnamed	Lake Superior	240.9	132821	1	10	132832	0:100	Yes	
50179	32069	CLOVER SANITARY DISTRICT	Unnamed	Lake Superior	0.1	11	0	90	101	89:11	Speak with WDNR Basin Engineer	EC
50100	31615	DRUMMOND SANITARY DISTRICT 1	Unnamed	Lake Superior				117			No Result	
50880	44831	DULUTH WINNIPEG & PACIFIC RAILWAY	Unnamed	Lake Superior	0.9	76	0	5	81	6:94	Yes	
50302	35131	GRAND VIEW SANITARY DISTRICT	Twentymile Creek	Lake Superior	17.1	6088	0	57	6145	1:99	Yes	
50846	44334	IRON RIVER NATIONAL FISH HATCHERY	Schacte Creek	Lake Superior	2.5	224	0	953	1177	81:19	Speak with WDNR Basin Engineer	
71336	28941	KNIGHT TOWN OF	Alder Creek	Lake Superior	10.1	5155	0	11	5166	0:100	Yes	
49936	30759	MADELINE SANITARY DISTRICT	Lake Superior	Lake Superior				157			No Result	
49574	29009	MAPLE SCHOOL DISTRICT	Bardon Creek	Lake Superior	0.2	282	0	20	302	7:93	Yes	
47609	20311	MELLEN CITY OF	Bad River	Lake Superior	99.0	20152	0	587	20739	3:97	Yes	
49736	29742	MIDDLE RIVER HEALTH & REHABILITATION CENTER	Middle River	Lake Superior	33.4	4099	0	107	4206	3:97	Yes	
50539	38946	MIDWEST ENERGY RESOURCES COMPANY	Lake Superior	Lake Superior				32			No Result	
48349	22306	MONTREAL CITY OF	West Fork Montreal River	Lake Superior	75.8	12776	0	978	13754	7:93	Yes	

Appendix L
In-stream Sampling Locations


Sampling Location
Coon Branch Watershed
Cuba City
Sample Location: Roaster Road
42°35'41.01"N
90°24'44.06"W
Sample Location: State Highway 11
N
0.08 0 0.08 0.16 0.24 0.32
Miles
TOWN & COUNTRY ENGINEERING, INC.
2912 Marketplace Drive
Suite 103
Madison, WI 53719
(608) 273-3350
www.tcengineers.net
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Date: 10/12/2018
Document Path: H:\Cuba_City\EVAAL\EVAAL_GIS.mxd
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Appendix M
County Letter of Support

Conservation and Zoning Department
1900 Ervin Johnson Drive
Darlington, WI 53530-9271
Phone: (608) 776-3836

November 28, 2018

Mr. Gregory Droessler
Town & Country Engineering, Inc.
10505 Corporate Drive, Suite 105A
Pleasant Prairie, WI 53158

Subject: Cuba City Adaptive Management Plan

Dear Mr. Droessler:

Lafayette County Land Conservation Department intends to assist the Cuba City Wastewater Treatment Plant and Commission with implementation of their proposed adaptive management plan within the scope of the services typically provided by Lafayette County Land Conservation Department to landowners. A service agreement is proposed to be developed between Cuba City WWTP and Lafayette County and approved by the appropriate boards and commissions identifying services to be provided by Lafayette County Land Conservation Department as a broker for the Cuba City adaptive management plan.

If you have additional questions, please contact me at (608) 776-3836, or terry.loeffelholz@lafayettecountywi.org.

Sincerely,

Terry Loffelholz
Lafayette County Conservation & Zoning Manager

Cc: Matthew Claucherty, Wisconsin Department of Natural Resources

Appendix N
Cost Share Examples

Appendix O
Financial Security Statement

CITY OF CUBA CITY
STATEMENT OF FINANCIAL SERCURITY

WHEREAS, the City of Cuba City, Grant and Lafayette County, Wisconsin (the "City") 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 City expects to finance the Project with existing funds and user charges;

NOW, THEREFORE, City of Cuba City, Grant and Lafayette County, Wisconsin confirms that the Commission has the financial means to implement the project during the next WPDES permit term, beginning in October 2019.

Signed this 19th day of December, 2018.

Thomas Gile

Mayor – City of Cuba City