THE GREEN LAKE WATERSHED PHOSPHORUS PRIORITIZATION TOOL

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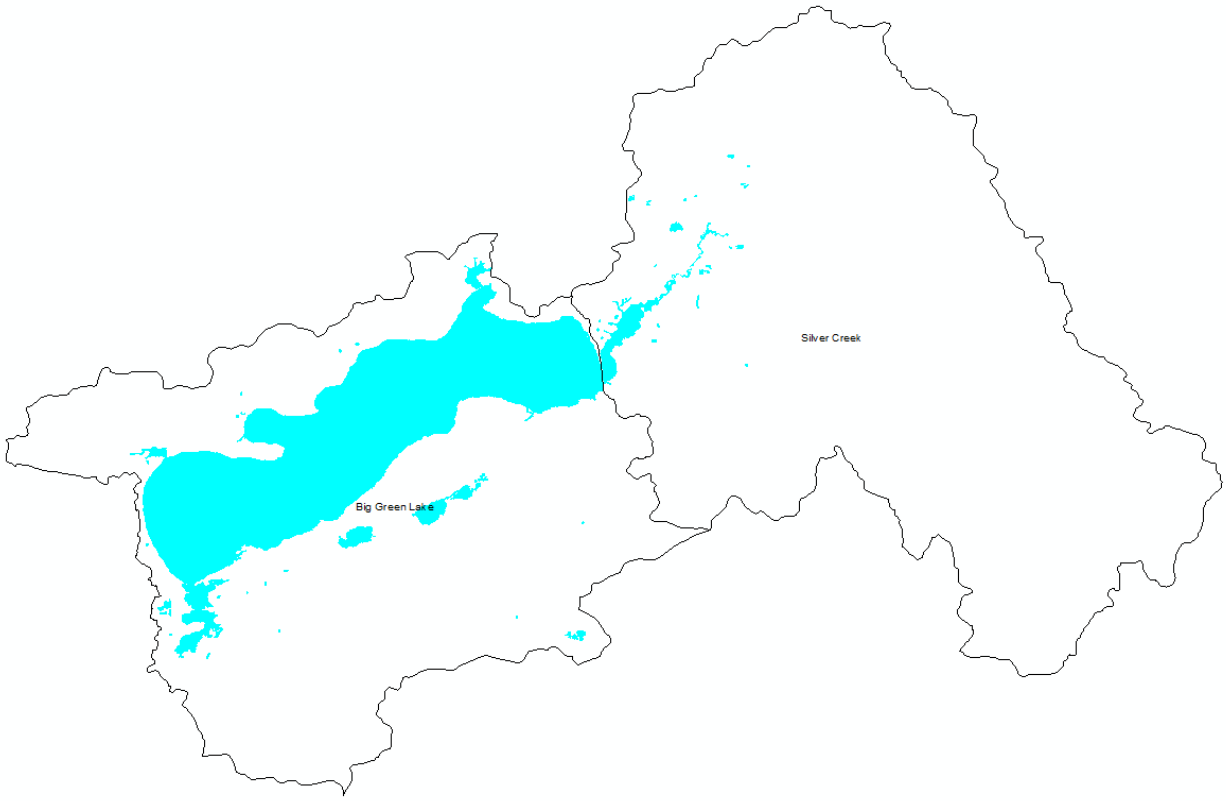

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Executive Summary

Big Green Lake has a long-term trend of water quality decline, in large part from excessive sediment and phosphorus loading from the 107 square mile watershed. A 2015 Soil and Water Assessment Tool (SWAT) watershed model estimated that Green Lake receives an average of 23,960 pounds of phosphorus loading annually.

In 2013, a Lake Management Plan (LMP) was developed for Green Lake in an attempt to guide water quality efforts for the lake. While the LMP team has had much success, areas of non-point source pollution remain difficult to identify, quantify and prioritize. Delta Institute worked closely with the Green Lake Association and LMP team to develop the Green Lake Watershed Phosphorus Prioritization Tool (PPT) as a decision-making tool as it relates to agricultural non-point source pollution.

The PPT identifies 12 nutrient loading priority areas (NLPAs) in the watershed. Hypothetical annual phosphorus reduction goals of 25% by 2025 and 35% by 2035 within NLPAs are based on field-level implementation scenarios of five soft and hard best-practices: Mulch tillage, no-till, cover crops, filter strips, and grassed waterways. These phosphorus reduction goals are not based on water quality goals, but could be recalibrated once results from an ongoing lake model equate water quality goals with phosphorus reduction goals.

The total installation cost of these implementation scenarios is $600,900 (25% reduction by 2025) and $1.8 million (35% reduction by 2035). Assuming EQIP funding at 25%, 50% and 75%, the maximum funding gap ranges from $488,300 (25% reduction by 2025) to $1.4 million (35% reduction by 2035) based on the field implementation scenarios.

The Delta Institute recommends that the PPT be used to prioritize ongoing efforts, to inform potential new strategies, and to seek additional funding for BMPs to achieve the Green Lake watershed's phosphorus reduction goals.

Background

Big Green Lake ('Green Lake', Green Lake County, Wisconsin) is known for its cold- and warm-water fishing, recreation, and aesthetic beauty. With a surface area of 7,346 acres and a maximum depth of 236 feet, it is Wisconsin's deepest natural inland lake. Green Lake contains a vast volume of water,

nearly 250 billion gallons (or 762,000 acre-feet). If the lake were to be emptied, normal stream flow conditions would require at least 20 years for it to completely fill again.

While all lakes naturally age over long periods of time, a lake's aging can be significantly accelerated by human activities throughout the watershed. Green Lake's watershed is 107 square miles and spans Green Lake County (63 square miles, or 58%), Fond du Lac County (44 square miles, or 41%), and Winnebago County (1 square mile, or 1%). Urban areas, including the cities of Green Lake and Ripon, and shoreline residences along the lake's 25-mile perimeter account for 3% of its land use [1]. Agricultural areas account for 57% of Green Lake's watershed [1]. Forty percent of the watershed is made up wetlands, forests, open water and other natural areas [1].

Nutrient and sediment loading originating from sources throughout the lake's watershed can threaten lake health, recreational pastimes and local economic development. The impact of unpredictable factors – such as the introduction of aquatic invasive species; more intense, more frequent rainfall events; and fluctuations in crop markets that impact total agricultural acres in the Conservation Reserve Program – have the potential to further degrade the lake's water quality.

Green Lake's water quality trends are validated by a long history of data collection. Birge and Juday, the founders of limnology based at University of Wisconsin-Madison, collected dissolved oxygen measurements in Green Lake beginning in 1905 [2]. Sediment cores extracted from the lake bottom in the 1990s allowed for phosphorus and sediment accumulation dating back to the late 1800s [3]. These data show that Green Lake's water quality began to degrade after European settlement in the 1840s with substantial phosphorus accumulation after the 1940s to the present [3].

Results from a 2015 Soil and Water Assessment Tool (SWAT) model by Baumgart estimated that, on average, Green Lake receives 23,960 pounds of phosphorus annually [4]. The SWAT model used inputs of land cover, land use, tillage practices, nutrient management, soil materials, and stream flows from 1998-2012. Average annual discharge and loads from the Ripon Municipal Wastewater Treatment Plant were included in the model calibration and validation simulations [4].

While phosphorus concentrations fluctuate on an annual and seasonal basis, the 5-year June-August average phosphorus concentration measured by the U.S. Geological Survey near the lake's surface is 17.2 μg/L (confidence intervals range from 14.4 – 18.3 μg/L) [6]. This range nearly exceeds threshold water quality standards of 15 μg/L established by the Wisconsin Department of Natural Resources [7].

Furthermore, dissolved oxygen at mid- and bottom-lake depths is often below the lowest recommended concentration of 5 mg/L when the lake is stratified into warm- and cold-water layers [7]. In 2009, for example, mid-lake dissolved oxygen concentrations were 0.3 mg/L, but other years are similar.

As a reflection of these long-term trends, in 2014, the Wisconsin Department of Natural Resources (WDNR) classified Green Lake as an impaired water body due to low dissolved oxygen content from phosphorus loading [8]. Green Lake's long-term water quality trends are likely the consequence of upstream impacts, among other factors. While pollution from individual point sources can be identified, quantified and addressed, non-point pollution from agricultural and urban sources remains an understudied issue in the Green Lake watershed. Non-point source pollution comes

from non-concentrated areas spread over a wide area, making solutions more difficult to identify, prioritize, and rectify.

These and other concerns are reflected in the Lake Management Plan (LMP) for Green Lake, a document approved by the WDNR in 2013 that outlines Green Lake's challenges, watershed management priorities, and strategies to improve water quality [1]. The Green Lake LMP contains a phosphorous reduction goal of 15% by 2023. This initial goal is not based directly on water quality goals or on lake/watershed models.

However, the Green Lake Association is sponsoring a 3-year dissolved oxygen monitoring and lake modeling study (2016-2019) through a $200,000 WDNR Lake Protection Grant. Once complete, the initiative will provide management strategies and nutrient reductions required to achieve water quality goals.

Key partners of the LMP team include the Green Lake Association (GLA), Green Lake Sanitary District (GLSD), Green Lake and Fond du Lac County Land Conservation Departments, WDNR, and Natural Resources Conservation Service (NRCS), among others. The LMP team is committed to reducing nutrient and sediment loading to Green Lake in an attempt to improve its water quality over the long term.

Prior to the development of the Green Lake LMP, various lake management projects were being implemented by various groups. This disparity made it difficult to prioritize, track and leverage lake management efforts. The Green Lake LMP and its team have synthesized these lake management efforts into a single guiding document. Since then, the LMP team has been successful at implementing a series of urban, shoreline and agricultural practices throughout the watershed.

Among other accomplishments, the LMP team has made conservation progress within the watershed's estimated 32,400 acres of tillable land [9]. By 2012-2017, the team will have installed over 100 agricultural best management practices (BMPs), valued at over $1.2 million, in Green Lake County within the Green Lake watershed alone. These projects are made possible by funding from the NRCS' National Water Quality Initiative, which has awarded the Green Lake watershed as one of three priority watersheds in the state for six consecutive years [10]. Collaboration between the NRCS, GLSD, Green Lake County Land Conservation Department and WDNR allows the majority of these BMPs to be installed free-of-charge to landowners. In exchange, the practices are installed and maintained in perpetuity.

In 2016, the GLSD also received $200,000 from a WDNR Lake Protection Grant to install agricultural BMPs in the Fond du Lac County portion of the Green Lake watershed. Several projects were secured by a GLSD-sponsored Ag Outreach Coordinator who continues to work directly in Fond du Lac County in the Green Lake watershed to increase the adoption of conservation practices.

Project Goals

While there is a time delay in upstream conservation practices and downstream water quality improvements, Green Lake has not achieved its water quality goals, particularly as it relates to its impairment listing. Among other strategies, continued phosphorus-reducing practices are therefore required.

The LMP team wants to achieve its water quality goals in the most efficient way possible by targeting areas of high nutrient and sediment loading with cost-effective, science-supported practices. Delta Institute has worked closely with the GLA and other key partners to identify non-point source pollution in the agricultural sector within the watershed.

The resulting Green Lake Watershed Phosphorus Prioritization Tool (PPT) seeks to develop an effective decision-making tool for the LMP team to reduce sediment and phosphorus loading in the Green Lake watershed. In particular, the goals of the PPT are to:

- Identify **agricultural nutrient loading priority areas** throughout the Green Lake watershed,
- Determine the **location and type of best practices** needed to achieve milestone annual phosphorus reduction goals of 25% by 2025 and 35% by 2035 through field-level implementation scenarios,
- Calculate the **funding gap** to install best practices that achieve milestone reduction goals, assuming projects are funded by the NRCS' Environmental Quality Incentives Program (EQIP) program at 25%, 50% and 75%,
- Compile a list of potential **grant opportunities** that may cover the remaining funding gap, and
- Provide the information necessary to enhance agricultural outreach that **increases the adoption of conservation practices** in the watershed.

Methods

Development of Nutrient Loading Priority Areas

Delta Institute conducted a nutrient loading analysis of the Green Lake watershed using a series of watershed models that incorporate information about topography, soils, rainfall and land cover.

An Erosion Vulnerability Assessment for Agricultural Lands (EVAAL) for the Green Lake watershed was developed to identify areas that have moderate- to high-erosion indexes created by sheet, rill, and gully erosion. These results were compared to Green Lake's 2015 Soil and Water Assessment Tool (SWAT) watershed model [4] and other phosphorus loading data.

Existing agricultural BMPs (and those currently planned until 2017) were mapped based on information provided by the Green Lake County Land Conservation Department. Similar records and cost-share programs do not exist in Fond du Lac County.

Results were used to identify 12 nutrient loading priority areas (NLPAs) – six in Green Lake County and six in Fond du Lac County – based on high-density clusters of high nutrient loading and low-density clusters of existing BMPs. These 12 NLPAs total 6,862 tillable acres in the watershed with an estimated 15,096 pounds of phosphorus loss annually (or 2.2 pounds/acre).

These NLPAs were identified using EVAAL model results, aerial photographs, and other relevant digital data. The LMP team could consider field-verifying these NLPAs and adjust the prioritization based on those findings in combination with EVAAL model results.

Delta recommends that the LMP team focus on these areas when implementing future conservation practices, as they offer the highest rate of return for sediment and phosphorus reduction. However, best practices can be implemented for phosphorus reductions throughout the watershed, regardless of whether they fall within or outside of the NLPAs.

Refer to appendix A for a more detailed summary of watershed models and inputs used. Refer to appendix C for maps of NLPAs, as well as SWAT and EVAAL watershed model results.

Field-Level Implementation Scenarios

Within each NLPA, Delta conducted field-level implementation scenarios to identify hypothetical areas suitable for a suite of various soft and hard best-practices: Mulch tillage, no-till, cover crops, filter strips, and grassed waterways. These five BMPs were chosen because scientific studies show they offer the greatest potential in reducing phosphorus loads [11],[12],[13]. They are also cost-effective, low-impact, and common in the agricultural conservation community. Incorporation of these practices has the potential to decrease sediment loading and ultimately reduce maintenance costs for retention ponds and other hard practices currently installed in the watershed.

Hypothetical BMPs installation sites were identified based on available data, watershed model results, and geographic characteristics visible from aerial maps. The accuracy of the NLPAs could be enhanced or modified in the future based on field verification.

The quantity and size of these BMPs were determined so that all field-level implementation scenarios from the 12 NLPAs totaled milestone annual phosphorus reduction goals of 25% (or 5,990 pounds) and 35% (or 8,386 pounds). These annual reduction goals are for annual edge-of-field phosphorus reductions that do not account for phosphorus delivery to Green Lake (based on distance from the lake, stream slope, etc.). Note that any phosphorus reduction goals based on delivery to the lake requires higher edge-of-field phosphorus reductions to account for this difference.

Refer to appendix D for detailed field-level implementation scenarios within each NLPA.

Project Cost and Funding Gap

Each BMP's size, estimated phosphorus reduction, and cost were based on data provided by the Environmental Protection Agency (EPA) Region 5 model [14], USDA-NRCS cost estimates [15], and other related data.

BMP costs are estimated based on the following assumptions:

Mulch Tillage (Soft Practice)

Mulch tillage is managing the amount, orientation, and distribution of crop and other plant residue on the soil surface year-round while limiting soil-disturbing activities used to grow crops in systems where the entire field surface is tilled prior to planting.

The PPT assumes increased participation in mulch tillage annually, reaching a maximum of 500 acres in annual participation by 2035. As an annual practice, the cost estimate assumes annual reimbursement of time for all participants.

No-Till (Soft Practice)

No-till is managing the amount, orientation, and distribution of crop and other plant residue on the soil surface year-round while limiting soil-disturbing activities to only those necessary to place nutrients, condition residue, and plant crops.

The PPT assumes increased participation in no-till agriculture annually, reaching a maximum of 950 acres in annual participation by 2035. As an annual practice, the cost estimate assumes yearly reimbursement of time for all participants.

Cover Crops (Soft Practice)

Cover crops are grasses, small grains, legumes, forbs, and/or other herbaceous plant established for seasonal cover and conservation purposes.

The PPT assumes increased participation in cover crop planting, reaching a maximum of 1,300 acres in annual participation by 2035. As an annual practice, the cost estimate assumes yearly reimbursement for all participants for time and cover crop seed.

Filter Strips (Soft Practice)

A filter strip is an area of herbaceous vegetation that removes contaminants from overland flows. Filter strips differ from grassed waterways because they are usually adjacent to stream or creek banks and they do not have the parabolic shape of a grassed waterway.

The PPT assumes 2,000 linear feet of filter strips installed annually, totaling 20,000 linear feet by 2025 (and 20,000 linear feet by 2035). The project cost includes the cost of design and installation, but does not include maintenance or administration costs.

Grassed Waterways (Hard Practice)

A grassed waterway is a shaped or graded channel that is established with suitable vegetation to convey surface water at a non-erosive velocity using a broad and shallow cross-section to a stable outlet.

The PPT assumes 1,000 to 2,000 linear feet of grassed waterways installed annually, totaling 30,000 linear feet by 2035. The project cost includes the cost of design and installation, but does not include maintenance or administration costs.

Retention ponds and stream restoration projects were not included in any field-level implementation scenarios. Given that these practices are significantly more expensive than the five incorporated BMPs, project costs and funding gaps would increase accordingly, if utilized. However, these five implementation scenario BMPs have the potential to reduce field erosion and ultimately decrease maintenance costs of retention ponds currently installed in the watershed.

Refer to appendix B for long-term cost projections to reduce phosphorus by 25% by 2025 and 35% by 2035 by installing identified soft and hard practices. Refer to appendix E for definitions, benefits, and parameters for the conservation best practices recommended in the PPT. Refer to appendix F for funding opportunities available for BMPs the Green Lake watershed.

Interactive Map

Delta produced an interactive, GIS-based map of the EVAAL watershed model, SWAT watershed model, NLPAs, current documented BMPs, and other parameter layers. The map has been created to provide a "bird's eye view" of the data that was compiled and to assist the LMP team in identifying the potential priority areas for future BMPs. Delta recommends that the LMP maintain this GIS-based map for spatial representation and recordkeeping of installed BMPs.

Given privacy considerations of this dataset, please contact the Green Lake Association or Delta Institute if you are interested in receiving access to the interactive map.

Green Lake Watershed Phosphorus Prioritization Tool

Based on ongoing success and research, historic and current monitoring, and the analysis conducted by Delta Institute, the Green Lake LMP team is well-positioned to achieve phosphorus reductions in the watershed. The challenge of achieving annual reduction goals, however, is magnified by unknown variables (i.e. crop prices) and changing realities on the ground (i.e. acres removed from the Conservation Reserve Program).

Additional strategies are therefore needed to maintain consistent progress in nutrient reductions to achieve water quality goals. Delta recommends that the LMP team use the Green Lake Watershed Phosphorus Prioritization Tool (PPT) to guide its current BMP strategy to prioritize projects, to extend current funding, and to seek additional funding to achieve its nutrient reduction goals.

With the information provided in this report, the PPT can also help to strengthen or develop incentive programs or other initiatives locally-tailored by farmers and/or the LMP team to increase the adoption of conservation practices in the watershed.

PPT Results

The Green Lake LMP recommends the adoption of a 10-year (10% phosphorus load decrease), 20-year (30% phosphorus load decrease), and 50-year phosphorus reduction goal [1]. In combination with ongoing lake model research, Delta's example scenario will help to guide long-term phosphorus reduction within the watershed. The PPT will also provide useful information if the LMP team proceeds with updating its LMP team to meet the criteria for the Environmental Protection Agency's Nine Key Element Plan, which could increase funding for the watershed.

Delta believes the Green Lake LMP team can achieve a 25% phosphorus load reduction by 2025 and a 35% phosphorus reduction by 2035 if BMPs are implemented within the NLPAs (see table below for details). The 25% by 2025 (5,970 pounds) and a 35% by 2035 (8,386 pounds) are reduction goals based on load calculations from the EPA Region 5 Model. While these goals are obtainable and tangible, further research and implementation needs to be completed to target specific reduction goals in order improve water quality to the point of being de-listed from the WDNR's impaired waters list. Delta strongly believes that, if the LMP team implements the proposed PPT strategy, Green Lake will be a vibrant and a healthier ecosystem in the years to come.

To achieve 25% phosphorus reduction by 2025 from agricultural non-point source areas, 5,970 pounds per year of phosphorus will need to be reduced within the NLPA. The estimated total cost for BMP implementation needed to reach this goal by 2025 is $600,935 (including a 15% contingency). Depending on the how the LMP team decides to solicit, track and administer the program, there may be additional $5,000 to $25,000 administration cost per year to implement the program. While implementation of BMPs is only occurring in the NLPAs, the phosphorus reductions are at a watershed scale.

To achieve 35% phosphorus reduction by 2035 from agricultural non-point source areas, 8,308 pounds per year of phosphorus will need to be reduced within the NLPA. The estimated total cost

for BMP implementation needed to reach this goal by 2035 is $1,755,142 (including a 15% contingency). Depending on the how the LMP team decides to solicit, track and administer the program, there may be additional $5,000 to $35,000 administration cost per year to implement the program. While implementation of BMPs is only occurring in the NLPAs, the phosphorus reductions are at a watershed scale.

For more detailed information regarding funding for this long-term reduction strategy, see appendix B.

Project Cost and Funding Gap

While the total cost of a 25% and 35% phosphorus reduction goal ranges from $600,965 to $1.7 million, accordingly, a large portion of these BMP projects may be covered through existing funding opportunities. This funding gap will increase if retention ponds and/or shoreline restoration projects, not currently included in field implementation scenarios, are implemented.

Delta recommends that the LMP team promote existing funding opportunities to reduce the overall funding gap. Existing programs include the U.S. Department of Agriculture-NRCS's Environmental Quality Incentive Program (EQIP), Wildlife Habitat Incentive Program (WHIP), Conservation Reserve Program (CRP), Conservation Security Program (CSP), and others. These existing federal programs are already set up for potential cost share opportunities for private landowners.

In addition to these funding opportunities, various LMP team members have designated funds for BMP projects. The GLSD is willing to commit $500,000 to $1 million towards BMP projects between 2015 and 2025. The Green Lake County Land Conservation Department has funds set aside for a future filter strip program to help reduce nutrient loading throughout the Green Lake watershed in Green Lake County.

Another opportunity for BMP cost-share funding includes the NRCS' National Water Quality Initiative (NWQI) program. As of 2016, the NRCS has awarded NWQI funding to the Green Lake watershed in Green Lake County for six consecutive years. The LMP team may want to consider encouraging the NRCS to transfer this program to the Green Lake watershed in Fond du Lac County.

While these programs provide funding directly to farmers, there are other funding opportunities that the GLA and other LMP team partners can request to fund BMPs in the watershed. All of these funding opportunities are outlined in appendix F.

Delta encourages the LMP team to use the success of existing BMP programs and the information provided by NLPAs to apply for additional funding to reduce phosphorus loading in the Green Lake watershed.

The following table outlines the total cost of reducing phosphorus by 25% and 35% in the watershed. It also provides a funding gap if EQIP funds only cost-share 25%, 50% and 75%.

Hypothetical scenarios to achieve 25% and 35% phosphorus reductions	Percent of BMP cost covered by EQIP funding		
	25% covered	50% covered	75% covered
HYPOTHETICAL SCENARIO 1: **25% PHOSPHORUS REDUCTION BY 2025** (5,990 POUNDS PF PHOSPHORUS) *Soft-practice cost: $ 360,360* *Hard-practice cost: $ 162,192* *Total cost: $522,552* **Total cost + 15% contingency: $ 600,935**			
Estimated EQIP funding received by 2025	$ 112,700	$ 225,350	$ 338,000
Estimated funding gap through 2025	$ 488,300	$ 375,600	$ 262,900
2025 Funding Gap: $ 112,700 – $488,300			
HYPOTHETICAL SCENARIO 2: **35% PHOSPHORUS REDUCTION BY 2035** (8,386 POUNDS OF PHOSPHORUS) *Soft-practice cost: $ 1,301,430* *Hard-practice cost: $ 242,172* *Total cost: $1,543,602* **Total cost + 15% contingency: $ 1,775,142**			
Estimated EQIP funding received by 2035	$ 332,850	$ 665,700	$ 998,500
Estimated funding gap through 2035	$ 1,442,300	$ 1,109,500	$ 776,600
2035 Funding Gap: $ 332,850 – $1,442,300			

Outreach

The LMP team has members that represent key agriculturally-focused conservation groups in the Green Lake watershed, including the Green Lake and Fond du Lac County Land Conservation Departments, Green Lake Sanitary District, NRCS, and WDNR. Many of these partners also have strong relationships with certified crop advisors, crop consultants, and other conservation advocacy groups.

Delta encourages these select LMP partners to reach out to local conservation advocacy groups to share the LMP team's long-term nutrient reduction vision and to review the NLPAs identified in the PPT. In addition to quarterly LMP meetings, the team may wish to arrange additional biannual meeting with these conservation advocacy groups to keep them up-to-date on LMP efforts and to coordinate strategies, priorities, and goals.

Of course, implementation of the PPT and other nutrient-reduction strategies will require the voluntary landowner participation on private property. Increasing the participation of these

practices could be initially guided by social science. In 2016/2017, the GLA is collaborating with Aaron Thompson, UW-Extension, to facilitate an agricultural social science survey within the watershed. The voluntary assessment seeks to better understand agricultural producers' land management decisions and to seek input for solutions that collectively benefit crops, soil health, and downstream water resources. Delta recommends that the LMP team use survey results to guide future BMP and/or incentives programs to increase the adoption of conservation practices in the Green Lake watershed. When those survey results are used in combination with the PPT, it may be possible to work with willing landowners in NLPAs to maximum the impact and minimize the cost of nutrient reductions.

As part of an outreach campaign, the LMP team should coordinate various conservation workshops and field days to inform landowners about agricultural BMPs, conservation programs, and other opportunities and projects underway within the watershed. Information contained in the PPT may also provide useful information to inform ongoing incentive strategies or to develop new conservation programs locally-tailored by farmers and/or the LMP team.

The target audience for workshops and field days should include landowners within the 12 NLPAs. During conservation workshops, Delta recommends that the LMP team position programming around shared goals and how BMPs can benefits landowners' operations. Key partners can showcase beneficial BMPs within the watershed, implementation strategies, and conservation programs that provide cost assistance or cost-share. Given timing of planting and harvest, at least one workshop should be help during the winter months.

Field days provide landowners the chance to network with their peers and to learn about innovating farming and conservation practices. Topics could include cover crop installation, pasture conservation and renovation, nutrient management, soil health and stewardship, and no-till practices.

Delta also recommends creating marketing material to promote the PPT concept. This includes, but is not limited to: flyers in agriculture retail stores, quarterly newsletters, a website, and social media outreach. The LMP team can promote upcoming meetings, workshops, field days, and functions through these platforms. Farmers also gather the majority of their information through their peers. Delta recommends that the LMP team reach out to active and influential farmers in the watershed to share team initiatives with them personally.

Delta recognizes that cover crops and other soft practices recommended in the NLPAs are not currently utilized in the watershed as frequently as retention ponds and streambank protection projects, which represent 30% and 12% of current BMP projects, respectively. However, over the long term, soft practices recommended in the PPT have the ability to change soil structure, increase soil aggregate stability, increase infiltration, and reduce runoff, among other benefits.

Increasing the adoption of these less common strategies will require farm management changes guided in part by one-one-one communication with individual landowners. Based on feedback from the LMP team, there is currently limited staff capacity to do this. Delta recommends that the LMP team consider hiring an agronomist, cover crop specialist or certified crop adviser whose time could

be shared between Green Lake and Fond du Lac County. This individual could be responsible for meeting with landowners, organizing field days, as well as soliciting, tracking and administering the program.

The GLA and LMP team have worked with many universities and research programs in the past to provide science-based data on Green Lake and the watershed. Delta encourages that partnerships are continued with Ripon College, University of Wisconsin, Nelson Institute for Environmental Studies, University of Wisconsin Extension Service, and others.

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APPENDIX A: NLPA INTRODUCTION

For this project, Delta used several data sets and models to identify Nutrient Load Priority Areas (NLPAs) and the Best Management Practices that are most applicable for each NLPA. The NLPAs identified are areas within the Green Lake and Silver Creek watershed that have the greatest potential for erosion, which is an indication of high nutrient loading. Identifying NLPAs will assist the LCDs in prioritizing areas where BMP implementation BMPs will be most impactful.

The NLPAs were identified using various geospatial models and datasets pertaining to land use and geophysical land characteristics. The section outlines all of the data sources and models used in the NLPA identification and prioritization process, and explains why each source was included in the process.

A. MODELS

1. SWAT, Total Phosphorus Yield (lbs. /acre)

Source: Lower Fox River Watershed SWAT model, UWGB

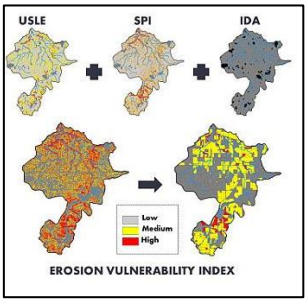
Description: Created by the USDA Agriculture Research Service, the SWAT model is a tool that predicts the impacts of various water, sediment, and nutrient management practices. This SWAT model operates on a river basin scale and on daily time steps, allowing the tool to predict long-term impacts in large river basins. The model's primary inputs include the watershed configuration, climate and precipitation data, land cover, and land management. This model is used to quantify loading of many non-point source pollutants, but for the purpose of this project was used to estimate Phosphorous loading in each of the sub-watersheds within the Green Lake and Silver Creek watersheds. This tool is widely accepted in the field of land management and conservation both nationally and internationally, and is commonly used to assess the efficiency of BMPs.

Rational for Incorporating Data: The Total Phosphorus (TP)- lbs./acre is a simulated yield of the amount of Phosphorus that is being lost annually in each designated HUC 14. This data was incorporated in our NLPA prioritization because it provides reliable Phosphorus loads in each-sub watershed.

Potential Limitations: The TP data is generated through a model using a simulated matrix, but is not data from actual farm/field operation and practices. Actual farm/field operations may vary from model outputs.

2. Erosion Vulnerability Assessment of Agricultural Lands (EVAAL)

Source: Wisconsin Department of Natural Resources/Fond du Lac LCD/Green Lake GIS Department



Description: The EVAAL model was created by the Wisconsin Department of Natural Resources and the Bureau of Water Quality to assist in the prioritization of areas within a watershed that may be vulnerable to water erosion. The tool evaluates vulnerability to sheet, rill, and gully erosion based on the model inputs. The models inputs include: topography, soil characteristics, precipitation, and land cover. With this information, the model outputs an "Erosion Vulnerability Index" (EVI). This index uses a

simple scale from Low EVI to high EVI. Areas with higher EVI are more vulnerable to erosion, making them more likely to export nutrients downstream. This tool generates the EVIs separately for sheet vs rill erosion using the "Universal Soil Loss Equation" (USLE), and gully erosion using the "Stream Power Index" (SPI). The model also deprioritizes areas that are not hydrologically connected to surface water, "Internal Drainage Areas" (IDA). The summation of these data points result in the EVI.

Rational for Incorporating Data: This tool provides information that allows them to prioritize areas on a field level that are most susceptible to erosion, while other models are only able to generate this information by HUCs or larger hydraulic defined boundaries

Potential Limitations: The output data generated is only as reliable and accurate as the data entered into the model, and only represent a simulation rather than actual data.

B. DATA INPUTS

1. USGS Monitors- Active

Source: United States Geological Survey

Description: USGS Monitors are water data collection systems that provide data on the water quality. An active monitor has collected time-series (automated) data within the last 183 days (6 months), or it has collected discrete (manually collected) data within 397 days (13 months).

Rational for Incorporating Data: Water quality data from USGS monitors provide actuate and site localized data regarding nutrient levels where stationed. Using this information may also prove valuable when applying for funds that require stream-level monitoring and annual reports.

Potential Limitations: There may be more monitors in the Green Lake watershed that may be inactive. There may also be information related to grab sampling that might not be readily available.

2. Total Number of BPM Install in Green Lake County

Source: Green Lake County LCD

Descriptions: This data layer includes the soil and water conservation practices, other management techniques, and social actions that have been already been implemented in Green Lake County.

Rational for Incorporating Data: Identifying the location of existing BMPs will assist the GLA and Land Conservation Departments in targeting areas to implement and apply new BMPs. The BMPs included in this dataset are: cover crops, filter strips, grassed waterways, diversion terraces, sediment basins, animal waste storage, and stream bank protection.

Potential limitations: The BMPs identified are not an exhaustive list of all implemented BMPs in the Green Lake and Silver Creek watersheds. The BMPs mapped are practices that have been cost shared through federal or state dollars that have been identified by local conservation groups. Delta identified available data of existing conservation practices and due to the limitations of the data, and we do not believe the existing BMP information would impact plans to achieve a 25% P reduction through 2025.

3. Green Lake Buffer Assessment Project

Source: Green Lake County LCD

Descriptions: This dataset includes an inventory of vegetative buffer condition and spatial coverage, areas of convergence, soil types, watersheds, land use, bank condition, and physical stream status.

Rational for Incorporating Data: The Green Lake Buffer Assessment Project will assess the location and spatial extent of riparian buffer, identify impaired buffers, recognize floodplain areas, locate areas bank instability, classify target areas for precision buffers, and locate target areas for upland conservation practices. This will assist the LCDs in identifying areas along streams that could benefit from BMPs related to stream bank erosion.

Potential limitations: N/A

4. Soil Types

Source: United States Department of Agriculture (USDA)

Descriptions: The unconsolidated mineral or organic matter on the surface of the Earth that has been subjected to and shows effects of genetic and environmental factors of: climate (including water and temperature effects) and macro- and microorganisms, conditioned by relief, acting on parent material over a period of time.

Rational for Incorporating Data: Soil descriptions and characteristics assist in identifying what BMPs would be most effective in that specific location. For example, we focused on areas with soils characterized as sandy loam/ loam, as these soil type are more susceptible to erosion.

Potential limitations: All soil information was identified using the Geo Spatial Gateway and the Web Soil Survey provided by USDA. Soil samples should be taken at the field-level scale by a professional to accurately depict soil information at that specific location.

5. CropScape- Cropland Data Layer (CDL)

Source: United States Department of Agriculture (USDA)

Descriptions: The Cropland Data Layer (CDL) is a land cover product depicting detailed field-level information on crop and non-crop categories and locations covering the contiguous United States.

Rational for Incorporating Data: This geospatial data offers independent statistical estimates of crop acreage throughout the growing season on a parcel level. The crops produced on a specific parcel of land provide an important piece of information when determining which BMPs would be most impactful.

Potential limitations: Acreage counts are not official estimates.

APPENDIX B: Long-Term Reduction Scenarios

The section below details the amount of Phosphorus that needs to be reduced and the approximate amount of funds that are need to implement BMP's to meet the goals outlined. This section also includes a year by year implementation plan of selected soft and hard BMP practices. These BMP's were selected for their adaptability and farmer willingness of implementation. The data that was used to calculate these numbers came from the Green Lake Nutrient Load Priority Area Snapshots and the Field Level Implementation Scenarios in Appendix D.

Table 1: Basic Information

Green Lake Watershed	Data
Total Tillable Acres in Green Lake Watershed (CropScape 14') (Acres)	32,400
Estimated P Loss in Green Lake Watershed (SWAT 15') (lbs.)	23,960
Estimated P loss per Acre in Green Lake Watershed (lbs./acre)	0.75
Nutrient Load Priority Area	
Total Tillable area in NLPA Scenarios (Acres)	6,862
Estimated P Loss in NLPA (SWAT 15') (lbs.)	15,096
Estimated P loss per Acre in NPLA (lbs./acre)	2.2

Table 2: 25 X 2025 Plan: 25% Phosphorous Load Reduction by 2025

	PRACTICE	Annual Phosphorous (lb) reduced by 2025	Annual % Phosphorous reduction by 2025	Acres/ year implemented by 2025	Annual Cost to Maintain Goal	TOTAL cost to Reach Goal (2016-2025)
Soft Practice	Mulch Till	850	4%	500	11800	$ 61,600.00
	No Till	820	3%	500	14750	$ 77,000.00
	Cover Crop	1660	7%	1000	42480	$ 221,760.00
	Soft Practice Total	3330	14%	2000	69030	$ 360,360.00
Hard Practices				Linear Feet Active by 2025		
	Filter Strips	600	3%	20000	$ 2,926	$ 27,032
	Grass Waterways	2040	9%	20000	$ 14,632	$ 135,160
	Hard Practice Total	2640	11%	40000	$ 17,558	$ 162,192
All Practices	TOTAL	5970	25%	NA	$ 86,588	$ 522,552
	TOTAL with 15% Contingency	NA	NA	NA	$ 99,577	$ 600,935

Table 3: 35 X 2035 Plan: 35% Phosphorous Load Reduction by 2035

	PRACTICE	Annual Phosphorous (lb) reduced by 2035	Annual % Phosphorous reduction by 2035	Acres/ year implemented by 2035	Annual Cost to maintain goal	TOTAL cost to Reach Goal (2016-2035)
Soft Practice	Mulch Till	850	4%	500	13800	$ 190,600.00
	No Till	1640	7%	1000	34500	$ 329,000.00
	Cover Crop	2158	9%	1300	64584	$ 781,830.00
	Soft Practice Total	4648	19%	2800	112884	$ 1,301,430.00
Hard Practices				Linear Feet Active by 2035		
	Filter Strips	600	3%	20000	$ -	$ 27,032
	Grass Waterways	3060	13%	30000	$ 8,556	$ 215,140
	Hard Practice Total	3660	15%	50000	$ 8,556	$ 242,172
All Practices	TOTAL	8308	35%	NA	$ 121,440	$ 1,543,602
	TOTAL with 15% Contingency	NA	NA	NA	$ 139,656	$ 1,775,142

*A 15% contingency has been added to the total cost of each plan to account for increases and inflations. All percentages were rounded to the nearest whole number.

Figure 1: Annual Implementation Cost and P Load Reduction

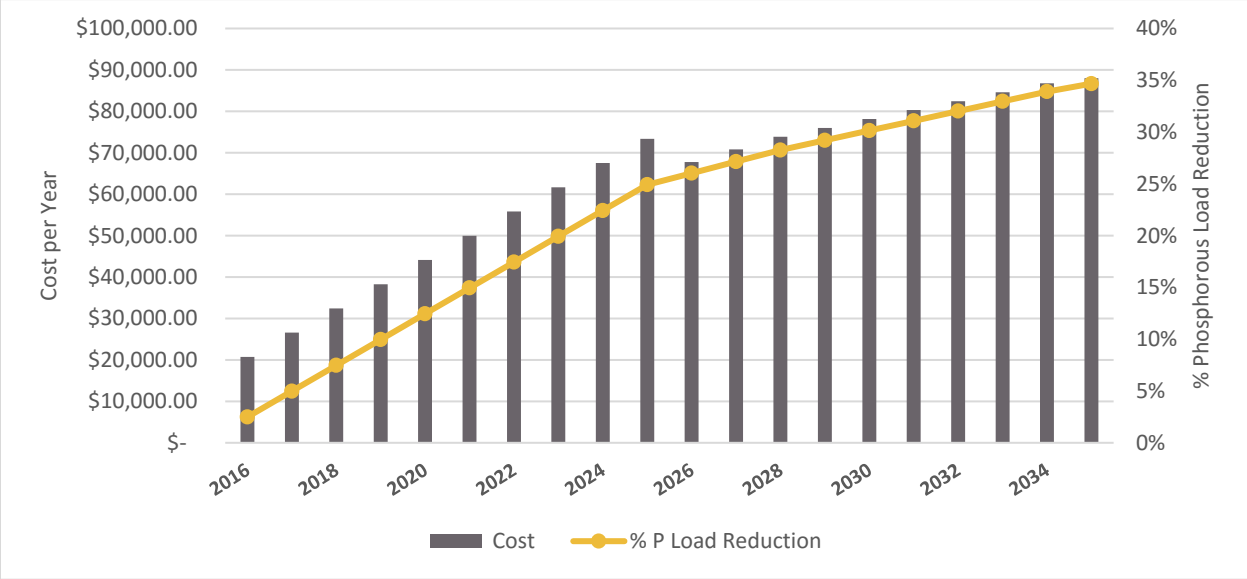


Table 4: Annual Implementation Plan

	SOFT PRACTICES (Acres)			HARD PRACTICES (Linear Feet)		ALL PRACTICES		
	Mulch Till	No Till	Cover Crops	Filter Strips	Grass Waterway	Annual Cost	Cumulative Cost	% Annual P Load Reduction
2016	50	50	100	2,000	2,000	$ 20,730	$ 20,730	2%
2017	100	100	200	4,000	4,000	$ 27,112	$ 47,842	5%
2018	150	150	300	6,000	6,000	$ 33,727	$ 81,569	7%
2019	200	200	400	8,000	8,000	$ 40,577	$ 122,146	10%
2020	250	250	500	10,000	10,000	$ 47,660	$ 169,806	12%
2021	300	300	600	12,000	12,000	$ 54,978	$ 224,784	15%
2022	350	350	700	14,000	14,000	$ 62,530	$ 287,314	17%
2023	400	400	800	16,000	16,000	$ 70,315	$ 357,629	20%
2024	450	450	900	18,000	18,000	$ 78,335	$ 435,964	22%
2025	500	500	1,000	20,000	20,000	$ 86,588	$ 522,552	25%
2026	500	550	1,050	20,000	21,000	$ 81,300	$ 603,852	26%
2027	500	600	1,100	20,000	22,000	$ 86,376	$ 690,228	27%
2028	500	650	1,150	20,000	23,000	$ 91,574	$ 781,802	28%
2029	500	700	1,175	20,000	24,000	$ 95,760	$ 877,562	29%
2030	500	750	1,200	20,000	25,000	$ 100,032	$ 977,594	30%
2031	500	800	1,225	20,000	26,000	$ 104,390	$ 1,081,984	31%
2032	500	850	1,250	20,000	27,000	$ 108,834	$ 1,190,818	32%
2033	500	900	1,275	20,000	28,000	$ 113,364	$ 1,304,182	33%
2034	500	950	1,300	20,000	29,000	$ 117,980	$ 1,422,162	34%
2035	500	1,000	1,300	20,000	30,000	$ 121,440	$ 1,543,602	35%

*A 2% increase has been applied year over year to account for inflation and potential increases in BMP implementation over the next 20 years.

Figure 2: Soft Practices Implementation Plan

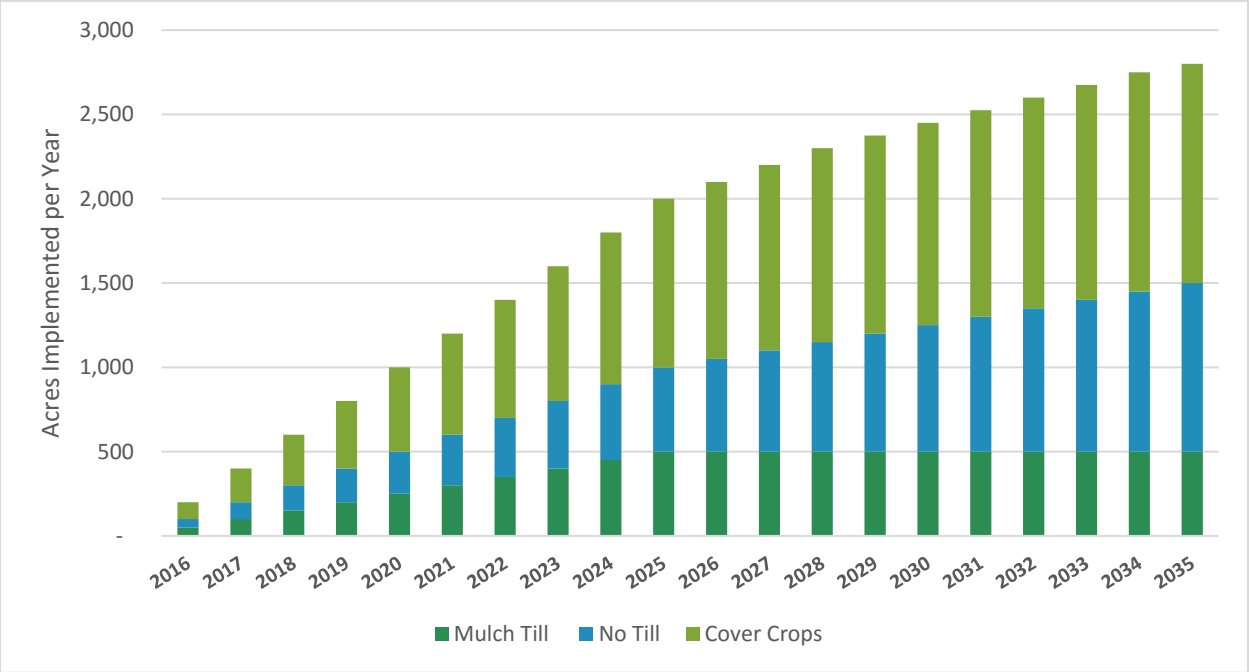
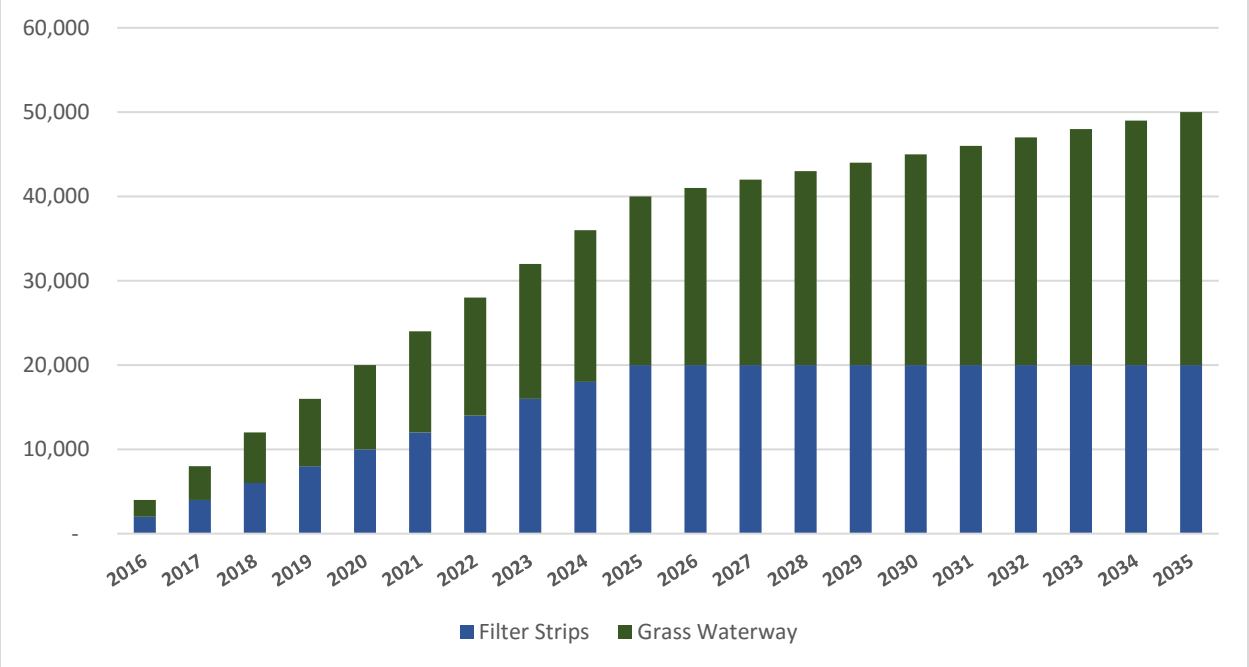


Figure 3: Hard Practices Implementation Plan

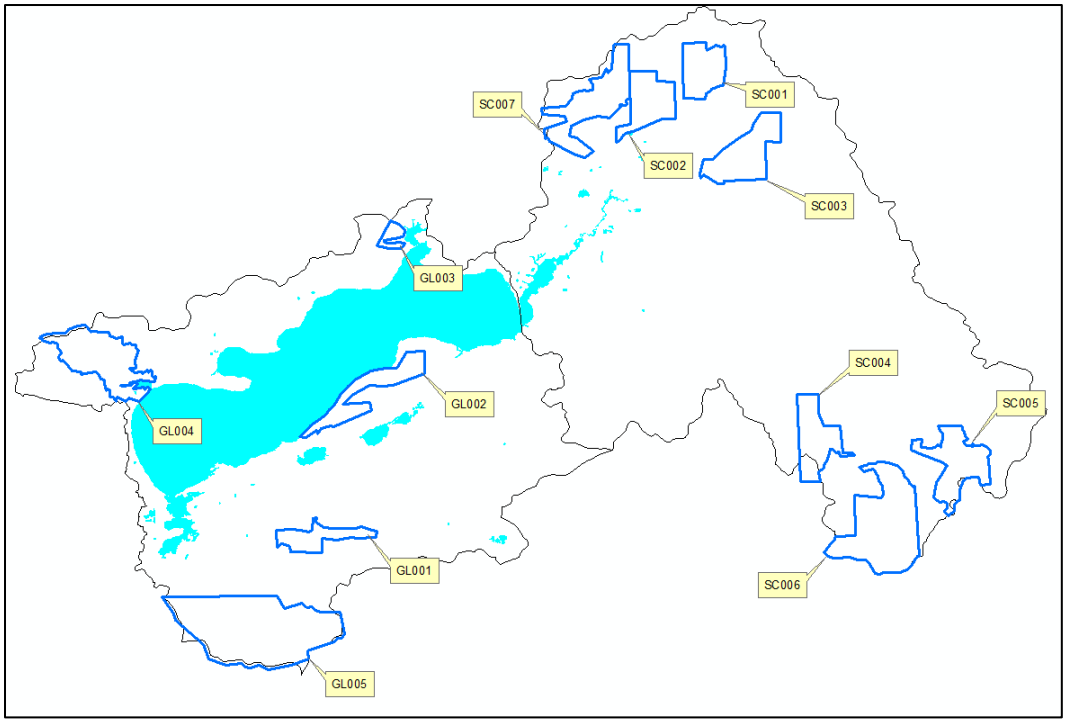


The graphs above illustrate the cost per year associated with annual Phosphorous reductions require to meet the specified reduction goal. The P reductions are represented as annual reductions in the graphs

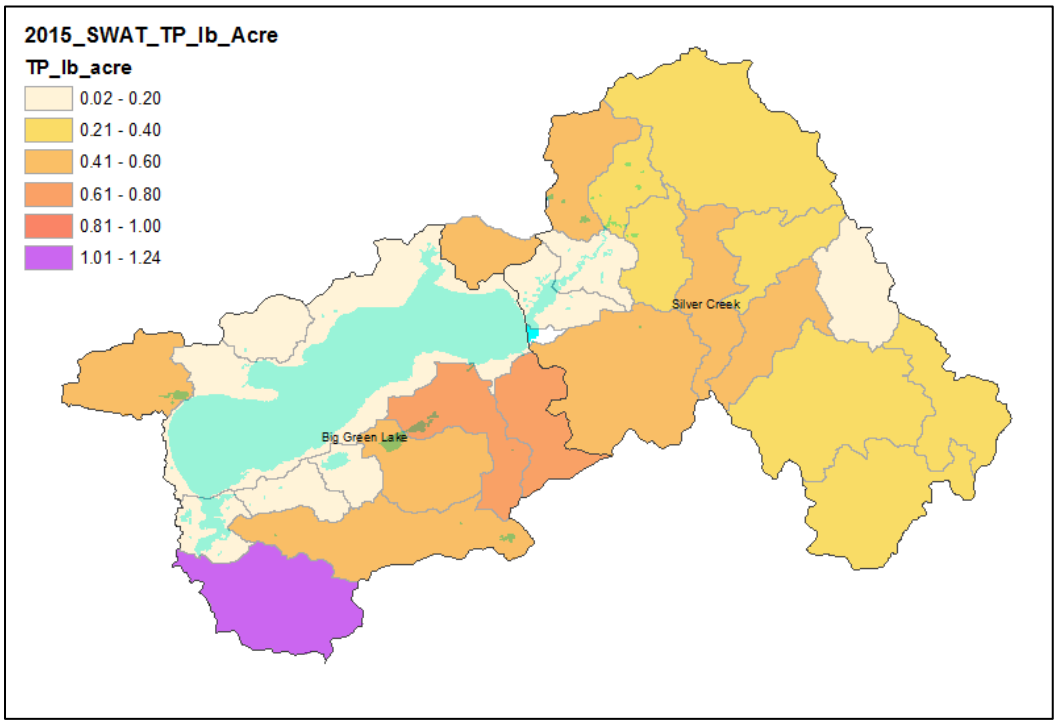
above, which assume the implementation acreage for annual practices, such as cover crops, increases from one year to the next.

APPENDIX C: Overview Maps

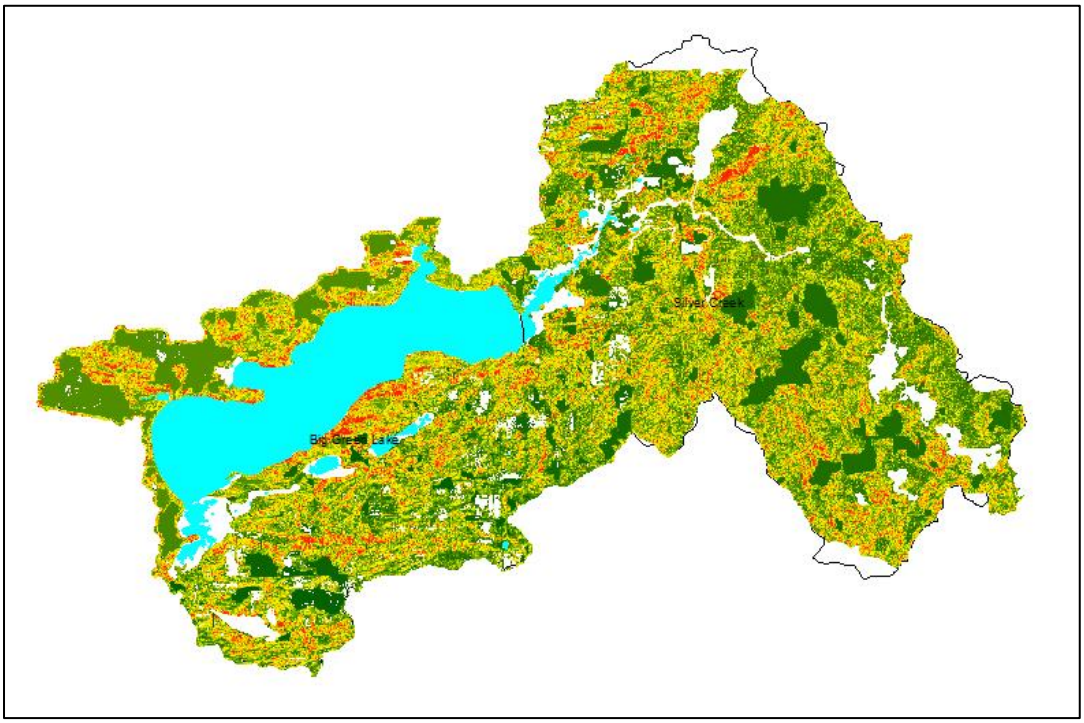
Map1: Green Lake Watershed, Wisconsin Nutrient Load Priority Areas



Map 2: Green Lake Watershed, Wisconsin SWAT Model



Map 3: Green Lake Watershed, Wisconsin EVAAL Model



APPENDIX D: NLPA Snapshots

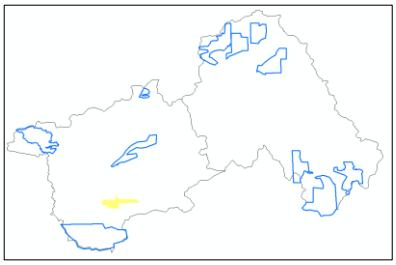
GREEN LAKE ASSOCIATION
CARING FOR OUR LAKE FOR GENERATIONS

GREEN LAKE NUTRIENT LOAD PRIORITY AREA SNAPSHOT

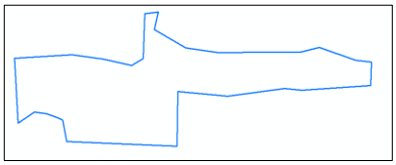
delta institute

GENERAL DISCRIPTION

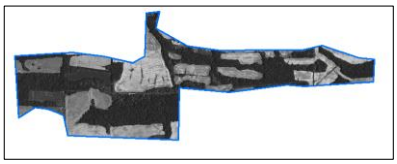
Nutrient Load Priority Area ID	GL001
Total Acres	332
Tillable Acres	175
Non Tillable Acres	157
Average Slope %	6-12



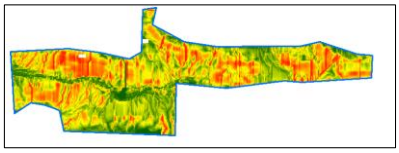
NLPA Regional Overview



NLPA Section Boundary



NLPA Orthophoto Map



NLPA EVAAL map

Erosion Potential Legend:
High
High-Medium
Low-Medium
Low

TILLABLE LAND USE HISTORY FROM 2012-2014 (Acres)

Crop Type	2012	2013	2014	Average	% Change (2012-2014)	Trend Line
Corn	82.5	103.0	45.1	76.87	-45%	
Soybeans	3.8	0.9	64.5	23.07	1597%	
Winter Wheat	14.7	10.0	2.0	8.90	-86%	
Oats	2.2	-	0.2	1.20	-91%	
Alfalfa	19.6	19.1	19.3	19.33	-2%	
Other Hay/Non Alfalfa	4.2	-	0.4	2.30	-90%	
Dry Beans	-	0.4	-	0.40	-	
Peas	1.1	-	-	1.10	-	
Sweet Corn	-	-	-	-	-	
Spring Wheat	-	-	-	-	-	
Christmas Trees	-	-	-	-	-	
Rye	-	-	-	-	-	
Barren	-	-	-	-	-	
Sod/Grass Seed	-	-	-	-	-	
Sugarbeets	-	-	-	-	-	
Herbs	-	-	-	-	-	
Cabbage	-	-	-	-	-	
Barley	-	-	-	-	-	
Grass/Pasture	59.8	36.3	43.8	46.6	-27%	
Dbl Crop WinWht/Corn	-	-	-	-	-	

NON-TILLABLE LAND USE HISTORY FROM 2012-2014 (Acres)

Land Use Type	2012	2013	2014	Average	% Change	Trend Line
Fallow/Idle Cropland	-	-	-	-	-	
Shrubland	-	-	0.2	0.2	-	
Deciduous Forest	111.6	143.9	137.7	131.1	23%	
Evergreen Forest	-	-	-	-	-	
Mixed Forest	0.4	0.4	0.4	0.4	0%	
Woody Wetlands	15.6	5.3	13.3	11.4	-15%	
Herbaceous Wetlands	16.9	13.1	4.4	11.5	-74%	
Open Water	-	-	-	-	-	
Developed/Open Space	0.2	0.2	0.2	0.2	0%	
Developed/Low Intensity	-	-	-	-	-	
Developed/Medium Intensity	-	-	-	-	-	
Developed/High Intensity	-	-	-	-	-	

TOP THREE PROMINENT SOILS IN NLPA AREA

Soil Name	Primary Soil	Secondary Soil	Tertiary Soils
	Knowles Silt Loam	St. Charles Silt Loam	Ossian Silt Loam
Description	The Knowles series consists of well drained soils that are moderately deep to a lithic contact with dolomite bedrock. These soils formed in a loess mantle and in the underlying loamy till are on ground moraines. Slope ranges from 0 to 30 percent. Mean annual precipitation is about 762 mm (30 inches). Mean annual air temperature is about 8.9 degrees C (48 degrees F).	The Sebewa series consists of very deep, poorly drained or very poorly drained soils formed in loamy outwash and the underlying gravelly and sandy outwash on outwash plains, valley trains, and stream terraces on terrace landscapes. They are moderately deep to the gravelly and sandy outwash. Slope ranges from 0 to 3 percent. Mean annual precipitation is about 838 mm (33 inches), and mean annual temperature is about 9.4 degrees C (49 degrees F).	The Ossian series consists of very deep, poorly drained soils formed in silty alluvium. These soils are on flood plains, low stream terraces, upland drainageways, and lake basins. Slope ranges from 0 to 4 percent. Mean annual air temperature is about 9 degrees C. Mean annual precipitation is about 850 millimeters.

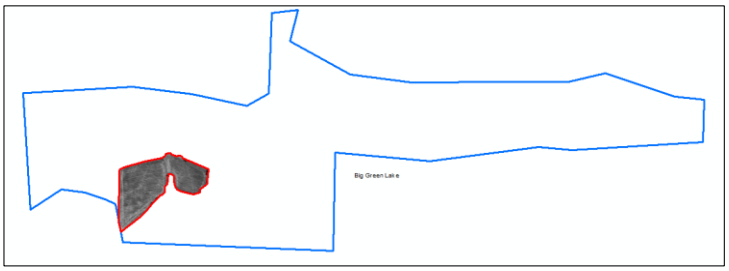
RECOMMENDED BMP'S FOR IMPLEMENTATION IN NLPA

BMP's	Cover Crops	Critical Area planting	No Till and Strip Till	Fertilizer and Nutrient Management/ Application	Much Till	Filter Strip	Grassed Waterway	Streambank and Shoreline Protection
Recommendation for Implementation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

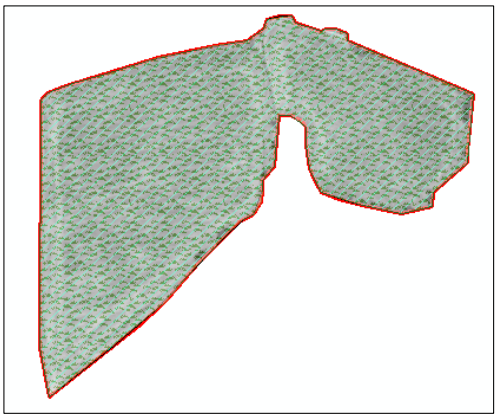
***See appendix for Best Management Practices definitions and descriptions**

FIELD LEVEL IMPLEMENTATION SCENARIOS

Field Overview	
Field Size (Acres)	17
Estimated Baseline Phosphorus Lost (lbs)/Year	55
Scenario #1	**No Till (from Convential Till)**
Scenario Feature Measure	Area
Scenario Unit	Acre
Scenario Size	17
Practice Length (years)	1
Estimated Phosphorus Reduction (lbs)/Year	32
% Reduction from Baseline	58%
Estimated Total Cost	$ 668.00
Estimated Federal Cost Share	$ 501.00
Estimated Funding Gap	$ (167.00)
Potential Cost Share Program	EQIP
Scenario #2	**Cover Crop- one Species**
Scenario Feature Measure	Area planted
Scenario Unit	Acre
Scenario Size	17
Practice Length (years)	1
Estimated Phosphorus Reduction (lbs)/Year	34
% Reduction from Baseline	62%
Estimated Total Cost	$ 1,022.00
Estimated Federal Cost Share	$ 766.50
Estimated Funding Gap	$ (255.50)
Potential Cost Share Program	EQIP
Scenario #3	**-**
Scenario Feature Measure	-
Scenario Unit	-
Scenario Size	-
Practice Length (years)	-
Estimated Phosphorus Reduction (l	-
% Reduction from Baseline	-
Estimated Total Cost	-
Estimated Federal Cost Share	-
Estimated Funding Gap	-
Potential Cost Share Program	-



NLPA Boundary with BMP Implementation Area Map



BMP Implementation Area Map

BMP Legend:

- Mulch_Till
- StreamBank_Restore
- Grassed_Waterway
- Filter_Strip
- Nutrient_Management
- Critical_Area_Planting
- Cover Crops
- No_Till_Strip_Till

FIELD LEVEL IMPLEMENTATION NOTES AND ASSUMPTIONS

Field level implementation scenarios were picked base on available data, EVAAL model results, and geographic characteristics visible in orthophotographic maps. BMPs, size, practice length, estimated Phosphorus reduction, and cost estimations were modeled based on data provided by the Green Lake WI "Field Office Technical Guide", and resources mentioned below

Estimated Total Phosphous Loading and Reduction was calculated using the EPA Region 5 model. Reductions may vary depending on field characteristics. Phosphorus Reductions may also vary depending on different models used. Phosphorus Loading Reductions are for example purposes only.

Funding Source that is listed is the most appropriate for the Best Management Practice (BMP) modeled in each scenario. Other funding sources may also be appropriate.

CRP= Conservation Reserve Program.
EQIP= Environmental Quality Incentive Program.
See Appendix B for funding and cost share program details

REFERENCES:

USDA National Agricultural Statistics Service, "CropScape". http://nassgeodata.gmu.edu/CropScape/

USDA Natural Resource Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/

Nutrient Stewardship, "Implementing the 4RS". http://www.nutrientstewardship.com/implement-4rs

NRCS, Green Lake WI "Field Office Technical Guide", https://efotg.sc.egov.usda.gov/toc.aspx?CatID=16711

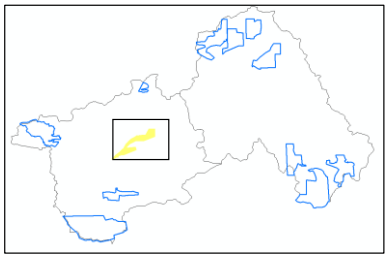
GREEN LAKE ASSOCIATION
CARING FOR OUR LAKE FOR GENERATIONS

GREEN LAKE NUTRIENT LOAD PRIORITY AREA SNAPSHOT

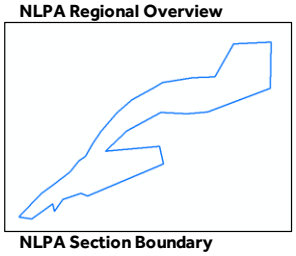
delta institute

GENERAL DISCRIPTION

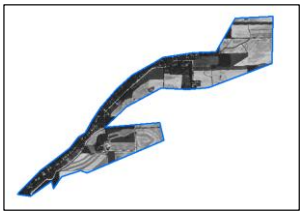
Nutrient Load Priority Area ID	GL002
Total Acres	526
Tillable Acres	344
Non Tillable Acres	182
Average Slope %	6-12



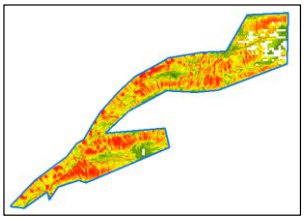
NLPA Regional Overview



NLPA Section Boundary



NLPA Orthophoto Map



NLPA EVAAL map

Erosion Potential Legend:	
	High
	High-Medium
	Low-Medium
	Low

TILLABLE LAND USE HISTORY FROM 2012-2014 (Acres)

Crop Type	2012	2013	2014	Average	% Change (2012-2014)	Trend Line
Corn	201.0	112.1	137.9	150.33	-31%	
Soybeans	23.1	71.4	41.6	45.37	80%	
Winter Wheat	3.3	13.6	15.8	10.90	379%	
Oats	-	0.7	0.4	0.55	-	
Alfalfa	43.6	36.5	47.1	42.40	8%	
Other Hay/Non Alfalfa	-	9.6	0.9	5.25	-	
Dry Beans	-	-	-	-	-	
Peas	-	-	-	-	-	
Sweet Corn	-	-	-	-	-	
Spring Wheat	-	-	-	-	-	
Christmas Trees	-	-	0.2	0.20	-	
Rye	-	-	0.4	0.40	-	
Barren	-	-	0.2	0.20	-	
Sod/Grass Seed	-	-	-	-	-	
Sugarbeets	-	-	-	-	-	
Herbs	-	-	-	-	-	
Cabbage	-	-	-	-	-	
Barley	-	-	-	-	-	
Grass/Pasture	80.5	85.4	99	88.3	23%	
Dbl Crop WinWht/Corn	-	-	-	-	-	

NON-TILLABLE LAND USE HISTORY FROM 2012-2014 (Acres)

Land Use Type	2012	2013	2014	Average	% Change	Trend Line
Fallow/Idle Cropland	-	-	0.7	0.7	-	
Shrubland	0.2	0.2	0.2	0.2	0%	
Deciduous Forest	66.7	68.5	72.7	69.3	9%	
Evergreen Forest	3.6	0.7	2.7	2.3	-25%	
Mixed Forest	2	0.7	4.2	2.3	110%	
Woody Wetlands	47.4	51.4	45.1	48.0	-5%	
Herbaceous Wetlands	10.2	27.1	11.8	16.4	16%	
Open Water	15.3	16.9	18.9	17.0	24%	
Developed/Open Space	18.9	21.8	22.9	21.2	21%	
Developed/Low Intensity	8.9	8.5	5.8	7.7	-35%	
Developed/Medium Intensity	-	-	-	-	-	
Developed/High Intensity	-	-	-	-	-	

TOP THREE PROMINENT SOILS IN NLPA AREA

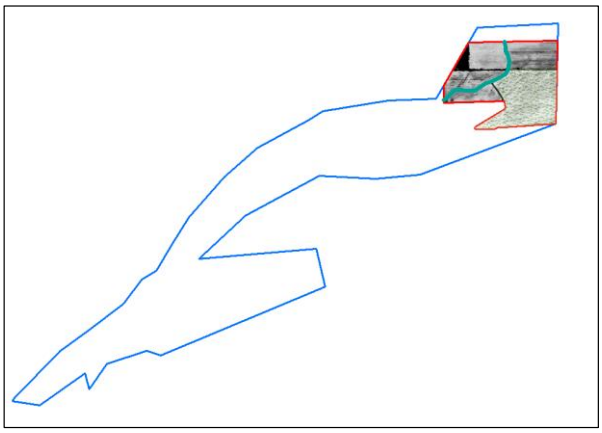
Soil Name	Primary Soil	Secondary Soil	Tertiary Soils
	St. Charles Silt Loam	Lomira Silt Loam	Dodge Silt Loam
Description	The St. Charles series consists of very deep, well drained soils on outwash plains, till plains, or stream terraces. They formed in 40 to 60 inches of loess and in the underlying loamy outwash or sandy loam till. Slope commonly is 0 to 15 percent but ranges from 0 to 30 percent. Mean annual temperature is about 11.1 degrees C (52 degrees F)., and mean annual precipitation is about 889 mm (35 inches).	The Granby series consists of very deep, poorly drained or very poorly drained soils formed in sandy outwash or sandy glaciolacustrine deposits on outwash plains, lake plains, and glacial drainageways. Slope ranges from 0 to 3 percent. Mean annual precipitation is about 889 mm (35 inches), and mean annual temperature is about 10.0 degrees C (50 degrees F).	The Dodge series consists of very deep well-drained soils formed in loess and in the underlying till on ground moraines, end moraines, and drumlins. Slope ranges from 0 to 20 percent. Mean annual precipitation is about 762 mm (30 inches). Mean annual air temperature is about 9.4 degree C (49 degrees F).

RECOMMENDED BMP'S FOR IMPLEMENTATION IN NLPA

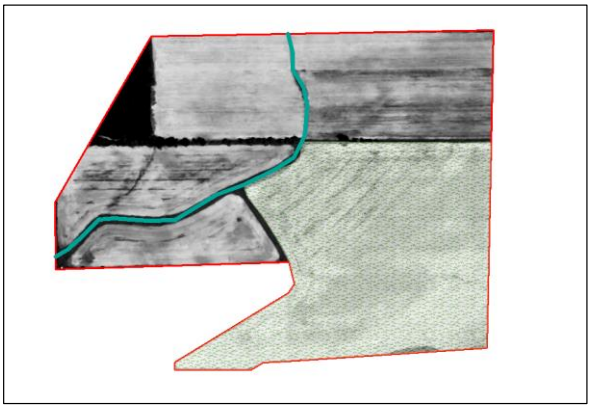
BMP's	Cover Crops	Critical Area planting	No Till and Strip Till	Fertilizer and Nutrient Management/ Application	Much Till	Filter Strip	Grassed Waterway	Streambank and Shoreline Protection
Recommendation for Implementation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

***See appendix for Best Management Practices definitions and descriptions**

FIELD LEVEL IMPLEMENTATION SCENARIOS	
Field Overview	
Field Size (Acres)	37
Estimated Baseline Phosphorus Lost (lbs)/Year	104
Scenario #1	**Grassed Waterway**
Scenario Feature Measure	Linear Feet of Waterway
Scenario Unit	Linear Foot
Scenario Size	2300
Practice Length (years)	10
Estimated Phosphorus Reduction (lbs)/Year	96
% Reduction from Baseline	95%
Estimated Total Cost	$ 13,700.00
Estimated Federal Cost Share	$ 12,330.00
Estimated Funding Gap	$ (1,370.00)
Potential Cost Share Program	CRP
Scenario #2	**Cover Crop- one Species**
Scenario Feature Measure	Area planted
Scenario Unit	Acre
Scenario Size	37
Practice Length (years)	1
Estimated Phosphorus Reduction (lbs)/Year	65
% Reduction from Baseline	64%
Estimated Total Cost	$ 2,225.00
Estimated Federal Cost Share	$ 1,668.75
Estimated Funding Gap	$ (556.25)
Potential Cost Share Program	EQIP
Scenario #3	**-**
Scenario Feature Measure	-
Scenario Unit	-
Scenario Size	-
Practice Length (years)	-
Estimated Phosphorus Reduction (l	-
% Reduction from Baseline	-
Estimated Total Cost	-
Estimated Federal Cost Share	-
Estimated Funding Gap	-
Potential Cost Share Program	-



NLPA Boundary with BMP Implementation Area Map



BMP Implementation Area Map

BMP Legend:

- Mulch_Till
- StreamBank_Restore
- Grassed_Waterway
- Filter_Strip
- Nutrient_Management
- Critical_Area_Planting
- Cover Crops
- No_Till_Strip_Till

FIELD LEVEL IMPLEMENTATION NOTES AND ASSUMPTIONS
Field level implementation scenarios were picked base on available data, EVAAL model results, and geographic characteristics visible in orthophotographic maps. BMPs, size, practice length, estimated Phosphorus reduction, and cost estimations were modeled based on data provided by the Green Lake WI "Field Office Technical Guide", and resources mentioned below
Estimated Total Phosphous Loading and Reduction was calculated using the EPA Region 5 model. Reductions may vary depending on field characteristics. Phosphorus Reductions may also vary depending on different models used. Phosphorus Loading Reductions are for example purposes only.
Funding Source that is listed is the most appropriate for the Best Management Practice (BMP) modeled in each scenario. Other funding sources may also be appropriate.
CRP= Conservation Reserve Program. EQIP= Environmental Quality Incentive Program. *See Appendix B for funding and cost share program details*

REFERENCES:

USDA National Agricultural Statistics Service, "CropScape". http://nassgeodata.gmu.edu/CropScape/

USDA Natural Resource Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/

Nutrient Stewardship, "Implementing the 4RS". http://www.nutrientstewardship.com/implement-4rs

NRCS, Green Lake WI "Field Office Technical Guide", https://efotg.sc.egov.usda.gov/toc.aspx?CatID=16711

GREEN LAKE ASSOCIATION
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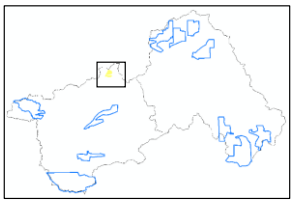
GREEN LAKE NUTRIENT LOAD PRIORITY AREA SNAPSHOT

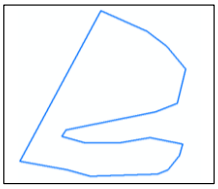
delta institute

GENERAL DISCRIPTION

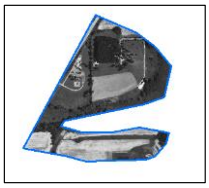
Nutrient Load Priority Area ID	GL003
Total Acres	94
Tillable Acres	72
Non Tillable Acres	22
Average Slope %	2-6



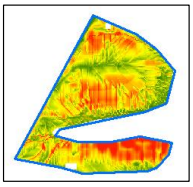
NLPA Regional Overview



NLPA Section Boundary



NLPA Orthophoto Map



NLPA EVAAL map

Erosion Potential Legend:	
	High
	High-Medium
	Low-Medium
	Low

TILLABLE LAND USE HISTORY FROM 2012-2014 (Acres)

Crop Type	2012	2013	2014	Average	% Change (2012-2014)	Trend Line
Corn	26.2	27.1	22.7	25.33	-13%	
Soybeans	4.9	1.1	0.4	2.13	-92%	
Winter Wheat	-	-	6.0	6.00	-	
Oats	-	-	-	-	-	
Alfalfa	4.2	-	1.8	3.00	-57%	
Other Hay/Non Alfalfa	0.2	2.0	1.8	1.33	800%	
Dry Beans	-	-	-	-	-	
Peas	0.2	-	-	0.20	-	
Sweet Corn	-	-	-	-	-	
Spring Wheat	-	-	-	-	-	
Christmas Trees	-	-	-	-	-	
Rye	-	-	-	-	-	
Barren	-	-	-	-	-	
Sod/Grass Seed	-	-	-	-	-	
Sugarbeets	-	-	-	-	-	
Herbs	-	-	-	-	-	
Cabbage	-	-	-	-	-	
Barley	-	-	-	-	-	
Grass/Pasture	32	39.8	38.9	36.9	22%	
Dbl Crop WinWht/Corn	-	-	-	-	-	

NON-TILLABLE LAND USE HISTORY FROM 2012-2014 (Acres)

Land Use Type	2012	2013	2014	Average	% Change	Trend Line
Fallow/Idle Cropland	-	-	-	-	-	
Shrubland	-	-	-	-	-	
Deciduous Forest	10.7	8.9	11.6	10.4	8%	
Evergreen Forest	-	-	-	-	-	
Mixed Forest	-	-	-	-	-	
Woody Wetlands	0.9	3.3	0.4	1.5	-56%	
Herbaceous Wetlands	9.1	6.2	5.1	6.8	-44%	
Open Water	-	-	-	-	-	
Developed/Open Space	1.3	0.9	1.1	1.1	-15%	
Developed/Low Intensity	4.4	4.9	4.9	4.7	11%	
Developed/Medium Intensity	-	-	-	-	-	
Developed/High Intensity	-	-	-	-	-	

TOP THREE PROMINENT SOILS IN NLPA AREA

Soil Name	Primary Soil	Secondary Soil	Tertiary Soils
	Grelton Fine Sandy Loam	St. Charles Silt Loam	Kibbie Loam
Description	#N/A	The Sebewa series consists of very deep, poorly drained or very poorly drained soils formed in loamy outwash and the underlying gravelly and sandy outwash on outwash plains, valley trains, and stream terraces on terrace landscapes. They are moderately deep to the gravelly and sandy outwash. Slope ranges from 0 to 3 percent. Mean annual precipitation is about 838 mm (33 inches), and mean annual temperature is about 9.4 degrees C (49 degrees F).	The Kibbie series consists of very deep, somewhat poorly drained soils on lake plains, ground moraines, outwash plains, and deltas. They formed in stratified loamy and silty glaciofluvial or glaciolacustrine deposits. Slope ranges from 0 to 6 percent. Mean annual precipitation is about 813 mm (32 inches), and mean annual temperature is about 9.4 degrees C (49 degrees F).

RECOMMENDED BMP'S FOR IMPLEMENTATION IN NLPA

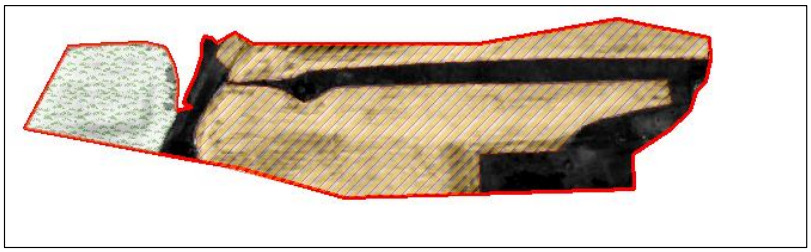
BMP's	Cover Crops	Critical Area planting	No Till and Strip Till	Fertilizer and Nutrient Management/ Application	Much Till	Filter Strip	Grassed Waterway	Streambank and Shoreline Protection
Recommendation for Implementation	Yes	No	Yes	Yes	Yes	No	Yes	No

*See appendix for Best Management Practices definitions and descriptions

FIELD LEVEL IMPLEMENTATION SCENARIOS

Field Overview	
Field Size (Acres)	19
Estimated Baseline Phosphorus Lost (lbs)/Year	67
Scenario #1	**Mulch Till**
Scenario Feature Measure	Area
Scenario Unit	Acres
Scenario Size	15
Practice Length (years)	1
Estimated Phosphorus Reduction (lbs)/Year	29
% Reduction from Baseline	43%
Estimated Total Cost	$ 445.00
Estimated Federal Cost Share	$ 333.75
Estimated Funding Gap	$ (111.25)
Potential Cost Share Program	EQIP
Scenario #2	**Cover Crop- one Species**
Scenario Feature Measure	Area planted
Scenario Unit	Acre
Scenario Size	4
Practice Length (years)	1
Estimated Phosphorus Reduction (lbs)/Year	29
% Reduction from Baseline	43%
Estimated Total Cost	$ 240.00
Estimated Federal Cost Share	$ 180.00
Estimated Funding Gap	$ (60.00)
Potential Cost Share Program	EQIP
Scenario #3	**-**
Scenario Feature Measure	-
Scenario Unit	-
Scenario Size	-
Practice Length (years)	-
Estimated Phosphorus Reduction (l	-
% Reduction from Baseline	-
Estimated Total Cost	-
Estimated Federal Cost Share	-
Estimated Funding Gap	-
Potential Cost Share Program	-

NLPA Boundary with BMP Implementation Area Map



BMP Implementation Area Map

FIELD LEVEL IMPLEMENTATION NOTES AND ASSUMPTIONS

Field level implementation scenarios were picked base on available data, EVAAL model results, and geographic characteristics visible in orthophotographic maps. BMPs, size, practice length, estimated Phosphorus reduction, and cost estimations were modeled based on data provided by the Green Lake WI "Field Office Technical Guide", and resources mentioned below

Estimated Total Phosphous Loading and Reduction was calculated using the EPA Region 5 model. Reductions may vary depending on field characteristics. Phosphorus Reductions may also vary depending on different models used. Phosphorus Loading Reductions are for example purposes only.

Funding Source that is listed is the most appropriate for the Best Management Practice (BMP) modeled in each scenario. Other funding sources may also be appropriate.

CRP= Conservation Reserve Program.
EQIP= Environmental Quality Incentive Program.
See Appendix B for funding and cost share program details

REFERENCES:

USDA National Agricultural Statistics Service, "CropScape". http://nassgeodata.gmu.edu/CropScape/

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GREEN LAKE ASSOCIATION
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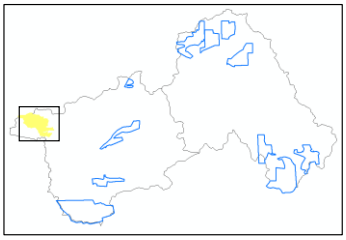
GREEN LAKE NUTRIENT LOAD PRIORITY AREA SNAPSHOT

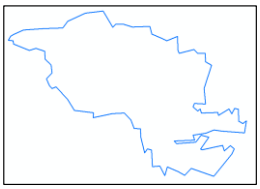
delta institute

GENERAL DISCRIPTION

Nutrient Load Priority Area ID	GL004
Total Acres	873
Tillable Acres	432
Non Tillable Acres	441
Average Slope %	2-6

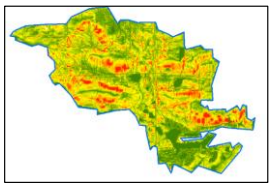


NLPA Regional Overview



NLPA Section Boundary

NLPA Orthophoto Map



NLPA EVAAL map

Erosion Potential Legend:	
	High
	High-Medium
	Low-Medium
	Low

TILLABLE LAND USE HISTORY FROM 2012-2014 (Acres)

Crop Type	2012	2013	2014	Average	% Change (2012-2014)	Trend Line
Corn	121.9	99.6	113.6	111.70	-7%	
Soybeans	9.1	15.6	1.8	8.83	-80%	
Winter Wheat	14.7	-	2.2	8.45	-85%	
Oats	-	-	0.2	0.20	-	
Alfalfa	26.5	8.2	6.4	13.70	-76%	
Other Hay/Non Alfalfa	2.7	0.4	12.9	5.33	378%	
Dry Beans	-	-	0.4	0.40	-	
Peas	1.3	-	-	1.30	-	
Sweet Corn	0.2	-	-	0.20	-	
Spring Wheat	-	-	-	-	-	
Christmas Trees	0.7	-	-	0.70	-	
Rye	-	-	0.2	0.20	-	
Barren	0.2	0.2	0.2	0.20	0%	
Sod/Grass Seed	0.2	-	-	0.20	-	
Sugarbeets	-	-	-	-	-	
Herbs	-	-	-	-	-	
Cabbage	-	-	-	-	-	
Barley	-	-	-	-	-	
Grass/Pasture	254	241.5	308.5	268.0	21%	
Dbl Crop WinWht/Corn	-	-	-	-	-	

NON-TILLABLE LAND USE HISTORY FROM 2012-2014 (Acres)

Land Use Type	2012	2013	2014	Average	% Change	Trend Line
Fallow/Idle Cropland	0.7	0.4	4	1.7	471%	
Shrubland	0.4	2.4	0.7	1.2	75%	
Deciduous Forest	230.4	352.9	230.2	271.2	0%	
Evergreen Forest	12.2	9.1	4.9	8.7	-60%	
Mixed Forest	1.3	1.1	0.9	1.1	-31%	
Woody Wetlands	30.7	31.1	38.5	33.4	25%	
Herbaceous Wetlands	87.8	36.7	77.2	67.2	-12%	
Open Water	8.5	4.2	1.3	4.7	-85%	
Developed/Open Space	42	43.1	43.8	43.0	4%	
Developed/Low Intensity	27.4	26.5	24.9	26.3	-9%	
Developed/Medium Intensity	2.7	2.2	2.7	2.5	0%	
Developed/High Intensity	0.2	0.2	0.2	0.2	0%	

TOP THREE PROMINENT SOILS IN NLPA AREA

Soil Name	Primary Soil	Secondary Soil	Tertiary Soils
	Kidder Fine Sandy Loam	Grelton Fine Sandy Loam	Granby Loam Fine Sand
Description	The Kidder series consists of very deep, well drained soils formed in thin loess and in loamy till or just in loamy till on moraines and drumlins. Slope ranges from 0 to 35 percent. Mean annual precipitation is about 815 mm (32 inches). Mean annual air temperature is about 10 degrees C (50 degrees F).	The Grellton series consists of very deep, well drained soils formed in loamy outwash or eolian deposits; in the underlying silty deposits; and, in many pedons, in loamy till on ground moraines. Slope ranges from 0 to 20 percent. Mean annual precipitation is about 762 mm (30 inches). Mean annual air temperature is about 9.4 degrees C (49 degrees F).	The Granby series consists of very deep, poorly drained or very poorly drained soils formed in sandy outwash or sandy glaciolacustrine deposits on outwash plains, lake plains, and glacial drainageways. Slope ranges from 0 to 3 percent. Mean annual precipitation is about 889 mm (35 inches), and mean annual temperature is about 10.0 degrees C (50 degrees F).

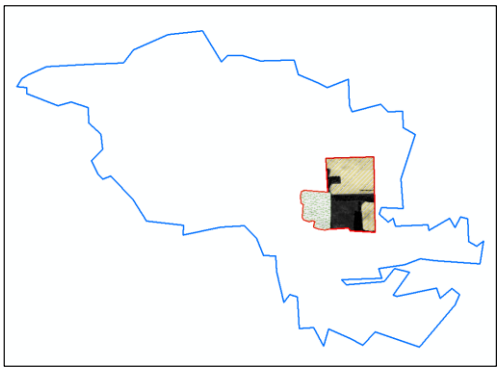
RECOMMENDED BMP'S FOR IMPLEMENTATION IN NLPA

BMP's	Cover Crops	Critical Area planting	No Till and Strip Till	Fertilizer and Nutrient Management/ Application	Much Till	Filter Strip	Grassed Waterway	Streambank and Shoreline Protection
Recommendation for Implementation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

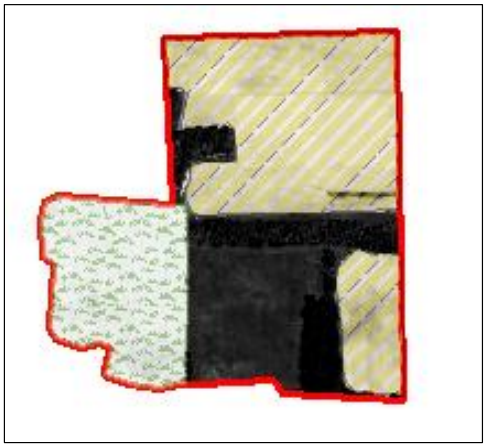
*See appendix for Best Management Practices definitions and descriptions

FIELD LEVEL IMPLEMENTATION SCENARIOS

Field Overview	
Field Size (Acres)	38
Estimated Baseline Phosphorus Lost (lbs)/Year	133
Scenario #1	**Nurtient Management**
Scenario Feature Measure	Area of NM
Scenario Unit	Acre
Scenario Size	25
Practice Length (years)	1
Estimated Phosphorus Reduction (lbs)/Year	46
% Reduction from Baseline	35%
Estimated Total Cost	$ 4,200.00
Estimated Federal Cost Share	$ 3,150.00
Estimated Funding Gap	$ (1,050.00)
Potential Cost Share Program	EQIP
Scenario #2	**Cover Crop- one Species**
Scenario Feature Measure	Area planted
Scenario Unit	Acre
Scenario Size	13
Practice Length (years)	1
Estimated Phosphorus Reduction (lbs)/Year	19
% Reduction from Baseline	18%
Estimated Total Cost	$ 790.00
Estimated Federal Cost Share	$ 592.50
Estimated Funding Gap	$ (197.50)
Potential Cost Share Program	EQIP
Scenario #3	**-**
Scenario Feature Measure	-
Scenario Unit	-
Scenario Size	-
Practice Length (years)	-
Estimated Phosphorus Reduction (l	-
% Reduction from Baseline	-
Estimated Total Cost	-
Estimated Federal Cost Share	-
Estimated Funding Gap	-
Potential Cost Share Program	-



NLPA Boundary with BMP Implementation Area Map



BMP Implementation Area Map

BMP Legend:

- Mulch_Till
- StreamBank_Restore
- Grassed_Waterway
- Filter_Strip
- Nutrient_Management
- Critical_Area_Planting
- Cover Crops
- No_Till_Strip_Till

FIELD LEVEL IMPLEMENTATION NOTES AND ASSUMPTIONS

Field level implementation scenarios were picked base on available data, EVAAL model results, and geographic characteristics visible in orthophotographic maps. BMPs, size, practice length, estimated Phosphorus reduction, and cost estimations were modeled based on data provided by the Green Lake WI "Field Office Technical Guide", and resources mentioned below

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GREEN LAKE ASSOCIATION
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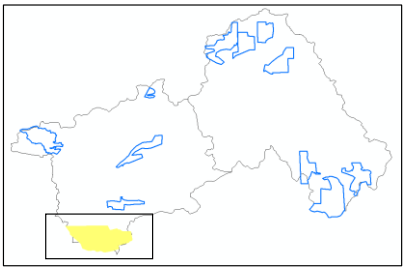
GREEN LAKE NUTRIENT LOAD PRIORITY AREA SNAPSHOT

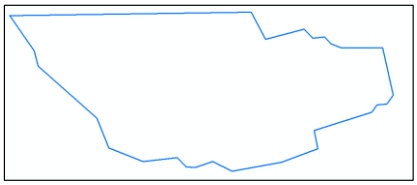
delta institute

GENERAL DISCRIPTION

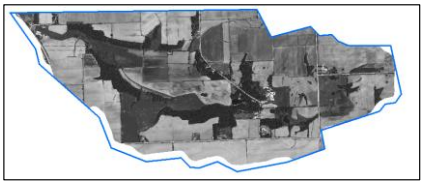
Nutrient Load Priority Area ID	GL005
Total Acres	1952
Tillable Acres	1607
Non Tillable Acres	345
Average Slope %	0-6



NLPA Regional Overview



NLPA Section Boundary



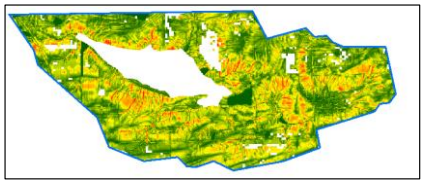
NLPA Orthophoto Map

TILLABLE LAND USE HISTORY FROM 2012-2014 (Acres)

Crop Type	2012	2013	2014	Average	% Change (2012-2014)	Trend Line
Corn	977.2	1021.2	722.8	907.07	-26%	
Soybeans	128.1	157.0	395.4	226.83	209%	
Winter Wheat	14.2	21.3	67.2	34.23	373%	
Oats	-	50.3	0.7	25.50	-	
Alfalfa	96.7	34.9	56.0	62.53	-42%	
Other Hay/Non Alfalfa	4.4	1.8	6.2	4.13	41%	
Dry Beans	0.7	17.6	8.7	9.00	1143%	
Peas	50.5	27.6	0.4	26.17	-99%	
Sweet Corn	77.8	31.8	145.7	85.10	87%	
Spring Wheat	-	-	-	-	-	
Christmas Trees	0.2	-	-	0.20	-	
Rye	-	-	-	-	-	
Barren	-	0.7	-	0.70	-	
Sod/Grass Seed	-	-	-	-	-	
Sugarbeets	0.2	-	0.2	0.20	0%	
Herbs	-	-	0.2	0.20	-	
Cabbage	-	-	-	-	-	
Barley	-	-	-	-	-	
Grass/Pasture	230.8	192.4	201	208.1	-13%	
Dbl Crop WinWht/Corn	-	-	-	-	-	

NON-TILLABLE LAND USE HISTORY FROM 2012-2014 (Acres)

Land Use Type	2012	2013	2014	Average	% Change	Trend Line
Fallow/Idle Cropland	-	-	0.2	0.2	-	
Shrubland	0.4	0.2	0.7	0.4	75%	
Deciduous Forest	161.9	217.5	193.3	190.9	19%	
Evergreen Forest	1.6	0.7	1.1	1.1	-31%	
Mixed Forest	0.9	0.2	2.2	1.1	144%	
Woody Wetlands	18	15.6	17.8	17.1	-1%	
Herbaceous Wetlands	114.5	91	60.7	88.7	-47%	
Open Water	5.6	4.9	4.2	4.9	-25%	
Developed/Open Space	51.2	45.4	48.5	48.4	-5%	
Developed/Low Intensity	21.6	24.9	19.8	22.1	-8%	
Developed/Medium Intensity	0.2	-	0.2	0.2	0%	
Developed/High Intensity	-	-	-	-	-	



NLPA EVAAL map

Erosion Potential Legend:	
	High
	High-Medium
	Low-Medium
	Low

TOP THREE PROMINENT SOILS IN NLPA AREA

Soil Name	Primary Soil Plano Silt Loam	Secondary Soil Houghton Muck	Tertiary Soils Dodge Silt Loam
Description	The Plano series consists of very deep, well drained soils on outwash plains, stream terraces, or till plains. These soils formed in loess or other silty material and in the underlying loamy stratified outwash or sandy loam till. Slope ranges from 0 to 12 percent. The mean annual air temperature is about 8.9 degrees C (48 degrees F), and the mean annual precipitation is about 914 mm (36 inches).	The Houghton series consists of very deep, very poorly drained soils formed in herbaceous organic materials more than 130 cm (51 inches) thick in depressions on lake plains, outwash plains, ground moraines, end moraines, and floodplains. Slope ranges from 0 to 2 percent. Mean annual precipitation is about 889 mm (35 inches), and mean annual temperature is about 10.0 degrees C (50 degrees F).	The Dodge series consists of very deep well-drained soils formed in loess and in the underlying till on ground moraines, end moraines, and drumlins. Slope ranges from 0 to 20 percent. Mean annual precipitation is about 762 mm (30 inches). Mean annual air temperature is about 9.4 degree C (49 degrees F).

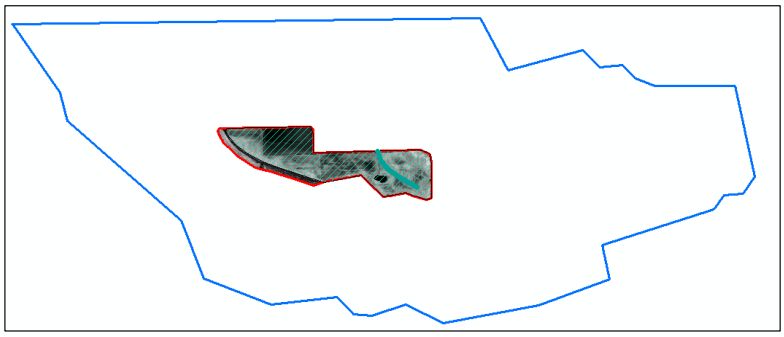
RECOMMENDED BMP'S FOR IMPLEMENTATION IN NLPA

BMP's	Cover Crops	Critical Area planting	No Till and Strip Till	Fertilizer and Nutrient Management/ Application	Much Till	Filter Strip	Grassed Waterway	Streambank and Shoreline Protection
Recommendation for Implementation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

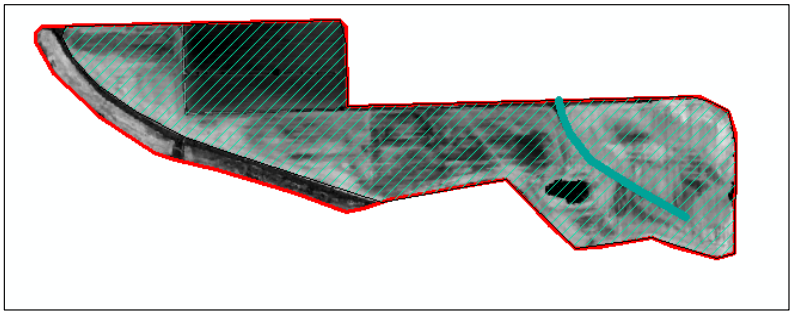
*See appendix for Best Management Practices definitions and descriptions

FIELD LEVEL IMPLEMENTATION SCENARIOS

Field Overview	
Field Size (Acres)	91
Estimated Baseline Phosphorus Lost (lbs)/Year	319
Scenario #1	**Grassed Waterway**
Scenario Feature Measure	Linear Feet of Waterway
Scenario Unit	Linear Foot
Scenario Size	1300
Practice Length (years)	10
Estimated Phosphorus Reduction (lbs)/Year	274
% Reduction from Baseline	86%
Estimated Total Cost	$ 8,600.00
Estimated Federal Cost Share	$ 7,740.00
Estimated Funding Gap	$ (860.00)
Potential Cost Share Program	CRP
Scenario #2	**No Till (from Convential Till)**
Scenario Feature Measure	Area
Scenario Unit	Acre
Scenario Size	91
Practice Length (years)	1
Estimated Phosphorus Reduction (lbs)/Year	146
% Reduction from Baseline	46%
Estimated Total Cost	$ 3,549.00
Estimated Federal Cost Share	$ 2,661.75
Estimated Funding Gap	$ (887.25)
Potential Cost Share Program	EQIP
Scenario #3	**-**
Scenario Feature Measure	-
Scenario Unit	-
Scenario Size	-
Practice Length (years)	-
Estimated Phosphorus Reduction (l	-
% Reduction from Baseline	-
Estimated Total Cost	-
Estimated Federal Cost Share	-
Estimated Funding Gap	-
Potential Cost Share Program	-

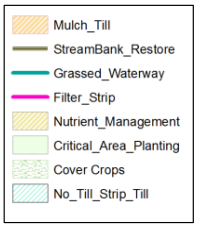


NLPA Boundary with BMP Implementation Area Map



BMP Implementation Area Map

BMP Legend:



FIELD LEVEL IMPLEMENTATION NOTES AND ASSUMPTIONS

Field level implementation scenarios were picked base on available data, EVAAL model results, and geographic characteristics visible in orthophotographic maps. BMPs, size, practice length, estimated Phosphorus reduction, and cost estimations were modeled based on data provided by the Green Lake WI "Field Office Technical Guide", and resources mentioned below

Estimated Total Phosphous Loading and Reduction was calculated using the EPA Region 5 model. Reductions may vary depending on field characteristics. Phosphorus Reductions may also vary depending on different models used. Phosphorus Loading Reductions are for example purposes only.

Funding Source that is listed is the most appropriate for the Best Management Practice (BMP) modeled in each scenario. Other funding sources may also be appropriate.

CRP= Conservation Reserve Program.
EQIP= Environmental Quality Incentive Program.
See Appendix B for funding and cost share program details

REFERENCES:

USDA National Agricultural Statistics Service, "CropScape". http://nassgeodata.gmu.edu/CropScape/

USDA Natural Resource Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/

Nutrient Stewardship, "Implementing the 4RS". http://www.nutrientstewardship.com/implement-4rs

NRCS, Green Lake WI "Field Office Technical Guide", https://efotg.sc.egov.usda.gov/toc.aspx?CatID=16711

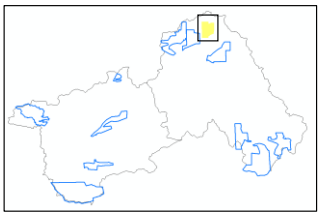
GREEN LAKE ASSOCIATION
CARING FOR OUR LAKE FOR GENERATIONS

GREEN LAKE NUTRIENT LOAD PRIORITY AREA SNAPSHOT

delta institute

GENERAL DISCRIPTION

Nutrient Load Priority Area ID	SC001
Total Acres	437
Tillable Acres	312
Non Tillable Acres	125
Average Slope %	2-6



NLPA Regional Overview

NLPA Section Boundary

NLPA Orthophoto Map

NLPA EVAAL map

Erosion Potential Legend:	
	High
	High-Medium
	Low-Medium
	Low

TILLABLE LAND USE HISTORY FROM 2012-2014 (Acres)

Crop Type	2012	2013	2014	Average	% Change (2012-2014)	Trend Line
Corn	174.8	122.8	169.9	155.83	-3%	
Soybeans	44.5	31.6	13.6	29.90	-69%	
Winter Wheat	-	52.7	35.4	44.05	-	
Oats	-	-	-	-	-	
Alfalfa	6.7	15.3	3.6	8.53	-46%	
Other Hay/Non Alfalfa	1.1	2.0	5.8	2.97	427%	
Dry Beans	-	0.2	-	0.20	-	
Peas	-	0.7	-	0.70	-	
Sweet Corn	1.1	0.7	-	0.90	-	
Spring Wheat	-	-	-	-	-	
Christmas Trees	-	-	-	-	-	
Rye	-	-	-	-	-	
Barren	-	0.4	0.4	0.40	-	
Sod/Grass Seed	-	-	-	-	-	
Sugarbeets	-	-	-	-	-	
Herbs	-	-	-	-	-	
Cabbage	-	-	-	-	-	
Barley	-	-	-	-	-	
Grass/Pasture	81.8	66.7	83.4	77.3	2%	
Dbl Crop WinWht/Corn	-	-	-	-	-	

NON-TILLABLE LAND USE HISTORY FROM 2012-2014 (Acres)

Land Use Type	2012	2013	2014	Average	% Change	Trend Line
Fallow/Idle Cropland	-	0.2	-	0.2	-	
Shrubland	-	0.4	-	0.4	-	
Deciduous Forest	59.4	57.8	77.8	65.0	31%	
Evergreen Forest	-	-	-	-	-	
Mixed Forest	-	-	0.2	0.2	-	
Woody Wetlands	2	6	3.1	3.7	55%	
Herbaceous Wetlands	50.9	66.9	28.2	48.7	-45%	
Open Water	-	-	-	-	-	
Developed/Open Space	9.3	7.1	10.9	9.1	17%	
Developed/Low Intensity	4.9	4.9	4	4.6	-18%	
Developed/Medium Intensity	0.2	0.2	0.4	0.3	100%	
Developed/High Intensity	-	-	-	-	-	

TOP THREE PROMINENT SOILS IN NLPA AREA

Soil Name	Primary Soil	Secondary Soil	Tertiary Soils
	Lomira Silt Loam	Plano Silt Loam	Sebewa Silt Loam
Description	The Lomira series consists of very deep, well drained soils formed in loess and in the underlying highly calcareous, loamy till. These soils are on ground moraines. Slope ranges from 0 to 20 percent. Mean annual precipitation is about 762 mm (30 inches). Mean annual air temperature is about 8.9 degrees C (48 degrees F)	The Granby series consists of very deep, poorly drained or very poorly drained soils formed in sandy outwash or sandy glaciolacustrine deposits on outwash plains, lake plains, and glacial drainageways. Slope ranges from 0 to 3 percent. Mean annual precipitation is about 889 mm (35 inches), and mean annual temperature is about 10.0 degrees C (50 degrees F).	The Sebewa series consists of very deep, poorly drained or very poorly drained soils formed in loamy outwash and the underlying gravelly and sandy outwash on outwash plains, valley trains, and stream terraces on terrace landscapes. They are moderately deep to the gravelly and sandy outwash. Slope ranges from 0 to 3 percent. Mean annual precipitation is about 838 mm (33 inches), and mean annual temperature is about 9.4 degrees C (49 degrees F).

RECOMMENDED BMP'S FOR IMPLEMENTATION IN NLPA

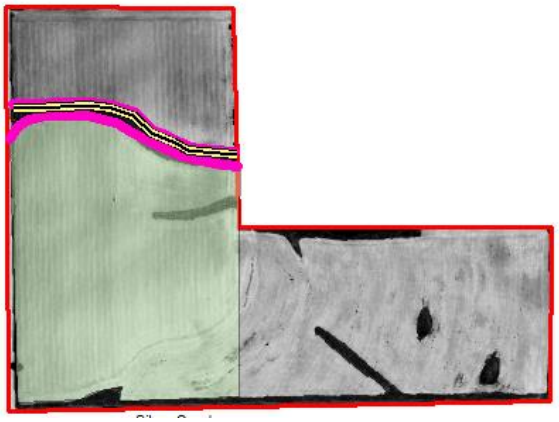
BMP's	Cover Crops	Critical Area planting	No Till and Strip Till	Fertilizer and Nutrient Management/ Application	Much Till	Filter Strip	Grassed Waterway	Streambank and Shoreline Protection
Recommendation for Implementation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*See appendix for Best Management Practices definitions and descriptions

FIELD LEVEL IMPLEMENTATION SCENARIOS

Field Overview	
Field Size (Acres)	33
Estimated Baseline Phosphorus Lost (lbs)/Year	116
Scenario #1	**Streambank Stabilization**
Scenario Feature Measure	near Feet of stabilization
Scenario Unit	Linear Foot
Scenario Size	1100
Practice Length (years)	10
Estimated Phosphorus Reduction (lbs)/Year	85
% Reduction from Baseline	73%
Estimated Total Cost	$ 20,800.00
Estimated Federal Cost Share	$ 15,600.00
Estimated Funding Gap	$ (5,200.00)
Potential Cost Share Program	EQIP
Scenario #2	**Critical Area Planting**
Scenario Feature Measure	Area planted
Scenario Unit	Acre
Scenario Size	32
Practice Length (years)	1
Estimated Phosphorus Reduction (lbs)/Year	57
% Reduction from Baseline	49%
Estimated Total Cost	$ 2,730.00
Estimated Federal Cost Share	$ 2,047.50
Estimated Funding Gap	$ (682.50)
Potential Cost Share Program	EQIP
Scenario #3	**Filter Strip**
Scenario Feature Measure	Linear Feet of Filter Strip
Scenario Unit	Linear Foot
Scenario Size	2200
Practice Length (years)	10
Estimated Phosphorus Reduction (l	110
% Reduction from Baseline	95%
Estimated Total Cost	$ 1,100.00
Estimated Federal Cost Share	$ 825.00
Estimated Funding Gap	$ (275.00)
Potential Cost Share Program	EQIP

NLPA Boundary with BMP Implementation Area Map



BMP Implementation Area Map

BMP Legend:

- Mulch_Till
- StreamBank_Restore
- Grassed_Waterway
- Filter_Strip
- Nutrient_Management
- Critical_Area_Planting
- Cover Crops
- No_Till_Strip_Till

FIELD LEVEL IMPLEMENTATION NOTES AND ASSUMPTIONS

Field level implementation scenarios were picked base on available data, EVAAL model results, and geographic characteristics visible in orthophotographic maps. BMPs, size, practice length, estimated Phosphorus reduction, and cost estimations were modeled based on data provided by the Green Lake WI "Field Office Technical Guide", and resources mentioned below

Estimated Total Phosphous Loading and Reduction was calculated using the EPA Region 5 model. Reductions may vary depending on field characteristics. Phosphorus Reductions may also vary depending on different models used. Phosphorus Loading Reductions are for example purposes only.

Funding Source that is listed is the most appropriate for the Best Management Practice (BMP) modeled in each scenario. Other funding sources may also be appropriate.

CRP= Conservation Reserve Program.
EQIP= Environmental Quality Incentive Program.
See Appendix B for funding and cost share program details

REFERENCES:

USDA National Agricultural Statistics Service, "CropScape". http://nassgeodata.gmu.edu/CropScape/

USDA Natural Resource Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/

Nutrient Stewardship, "Implementing the 4RS". http://www.nutrientstewardship.com/implement-4rs

NRCS, Green Lake WI "Field Office Technical Guide", https://efotg.sc.egov.usda.gov/toc.aspx?CatID=16711

GREEN LAKE ASSOCIATION
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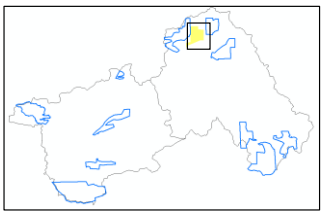
GREEN LAKE NUTRIENT LOAD PRIORITY AREA SNAPSHOT

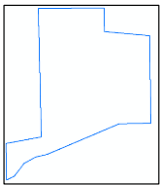
delta institute

GENERAL DISCRIPTION

Nutrient Load Priority Area ID	SC002
Total Acres	499
Tillable Acres	444
Non Tillable Acres	55
Average Slope %	2-6

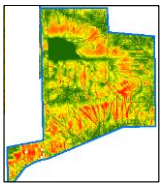


NLPA Regional Overview



NLPA Section Boundary

NLPA Orthophoto Map



NLPA EVAAL map

Erosion Potential Legend:	
	High
	High-Medium
	Low-Medium
	Low

TILLABLE LAND USE HISTORY FROM 2012-2014 (Acres)

Crop Type	2012	2013	2014	Average	% Change (2012-2014)	Trend Line
Corn	298.2	259.8	318.0	292.00	7%	
Soybeans	44.3	12.2	25.4	27.30	-43%	
Winter Wheat	0.2	74.1	-	37.15	-	
Oats	-	0.4	-	0.40	-	
Alfalfa	1.6	0.7	2.0	1.43	25%	
Other Hay/Non Alfalfa	0.7	1.6	0.4	0.90	-43%	
Dry Beans	8.9	0.2	0.4	3.17	-96%	
Peas	24.9	1.6	-	13.25	-	
Sweet Corn	3.1	25.6	30.5	19.73	884%	
Spring Wheat	-	-	-	-	-	
Christmas Trees	-	-	-	-	-	
Rye	-	-	-	-	-	
Barren	-	-	-	-	-	
Sod/Grass Seed	-	-	-	-	-	
Sugarbeets	-	-	0.2	0.20	-	
Herbs	-	-	-	-	-	
Cabbage	-	0.4	-	0.40	-	
Barley	-	-	-	-	-	
Grass/Pasture	62.5	67.6	67.2	65.8	8%	
Dbl Crop WinWht/Corn	-	-	-	-	-	

NON-TILLABLE LAND USE HISTORY FROM 2012-2014 (Acres)

Land Use Type	2012	2013	2014	Average	% Change	Trend Line
Fallow/Idle Cropland	-	-	-	-	-	
Shrubland	-	-	0.2	0.2	-	
Deciduous Forest	22.7	18.9	29.1	23.6	28%	
Evergreen Forest	-	-	-	-	-	
Mixed Forest	-	-	-	-	-	
Woody Wetlands	0.4	3.1	1.3	1.6	225%	
Herbaceous Wetlands	8	10	0.7	6.2	-91%	
Open Water	-	-	-	-	-	
Developed/Open Space	13.3	12.5	14.5	13.4	9%	
Developed/Low Intensity	9.3	9.6	7.6	8.8	-18%	
Developed/Medium Intensity	-	-	-	-	-	
Developed/High Intensity	-	-	-	-	-	

TOP THREE PROMINENT SOILS IN NLPA AREA

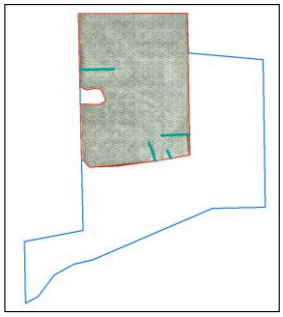
Soil Name	Primary Soil Mendota Silt Loam	Secondary Soil Plano Silt Loam	Tertiary Soils Warsaw Silt Loam
Description	The Mendota series consists of very deep, well drained soils formed in loess and in the underlying highly calcareous loamy till. These soils are on ground moraines. Slope rangeS from 0 to 12 percent. Mean annual precipitation is about 762 mm (30 inches). Mean annual air temperature is about 7.8 degrees C (46 degrees F).	The Granby series consists of very deep, poorly drained or very poorly drained soils formed in sandy outwash or sandy glaciolacustrine deposits on outwash plains, lake plains, and glacial drainageways. Slope ranges from 0 to 3 percent. Mean annual precipitation is about 889 mm (35 inches), and mean annual temperature is about 10.0 degrees C (50 degrees F).	The Warsaw series consists of well drained soils formed in loamy sediments and in the underlying gravelly outwash on outwash plains, terraces, kames, and valley trains. These are very deep soils that are deep or very deep to calcareous, stratified gravelly or very gravelly coarse sand and sand. Slope ranges from 0 to 15 percent. Mean annual precipitation is about 1016 mm (40 inches), and mean annual temperature is about 11.1 degrees C (52 degrees F).

RECOMMENDED BMP'S FOR IMPLEMENTATION IN NLPA

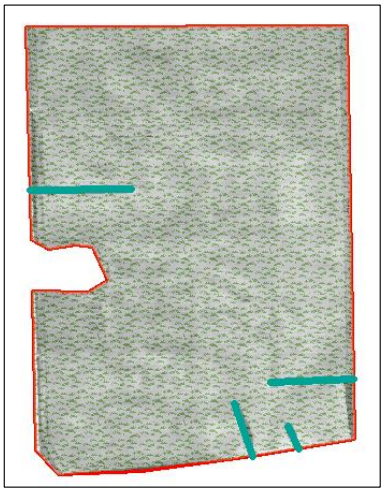
BMP's	Cover Crops	Critical Area planting	No Till and Strip Till	Fertilizer and Nutrient Management/ Application	Much Till	Filter Strip	Grassed Waterway	Streambank and Shoreline Protection
Recommendation for Implementation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*See appendix for Best Management Practices definitions and descriptions

FIELD LEVEL IMPLEMENTATION SCENARIOS	
Field Overview	
Field Size (Acres)	200
Estimated Baseline Phosphorus Lost (lbs)/Year	700
Scenario #1	**Grassed Waterway**
Scenario Feature Measure	Linear Feet of Waterway
Scenario Unit	Linear Foot
Scenario Size	2500
Practice Length (years)	10
Estimated Phosphorus Reduction (lbs)/Year	308
% Reduction from Baseline	45%
Estimated Total Cost	$ 15,625.00
Estimated Federal Cost Share	$ 14,062.50
Estimated Funding Gap	$ (1,562.50)
Potential Cost Share Program	CRP
Scenario #2	**Cover Crop- one Species**
Scenario Feature Measure	Area planted
Scenario Unit	Acre
Scenario Size	200
Practice Length (years)	1
Estimated Phosphorus Reduction (lbs)/Year	296
% Reduction from Baseline	42%
Estimated Total Cost	$ 12,030.00
Estimated Federal Cost Share	$ 9,022.50
Estimated Funding Gap	$ (3,007.50)
Potential Cost Share Program	EQIP
Scenario #3	**-**
Scenario Feature Measure	-
Scenario Unit	-
Scenario Size	-
Practice Length (years)	-
Estimated Phosphorus Reduction (l	-
% Reduction from Baseline	-
Estimated Total Cost	-
Estimated Federal Cost Share	-
Estimated Funding Gap	-
Potential Cost Share Program	-

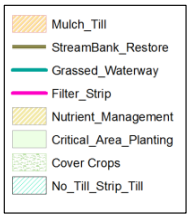


NLPA Boundary with BMP Implementation Area Map



BMP Implementation Area Map

BMP Legend:



FIELD LEVEL IMPLEMENTATION NOTES AND ASSUMPTIONS
Field level implementation scenarios were picked base on available data, EVAAL model results, and geographic characteristics visible in orthophotographic maps. BMPs, size, practice length, estimated Phosphorus reduction, and cost estimations were modeled based on data provided by the Green Lake WI "Field Office Technical Guide", and resources mentioned below Estimated Total Phosphous Loading and Reduction was calculated using the EPA Region 5 model. Reductions may vary depending on field characteristics. Phosphorus Reductions may also vary depending on different models used. Phosphorus Loading Reductions are for example purposes only. Funding Source that is listed is the most appropriate for the Best Management Practice (BMP) modeled in each scenario. Other funding sources may also be appropriate. CRP= Conservation Reserve Program. EQIP= Environmental Quality Incentive Program. *See Appendix B for funding and cost share program details*

REFERENCES:

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NRCS, Green Lake WI "Field Office Technical Guide", https://efotg.sc.egov.usda.gov/toc.aspx?CatID=16711

GREEN LAKE ASSOCIATION
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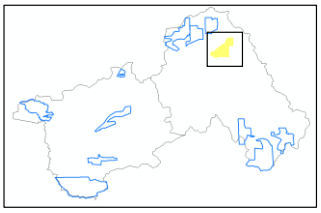
GREEN LAKE NUTRIENT LOAD PRIORITY AREA SNAPSHOT

delta institute

GENERAL DISCRIPTION

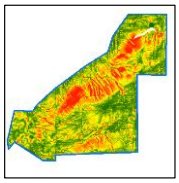
Nutrient Load Priority Area ID	SC003
Total Acres	641
Tillable Acres	575
Non Tillable Acres	66
Average Slope %	2-6



NLPA Regional Overview

NLPA Section Boundary

NLPA Orthophoto Map



NLPA EVAAL map

Erosion Potential Legend:	
	High
	High-Medium
	Low-Medium
	Low

TILLABLE LAND USE HISTORY FROM 2012-2014 (Acres)

Crop Type	2012	2013	2014	Average	% Change (2012-2014)	Trend Line
Corn	412.3	326.3	197.9	312.17	-52%	
Soybeans	77.2	102.3	231.1	136.87	199%	
Winter Wheat	0.7	27.6	41.1	23.13	5771%	
Oats	0.2	0.9	-	0.55	-	
Alfalfa	16.2	4.2	18.7	13.03	15%	
Other Hay/Non Alfalfa	1.1	18.0	2.7	7.27	145%	
Dry Beans	-	6.7	0.2	3.45	-	
Peas	0.2	2.4	0.2	0.93	0%	
Sweet Corn	0.4	1.1	-	0.75	-	
Spring Wheat	-	0.2	-	0.20	-	
Christmas Trees	-	-	-	-	-	
Rye	-	-	-	-	-	
Barren	-	-	-	-	-	
Sod/Grass Seed	-	-	-	-	-	
Sugarbeets	-	0.4	-	0.40	-	
Herbs	-	-	-	-	-	
Cabbage	-	0.7	-	0.70	-	
Barley	-	-	-	-	-	
Grass/Pasture	66.5	73.8	83	74.4	25%	
Dbl Crop WinWht/Corn	-	-	-	-	-	

NON-TILLABLE LAND USE HISTORY FROM 2012-2014 (Acres)

Land Use Type	2012	2013	2014	Average	% Change	Trend Line
Fallow/Idle Cropland	-	0.7	-	0.7	-	
Shrubland	-	-	-	-	-	
Deciduous Forest	13.6	11.8	19.3	14.9	42%	
Evergreen Forest	-	-	-	-	-	
Mixed Forest	-	-	0.2	0.2	-	
Woody Wetlands	1.3	1.6	1.1	1.3	-15%	
Herbaceous Wetlands	20.7	32.9	13.3	22.3	-36%	
Open Water	-	-	-	-	-	
Developed/Open Space	18.7	17.6	20.5	18.9	10%	
Developed/Low Intensity	11.6	11.6	10.9	11.4	-6%	
Developed/Medium Intensity	-	-	0.4	0.4	-	
Developed/High Intensity	-	-	-	-	-	

TOP THREE PROMINENT SOILS IN NLPA AREA

Soil Name	Primary Soil	Secondary Soil	Tertiary Soils
	Lomira Silt Loam	Mendota Silt Loam	Plano Silt Loam
Description	The Lomira series consists of very deep, well drained soils formed in loess and in the underlying highly calcareous, loamy till. These soils are on ground moraines. Slope ranges from 0 to 20 percent. Mean annual precipitation is about 762 mm (30 inches). Mean annual air temperature is about 8.9 degrees C (48 degrees F)	The Granby series consists of very deep, poorly drained or very poorly drained soils formed in sandy outwash or sandy glaciolacustrine deposits on outwash plains, lake plains, and glacial drainageways. Slope ranges from 0 to 3 percent. Mean annual precipitation is about 889 mm (35 inches), and mean annual temperature is about 10.0 degrees C (50 degrees F).	The Plano series consists of very deep, well drained soils on outwash plains, stream terraces, or till plains. These soils formed in loess or other silty material and in the underlying loamy stratified outwash or sandy loam till. Slope ranges from 0 to 12 percent. The mean annual air temperature is about 8.9 degrees C (48 degrees F), and the mean annual precipitation is about 914 mm (36 inches).

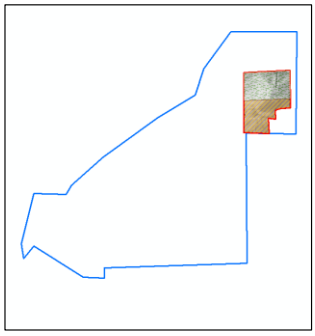
RECOMMENDED BMP'S FOR IMPLEMENTATION IN NLPA

BMP's	Cover Crops	Critical Area planting	No Till and Strip Till	Fertilizer and Nutrient Management/ Application	Much Till	Filter Strip	Grassed Waterway	Streambank and Shoreline Protection
Recommendation for Implementation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

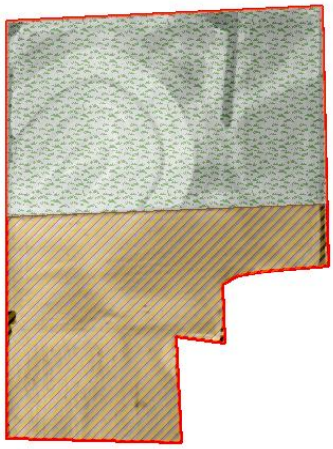
*See appendix for Best Management Practices definitions and descriptions

FIELD LEVEL IMPLEMENTATION SCENARIOS

Field Overview	
Field Size (Acres)	45
Estimated Baseline Phosphorus Lost (lbs)/Year	157.5
Scenario #1	**Mulch Till**
Scenario Feature Measure	Area
Scenario Unit	Acre
Scenario Size	20
Practice Length (years)	1
Estimated Phosphorus Reduction (lbs)/Year	37
% Reduction from Baseline	24%
Estimated Total Cost	$ 450.00
Estimated Federal Cost Share	$ 337.50
Estimated Funding Gap	$ (112.50)
Potential Cost Share Program	CRP
Scenario #2	**Cover Crop- one Species**
Scenario Feature Measure	Area planted
Scenario Unit	Acre
Scenario Size	25
Practice Length (years)	1
Estimated Phosphorus Reduction (lbs)/Year	46
% Reduction from Baseline	30%
Estimated Total Cost	$ 1,505.00
Estimated Federal Cost Share	$ 1,128.75
Estimated Funding Gap	$ (376.25)
Potential Cost Share Program	EQIP
Scenario #3	**-**
Scenario Feature Measure	-
Scenario Unit	-
Scenario Size	-
Practice Length (years)	-
Estimated Phosphorus Reduction (l	-
% Reduction from Baseline	-
Estimated Total Cost	-
Estimated Federal Cost Share	-
Estimated Funding Gap	-
Potential Cost Share Program	-

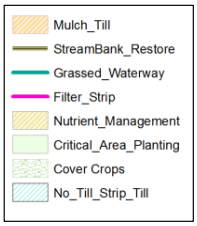


NLPA Boundary with BMP Implementation Area Map



BMP Implementation Area Map

BMP Legend:



FIELD LEVEL IMPLEMENTATION NOTES AND ASSUMPTIONS

Field level implementation scenarios were picked base on available data, EVAAL model results, and geographic characteristics visible in orthophotographic maps. BMPs, size, practice length, estimated Phosphorus reduction, and cost estimations were modeled based on data provided by the Green Lake WI "Field Office Technical Guide", and resources mentioned below

Estimated Total Phosphous Loading and Reduction was calculated using the EPA Region 5 model. Reductions may vary depending on field characteristics. Phosphorus Reductions may also vary depending on different models used. Phosphorus Loading Reductions are for example purposes only.

Funding Source that is listed is the most appropriate for the Best Management Practice (BMP) modeled in each scenario. Other funding sources may also be appropriate.

CRP= Conservation Reserve Program.
EQIP= Environmental Quality Incentive Program.
See Appendix B for funding and cost share program details

REFERENCES:

USDA National Agricultural Statistics Service, "CropScape". http://nassgeodata.gmu.edu/CropScape/

USDA Natural Resource Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/

Nutrient Stewardship, "Implementing the 4RS". http://www.nutrientstewardship.com/implement-4rs

NRCS, Green Lake WI "Field Office Technical Guide", https://efotg.sc.egov.usda.gov/toc.aspx?CatID=16711

GREEN LAKE ASSOCIATION
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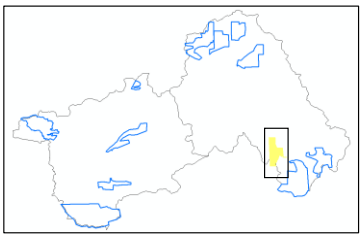
GREEN LAKE NUTRIENT LOAD PRIORITY AREA SNAPSHOT

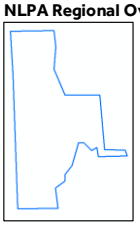
delta institute

GENERAL DISCRIPTION

Nutrient Load Priority Area ID	SC004
Total Acres	546
Tillable Acres	516
Non Tillable Acres	30
Average Slope %	0-6



NLPA Regional Overview



NLPA Section Boundary

NLPA Orthophoto Map

NLPA EVAAL map

Erosion Potential Legend:	
	High
	High-Medium
	Low-Medium
	Low

TILLABLE LAND USE HISTORY FROM 2012-2014 (Acres)

Crop Type	2012	2013	2014	Average	% Change (2012-2014)	Trend Line
Corn	293.1	221.5	294.9	269.83	1%	
Soybeans	56.9	89.4	82.7	76.33	45%	
Winter Wheat	8.5	34.0	6.9	16.47	-19%	
Oats	-	0.7	0.2	0.45	-	
Alfalfa	46.5	19.1	22.2	29.27	-52%	
Other Hay/Non Alfalfa	1.1	6.4	3.3	3.60	200%	
Dry Beans	0.7	-	-	0.70	-	
Peas	0.7	0.4	0.4	0.50	-43%	
Sweet Corn	-	15.6	1.6	8.60	-	
Spring Wheat	-	-	-	-	-	
Christmas Trees	-	-	-	-	-	
Rye	-	0.2	-	0.20	-	
Barren	-	0.7	-	0.70	-	
Sod/Grass Seed	-	-	-	-	-	
Sugarbeets	-	0.2	-	0.20	-	
Herbs	-	-	-	-	-	
Cabbage	-	-	-	-	-	
Barley	1.3	-	-	1.30	-	
Grass/Pasture	89.6	87	103.9	93.5	16%	
Dbl Crop WinWht/Corn	-	-	-	-	-	

NON-TILLABLE LAND USE HISTORY FROM 2012-2014 (Acres)

Land Use Type	2012	2013	2014	Average	% Change	Trend Line
Fallow/Idle Cropland	0.2	0.4	-	0.3	-	
Shrubland	-	-	-	-	-	
Deciduous Forest	10.9	5.6	10.7	9.1	-2%	
Evergreen Forest	-	-	-	-	-	
Mixed Forest	-	-	-	-	-	
Woody Wetlands	0.2	2.2	1.1	1.2	450%	
Herbaceous Wetlands	29.1	55.6	8	30.9	-73%	
Open Water	-	-	-	-	-	
Developed/Open Space	6.7	7.1	5.6	6.5	-16%	
Developed/Low Intensity	6.9	6.2	6.2	6.4	-10%	
Developed/Medium Intensity	0.2	0.2	-	0.2	-	
Developed/High Intensity	-	-	-	-	-	

TOP THREE PROMINENT SOILS IN NLPA AREA

Soil Name	Primary Soil Lomira Silt Loam	Secondary Soil Pella Silt Loam	Tertiary Soils Virgil Silt Loam
Description	The Lomira series consists of very deep, well drained soils formed in loess and in the underlying highly calcareous, loamy till. These soils are on ground moraines. Slope ranges from 0 to 20 percent. Mean annual precipitation is about 762 mm (30 inches). Mean annual air temperature is about 8.9 degrees C (48 degrees F)	The Granby series consists of very deep, poorly drained or very poorly drained soils formed in sandy outwash or sandy glaciolacustrine deposits on outwash plains, lake plains, and glacial drainageways. Slope ranges from 0 to 3 percent. Mean annual precipitation is about 889 mm (35 inches), and mean annual temperature is about 10.0 degrees C (50 degrees F).	The Virgil series consists of very deep, somewhat poorly drained soils on outwash plains, stream terraces, or till plains. These soils formed in loess or other silty material and in the underlying loamy outwash or sandy loam till. Slope ranges from 0 to 6 percent. Mean annual air temperature is about 8.3 degrees C (47 degrees F). Mean annual precipitation is about 890 mm (35 inches).

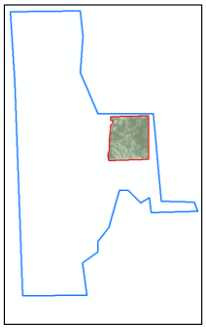
RECOMMENDED BMP'S FOR IMPLEMENTATION IN NLPA

BMP's	Cover Crops	Critical Area planting	No Till and Strip Till	Fertilizer and Nutrient Management/ Application	Mulch Till	Filter Strip	Grassed Waterway	Streambank and Shoreline Protection
Recommendation for Implementation	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes

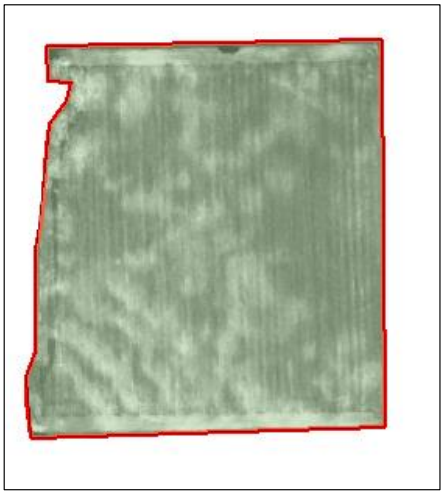
*See appendix for Best Management Practices definitions and descriptions

FIELD LEVEL IMPLEMENTATION SCENARIOS

Field Overview	
Field Size (Acres)	37
Estimated Baseline Phosphorus Lost (lbs)/Year	122.5
Scenario #1	**Critical Area Planting**
Scenario Feature Measure	Area planted
Scenario Unit	Acre
Scenario Size	37
Practice Length (years)	1
Estimated Phosphorus Reduction (lbs)/Year	62
% Reduction from Baseline	51%
Estimated Total Cost	$ 7,700.00
Estimated Federal Cost Share	$ 5,775.00
Estimated Funding Gap	$ (1,925.00)
Potential Cost Share Program	EQIP
Scenario #2	**-**
Scenario Feature Measure	-
Scenario Unit	-
Scenario Size	-
Practice Length (years)	-
Estimated Phosphorus Reduction (lbs)/Year	-
% Reduction from Baseline	-
Estimated Total Cost	-
Estimated Federal Cost Share	-
Estimated Funding Gap	-
Potential Cost Share Program	-
Scenario #3	**-**
Scenario Feature Measure	-
Scenario Unit	-
Scenario Size	-
Practice Length (years)	-
Estimated Phosphorus Reduction (l	-
% Reduction from Baseline	-
Estimated Total Cost	-
Estimated Federal Cost Share	-
Estimated Funding Gap	-
Potential Cost Share Program	-



NLPA Boundary with BMP Implementation Area Map



BMP Implementation Area Map

BMP Legend:

- Mulch_Till
- StreamBank_Restore
- Grassed_Waterway
- Filter_Strip
- Nutrient_Management
- Critical_Area_Planting
- Cover Crops
- No_Till_Strip_Till

FIELD LEVEL IMPLEMENTATION NOTES AND ASSUMPTIONS

Field level implementation scenarios were picked base on available data, EVAAL model results, and geographic characteristics visible in orthophotographic maps. BMPs, size, practice length, estimated Phosphorus reduction, and cost estimations were modeled based on data provided by the Green Lake WI "Field Office Technical Guide", and resources mentioned below

Estimated Total Phosphous Loading and Reduction was calculated using the EPA Region 5 model. Reductions may vary depending on field characteristics. Phosphorus Reductions may also vary depending on different models used. Phosphorus Loading Reductions are for example purposes only.

Funding Source that is listed is the most appropriate for the Best Management Practice (BMP) modeled in each scenario. Other funding sources may also be appropriate.

CRP= Conservation Reserve Program.
EQIP= Environmental Quality Incentive Program.
See Appendix B for funding and cost share program details

REFERENCES:

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Nutrient Stewardship, "Implementing the 4RS". http://www.nutrientstewardship.com/implement-4rs

NRCS, Green Lake WI "Field Office Technical Guide", https://efotg.sc.egov.usda.gov/toc.aspx?CatID=16711

GREEN LAKE ASSOCIATION
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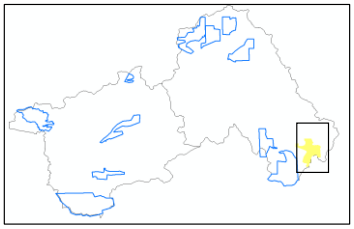
GREEN LAKE NUTRIENT LOAD PRIORITY AREA SNAPSHOT

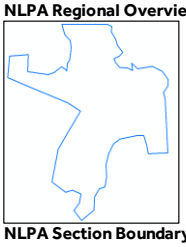
delta institute

GENERAL DISCRIPTION

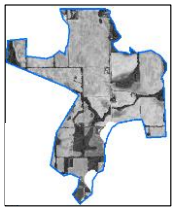
Nutrient Load Priority Area ID	SC005
Total Acres	657
Tillable Acres	572
Non Tillable Acres	85
Average Slope %	0-6



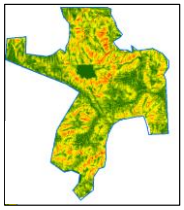
NLPA Regional Overview



NLPA Section Boundary



NLPA Orthophoto Map



NLPA EVAAL map

Erosion Potential Legend:	
	High
	High-Medium
	Low-Medium
	Low

TILLABLE LAND USE HISTORY FROM 2012-2014 (Acres)

Crop Type	2012	2013	2014	Average	% Change (2012-2014)	Trend Line
Corn	453.9	313.1	320.7	362.57	-29%	
Soybeans	50.9	162.8	126.5	113.40	149%	
Winter Wheat	-	0.9	50.5	25.70	-	
Oats	0.9	0.2	0.4	0.50	-56%	
Alfalfa	6.9	21.1	22.9	16.97	232%	
Other Hay/Non Alfalfa	14.7	0.9	1.1	5.57	-93%	
Dry Beans	-	-	-	-	-	
Peas	-	1.6	-	1.60	-	
Sweet Corn	-	21.1	-	21.10	-	
Spring Wheat	-	-	-	-	-	
Christmas Trees	-	-	-	-	-	
Rye	-	-	-	-	-	
Barren	-	0.2	-	0.20	-	
Sod/Grass Seed	-	-	-	-	-	
Sugarbeets	-	-	0.2	0.20	-	
Herbs	-	-	-	-	-	
Cabbage	-	-	-	-	-	
Barley	-	-	-	-	-	
Grass/Pasture	32.7	37.8	49.6	40.0	52%	
Dbl Crop WinWht/Corn	-	-	-	-	-	

NON-TILLABLE LAND USE HISTORY FROM 2012-2014 (Acres)

Land Use Type	2012	2013	2014	Average	% Change	Trend Line
Fallow/Idle Cropland	-	0.7	-	0.7	-	
Shrubland	0.2	-	-	0.2	-	
Deciduous Forest	8.9	2.4	4.7	5.3	-47%	
Evergreen Forest	-	-	-	-	-	
Mixed Forest	-	-	-	-	-	
Woody Wetlands	1.1	0.4	2.4	1.3	118%	
Herbaceous Wetlands	59.4	66.5	50.7	58.9	-15%	
Open Water	-	0.2	-	0.2	-	
Developed/Open Space	19.8	17.1	17.1	18.0	-14%	
Developed/Low Intensity	7.8	10	10	9.3	28%	
Developed/Medium Intensity	-	-	-	-	-	
Developed/High Intensity	-	-	0.2	0.2	-	

TOP THREE PROMINENT SOILS IN NLPA AREA

Soil Name	Primary Soil	Secondary Soil	Tertiary Soils
	Lomira Silt Loam	Pella Silt Loam	Virgil Silt Loam
Description	The Lomira series consists of very deep, well drained soils formed in loess and in the underlying highly calcareous, loamy till. These soils are on ground moraines. Slope ranges from 0 to 20 percent. Mean annual precipitation is about 762 mm (30 inches). Mean annual air temperature is about 8.9 degrees C (48 degrees F)	The Granby series consists of very deep, poorly drained or very poorly drained soils formed in sandy outwash or sandy glaciolacustrine deposits on outwash plains, lake plains, and glacial drainageways. Slope ranges from 0 to 3 percent. Mean annual precipitation is about 889 mm (35 inches), and mean annual temperature is about 10.0 degrees C (50 degrees F).	The Virgil series consists of very deep, somewhat poorly drained soils on outwash plains, stream terraces, or till plains. These soils formed in loess or other silty material and in the underlying loamy outwash or sandy loam till. Slope ranges from 0 to 6 percent. Mean annual air temperature is about 8.3 degrees C (47 degrees F). Mean annual precipitation is about 890 mm (35 inches).

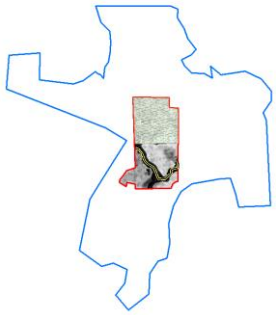
RECOMMENDED BMP'S FOR IMPLEMENTATION IN NLPA

BMP's	Cover Crops	Critical Area planting	No Till and Strip Till	Fertilizer and Nutrient Management/ Application	Much Till	Filter Strip	Grassed Waterway	Streambank and Shoreline Protection
Recommendation for Implementation	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes

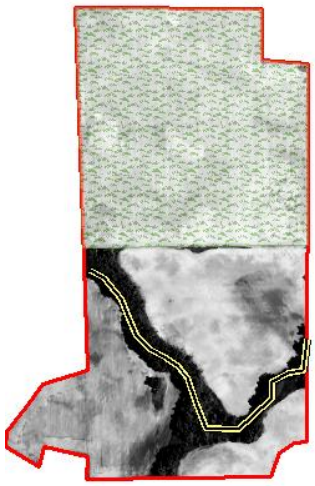
*See appendix for Best Management Practices definitions and descriptions

FIELD LEVEL IMPLEMENTATION SCENARIOS

Field Overview	
Field Size (Acres)	33
Estimated Baseline Phosphorus Lost (lbs)/Year	115.5
Scenario #1	**Streambank Stabilization**
Scenario Feature Measure	near Feet of stabilization
Scenario Unit	Linear Foot
Scenario Size	2100
Practice Length (years)	10
Estimated Phosphorus Reduction (lbs)/Year	90
% Reduction from Baseline	78%
Estimated Total Cost	$ 31,000.00
Estimated Federal Cost Share	$ 23,250.00
Estimated Funding Gap	$ (7,750.00)
Potential Cost Share Program	CRP
Scenario #2	**Cover Crop- one Species**
Scenario Feature Measure	Area planted
Scenario Unit	Acre
Scenario Size	30
Practice Length (years)	1
Estimated Phosphorus Reduction (lbs)/Year	54
% Reduction from Baseline	47%
Estimated Total Cost	$ 1,805.00
Estimated Federal Cost Share	$ 1,353.75
Estimated Funding Gap	$ (451.25)
Potential Cost Share Program	EQIP
Scenario #3	**-**
Scenario Feature Measure	-
Scenario Unit	-
Scenario Size	-
Practice Length (years)	-
Estimated Phosphorus Reduction (l	-
% Reduction from Baseline	-
Estimated Total Cost	-
Estimated Federal Cost Share	-
Estimated Funding Gap	-
Potential Cost Share Program	-



NLPA Boundary with BMP Implementation Area Map



BMP Implementation Area Map

BMP Legend:

- Mulch_Till
- StreamBank_Restore
- Grassed_Waterway
- Filter_Strip
- Nutrient_Management
- Critical_Area_Planting
- Cover Crops
- No_Till_Strip_Till

FIELD LEVEL IMPLEMENTATION NOTES AND ASSUMPTIONS

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GREEN LAKE ASSOCIATION
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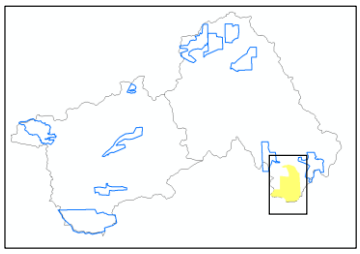
GREEN LAKE NUTRIENT LOAD PRIORITY AREA SNAPSHOT

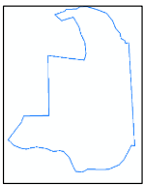
delta institute

GENERAL DISCRIPTION

Nutrient Load Priority Area ID	SC006
Total Acres	1292
Tillable Acres	1158
Non Tillable Acres	134
Average Slope %	2-6



NLPA Regional Overview



NLPA Section Boundary

NLPA Orthophoto Map

NLPA EVAAL map

Erosion Potential Legend:	
	High
	High-Medium
	Low-Medium
	Low

TILLABLE LAND USE HISTORY FROM 2012-2014 (Acres)

Crop Type	2012	2013	2014	Average	% Change (2012-2014)	Trend Line
Corn	780.6	631.2	403.2	605.00	-48%	
Soybeans	190.4	115.6	281.6	195.87	48%	
Winter Wheat	20.5	66.3	201.9	96.23	885%	
Oats	1.6	2.4	2.9	2.30	81%	
Alfalfa	5.1	8.7	13.1	8.97	157%	
Other Hay/Non Alfalfa	1.3	2.4	8.2	3.97	531%	
Dry Beans	18.2	6.4	0.4	8.33	-98%	
Peas	33.6	145.9	106.1	95.20	216%	
Sweet Corn	-	55.2	42.5	48.85	-	
Spring Wheat	-	-	-	-	-	
Christmas Trees	-	-	-	-	-	
Rye	-	-	-	-	-	
Barren	-	-	-	-	-	
Sod/Grass Seed	-	-	-	-	-	
Sugarbeets	-	1.3	2.2	1.75	-	
Herbs	-	-	-	-	-	
Cabbage	-	-	-	-	-	
Barley	-	-	-	-	-	
Grass/Pasture	75.6	93.6	96.3	88.5	27%	
Dbl Crop WinWht/Corn	-	0.4	-	0.40	-	

NON-TILLABLE LAND USE HISTORY FROM 2012-2014 (Acres)

Land Use Type	2012	2013	2014	Average	% Change	Trend Line
Fallow/Idle Cropland	-	2	-	2.0	-	
Shrubland	-	-	-	-	-	
Deciduous Forest	14.9	5.6	9.3	9.9	-38%	
Evergreen Forest	-	-	-	-	-	
Mixed Forest	-	-	-	-	-	
Woody Wetlands	1.3	2	1.6	1.6	23%	
Herbaceous Wetlands	85.4	95	66.7	82.4	-22%	
Open Water	0.2	-	-	0.2	-	
Developed/Open Space	41.8	32.9	31.6	35.4	-24%	
Developed/Low Intensity	20	23.1	22.7	21.9	14%	
Developed/Medium Intensity	-	0.2	0.9	0.6	-	
Developed/High Intensity	-	0.2	-	0.2	-	

TOP THREE PROMINENT SOILS IN NLPA AREA

Soil Name	Primary Soil	Secondary Soil	Tertiary Soils
	Lomira Silt Loam	St. Charles Silt Loam	Pella Silt Loam
Description	The Lomira series consists of very deep, well drained soils formed in loess and in the underlying highly calcareous, loamy till. These soils are on ground moraines. Slope ranges from 0 to 20 percent. Mean annual precipitation is about 762 mm (30 inches). Mean annual air temperature is about 8.9 degrees C (48 degrees F)	The Sebewa series consists of very deep, poorly drained or very poorly drained soils formed in loamy outwash and the underlying gravelly and sandy outwash on outwash plains, valley trains, and stream terraces on terrace landscapes. They are moderately deep to the gravelly and sandy outwash. Slope ranges from 0 to 3 percent. Mean annual precipitation is about 838 mm (33 inches), and mean annual temperature is about 9.4 degrees C (49 degrees F).	The Pella series consists of very deep, poorly drained soils formed in loamy or silty sediments and the underlying stratified loamy glacial sediments on lake plains, outwash plains, and till plains. Slope ranges from 0 to 3 percent. Mean annual precipitation is about 914 mm (36 inches), and mean annual air temperature is about 10 degrees C (50 degrees F).

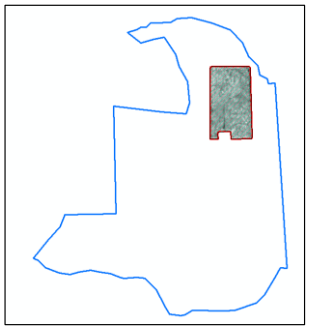
RECOMMENDED BMP'S FOR IMPLEMENTATION IN NLPA

BMP's	Cover Crops	Critical Area planting	No Till and Strip Till	Fertilizer and Nutrient Management/ Application	Mulch Till	Filter Strip	Grassed Waterway	Streambank and Shoreline Protection
Recommendation for Implementation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

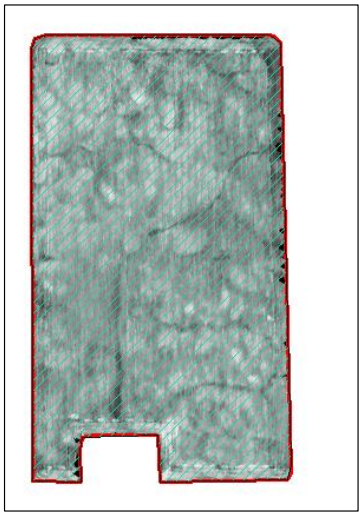
*See appendix for Best Management Practices definitions and descriptions

FIELD LEVEL IMPLEMENTATION SCENARIOS

Field Overview	
Field Size (Acres)	85
Estimated Baseline Phosphorus Lost (lbs)/Year	297.5
Scenario #1	**No Till**
Scenario Feature Measure	Area
Scenario Unit	Acre
Scenario Size	85
Practice Length (years)	1
Estimated Phosphorus Reduction (lbs)/Year	137
% Reduction from Baseline	46%
Estimated Total Cost	$ 3,315.00
Estimated Federal Cost Share	$ 2,486.25
Estimated Funding Gap	$ (828.75)
Potential Cost Share Program	EQIP
Scenario #2	**-**
Scenario Feature Measure	-
Scenario Unit	-
Scenario Size	-
Practice Length (years)	-
Estimated Phosphorus Reduction (lbs)/Year	-
% Reduction from Baseline	-
Estimated Total Cost	-
Estimated Federal Cost Share	-
Estimated Funding Gap	-
Potential Cost Share Program	-
Scenario #3	**-**
Scenario Feature Measure	-
Scenario Unit	-
Scenario Size	-
Practice Length (years)	-
Estimated Phosphorus Reduction (l	-
% Reduction from Baseline	-
Estimated Total Cost	-
Estimated Federal Cost Share	-
Estimated Funding Gap	-
Potential Cost Share Program	-



NLPA Boundary with BMP Implementation Area Map



BMP Implementation Area Map

FIELD LEVEL IMPLEMENTATION NOTES AND ASSUMPTIONS

Field level implementation scenarios were picked base on available data, EVAAL model results, and geographic characteristics visible in orthophotographic maps. BMPs, size, practice length, estimated Phosphorus reduction, and cost estimations were modeled based on data provided by the Green Lake WI "Field Office Technical Guide", and resources mentioned below

Estimated Total Phosphous Loading and Reduction was calculated using the EPA Region 5 model. Reductions may vary depending on field characteristics. Phosphorus Reductions may also vary depending on different models used. Phosphorus Loading Reductions are for example purposes only.

Funding Source that is listed is the most appropriate for the Best Management Practice (BMP) modeled in each scenario. Other funding sources may also be appropriate.

CRP= Conservation Reserve Program.
EQIP= Environmental Quality Incentive Program.
See Appendix B for funding and cost share program details

REFERENCES:

USDA National Agricultural Statistics Service, "CropScape". http://nassgeodata.gmu.edu/CropScape/

USDA Natural Resource Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/

Nutrient Stewardship, "Implementing the 4RS". http://www.nutrientstewardship.com/implement-4rs

NRCS, Green Lake WI "Field Office Technical Guide", https://efotg.sc.egov.usda.gov/toc.aspx?CatID=16711

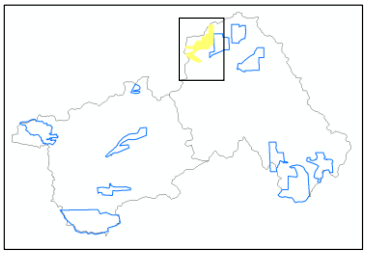
GREEN LAKE ASSOCIATION
CARING FOR OUR LAKE FOR GENERATIONS

GREEN LAKE NUTRIENT LOAD PRIORITY AREA SNAPSHOT

delta institute

GENERAL DISCRIPTION

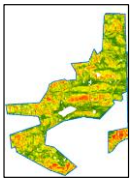
Nutrient Load Priority Area ID	SC007
Total Acres	781
Tillable Acres	655
Non Tillable Acres	126
Average Slope %	2-6



NLPA Regional Overview

NLPA Section Boundary

NLPA Orthophoto Map



NLPA EVAAL map

Erosion Potential Legend:	
	High
	High-Medium
	Low-Medium
	Low

TILLABLE LAND USE HISTORY FROM 2012-2014 (Acres)

Crop Type	2012	2013	2014	Average	% Change (2012-2014)	Trend Line
Corn	402.5	462.1	230.8	365.13	-43%	
Soybeans	114.5	25.8	282.7	141.00	147%	
Winter Wheat	0.2	25.6	-	12.90	-	
Oats	-	0.2	-	0.20	-	
Alfalfa	11.6	7.6	9.8	9.67	-16%	
Other Hay/Non Alfalfa	2.0	8.9	3.6	4.83	80%	
Dry Beans	-	0.2	0.2	0.20	-	
Peas	-	1.6	-	1.60	-	
Sweet Corn	0.2	0.9	-	0.55	-	
Spring Wheat	-	0.2	-	0.20	-	
Christmas Trees	0.4	-	-	0.40	-	
Rye	-	-	-	-	-	
Barren	-	-	-	-	-	
Sod/Grass Seed	-	-	-	-	-	
Sugarbeets	-	-	-	-	-	
Herbs	-	-	-	-	-	
Cabbage	-	-	-	-	-	
Barley	-	-	-	-	-	
Grass/Pasture	105.2	111.2	127.7	114.7	21%	
Dbl Crop WinWht/Corn	-	-	-	-	-	

NON-TILLABLE LAND USE HISTORY FROM 2012-2014 (Acres)

Land Use Type	2012	2013	2014	Average	% Change	Trend Line
Fallow/Idle Cropland	-	-	-	-	-	
Shrubland	-	-	-	-	-	
Deciduous Forest	56.7	56	67.2	60.0	19%	
Evergreen Forest	-	-	-	-	-	
Mixed Forest	-	-	0.2	0.2	-	
Woody Wetlands	2	6.7	1.6	3.4	-20%	
Herbaceous Wetlands	55.2	44.5	26.7	42.1	-52%	
Open Water	-	-	-	-	-	
Developed/Open Space	23.8	20.9	22	22.2	-8%	
Developed/Low Intensity	8.7	10.7	7.8	9.1	-10%	
Developed/Medium Intensity	-	-	-	-	-	
Developed/High Intensity	-	-	-	-	-	

TOP THREE PROMINENT SOILS IN NLPA AREA

Soil Name	Primary Soil	Secondary Soil	Tertiary Soils
	Lomira Silt Loam	St. Charles Silt Loam	Pella Silt Loam
Description	The Lomira series consists of very deep, well drained soils formed in loess and in the underlying highly calcareous, loamy till. These soils are on ground moraines. Slope ranges from 0 to 20 percent. Mean annual precipitation is about 762 mm (30 inches). Mean annual air temperature is about 8.9 degrees C (48 degrees F)	The Sebewa series consists of very deep, poorly drained or very poorly drained soils formed in loamy outwash and the underlying gravelly and sandy outwash on outwash plains, valley trains, and stream terraces on terrace landscapes. They are moderately deep to the gravelly and sandy outwash. Slope ranges from 0 to 3 percent. Mean annual precipitation is about 838 mm (33 inches), and mean annual temperature is about 9.4 degrees C (49 degrees F).	The Pella series consists of very deep, poorly drained soils formed in loamy or silty sediments and the underlying stratified loamy glacial sediments on lake plains, outwash plains, and till plains. Slope ranges from 0 to 3 percent. Mean annual precipitation is about 914 mm (36 inches), and mean annual air temperature is about 10 degrees C (50 degrees F).

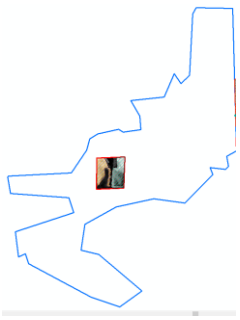
RECOMMENDED BMP'S FOR IMPLEMENTATION IN NLPA

BMP's	Cover Crops	Critical Area planting	No Till and Strip Till	Fertilizer and Nutrient Management/ Application	Mulch Till	Filter Strip	Grassed Waterway	Streambank and Shoreline Protection
Recommendation for Implementation	Yes	No	Yes	Yes	Yes	No	Yes	No

*See appendix for Best Management Practices definitions and descriptions

FIELD LEVEL IMPLEMENTATION SCENARIOS

Field Overview	
Field Size (Acres)	19
Estimated Baseline Phosphorus Lost (lbs)/Year	66.5
Scenario #1	**Mulch Till**
Scenario Feature Measure	Area
Scenario Unit	Acre
Scenario Size	8
Practice Length (years)	1
Estimated Phosphorus Reduction (lbs)/Year	16
% Reduction from Baseline	25%
Estimated Total Cost	$ 180.00
Estimated Federal Cost Share	$ 135.00
Estimated Funding Gap	$ (45.00)
Potential Cost Share Program	EQIP
Scenario #2	**No Till**
Scenario Feature Measure	Area
Scenario Unit	Acre
Scenario Size	11
Practice Length (years)	1
Estimated Phosphorus Reduction (lbs)/Year	22
% Reduction from Baseline	3300%
Estimated Total Cost	$ 429.00
Estimated Federal Cost Share	$ 321.75
Estimated Funding Gap	$ (107.25)
Potential Cost Share Program	EQIP
Scenario #3	**-**
Scenario Feature Measure	-
Scenario Unit	-
Scenario Size	-
Practice Length (years)	-
Estimated Phosphorus Reduction (l	-
% Reduction from Baseline	-
Estimated Total Cost	-
Estimated Federal Cost Share	-
Estimated Funding Gap	-
Potential Cost Share Program	-



NLPA Boundary with BMP Implementation Area Map

BMP Implementation Area Map

FIELD LEVEL IMPLEMENTATION NOTES AND ASSUMPTIONS

Field level implementation scenarios were picked base on available data, EVAAL model results, and geographic characteristics visible in orthophotographic maps. BMPs, size, practice length, estimated Phosphorus reduction, and cost estimations were modeled based on data provided by the Green Lake WI "Field Office Technical Guide", and resources mentioned below

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Funding Source that is listed is the most appropriate for the Best Management Practice (BMP) modeled in each scenario. Other funding sources may also be appropriate.

CRP= Conservation Reserve Program.
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REFERENCES:

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USDA Natural Resource Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/

Nutrient Stewardship, "Implementing the 4RS". http://www.nutrientstewardship.com/implement-4rs

NRCS, Green Lake WI "Field Office Technical Guide", https://efotg.sc.egov.usda.gov/toc.aspx?CatID=16711

APPENDIX E: Conservation Best Practices

PRACTICE: COVER CROPS

Definition: Cover Crops are grasses, small grains, legumes, forbs, and/or other herbaceous plants established for seasonal cover and conservation purposes.

Planning: Plans and specifications should be prepared for each site according to planning criteria. Plans for the establishment of Cover Crops shall include:

Parameters:	Establishment Guidelines:
Field Location and Acres	Map all locations with exact acres to be planted
Species of Plants to be established	Multiple species exist for multiple benefits. See table 2 for more details.
Seeding Rates (Drilled)	Example ranges between 1-65 lbs/acre. Please see table 1 for more details.
Seeding Dates	Example ranges from April 1st to September 15th. Please see table 1 for more details.
Establishment Procedure	Broadcast, Drill or Aerial Application
Crop Termination	Ranges from Winter kill, plowing or prescribed burns

Implementation and verification:

- Time the cover crop establishment to maximize competition with weeds and volunteer plants. This will depend on your primary crop and harvest window.
- Termination will vary depending on the species of the cover crop. Termination should be planned to prevent a negative impact on the next crop in the crop rotation.
- Evaluate the cover crop to determine if it is meeting the planned purposes. If the cover crop is not meeting the intended purpose, adjust the current management, change the species of future cover crops, or choose a different establishment and termination method. Verification should take place once the cover crop is established and several different time throughout the life of the cover crop.

Potential Benefits	
Soil Erosion	4
Soil Quality	4
Water Quality	4
Air Quality	2
Fish and Wildlife	3

1= Poor, 2= Fair, 3= Good, 4= Very Good, 5= Excellent

Reference: USDA-NRCS- For more information, visit https://efotg.sc.egov.usda.gov/

Table 1

Species	Seeding Rate Drill/Broadcast	Seeding Date (statewide)	Planting Depth (inches)
COCKTAIL MIXTURES			
Forage/Oilseed Radish (50%)	4-12 lbs./ac	8/1-9/1	¾ to 1
Peas, Winter (50%)	65-100 lbs./ac		
Cereal Rye, Winter (50%)	60-120 lbs./ac	7/15-9/15	½ to 1½
Hairy Vetch (50%)	15-20 lbs./ac		
Annual Ryegrass (60%)	15-20 lbs./ac	4/10-6/1, 8/1-9/1	¼ to ½
Oilseed Radish (40%)	4-12 lbs./ac		
Berseem Clover (50%)	9-17 lbs./ac	6/1-8/1	½ to ¾
Oats (50%)	30-60 lbs./ac		
Oats (60%)	30-60 lbs./ac	4/10-6/15, 7/15-9/1	½ to ¾
Oilseed Radish (40%)	4-12 lbs./ac		
Oats (60%)	30-60 lbs./ac	6/1-6/15, 7/15-9/1	¼ to ½
Peas, Winter (40%)	65-100 lbs./ac		
Oilseed Radish (40%)	4-12 lbs./ac	8/1-9/1	¾ to 1
Hairy Vetch (60%)	15-20 lbs./ac		
Oats (60%)	30-60 lbs./ac	4/10-6/15, 7/15-9/1	¾ to 1
Oilseed Radish (40%)	4-12 lbs./ac		
Field Pea (20%)	65-100 lbs./ac		
Oats (60%)	30-60 lbs./ac	5/1-6/15, 7/15-9/1	½ to 1
Annual Ryegrass (20%)	15-20 lbs./ac		
Crimson Clover (20%)	11-17 lbs./ac		
Field Pea (20%)	65-100 lbs./ac	5/1-6/15, 7/15-9/1	½ to 1
Oats (30%)	30-60 lbs./ac		
Pearl Millet (20%)	22-28 lbs./ac		
Forage Turnips (15%)	1-5 lbs./ac		
Crimson Clover (15%)	11-17 lbs./ac		
Field Pea (30%)	65-100 lbs./ac	5/1-6/15, 7/15-9/1	½ to 1
Rapeseed/Canola (5%)	1-5 lbs./ac		
Crimson Clover (20%)	11-17 lbs./ac		
Oats (40%)	30-60 lbs./ac		
Sunflower (5%)	1-2 lbs./ac		

Reference: USDA-NRCS Wisconsin Agronomy Technical Note 7

Table 2

Species	Use [1]	N-Source	SoilBuilder	Erosion Fighter	Weed Fighter	Pest Fighter	N-Scavenger	Grazing	Quick Growth	Non-Fragile Residue	Pollinator	Deep Rooted
Alfalfa (Medicago sativa) [3]	C	4	3	3	3	1	2	3	3	1	3	4
Annual Ryegrass (Lolium multiflorum)	C	0	3	3	2	2	3	4	4	2	0	2
Barley, Spring (Hordeum vulgare)	C	0	3	3	3	1	3	3	3	4	0	2
Berseem Clover (Trifolium alexandrinum) [3]	C	4	2	2	2	1	1	4	2	1	3	1
Buckwheat (Fagopyrum esculentum)	C	0	2	3	3	1	3	1	4	0	4	4
Canola/Rapeseed (Brassica napus)	C	0	2	3	2	1	3	4	4	1	3	3
Cereal Rye, Winter (Secale cereale)	C	0	4	4	4	3	4	4	4	4	0	3
Chicory (Cichorium intybus)	E	0	2	2	2	0	2	3	2	1	2	3
Cowpea (Vigna unguiculata)	C	3	2	2	2	0	2	3	3	1	2	1
Crimson Clover (Trifolium incarnatum)	E	3	2	3	2	1	2	4	3	1	4	2
Field Pea (Pisum satuvum)	C	2	2	2	1	1	1	2	3	1	2	2
Forage Turnips (Brassica rapa)	C	0	1	3	2	0	3	4	3	1	1	1
Forage/Oilseed Radish (Raphanus sativus)	E	0	2	3	2	1	4	3	3	1	3	3
Hairy Vetch (Vicia villosa)	C	4	2	2	3	2	1	0	2	1	2	4
Japanese Millet (Echinochloa frumentacea)	C	0	3	3	3	3	3	3	4	4	1	3
Oats (Avena sativa)	C	0	3	3	3	2	3	4	4	2	0	2
Peas, Winter (Pisum sativum subsp. arvense)	C	2	2	2	1	1	1	2	3	1	2	2
Pearl Millet (Pennisetum glaucum)	C	0	3	3	4	2	3	4	4	4	1	2
Red Clover (Trifolium pratense)3	C	4	3	3	3	1	2	4	3	2	4	3
Sorghum-Sundangrass (Sorghum bicolor x S. bicolor var. Sudanese)	C	0	4	4	4	2	4	4	4	4	2	3
Sunangrass (Sorghum biclor)	C	0	4	3	4	3	4	4	4	4	2	3
Sunflower (Helianthus annuus)	E	0	2	2	2	1	3	1	3	3	3	4
Triticale, Winter (Triticum x Secale)	C	0	3	3	3	2	3	4	3	4	0	2
Wheat, Spring/Winter (Triticum aestivum)	C	0	3	3	3	2	3	4	3	4	0	2
White Clover (Trifolium repens) [3]	C	2	2	1	1	2	3	3	3	3	2	0

[1] Use: C=Common Use – Considerable state knowledge regarding species use.
E=Emerging Use – Limited state knowledge regarding species use.

[2] Attribute Ratings: 0=Poor, 1=Fair, 2=Good, 3=Very Good, 4=Excellent

[3] Legumes such as alfalfa and red clover may cause bloating of ruminant animals. Take necessary precautions to prevent bloat when grazing cover crops that contain these legumes.

Reference: USDA-NRCS Wisconsin Agronomy Technical Note 7

PRACTICE: CRITICAL AREA PLANTING

Definition: Critical Area Planting is the establishment of permanent vegetation on sites that have or are expected to have high erosion rates, and on sites that have physical, chemical, or biological conditions that prevent the establishment of vegetation with normal practices.

Planning: Plans and specifications should be prepared for each site according to planning criteria. Plans for the establishment of Critical Area Planting shall include:

Parameters:	Establishment Guidelines:
Field Location and Acres	Map all locations with exact acres to be planted
Species of Plants to be established	Cool or Warm Season Grasses
Seeding Rates (Drilled)	Varies depending on type of grass planted
Seeding Dates	Ranges from April 15th to November 1st
Establishment Procedure	Drill

Implementation and verification:

- Sites may require ongoing periodic maintenance consisting of mowing, burning, or herbicide treatment.
- Minimize activities which disturb wildlife during the primary nesting season May 15 through August 1.
- Consider planting native vegetation and/or local genotypes when restoring riparian corridors to its pre-settlement conditions.
- Sites should be inspected periodically to ensure site stabilization objectives are being met.

Potential Benefits	
Soil Erosion	4
Soil Quality	3
Water Quality	4
Air Quality	2
Fish and Wildlife	4

1= Poor, 2= Fair, 3= Good, 4= Very Good, 5= Excellent

Reference: USDA-NRCS

For more information, visit https://efotg.sc.egov.usda.gov/

PRACTICE: FILTER STRIP

Definition: A strip or area of herbaceous vegetation that removes contaminates from overland flow. Filter strips differ from grassed waterways in that filter strips usually are adjacent to stream or creek banks and they do not have parabolic shapes as grassed waterways.

Planning: Plans and specifications should be prepared for each site according to planning criteria. Plans for the establishment of filter strips shall include:

Parameters:	Establishment Guidelines:
Field Location and Acres	Map all locations with exact acres of filter strip
Layout, Design	Properly lay out stakes and flags for construction. Design: such as length and width
Seed Species	Perennial herbaceous
Seeding Rates (Drilled)	Varies depending on type of grass planted
Seeding Dates	Ranges from April 15th to November 1st
Establishment Procedure	Drill

Implementation and verification:

- Control weeds during first year of establishment. Mow weeds as often as needed to avoid weeds from flowering. Remove clippings to avoid smothering the cover.
- Control the establishment and spread of noxious weeds and other invasive species.
- Re-grade the filter strip area when sediment deposition jeopardizes its function.
- Filter strip should be inspected periodically to ensure site stabilization objectives are being met.

Potential Benefits	
Soil Erosion	1
Soil Quality	5
Water Quality	4
Air Quality	2
Fish and Wildlife	3

1= Poor, 2= Fair, 3= Good, 4= Very Good, 5= Excellent

Reference: USDA-NRCS, For more information, visit https://efotg.sc.egov.usda.gov/

PRACTICE: GRASSED WATERWAY

Definition: A grassed waterway is a shaped or graded channel that is established with suitable vegetation to convey surface water at a non-erosive velocity using a broad and shallow cross section to a stable outlet.

Planning: Plans and specifications should be prepared for each site according to planning criteria. Plans for the establishment of a grassed waterway shall include:

Parameters:	Establishment Guidelines:
Field Location and Acres	Map all locations with exact acres of grassed waterway
Layout, Survey and Design	Properly lay out stakes, flags and survey for construction. Design Waterway per NRCS Standards and Specifications.
Seed Species	Turf Type Fescue and a type of fast growing cover
Seeding Rates (Drilled)	Varies depending on type of grass planted
Seeding Dates	Ranges from April 15th to November 1st
Establishment Procedure	Drill

Implementation and verification:

- Construct waterway per NRCS Standards and Specifications and verify seeding and other erosion control measures are installed.
- Grassed waterway should be mowed once per year, after August 1st, to not disturb bird nesting season.
- Once grassed waterway is constructed, re-survey to make sure it was constructed per design.
- Grassed waterway should be inspected periodically to ensure site stabilization objectives are being met.

Potential Benefits	
Soil Erosion	5
Soil Quality	2
Water Quality	3
Air Quality	1
Fish and Wildlife	3

1= Poor, 2= Fair, 3= Good, 4= Very Good, 5= Excellent

Reference: USDA-NRCS, For more information, visit https://efotg.sc.egov.usda.gov/

PRACTICE: MULCH TILL

Definition: Mulch till is managing the amount, orientation, and distribution of crop and other plant residue on the soil surface year round while limiting the soil-disturbing activities used to grow crops in systems where the entire field surface is tilled prior to planting.

Planning: Plans and specifications should be prepared for each site according to planning criteria. Plans for implementing mulch till shall include:

Parameters:	Establishment Guidelines:
Field Location and Acres	Map all locations with exact acres
Tillage Practices	Chisels, Sweeps, Harrows, etc.

Implementation and verification:

- Residues shall be uniformly distributed over the entire field.
- Residue shall not be burned.
- Planned residue levels will be maintained from harvest until after planting.
- Verify practice after primary crop is planted in spring.

Potential Benefits	
Soil Erosion	3
Soil Quality	2
Water Quality	2
Air Quality	3
Fish and Wildlife	2

1= Poor, 2= Fair, 3= Good, 4= Very Good, 5= Excellent

Reference: USDA-NRCS

For more information, visit https://efotg.sc.egov.usda.gov/

PRACTICE: NO TILL

Definition: No till is managing the amount, orientation, and distribution of crop and other plant residue on the soil surface year round while limiting soil-disturbing activities to only those necessary to place nutrients, condition residue, and plant crops.

Planning: Plans and specifications should be prepared for each site according to planning criteria. Plans for the implementation of no till shall include:

Parameters:	Establishment Guidelines:
Field Location and Acres	Map all locations with exact acres to be planted
Tillage practice prior	Mulboard, Chisel, Strip, etc.

Implementation and verification:

- All residues shall be uniformly distributed over the entire field and planned residue levels maintained from harvest until after planting.
- Residue shall not be burned or removed.
- Soil loss and soil particulate reductions will be met by maintaining the necessary amount and orientation of crop residue, by managing the amount of soil disturbance, and by implementing additional conservation practices as necessary to address the identified resource concerns.

Potential Benefits	
Soil Erosion	4
Soil Quality	2
Water Quality	3
Air Quality	3
Fish and Wildlife	2

1= Poor, 2= Fair, 3= Good, 4= Very Good, 5= Excellent

Reference: USDA-NRCS

For more information, visit https://efotg.sc.egov.usda.gov/

PRACTICE: NUTRIENT MANAGEMENT

Definition: Nutrient management is a component of sustainable crop production systems, but to minimize the risk of agricultural non-point source pollution of surface and ground water resources, fertilizers must be applied in a correct manner. The "4R" nutrient stewardship principles depend on field- and site-specific characteristics, such as soil, cropping system, management techniques, and climate.

Planning: Plans and specifications should be prepared for each site according to planning criteria. Plans for the implementation of nutrient management include:

Parameters:	Establishment Guidelines:
Right Source	Ensure a balanced supply of essential nutrients, considering both natural available sources and the characteristics of specific products, in plant available forms.
Right Rate	Assess and make decisions based on soil nutrient supply and plant demand.
Right Time	Assess and make decisions based on the dynamics of crop uptake, soil supply nutrient loss risks and field operation logistics.
Right Place	Address root-soil dynamics and nutrient movement and manage spatial variability within the field to meet site specific crop needs and limit potential losses from field.

Implementation and verification:

- Manure always should be spread on fields uniformly and at the planned rates.
- Crop nutrient uptake is most efficient if manure is spread as close as possible to the time when plants will use the nutrients. The longer the manure is in the soil before the crops take up the nutrients, the more susceptible those nutrients will be to loss.
- Incorporation of manure into the soil as soon as possible after it is spread results in the greatest nutrient availability to crops and reduces nutrient losses, pollution, and odor. One-half inch of soaking rainfall without significant runoff is comparable to incorporation of surface-applied manure.

Potential Benefits	
Soil Erosion	1
Soil Quality	2
Water Quality	4
Air Quality	4
Fish and Wildlife	2

1= Poor, 2= Fair, 3= Good, 4= Very Good, 5= Excellent

Reference: USDA-NRCS/NutirnetStewardship.com

For more information, visit https://efotg.sc.egov.usda.gov/

PRACTICE: STREAMBANK PROTECTION

Definition: Stream bank Protection is used to stabilize and protect eroding banks of streams or constructed channels, and shorelines of lakes, reservoirs, or estuaries.

Planning: Plans and specifications should be prepared for each sit according to planning criteria. Plans for the establishment of a stream bank protection shall include:

Parameters:	Establishment Guidelines:
Field Location	Map all locations
Layout, Survey and Design	Properly lay out stakes, flags and survey for construction. Design project per NRCS Standards and Specifications.
Seed and tree Species	Will vary depending on what type or vegetation chosen
Seeding Rates	Varies depending on type of vegetation chosen
Seeding Dates	Ranges from April 15th to November 1st
Establishment Procedure	Depends on vegetation chosen

Implementation and verification:

- Since each reach of a channel, lake, or estuary is unique, measures for streambank and shoreline protection must be installed according to a plan and adapted to the specific site.
- Minimum clearing shall be performed to accomplish the project. Existing vegetation shall be preserved as much as possible.
- Excavated material shall not be placed in wetlands, water bodies, or other areas or habitats requiring avoidance, and shall be stabilized to prevent erosion.
- Practice should be inspected before, during and after construction. Periodic site visits should be conducted to make sure practice is working as designed.

Potential Benefits	
Soil Erosion	4
Soil Quality	1
Water Quality	2
Air Quality	1
Fish and Wildlife	3

1= Poor, 2= Fair, 3= Good, 4= Very Good, 5= Excellent

Reference: USDA-NRCS, For more information, visit https://efotg.sc.egov.usda.gov/

APPENDIX F: Funding Opportunities Available for Best Management Practices in the Green Lake Watershed, WI

EPA 319 Watershed Grants

In Wisconsin, these monies are split into several different grant opportunities managed by Wisconsin Department of Natural Resources (WIDNR):

Targeted Runoff Management Grant Program

The Targeted Runoff Management (TRM) Grant Program offers competitive grants for local governments for controlling nonpoint source (NPS) pollution. Grants reimburse costs for agriculture or urban runoff management practices in targeted, critical geographic areas with surface water or groundwater quality concerns. Application Deadline: April 15th, 2016. All projects accepted will start on January 1st, 2017. Please review http://dnr.wi.gov/Aid/TargetedRunoff.html for more details.

Surface Water Grants

Includes: Lake Management Planning, Lake Protection & Classification, River Protection, River Planning and Aquatic Invasive Species Control. Application deadlines vary. Please review http://dnr.wi.gov/Aid/SurfaceWater.html for more details.

Urban Nonpoint Source & Storm Water Management Grant Program

The Urban Nonpoint Source & Storm Water (UNPS&SW) Management Grant Program offers competitive grants to local governments. Grants reimburse costs of planning or construction projects controlling urban nonpoint source and storm water runoff pollution. Eligible areas are urban lands with population density of at least 1,000 people per square mile or non-permitted commercial or municipally-owned industrial use. Projects may be in areas that are expected to become urban within 20 years. Application Deadline: April 15th, 2016. All projects accepted will start on January 1st, 2017. Please review http://dnr.wi.gov/Aid/UrbanNonpoint.html for more details.

USDA-NRCS Farm Bill Programs

a. Environmental Quality Incentives Program
b. Wildlife Habitat Incentives Program
c. Wetland Reserve Program
d. Conservation Reserve Program
e. Conservation Reserve Enhancement Program
f. Conservation Security Program
g. National Water Quality Initiative

Please review: http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/farmbill/ for more details. All programs above have different rules and regulations along with deadlines for applications.

USDA-NRCS Conservation Innovation Grants (CIG)

NRCS provides funding opportunities for agriculturalists and others through various programs. Conservation Innovation Grants (CIG) is a voluntary program intended to stimulate the development and adoption of innovative conservation approaches and technologies while leveraging Federal investment in environmental enhancement and protection, in conjunction with agricultural production. Under CIG, Environmental Quality Incentives Program funds are used to award competitive grants to non-Federal governmental or nongovernmental organizations, Tribes, or individuals. Please review: http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/cig/ for more information.

Regional Conservation Partnership Program (RCPP)

The Regional Conservation Partnership Program (RCPP) promotes coordination between NRCS and its partners to deliver conservation assistance to producers and landowners. NRCS provides assistance to producers through partnership agreements and through program contracts or easement agreements. RCPP combines the authorities of four former conservation programs – the Agricultural Water Enhancement Program, the Chesapeake Bay Watershed Program, the Cooperative Conservation Partnership Initiative and the Great Lakes Basin Program. Assistance is delivered in accordance with the rules of EQIP, CSP, ACEP and HFRP; and in certain areas the Watershed Operations and Flood Prevention Program. Please review http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/farmbill/rcpp/ for more information.

Great Lakes Restoration Initiative (GLRI)

The Great Lakes Restoration Initiative accelerates efforts to protect and restore the largest system of fresh surface water in the world — the Great Lakes. The four main initiatives are: Cleaning up Great Lakes areas of concern, preventing and controlling invasive species, reducing nutrient runoff that contributes to harmful/nuisance algal blooms and restoring habitat to protect native species. Please review: http://greatlakesrestoration.us/ for more information.

Fund for Lake Michigan

The mission of the Fund for Lake Michigan is to support efforts, and in particular those in southeastern Wisconsin, that enhance the health of Lake Michigan and its shoreline and tributary river systems for the benefit of the people, plants and animals that depend upon the system for water, recreation and commerce. Please review: http://www.fundforlakemichigan.org/ for more information.

APPENDIX G: Case Studies

The following case study are good example of coalitions, partnerships, and projects that successful utilize frameworks to improve water quality and enhance our ecosystems. We recommend that the Green Lake Association review these programs to aid in implementing the GLASP outline.

Coalition to Support Iowa Farmers (CSIF) (IA):

The CSIF is a coalition that helps farmers raise livestock successful and responsibly manage changes to their livestock farms. Founded in 2004, their mission is to advocate and to help implement best management practices that support Iowa's farms in raising livestock responsible and successfully. The CSIF achieves their mission by help farmers navigate state and federal legislations, provide building site analysis, consulting on safeguarding the environment, and enhancing neighbor relations. For more information, visit http://www.supportfarmers.com/ .

Wilmette Partnership, Rogue River Project (OR):

The Wilmette Partnership is an organization that helps build resilience in both natural ecosystems and in their surrounding communities. The partnership relies on contributions from a diverse coalition of partners from the fields of conservation, business, government, agriculture, and science.

In 2010, the Wilmette Partnership worked with the City of Munford to address thermal pollution in the Rogue River. To address this issue, they helped build a program for the city to meet water quality need by investing in restoration projects that shade the river. The Willamette Partnership adapted its Ecosystem Credit Accounting System to translate the environmental benefit of riparian forest restoration into term that meet the city's water quality obligations. To achieve this, the brought together city staff, private landowners, restoration professional, and conservation organizations. The Fresh water trust works with landowners, nurseries and other contractors to design and install restoration project, which are then sold to the City's waste water facility to meet their regulations

Great Miami River Watershed Water Quality Credit Trading Program (OH):

The Great Miami River Watershed Water Quality Credit Trading Program was started in 2004 as a pilot to evaluate the viability of water quality credit trading as an approach to reduce nutrients in the Watershed. The pilot establishes a new sustainable local source of revenue for agricultural producers to implement conservation practices in cooperation with wastewater treatment plants. For more information, visit http://www.miamiconservancy.org/water/quality_credit.asp

Saginaw Bay Watershed Conservation Partnership (MI):

The Saginaw Bay Watershed Conservation Partnership has 35 partners and an NRCS offer of $10 million. Saginaw Bay, and embayment of Lake Huron, hosts the largest coastal wetland in Lake Huron and faces numerous water quality challenges, including loss of habitat, excessive nutrients and sediment, and algal blooms. This project will set ecologically relevant implementation goals, track progress using new online tools, and harness the influence of agribusiness as a complementary delivery mechanism in order to reach goals of treating 55,000 acres with conservation practices through EQIP and restoring 400 acres of wetlands through ACEP by 2019. The partners will track effectiveness using the Great Lakes Watershed Management System to quantify acres implemented and total sediment and nutrients reduced annually while also working with project partners to monitor long-term trends in fish community health. For more information, visit www.nature.org.

Delmarva Whole System Conservation Partnership (MD):

The Delmarva Whole System Conservation Partnership worked in the Chesapeake Bay to bring more than $10 million of funding and 30 partners to help farmers implement conservation practices that improve water quality and wildlife habitat while supporting farm operations. The project will develop a unique public-private partnership in collaboration with the Delaware Maryland Agribusiness Association and will target conservation practices where they will achieve the greatest outcomes by improving fertilizer efficiency and reducing excess nitrogen, phosphorus, and sediment flowing into the Chesapeake Bay. Targeted wetland restoration will also be used to trap pollution, provide flood storage, and create habitat for wildlife. For more information, visit (www.nature.org).