



# Butler Engineering, Inc.

Soil Testing • Engineering & Safety Consulting • Safety Training

Proposal: Lauderdale Lakes Country Club  
N7498 Country Club Dr.  
Elkhorn, WI 53121

We propose to design a replacement Conventional System for the Lauderdale Lakes Country Club house in full accordance with SPS 381 through SPS 384 as follows:

System design  
State of Wisconsin Review Application

Cost: \$ 2750

- Notes: 1) Design will be approved by the Wisconsin DSPS for installation for any Wisconsin Licensed Plumber.
- 2) Design Flow will be determined by State of Wisconsin code and related patronage data.
- 3) Proposal assumes that no kitchen-waste (food-preparation related) is produced by the facility. If such waste exists in the sewer stream, a separate grease-trap holding tank will be necessary in order to bring the system up to current code.

  
 \_\_\_\_\_  
 Harry Butler, P.E.  
 Butler Engineering Inc.

2/10/22  
 \_\_\_\_\_  
 Date

Accepted By: \_\_\_\_\_

\_\_\_\_\_  
 Date

**LIEN RIGHTS:**

As required by Wisconsin construction lien law, Contractor hereby notifies that persons or companies furnishing labor or materials for the construction on Owner's land may have lien rights on Owner's land and buildings if not paid. Those entitled to lien rights, in addition to the undersigned Builder, are those who contract directly with the Owner or those who give the owner notice within 60 days after they first furnish labor or materials for the construction. Accordingly, Owner probably will receive notices from those who furnish labor or materials for construction, and should give a copy of each notice received to his mortgage lender if any. Contractor agrees to cooperate with the Owner and his lender, if any, to see that all potential lien claimants are duly paid.

*Prepared for*

**Lauderdale Lakes Lake Management District**

N7511 Sterlingworth Drive  
Elkhorn, WI 53121

**Lauderdale Lakes Watershed Plan**

**Lauderdale Lakes  
Walworth County, WI**

*Prepared by*

**Geosyntec**   
consultants

engineers | scientists | innovators

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Project Number: MOW5336A

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## 1 INTRODUCTION

The Lauderdale Lakes Chain (Lauderdale Lakes) is a collection of three interconnected groundwater drainage lakes, Green, Middle and Mill Lakes, located in Walworth County, Wisconsin. These lakes are approximately 6.5 miles north of Elkhorn, Wisconsin and 9 miles southeast of Whitewater, Wisconsin. The Lauderdale Lakes are ground-water drainage lakes; that is, inflow is primarily from ground water and outflow is by a surface outlet. The lakes reside in the greater Upper Fox (IL, WI) watershed and more defined at the local level as residing in the headwaters of the Honey Creek watershed (HUC 0712000605). The drainage area of the lakes measured from the outlet is 16.1 square miles. The lake is classified as mesotrophic (USGS, 1996). An overview map of Lauderdale Lakes can be seen in Figure 1 below.

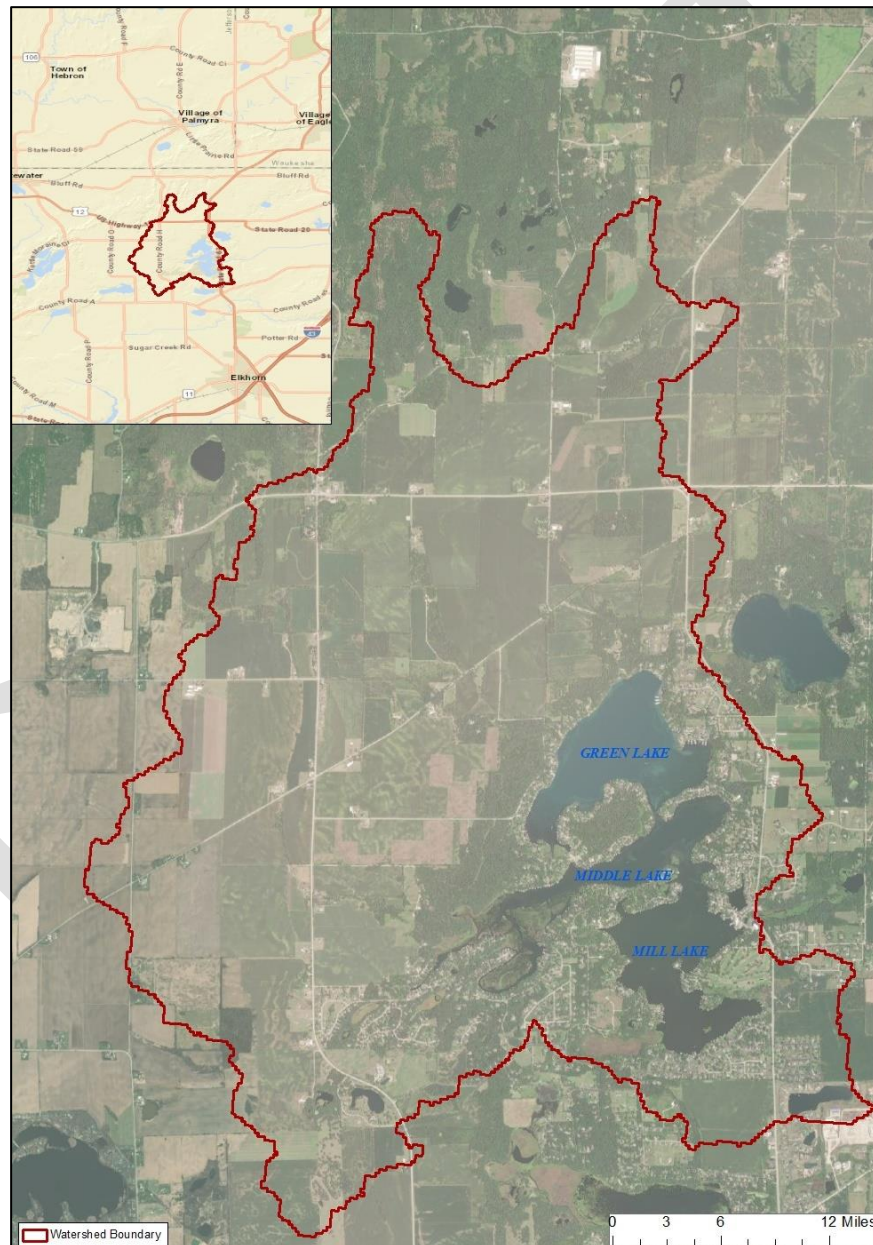


Figure 1. Lauderdale Location Map

## 1.1 Purpose of Report

Lauderdale Lakes is faced with a number of ongoing challenges tied to invasive species, infrastructure, stormwater runoff leading to both point and nonpoint pollution, and long-term planning. In 1991 the Lauderdale Lakes Lake Management District (LLLMD or “Management District”) was created with the primary purpose of protecting and rehabilitating Lauderdale Lakes. The lakes remain a highly sought recreational destination and the quality of the water protects property value and sustains a diverse fishery and is the host to several identified sensitive areas (WDNR, 1990, 2004).

As early as 1990, residents along the shoreline began expressing concerns about the lake chain water quality. While the Lauderdale Lakes Improvement Association (LLIA) has been conducting periodic lake monitoring since the late 1970s, heavy aquatic plant growth was occurring in 90s and approximately 565.6 tons (wet weight) of plant material was removed from the lakes, something that hadn’t been necessary since the 1950’s. As a result, the LLLMD understood the need for developing a nutrient reduction plan that would help limit the input of phosphorus into the lake. As a result, in 1993 the Management District worked with the U.S. Geological Survey (USGS) to develop a report that describes the water budget of the lakes, then lake water quality, major phosphorus loads and a phosphorus budget for the lakes.

In 1997 The Wisconsin Department of Natural Resources (WDNR) along with the Department of Agriculture, Trade and Consumer Protection (DATCP) partnered with Walworth County and a number of local stakeholders to draft the *Nonpoint Source Control Plan for the Sugar-Honey Creeks Priority Watershed Project Plan* under the Wisconsin Nonpoint Source Water Pollution Abatement Program. While this document provided framework for both the Sugar and Honey Creek watersheds at the time, the plan provided only limited context for Lauderdale Lakes and has become outdated as a planning tool and as a funding mechanism.

In 1998, with the assistance of a Lake Planning Grant from the DNR and technical assistance from Walworth County, LLLMD hired Hey and Associates to complete a surface runoff study to better identify nonpoint source issues and abatement projects. This resulted in the implementation of the most prioritized project identified in that study, a wetland treatment facility in the Gladhurst Subdivision which continues to serve the North watershed to Green Lake.

The LLLMD has realized they need to continue to move these initiatives forward with an updated plan and revisit how best to move forward. This report encompasses an updated watershed plan intended to be part of the WDNR Surface Water Grants program and build upon the previously mentioned studies.

This report will address 4 of the 9 key elements of a typical EPA 9 Element Watershed Based Plan (WBP) as negotiated with WDNR. The four key elements for a WBP to be addressed by this report include:

- An identification of the causes and sources or groups of similar sources that will need to be controlled to achieve the load reductions estimated in the watershed-based plan. Sources that need to be controlled are identified at the significant subcategory level with estimates of the extent to which they are present in the watershed.
- A description of the nonpoint source (NPS) pollution management measures that will need to be implemented to achieve the load reductions, and an identification of the critical areas in which those measures will be needed to implement in the plan.
- An estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon, to implement the plan.

- An information/education component that will be used to enhance public understanding of the project and encourage their early and continued participation in selecting, designing, and implementing the NPS management measures that will be implemented.

## 1.2 Background and Overview of Prior Studies

Previous studies have taken place within the Lauderdale Lakes watershed, several date back prior to 2000. Of these studies, two have provided a backdrop regarding existing watershed data and work completed. These studies and reports will serve as base information sources for updating initiatives:

1. Hydrology and Water Quality of Lauderdale Lakes, Walworth County, Wisconsin 1993-94 (USGS, 1996) – Herein referred to as “USGS Report”.
2. Surface Water Runoff Study for the Lauderdale Lakes Lake Management District (Hey and Associates, 1998) – Herein referred to as the “Hey and Associates Report”.

The USGS Report completed in 1996 provided context for various lake water quality parameters, specifically by identifying near lake septic systems and nearby surface water runoff as primary culprits and leading issues driving the phosphorus budget. This report detailed the phosphorus budget as 51% surface water runoff, 25% from septic systems, 13% from groundwater, and 11% from the atmosphere due to precipitation. Of the percentage of phosphorus from surface water runoff, 75% was identified as coming directly from sheet flow and private property with the remaining 25% coming from tributaries.

The Surface Water Runoff Study completed by Hey & Associates (1998) focused on water quality impacts from reviewing volumetric stormwater runoff loading on an annual basis. It was a focused study meant to follow up on the identified 51% of total phosphorus entering the lake via direct runoff and tributary flow. In addition, it provided a number of potential improvement best management practices (BMPs) that might be employed to help address these issues and successfully led to the implementation of the Gladhurst Subdivision wetland treatment facility. Per conversation with WDNR staff, updating these findings would be a preference for the State as part of any watershed planning effort.

## 2 EXISTING CONDITIONS ASSESMENT

The previous two studies assessed the lake chain using two different methods. The USGS Report was more empirically based and supported by water quality monitoring data taken from the lake chain. The Hey and Associates report used a window-based program Source Loading and Management Model (SLAMM) and Universal Soil Loss Equation (USLE). SLAMM is an urban nonpoint source water quality model that simulates the pollutant loading based on a specific rainfall file, event-based or annual rainfalls. SLAMM focuses on identifying specific pollutant and runoff control practices from developed urban areas – i.e., roofs, streets, parking areas, landscaped areas, etc.

Additionally, Hey and Associates used USLE to calculate total soil loss from agricultural fields. To enable a watershed analysis that assesses all of the existing land covers for the lake chain within one platform/model, a U.S. EPA Spreadsheet Tool for Estimating Pollutant Loads (STEPL) model was developed. This model utilizes standard USLE calculations but incorporates a larger array of land covers than SLAMM to quantify the phosphorus and TSS loading for the Lauderdale Lake Chain. As part of the updates, the tributary area was delineated for each lake (Mill Lake, Middle Lake, and Green Lake) to enable the LLMD to identify projects that best suit each lake. The delineation process also incorporated the direct runoff area the USGS report defined, and the revised tributary areas plus the delineated direct runoff areas were the basis for this analysis.

The watershed as delineation by USGS and the individual lakes watersheds as delineated as part of this study are shown in Figure 2. For the purpose of this study the USGS defined watershed serves as a boundary condition for the revised individual lake watersheds.

## 2.1 Pollutant Loading Analysis

### 2.1.1 STEPL Model Development

STEPL model version 4.4 was utilized to assess the phosphorus and TSS loading within the Lauderdale Lakes watershed. The STEPL spreadsheet model simulates annualized estimates of total runoff volume for nutrient and TSS loads based on the USLE, watershed characteristics (both default and user-specified), BMP implementation, and meteorology at a planning level scale. STEPL models are un-calibrated, and pollutant load estimates are based on event mean concentrations (EMC) for a given land use. The EMC is a flow weighted average based on a single runoff event, defined as the total pollution loading for a given land use divided by the respective total runoff volume. The runoff volume is based on the average rainfall depth per storm event and the land use's curve number (CN). Curve numbers are a characteristic developed by the USDA to estimate the range of runoff produced based on the drainage basins soils, plant cover, number of impervious areas, and land cover. The model results provide a planning-level tool to compare the potential relative reduction of pollutants between two alternatives. The reported values should not be used as absolute quantities.

### 2.1.2 Watershed Hydrology

Since previous reports were completed prior to 2000, the tributary area to the lakes was reassessed. Since the original reports have been published, new technologies have been developed that provide higher topographic resolution for these areas. Walworth County's 1-foot digital contour data was derived from 2015 Orthophotography multi-resolution seamless image database to conduct the existing condition watershed hydrology analysis. The tributary area for each Lake (Mill Lake, Middle Lake, and Green Lake) was delineated, which will allow the LLMD to identify projects that may best suit individual Lakes.

The Lauderdale Lakes watershed was delineated into drainage areas using desktop GIS to assess the watershed's hydrology. GIS has tools which can help automate watershed delineation by defining overland flow paths and drainage boundaries based on topographic data. Figure 3, located in Appendix A provides an overview of the calculated overland flow paths. Figure 4 (Appendix A) provides an overview of the individual drainage areas for Green, Middle, and Mill Lakes and a fourth drainage area that is not immediately tributary to the lake chain but was previously identified as tributary to the lakes in the USGS report. This area is north of the watershed tributary to Green Lake; however, the overland flow path has been determined to go north across Highway 12 based on the more recent, detailed topography. This area was not included as part of the Lauderdale Lakes watershed hydrology.

The results of the GIS analysis were further compared to the direct runoff area of the USGS Report. The USGS report acknowledges that portions of the topographically defined watershed area have closed depressional contours and regions that do not contribute runoff to the lakes. USGS delineated the direct runoff area based on field observations and quadrangle maps predating 1990. The direct runoff boundary was used to redefine the tributary areas developed during the GIS analysis and serve as the input boundary for the STEPL analysis. Figure 5 (Appendix A) shows a comparison between the GIS defined watershed and the USGS direct runoff area. Table 1 below shows a comparison of the direct runoff area (based on a digitized USGS map) and tributary area for Green, Middle, and Mill Lakes calculated in GIS.



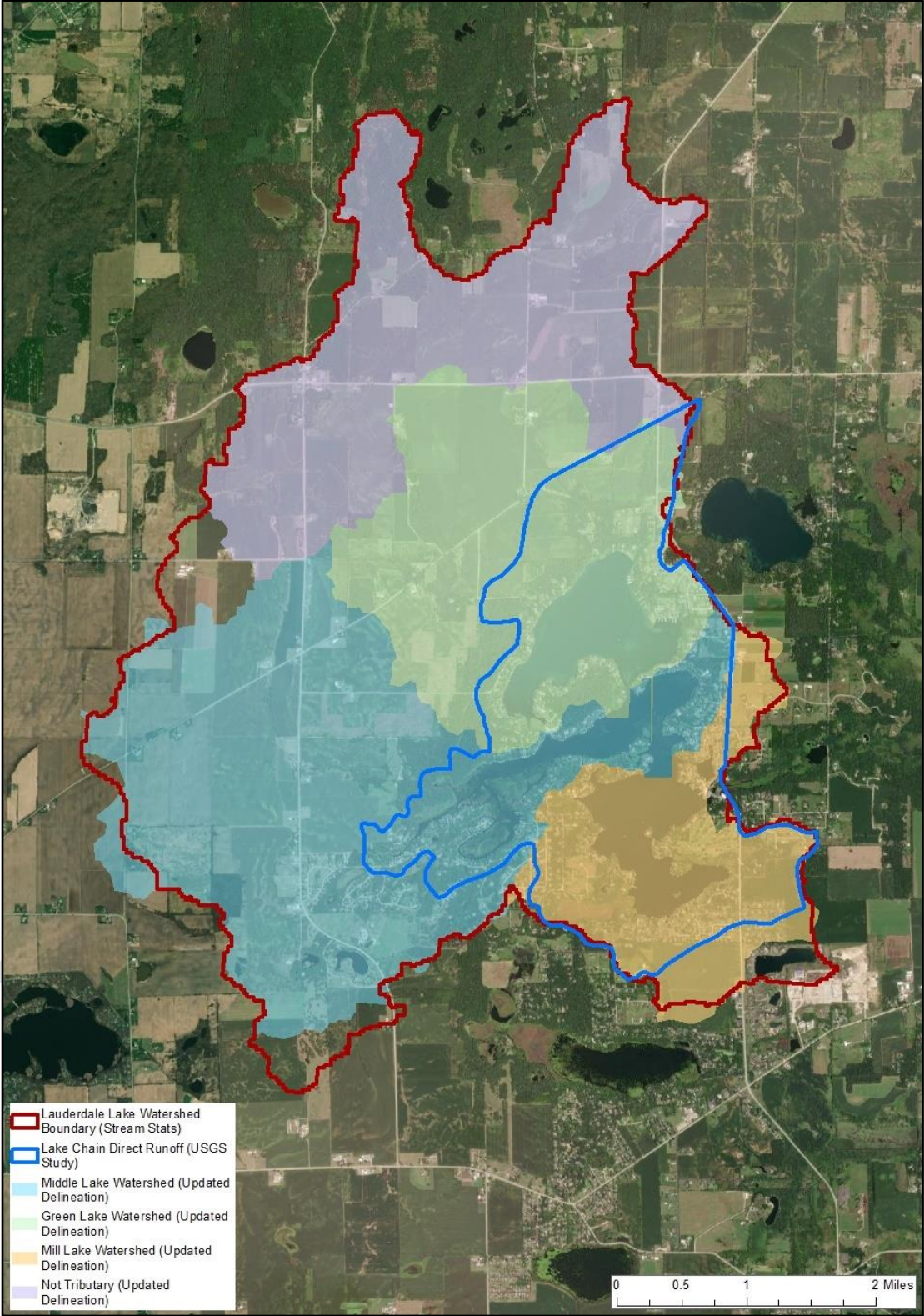


Figure 2. Existing Hydrology – Overview of watershed boundaries from different studies

**Table 1: Lauderdale Lake Direct Runoff Area and Tributary Area (See Figure 2)**

<b>Drainage Area</b>	<b>USGS Direct Runoff Area (ac)*</b>	<b>GIS Delineated Tributary Area (ac)**</b>
Green Lake	950	1149
Middle Lake	685	3053
Mill Lake	877	2010
Not Tributary	-	1963
<b>Total</b>	<b>2,512</b>	<b>8,175</b>

\*USGS Direct Runoff Area (Figure 2 – Blue Line): Area defined by 1992 USGS Study as providing direct runoff to the Lauderdale Lakes Chain. Areas represented above reflect the the 2022 individual lake watersheds (shaded areas) within the blue line only.

\*\*GIS Delineated Tributary Area (Figure 2 – Shaded Areas): Tributary areas recalculated as part of this current study (2022). Acreage shown represents entire watershed area (inside and outside of the USGS direct runoff area).

The GIS delineated watershed was ground-truthed during a Site visit in September 2021. The photolog is located in Appendix B. Based on the site visit, the overland flow routes generally appear correct. The acreage presented column 2 of Table 1 above reflects the individual watershed area for each lake bounded by the USGS delineated direct runoff area (blue line) and column 3 indicates the acreage for the ArcHydro delineated watersheds. These USGS direct runoff areas are used to analyze the ultimate loading determinations to the individual lakes. Figure 8 (Appendix A) provides a more definitive illustration of the individual watershed trimmed to the USGS study boundary.

### 2.1.3 Soils

Soils data for the watershed was extracted using the Web Soil Survey (WSS) application by USDA NRCS (USDA, 2019). The soils data was used to identify the type of soil and assign potential for runoff. The majority of the watershed consists of soils in hydrologic soil group B (87.1%) as shown on Figure 6 (Appendix A). Consistent with the Hey and Associates analysis, hydrologic soil group B was assumed for the STEPL analysis for the entire watershed. Table 2 provides a breakdown of the hydrologic soil groups within the direct runoff tributary area.

**Table 2: Direct Runoff Tributary Area Soil Summary**

<b>Hydrologic Soil Group or Soil Type</b>	<b>Total Area (ac)</b>
A	148
B	1,447
C	66
Water	809
Marsh	41
Gravel Pit	1
<b>Total</b>	<b>2,512</b>

#### 2.1.4 Watershed Land Cover

Land cover data was downloaded from the National Land Cover Database (NLCD, 2016), and an overview of the data for the surrounding area is shown on Figure 7 (Appendix A). Table 3 shows the breakdown of the land use in the watershed in fifteen (15) categories, and a spatial overview of the land cover is illustrated on Figure 8 (Appendix A).

**Table 3: Lauderdale Lake Chain Direct Runoff Land Cover, NLCD 2016**

Land Cover (NLCD 2016)	Combined Area (ac)	Percent Area
Open Water	811	32%
Developed, Open Space	262	10%
Developed, Low Intensity	153	6%
Developed, Medium Intensity	13	1%
Developed, High Intensity	1	0%
Barren Land	0	0%
Deciduous Forest	569	23%
Evergreen Forest	5	0%
Mixed Forest	58	2%
Shrub/Scrub	0	0%
Herbaceous	10	0%
Hay/Pasture	171	7%
Cultivated Crops	307	12%
Woody Wetlands	78	3%
Emergent Herbaceous Wetlands	74	3%
<b>Total</b>	<b>2,512</b>	<b>100%</b>

The land cover data were lumped into seven (7) categories to provide inputs for the STEPL model. The lumped land cover data for the watershed is presented in Table 4. Review of the land cover data shows that 12% of the watershed is cropland and 7% pasture. Various forest types cover an additional 25%. Suburban and commercial development cover 17% of the total watershed area. Wetlands cover 6% of the total watershed area. Other land use (open water and barren land) covers 32% of the total watershed area. The acreage for open water was not included in the watershed model as open water was assumed to not contribute to pollutant loading.

**Table 4: Lumped Land Cover**

Lumped Land Cover	Combined Area (ac)	Percent Area
Developed	167	7%
Developed Open Space	262	10%
Forest	632	25%
Pastureland	181	7%
Cropland	307	12%
Wetland	152	6%
Area Not included	811	32%
<b>Total</b>	<b>2,512</b>	<b>100%</b>

#### 2.1.5 Meteorology



For the watershed, the STEPL model uses meteorological data from the weather station located in Whitewater, Walworth County, Wisconsin.

### 2.1.6 Septic Systems

The USGS report identified septic systems as a key contributor to the phosphorus budget in the Lauderdale Lakes. Realizing this significance, the LLLMD developed a septic pump-out program that provides homeowners a free septic pumping on a 3-year rotational basis. While this is an excellent service to provide their constituents, the LLLMD also recognizes that there are more year-round residents than ever before, and home improvements/additions are typically made without consideration for impact to the capacity of the home's system. For this reason, we have included septic loading as part of the overall analysis.

STEPL models the nutrient load from human populations that use a septic system based on the number of septic tanks, the failure rate (percentage), and the ratio of people per septic system. As part of the analysis, the default values for failure rates (10%) was reduced to 2% with consideration of the pump out program. There are 974 septic systems around the lakes, with generally even distribution to each of the 3 lakes. The approximate loading is indicated in Table 6.

## 2.2 Baseline Loading from STEPL (Total Suspended Solids and Phosphorus)

Baseline unit loads (per unit acre per year) were estimated using the STEPL watershed model for each of the subwatersheds as described in the following sections. Total suspended solids and phosphorus are typically analyzed together due to phosphorus making up a small percentage of the suspended solids. For this plan, the STEPL nutrient loading analysis assumed 0.031% of soil is phosphorus. This is assumed to be a median value for the possible ranges of the respective land use represented.

### 2.2.1 Total Suspended Solids (TSS)

Major sources of TSS within the watershed include cultivated areas and highly impervious land uses such as roads and developed areas.

Yearly TSS unit loads simulated using the STEPL model are mapped on Figure 9 – enlargements for each Lake are shown on Figures 9A, 9B, and 9C (Appendix A). The STEPL TSS by land cover unit loads for Green, Middle, and Mill Lake are summarized in Table 5. It should be noted that the acreage as shown in Table 5 for the individual lakes matches the USGS watershed boundaries shown in Table 1.

**Table 5: Total Suspended Solids Loading by Land Cover\***

	<b>Green Lake - Total Area Model 622.51 ac</b>		<b>Middle Lake - Total Area Model 369.39 ac</b>		<b>Mill Lake - Total Area Model 555.58 ac</b>	
<b>Land Cover</b>	<b>Sediment Loading (lb/yr)</b>	<b>Sediment Loading (%)</b>	<b>Sediment Loading (lb/yr)</b>	<b>Sediment Loading (%)</b>	<b>Sediment Loading (lb/yr)</b>	<b>Sediment Loading (%)</b>
Urban	8,000	0.8%	6,000	4.1%	16,000	3.4%
Cropland	982,000	93.5%	84,000	57.5%	340,000	72.6%
Pastureland	40,000	3.8%	38,000	26.0%	100,000	21.4%
Forest	20,000	1.9%	18,000	12.3%	12,000	2.6%

Septic	0	0.0%	0	0.0%	0	0.0%
Total	1,050,000	-	146,000	-	468,000	-

\*Wetlands and Open Water are not included in loading calculations

### 2.2.2 Total Phosphorus

Total phosphorus (TP) serves as the primary nutrient source for aquatic plant species growth. Major sources of TP within the watershed include fertilizer lost from croplands, agricultural fields, on-site wastewater systems (septic), urban runoff, and animal agriculture.

Yearly TP unit loads simulated using the STEPL model are mapped on Figure 10 – enlargements for each Lake are shown on Figures 10A, 10B, and 10C (Appendix A). The STEPL TP unit loads by land cover for Green, Middle and Mill Lake are summarized in Table 6. Subwatersheds with maximum loading for TP typically have pastureland and cropland as their dominant land cover.

**Table 6: STEPL Total Phosphorus Loading by Land Cover\***

	Green Lake - Total Area Model 622.51 ac		Middle Lake - Total Area Model 369.39 ac		Mill Lake - Total Area Model 555.58 ac	
Land Cover	Phosphorus Loading (lb/yr)	Phosphorus Loading (%)	Phosphorus Loading (lb/yr)	Phosphorus Loading (%)	Phosphorus Loading (lb/yr)	Phosphorus Loading (%)
Urban	25	3.00%	19	10.1%	47	10.0%
Cropland	675	80.94%	57	30.3%	234	49.8%
Pastureland	33	3.96%	32	17.0%	85	18.1%
Forest	26	3.12%	22	11.7%	16	3.4%
Septic	75	8.99%	58	30.9%	88	18.7%
Total	834	-	188	-	470	-

\*Wetlands and Open Water are not included in loading calculations

## 2.3 Bulk Loading

Bulk loading analysis was also completed to obtain a perspective of the annual volume of sediment transported to the Lakes. Based on the general soil conditions of the watershed, the bulk loading analysis assumed a hydrologic soil group B, silt loam. The Minnesota Pollution Control Agency Stormwater Manual indicates the bulk density values for silt loam range from 1.2 to 1.5. A bulk density of 1.35 was therefore assumed to calculate the volume of TSS that could potentially be lost into the Lake Chain annually. The volume can either be used to size sediment basins/sediment traps designed to capture TSS before entering the Lake Chain or develop a dredging plan that identifies the frequency and volume of sediment that would need to be removed.

For the analyzed watershed, a total sediment load of 832 tons/year would result in approximately 731 cubic yards (CY) of sediment being eroded into the lakes per year. Individual lakes volumes would be smaller. Table 8 provides an overview of the loading for Lauderdale Lake Chain and each Lake. Middle Lake has the smallest loading, 64 CY/yr, while Green Lake has the largest loading, 461 CY/yr.

**Table 8: Bulk Loading**

<b>Drainage Area</b>	<b>TSS Loading (tons/yr)</b>	<b>TSS Loading (CY/yr)</b>
Lauderdale Lake Chain	832	731
Mill Lake	234	206
Middle Lake	73	64
Green Lake	525	461

## 2.4 Wave Analysis

A wave analysis was completed using Wisconsin DNRs wave height calculator. As part of this study, areas exposed to maximum wave heights were reviewed. The four maximum wave height potential locations are presented in Figure 12 (Appendix A). The wave heights are presented in Table 9. The areas graphically indicated should warrant occasional inspection if in a natural state. Furthermore any bulkheads should be regularly inspected to ensure they are working as intended. Bulkhead repairs can take a considerable time to repair and permit if a remedy is required. Natural solutions are always preferred as they provide habitat to fish and aquatic invertebrates.

The objective of the wave analysis was to identify shorelines with maximum wave energy and recommend shoreline restoration, stabilization or enhancement. The wave heights should not be confused with boat generated wake height.

**Table 9: Maximum Wave Height Potential**

<b>Maximum Wave Height Potential Location</b>	<b>Maximum Wave Height (ft)</b>
Green Lake	1.1
Middle Lake	1.2
Mill Lake	0.92
Don Jean Bay	0.92

As part of the Southeastern Wisconsin Regional Planning Commission's (SEWRPC) 2010 Aquatic Plant Management Plan for Lauderdale Lakes, a shorelines inventory was developed to identify the shoreline's protection techniques and condition. Techniques include; beach, bulkhead, natural, revetment, and riprap. It is worth noting, the report indicates no severe erosion-related problems were observed during the inventory in 2008. The information provided was not available electronically and was therefore digitized to be used in GIS for this plan. For this reason, some ground truthing may be necessary to validate the presented data. Figure 11 (Appendix A) provides an overview on where the different shoreline techniques exist, and Table 10 breaks down the total length of each technique for the three lakes.

While the wave height analysis was primarily focused on shoreline protection it also brings to light the concern over shoreline encroachment due to man induced wakes. Of growing concern to the LLLMD and shoreline property owners is the need to understand the impact of artificial waves and recreational boating on shorelines, including the numerous islands that exist within the Lauderdale Lakes Chain. Islands, both inhabited and uninhabited, along with shallow mid lake environments provide unique habitat opportunities for fish, plants, aquatic invertebrates, and birds. For the purpose of this watershed plan, lake islands are included in the overarching goals of the LLLMD to protect and restore the shorelines of the lakes. During watershed planning meetings, stakeholders had expressed concern over areas of the lakes subject to shoreline erosion not consistent with modeled wave impact locations. These areas could very well be the result of wake induced erosion.

**Table 10: Summary of Southeastern Wisconsin Regional Planning Commission Shoreline Protection Structures**

Lake	Beach - ft (% of total shoreline)	Bulkhead - ft (% of total shoreline)	Natural - ft (% of total shoreline)	Revetment - ft (% of total shoreline)	Riprap - ft (% of total shoreline)	Total Shoreline-ft
Green	1,937 (6.34)	6,407 (20.96)	10,451 (34.19)	112 (0.37)	11,665 (38.16)	30,573
Middle	698 (2.15)	4,959 (15.27)	16,362 (50.39)	60 (0.19)	10,391 (32.00)	32,470
Mill	1,052 (4.67)	6,166 (27.35)	7,101 (31.50)	58 (0.26)	8,166 (36.22)	22,543

## 2.5 Local Drainage

One component of the watershed plan that may not be directly reflected in watershed plan are local drainage hotspots. The STEPL model incorporates land use to reflect the impact of impervious cover land uses from development, however aging local infrastructure and unmaintained drainage are not included. These aspects which are impacted due to stormwater events are impacted on a storm by storm basis. STEPL does not acknowledge extreme event impacts but rather an estimated average trendline. Therefore local drainage will need to be reviewed and addressed for contributing impact on a case by case basis.

## 3 PROPOSED ALTERNATIVES

### 3.1 Summary of Recommended Projects from Previous Studies

Below is a summary of the recommended remedial alternative actions developed from the Hey and Associates Report. This list is presented as a reminder of what was previously recommended and additional identified opportunities based on the updated watershed review in Section 3.2. Several of these were modified to some degree to make them more pertinent to today, particularly Alternative 9 which was converted to an overall education process.

- Alternative 1 – Do Nothing
- Alternative 2 – Detention/Wetland Treatment
- Alternative 3 – Conservation Cover
- Alternative 4 – Residue Management
- Alternative 5 – Contour Farming/Contour Strips

- Alternative 6 – Grassed Waterway
- Alternative 7 – Conservation Easements
- Alternative 8 – Lake Buffer Strips
- Alternative 9 – Public Education on Lawn Care
- Alternative 10 – Development Controls

These remedial alternatives would have varying degrees of effectiveness and ease of implementation, with a wide range of capital and long-term operation and maintenance (O&M) costs. However, at a minimum, these remedial alternatives were developed to mitigate current and future phosphorus loadings into the Lauderdale Lakes Watershed. Remedial alternatives for the Site are presented in subsequent subsections.

### 3.1.1 Alternative 1 – Do Nothing

Alternative 1 is to do nothing. Under this approach sediment and nutrient inputs into the lakes will remain the same, sediments will continue to build up, and nutrients washed in from runoff will continue to feed algae and nuisance aquatic vegetation.

### 3.1.2 Alternative 2 – Detention/Wetland Treatment

Alternative 2 involves construction of a wet detention basin or wetland treatment system to remove sediment and nutrients. Ideally the system would be sized to treat the tributary watershed for a % effectiveness.

### 3.1.3 Alternative 3 – Conservation Cover

This alternative entails placing all agricultural land in conservation cover, meaning that all agricultural land is retired from production and a perennial vegetative cover is maintained over the soil.

### 3.1.4 Alternative 4 – Residue Management

Residue management is managing the amount, orientation and distribution of crop and other plant residues on the soil surface year-round, while growing crops in narrow slots or tilled strips in previously untilled soil and residue.

### 3.1.5 Alternative 5 – Contour Farming/Contour Strips

Contour farming is sloping the land in such a way that preparing land, planting, and cultivating are done on the contours. Contour strips are narrow strips of perennial, herbaceous vegetative cover established across the slope and alternated down the slope with wider cropped strips.

### 3.1.6 Alternative 6 – Grassed Waterway

A grassed waterway is a wide, shallow, sod lined channel designed to safely convey water during heavy rainfall. Grassed waterways are used to prevent the formation of gullies. Gully erosion is not estimated by the Universal Soil Loss Equation (USLE). Therefore, the exact sediment and phosphorus reductions by implementing this management practice are unknown. To protect the grass waterway from high flows during heavy rains, a detention basin is recommended to be constructed at the upstream area.

### 3.1.7 Alternative 7 – Conservation Easements

Just upstream of Green Lake, a tributary channel drains through a steep wooded ravine. The ravine is located within a residential development, known as the Gladhurst subdivision and runs along several lots. The ravine is located in a very steep forested area where erosion was identified. A 20-foot drainage easement currently exists on some of the lots. If the easement was encroached upon and the trees were cut down it could make the banks very unstable and susceptible to erosion. To protect the ravine a conservation easement should be acquired on all of the steep slope areas. It is possible a conservation easement does exist in this instance; however, this serves as an example of where such an easement is practical and necessary. The following is a list of activities that should be prohibited in the easement:

- Removal of any vegetation, including trees and shrubs.
- Runoff from driveways, roofs, and patios should not be drained into the ravine, except through a engineered waterway or pipe to prevent gully erosion.
- The stream channel should not be relocated. The channel has stabilized itself through years of self-armorment. Disturbance of the channel could damage the natural protection features and cause severe erosion.

### 3.1.8 Alternative 8 – Lake Buffer Strips

Lake buffer strips are grassed areas along the lake that are allowed to be left un-mowed. The strip of taller grass has the ability to absorb more nutrients than mowed turf and allows the grass to establish a deeper root system, decreasing shore erosion. For the purpose of this alternative, the vegetation is assumed to be native to the State of Wisconsin.

### 3.1.9 Alternative 9 – Public Education on Lawn Care

An education program focused on lawn care was recommended as part of the Hey and Associates 1998 report which hinged largely on fertilizer recommendations. While still important, some of the recommendations are now secondary as a ban on phosphorus-based fertilizers are now statewide and even farmers are required to perform testing indicating that phosphorus is necessary prior to obtaining approval to use as a soil additive.

In an effort to continually provide educational opportunity to stakeholders, the LLLMD has provided an open forum for watershed residents to fully participate in the watershed planning process. The LLLMD hosted four (4) meetings during the watershed planning process. Due to the pandemic, the meetings were all held virtually. The meetings held are recognized below:

1. Kickoff Meeting (6/30/2021): Provided participants with a snapshot of the watershed planning process, anticipated future meetings and topics, and the need for watershed planning and the purpose of the LLLMD.
2. Background Data Review (8/31/2021): The meeting reviewed the previous studies and background assessment performed to look at baseline loading to the lake from the watershed. The information introduced the stakeholders to management actions and the impact of development and land use on the lakes.
3. Project Implementation (10/26/2021): During this meeting attendees were introduced to beneficial land use practices and management actions which can mitigate existing land use impacts and current ongoing lake practices and proposed objection of the LLLMD.

4. Project Review, Summary, and Closeout (12/14/2021): The closeout was used to provide attendees a recap of the process, provide resources to the watershed plan and how they can participate in future actions undertaken by the LLLMD and other lake and watershed partners.

All presentations have been provided in Appendix D. The LLLMD is also hosting the presentations on the District’s website. Meetings 2-4 were recorded and are also hosted on the District’s website.

### 3.1.10 Alternative 10 – Development Controls

While conversion of the agricultural area to residential land use should reduce the amount of sediment and phosphorus entering the lake, other pollutants associated with urban development may increase. Petroleum hydrocarbons, heavy metal, and fecal coliforms are examples of pollutants that may increase without adequate stormwater controls. A stormwater management system that addresses water quality should be installed with any proposed development. If the area is developed as low density residential on large lots, the stormwater system should include grassed waterways and infiltration systems. If a clustered development of higher density lots is developed, wet detention may need to be incorporated into the design. The LLLMD should work with Walworth County and the Town of Sugar Creek/Town of LaGrange to assure that adequate stormwater controls are incorporated into the final design of any proposed development.

### 3.1.11 Summary of Hey and Associates Recommendations

Table 11 below highlights the Hey and Associates Report's specific recommendations and implementation schedule from the 1998 watershed study. At the time of this report, it was unclear whether the recommended activities had been implemented and their effectiveness at reducing TSS and phosphorus from entering the Lauderdale Lake Chain. It is known that the wet detention facility was installed within the Gladhurst subdivision. The LLLMD also reimburses a private land owner to keep a 0.55 acre filter strip undeveloped along the south end of Don Jean Bay which helps to filter runoff. Additional implementation projects from the plan are not known to have been completed.

**Table 11: Summary for Hey and Associates Recommendations**

<b>Recommendation</b>	<b>Schedule</b>
North Watershed	
Wet Detention Facility	Spring 1999
Grassed Waterway/detention basin	Spring 1999
Conservation easements	Fall 1998
Conservation tillage	Spring 1999
South Watershed	
Conservation tillage	Spring 1999
Zoning restriction and stormwater management requirements for new residential development	As development is proposed
Education program on lawn care	Spring 1998
Education program on the establishment of lake buffer strips	Summer 1998

The installation of the wet detention facility in the Gladhurst subdivision in 2001 was the first designed BMP to be implemented as part of the Hey and Associates study effort. The BMP is still in place and working as

intended. The LLLMD will continue to monitor the facility to determine its effectiveness in capturing pollutants.

## 3.2 Current Recommended BMP Selection

A BMP is defined as an environmental protection practice used to control pollutants. For the critical areas identified using the methodology described above, the BMPs assessed for implementation in the watershed are provided below in this section. Section 3.3 further considers the BMP recommendations identified in Figure 13. These recommendations are for specific locations where the BMPs mentioned below should be implemented. This section deviates from Section 3.1. It provides additional BMP measures to the LLLMD that are practical, economically feasible, and well suited to the layout of today's identified highly residential footprint.

### 3.2.1 Target Urban Road ROWs

BMPs such as bioswales, infiltration trenches, and vegetated swales are recommended for target road ROWs. These BMPs are designed to reduce the quantity and improve the quality of stormwater runoff from impervious surfaces in urban areas. These linear features can work well within a limited footprint, are easy to access for maintenance, typically disguise well in the ditchline, and have a relatively low to medium cost per lineal foot.

#### 3.2.1.1 Bioswales

Bioswales are vegetated, shallow, landscaped depressions designed to capture, treat, and infiltrate stormwater runoff as it moves downstream. These swales consist of a soil bed planted with suitable native vegetation. Stormwater runoff entering the bioretention system is filtered through the soil planting bed before being discharged downstream. These have the ability to function well in the watershed due to the natural permeability of the soils.

#### 3.2.1.2 Infiltration Trenches

An infiltration trench is a stormwater management practice that collects and stores runoff until it can infiltrate into the subsurface soil. Infiltration trenches typically are longer than they are wide, are less than 15 feet in width, and are intended to promote subsurface infiltration. Trenches are commonly filled with properly graded media that will promote infiltration and reduce pollutants discharged to surface waters, such as sediment, debris and nutrients. Infiltration trenches may be used as a detention feature in a stormwater management plan. Infiltration trenches also have the ability to be a well-suited match for the Lauderdale Lakes watershed.

#### 3.2.1.3 Vegetated Swales

Vegetated swales are constructed storm water conveyance systems designed to achieve water quality and quantity benefits. The purposes of this practice are to filter and trap pollutants, improve water quality, attenuate peak flow, and/or promote infiltration while limiting groundwater contamination. Vegetated swales are also cheaper to construct and maintain than bioswales, however may lack the ability to promote infiltration at the same scale.



#### 3.2.1.4 Detention ponds

Detention ponds hold stormwater runoff and allow pollutants to settle to the bottom. The water is then released slowly into controlled conveyance feature, reducing flooding and POCs in the discharge.

Unlike the other options provided above, these ponds do not promote infiltration to the degree as the other options mentioned above.

### 3.2.2 Upgradient of Sensitive Areas

Sensitive areas may include waterways, wetlands, sloping land, Karst features, floodways, setback areas and areas of the lakes that are designated as Critical Habitat Areas in Wisconsin or Areas of Special Natural Resources Interest (ASNRI). These areas may be comprised of aquatic vegetation identified by the WDNR as offering critical or unique fish and wildlife habitat, including seasonal or life stage requirements, or offering water quality or erosion control benefits to the body of water. Infiltration wetlands and sediment traps are feasible for subwatersheds upgradient of sensitive areas.

#### 3.2.2.1 Infiltration Wetland

An infiltration wetland is a site-specific combination of practices using physical and biological processes to remove sediment, nutrients, bacteria, pesticides, and organic matter from runoff. Site selection is key to the success of this practice and therefore would be limited to only a few locations within the watershed but can have multiple benefits for both runoff control and habitat function.

#### 3.2.2.2 Temporary Sediment Trap

A temporary sediment control device formed by the excavation and/or embankment to intercept sediment-laden runoff and to retain the sediment. This feature is used to detain sediment-laden runoff from disturbed areas for sufficient time to allow the majority of the sediment to settle out. Traps need to be maintained for storage to ensure they function as intended. If not appropriately maintained these features can actually become a pollutant source by resuspending settled constituents during intense rain/flow events.

### 3.2.3 Agricultural Land

Cropland BMPs are feasible for subwatersheds with a more significant proportion of cropland land use. Cover crops, nutrient management, and conservation tillage, can generally be implemented in cropland areas of the watershed without space constraints since these BMPs do not reduce the existing footprint of the cropland.

#### 3.2.3.1 Agricultural Runoff Treatment Systems (ARTS)

ARTS is a relatively new technology that has been implemented primarily in Outagamie and Brown Counties, WI where it has been applied in the Ashwaubenon and Dutchman Creek Watersheds. Preliminary monitoring by USGS and UWGB have shown downstream water quality benefits including 40% TP and 80% TSS load reductions. The ARTS currently have an estimated 10 to 20 year life of practice and can be sized based on the available treatment area.

Enhanced Agricultural Runoff Treatment Systems (eARTS), is a recently adapted version of the ARTS with included filter technology to better address dissolved phosphorus. The cost is approximately

15% greater than the base cost ARTS equivalent, however the maintenance upkeep is approximately 30% greater due to the need to increase monitoring and maintain the effectiveness of the filtration media.

#### 3.2.3.2 Conservation Tillage

Conservation Tillage involves the planting, growing, and harvesting of crops with minimal disturbance to the soil. This practice uses seeders and techniques that are more precise and require fewer passes, reducing the amount of fuel used for farm equipment.

#### 3.2.3.3 Cover Crops

Cover Crops are short-term crops grown after the primary cropping season to reduce nutrient and sediment loss from the farm fields. This ensures roots are in the ground for more days within the year and less likely to be mobilized during a particular rain event. Use of cover crops in the State of Wisconsin has grown greatly in the last 20 years.

#### 3.2.3.4 Vegetative Buffers

Vegetated buffers are areas along the perimeter of crop fields maintained in permanent vegetation to help reduce nutrient and sediment loss from croplands. These features are popular as they do not typically entail the sacrifice of significant land but rather better incorporate the use of property that is already fallow. This is also has a very low cost per unit for installation and maintenance.

#### 3.2.3.5 Nutrient Management

Nutrient Management helps the farmer maximize profits by balancing crop yields and nutrient inputs. Using a nutrient management plan, farmers can optimize the economic returns from nutrients used in production and minimize nutrient loss and water quality at the same time. These are typically required by farmers in the State of Wisconsin in order to apply various types of fertilizer or obtain any sort of cost share agreements.

#### 3.2.3.6 Terraces

Terraces are earth embankments and/or channels constructed across the slope of the field to intercept runoff and trap sediment contained in the runoff. Terraces need to be appropriately vegetated and constructed to ensure they are stable and not prone to erode during rain events.

#### 3.2.3.7 Enhanced Agricultural Runoff Treatment System (eARTS)

The eARTS is an improved phosphorus targeted system originally developed by Outagamie County as ARTS to focus on sediment and particulate phosphorus (Outagamie County LCD, 2020). While highly effective in controlling particulate phosphorus and sediment, the facility also has a secondary storm water volume control element. The eARTS was further improved to include a non-proprietary phosphorus system is included in the eARTS which also addressed dissolved phosphorus making it a highly effective phosphorus sponge, the eARTSs also boasts an impressive 20:1 watershed to treatment ratio. While the cost per acre is much greater than traditional agricultural land practices, the effectiveness is up to 10X greater with upkept maintenance.

### 3.2.4 Pastureland BMPs

Five types of pastureland BMPs were assessed for implementation in the pasture areas of the Lauderdale Lake Chain. Some of these BMPs limit the source of pollutants from feeding operations and others reduce the pathways for the pollutants to enter the adjacent waterbodies. While not a significant land practice in the watershed, the measures can be generally passive making them somewhat attractive for consideration.

#### 3.2.4.1 Manure Management

Manure Management or animal waste management systems involve manure storage, transportation off-site, and improvements in manure recoverability. This practice reduces the source of nutrients and bacteria in the runoff. Active pastures can be reviewed to see if current manure (if used) is stored appropriately.

#### 3.2.4.2 Grazing Management

Grazing Management involves controlling the movement of animals on the field. Grazing, movement and manure deposition by the animals encourages growth of pasture vegetation. However, animals can overgraze a pasture if they are not moved to a fresh area frequently enough. By rotating animals to other areas or pastures, the recently grazed vegetation has an opportunity to regrow, which improves the soil nutrient content. This reduces the need for fertilizer application in the field and reduces nutrient loading. The procedure seems straightforward, but it is not uncommon to see overgrazed portions of agricultural plots leading to exposed soils which are prone to suspension and transport.

#### 3.2.4.3 Fencing

Fencing of main overland flow paths and other waterbodies is designed to prevent livestock from entering the waterbody. This prevents livestock from depositing manure directly into the waterway. This is likely not an issue in the watershed since there are few intersections with surface water and agriculture within the watershed.

#### 3.2.4.4 Vegetative Filter Strips

Vegetative Filter Strips are vegetated areas that receive stormwater runoff from a pastureland with animal feeding operations. They can be incorporated much like vegetative buffers.

#### 3.2.4.5 Wetland restoration or creation

Wetland restoration or creation projects on pastureland provide numerous crucial environmental functions such as wildlife habitat, flood protection, and water quality improvements. These opportunities also may be minimal within the watershed, however where practical they can be highly sought after by collaborators like the USDA-NRCS as they serve multiple functions and are therefore available for cost share opportunities.

### 3.2.5 Forestry BMPs

There are isolated pockets of forest along the Lauderdale Lakes Chain. As a result, suitable forestry BMPs, including pre-harvest planning, road management, and improved harvesting practices, can reduce the nutrient and sediment load from runoff in forestry subwatersheds in the lake chain. Harvested lands that are not appropriately managed during tree removal can contribute sediments to waterways for a significant time until vegetation can fully reestablish.

### 3.2.6 Shoreline Restoration/Stabilization/Enhancement

Shoreline restoration/stabilization/enhancement are recommended at locations identified in the wave height study and analysis. BMPs are installed along the banks of lakes to reduce sediment in-lake resuspension and overland loadings into the receiving lakes, improve water quality, and improve the biological condition along the shoreline. The techniques also help to minimize the potential for the shoreline to destabilize and migrate horizontally, avoiding the unnecessary loss of critical nearshore habitat.

#### 3.2.6.1 Shoreline Restoration

Shoreline restoration is recommended when the shoreline is in disrepair, heavily eroded, potentially overrun with invasives, or otherwise inadequately protected. Shoreline restoration typically involves working closely within the existing footprint of the shoreline, requires minimal armoring or protective measures, and can be mostly restored with softer erosion control practices and vegetative reestablishment.

#### 3.2.6.2 Shoreline Stabilization

Shoreline stabilization is recommended when shoreline is compromised structurally, leading to a condition of mass wasting or eroded to a point of inclination where conventional erosion control measures cannot be applied. This typically can involve armoring or implementation of geostructural measures but may provide opportunities to introduce hybrid geotechnical measures with vegetative components to integrate rooted mass to support a well contemplated design. While armoring should not be the first choice, it is at times necessary to resupport an existing failed structurally armored feature. Dilapidated structures should be reviewed on a case per case basis to see when and if alternative options exist which may be better suited to the end goals of the LLLMD, this plan and if cost share agreements may exist to implement a shared solution.

#### 3.2.6.3 Shoreline Enhancement

Shoreline enhancement refers to improvements to address vegetative spottiness, invasive blight, or ecological underperformance. Additionally, this may include installing forest or grass buffers to improve the biological condition of the shoreline.

## 3.3 **Overview of Potential Pollutant Load Reductions Based on BMP**

The effectiveness of load reduction and feasibility of implementation of the BMP types discussed in Section 3.2 are described below.

### 3.3.1 BMP Pollutant Load Reduction Effectiveness

Percent load reduction efficiency data was extracted from literature review to estimate the load reduction of potential BMPs for the watershed. The literature review includes a summary of paired watershed case studies, watershed plans for similar watersheds and agricultural BMP reference guides. Percent load reduction was extracted for each BMP to reduce the load total phosphorus and TSS.

#### 3.3.1.1 Literature Review

A literature review was conducted to estimate the BMP percent removal efficiencies for total phosphorus and TSS. Due to the limited performance data available, no single source of data covers

the performance of all types of BMPs discussed in Section 3.2. Six sources of data were analyzed, from which BMP performance data is extracted:

**a) Spring River Nonpoint Source Watershed Plan**

This plan was written for the Spring River Watershed in Minnesota to address impairments caused by nutrients and sediment (MDNR, 2015). The list of considered BMPs in the Spring River Watershed study is similar to the discussed in Section 3.2, including urban, agricultural, shoreline and on-site wastewater system (septic) BMPs. The BMP removal efficiency data for nutrients and sediment from this WBP was utilized for this project, where applicable.

**b) International Stormwater BMP Database 2016 Summary Statistics**

The International Stormwater BMP Database (the Database) is a publicly accessible repository for BMP performance, design, and cost information. Since the initial development of the BMP Database in 1996, a portfolio of more than \$200 million in water quality research is represented in the Database. The 2016 summary statistics of the Database include treatment performance of urban BMPs for TP and TSS (Clary, J. et al. 2017). The median removal percentage for each BMP-pollutant pairing for all case studies in the Database was extracted from the report and used in this evaluation to estimate load reductions.

**c) Effectiveness of BMPs for Bacteria Removal Developed for the Upper Mississippi River Bacteria TMDL**

A literature review was conducted to inform the selection of the most practical and effective implementation strategies to improve water quality in the Upper Mississippi River Bacteria TMDL project area in the state of Minnesota (Tilman, L. et al., 2011). This literature review evaluated research findings regarding the effectiveness of various BMPs to reduce bacteria loading to surface waters. Only a limited number of BMPs were reviewed in this data source, but multiple studies were analyzed for each type of BMP. The median load reduction performance for indicator bacteria from all studies included in the data source for each type of BMP was extracted and used in this project for determining *E. coli* load reduction.

**d) The Agricultural BMP Handbook for Minnesota**

This literature review, published by the Minnesota Department of Agriculture (MDA), included empirical research on the effectiveness of 30 conservation practices, i.e., agricultural BMPs (MDA, 2012). Nutrient, sediment, and limited bacteria removal performance data for the 30 BMPs is available in this data source.

**e) Chesapeake Bay Quick Reference Guide for BMPs**

The Chesapeake Bay Program (CBP) is a regional partnership that leads and directs Chesapeake Bay restoration and protection. This reference guide provides summarized profiles for each CBP-approved BMP, including the effectiveness in pollutant load removal, cost and feasibility of implementation (CBP, 2018). In this data source, BMP load reduction percentages are often summarized for specific land use, crop types, or sub-type of the BMP. For the purpose of this project, the median value of the load reduction for each BMP-POC pairing was extracted from this reference guide.

**f) Efficiencies of Forestry BMPs for Reducing TSS and Nutrient Losses in the Eastern United States**

Compared to urban and agricultural BMPs, the available performance data for forestry BMPs is limited. This study from 2010 included three paired forested watershed studies in the eastern United States through an exhaustive literature search. No individual practices were isolated in the study. Instead, the combined effectiveness of multiple forestry BMPs in each paired forested watershed study to reduce TSS and TP was summarized in this study and used in this project (Edwards, P. J. et al., 2010).

3.3.1.2 Pollutant Load Reduction Efficiencies

Table 12 summarizes the load reduction percentage of example BMPs for TP and TSS and the corresponding source of data from the six sources listed in Section 3.3.1.1. The table includes BMPs that are not mentioned in Section 3.2 and that is to provide the LLLMD as many implementation options as possible.

**Table 12: BMP Pollutant Load Reduction Efficiencies Used for Calculating Load Reductions through BMP**

<b>BMP Type</b>	<b>BMP</b>	<b>TP</b>	<b>TSS</b>
<b>Cropland</b>	Cover Crops	0.07 <sup>e</sup>	0.1 <sup>e</sup>
	Nutrient Management	0.05 <sup>e</sup>	0.25 <sup>b</sup>
	Conservation Tillage	0.35 <sup>e</sup>	0.47 <sup>e</sup>
	Terrace	0.3 <sup>b</sup>	0.36 <sup>b</sup>
	Vegetated Buffer	0.5 <sup>b</sup>	0.5 <sup>b</sup>
	Retention Pond	0.5 <sup>b</sup>	0.5 <sup>b</sup>
<b>Pastureland</b>	Grazing Management	0.24 <sup>d</sup>	0.3 <sup>d</sup>
	Fencing	0.42 <sup>e</sup>	0.56 <sup>e</sup>
	Vegetative filter strip	0.5 <sup>b</sup>	0.56 <sup>e</sup>
	Wetland	0.4 <sup>e</sup>	0.31 <sup>e</sup>
<b>Forestry</b>	Pre-Harvest Management, Road Management, Improved Harvesting	0.85 <sup>f</sup>	0.6 <sup>f</sup>
<b>Shoreline</b>	Shoreline Stabilization	0.068 lbs/ft/yr <sup>e</sup>	248 lbs/ft/yr <sup>e</sup>
	Shoreline Buffer	0.42 <sup>e</sup>	0.56 <sup>e</sup>
<b>Urban</b>	Bioretention	0 <sup>a</sup>	0.75 <sup>a</sup>
	Grass Swale	0 <sup>a</sup>	0.16 <sup>a</sup>
	Wetland Basin	0.25 <sup>a</sup>	0.55 <sup>a</sup>
	Detention Pond	0.17 <sup>a</sup>	0.64 <sup>a</sup>
<b>On-site Septic System</b>	Repair/Replace program	TP and TSS removal based on percent of on-site wastewater system repaired/replace	

The data source for the load reduction rate for each BMP-POC pairing is from one of the six data sources listed in Section 3.3.1.1:

- a - International Stormwater BMP Database 2016 Summary Statistics;
- b – Spring River Nonpoint Source Watershed Plan;

- c - Effectiveness of BMP for Bacteria Removal Developed for the Upper Mississippi River Bacteria TMDL;
- d – The Agricultural BMP Handbook for Minnesota;
- e – Chesapeake Bay Quick Reference Guide for BMP;
- f – Efficiencies of Forestry BMP for Reducing Sediment and Nutrient Losses in the Eastern United States.

### 3.4 Critical Area for BMP Implementation

This plan focused on identifying critical areas within the Lakes direct runoff area (as defined by USGS) where BMPs should be implemented. The goal was to select their locations based on their effectiveness for reducing TSS and phosphorus loading into the lakes – see Table 12 BMP Pollutant load reduction efficiencies. Specific criteria for identifying critical areas are based on the following:

- High loading watersheds/land cover
- Contours/drainage areas
- “Open space” based on land cover, aerials (low conflict areas with existing infrastructure)
- Protection of sensitive areas
- Areas vulnerable to wave erosion – as identified by the wave height analysis

Identified critical areas within the Lauderdale Lake Chain for BMP implementation are shown on Figure 13. As part of the process for providing recommendations for implementing BMPs, both alternatives previously recommended by earlier studies and new options were evaluated. To develop a holistic watershed plan, each subwatershed was analyzed with the goal of recommending a BMP even if it was not identified as a critical area. Table 13 below indicates what BMP is best suited for a subwatershed and the applicable land use for implementing said BMP. Subwatersheds are listed from highest phosphorus loading to smallest.

**Table 13: Watershed-Wide BMP Recommendations**

Subwatershed ID*	Watershed-Wide BMP Recommendation	Applicable Land Cover
Gre_6	Conservation Tillage , Filter Strip, eARTS	Cultivated Crops
Gre_1	Conservation Tillage, Filter Strip, eARTS	Cultivated Crops
Mil_5	Bioswales and Infiltration trenches	Road Right-of-ways
Gre_2	Conservation Tillage, Filter Strip, eARTS	Cultivated Crops
Mil_3	Vegetative filter strip	Cultivated Crops
Mid_2	Bioswales	Road Right-of-ways
Mil_4	Linear BMP	Shoreline
Mid_1	Bioswales and Infiltration trenches	Road Right-of-ways
Gre_3	Linear BMP	Shoreline
Gre_4	Bioswales and Infiltration trenches	Road Right-of-ways
Mid_3	Infiltration Wetland	Emergent Wetland
Mil_1	Linear BMP	Shoreline
Mid_4	Bioswales	Road Right-of-ways
Mil_2	Linear BMP	Shoreline or Road Right-of-ways
Gre_5	Forestry BMP	Forest

\*Gre\_ indicates the subwatershed is in the Green Lake watershed, Mid\_ indicates the subwatershed is in the Middle Lake watershed, and Mil\_ indicates the subwatershed is in the Mill Lake watershed.

### 3.5 Prioritized Action Plan (PAP) – Watershed BMP Implementation

The Prioritized Action Plan (PAP) consists of project prioritization and the development of an implementation schedule based on BMP estimated unit costs, the likelihood for funding, and most importantly, its potential beneficial impact on the Lauderdale Lakes Chain. As can be seen from Table 5 in Section 2.2.1, the determined loading into Green Lake is significantly higher than Middle and Mill lakes, however, the opportunity will always need to be weighed against property ownership and obtaining easements, the LLLMD’s proposed budget and ability to acquire associated funding to offset costs and ongoing maintenance needs.

Primary funding would come via the LLLMD available budget, the WDNR Surface Water Grant (SWG) Program or other similar sources. The schedule is intended to prioritize subwatersheds listed at the top of Table 13 and implement projects that will provide the highest load capture while being cost-effective.

Within the first 5-years after plan approval, a recommended milestone is to reduce loading into the Lake Chain by 10%. Table 14 provides an example implementation schedule, and Table 15 provides a cost breakdown for different BMP technologies, including a visual aid representing a number of the practices.

The primary goal should be to implement projects that impact a high likelihood of success. Therefore, based on the loadings and project implementation review, the LLLMD should continue to undertake practices that focus on Green Lake first, targeting TSS and phosphorus. Once this has been accomplished, projects can subsequently begin on Mill Lake and Middle Lake. The LLLMD can also look to implement projects based on load prevention per dollar invested, however, this will be very project-specific and difficult to implement if land use agreements become difficult to acquire. Finally, while not always the most efficient method, the LLLMD can review property availability against opportunity and continue investing in projects based on the ability to acquire easements and low-cost projects. While not necessarily as efficient, the process typically ensures more projects get installed.

**Table 14: Prioritized BMP Recommendations**

Schedule	Subwatershed	BMP Recommendation	Units	Target Phosphorus Reduction (lbs)	Cost
Year 1	Gre_1	eARTS	20 acres	24	60K
Year 2	Gre_2	eARTS	20 acres	24	60K
	Gre_3	Shoreline	300 ft	20	45K
Years 3-5	Mil_1	Shoreline	500 ft	34	75K
	Mil_3	Vegetative Buffer	650 ft*	24	26K
	Mil_4	eARTS	20 acres	24	60K
Maintenance (10%)					30K
<b>Total</b>				150**	356K

\*Assumes 25-foot width, which is the recommended design minimum





\*\*Target based on Table 6, 10% of total annual load = 149.2 lbs






Any combination of practices and projects as indicated in Table 6 can be mixed and matched to accomplish the goal. LLLMD can develop a higher or lower goal based on land availability and funding. The PAP is meant to jumpstart the LLLMD’s restoration and preservation missions. Since the lakes are not considered impaired, there is no target to meet, and the goal is arbitrarily set. Additional monies should be set aside for maintenance which is assumed at 10%, and additionally contingency for construction. Using the possible schedule indicated above, 2022 should be considered the year of plan completion and acceptance by the WDNR. First-year (Year





1) improvements may not be constructed until 2023 since many project improvements require design and permitting take anywhere from 6-10 months.

**Table 15: Approximate BMP Implementation Cost**

<b>BMP Technology</b>	<b>Examples of BMP Technology</b>	<b>Unit Cost</b>
ARTS or eARTS		\$30,000/acre
Shoreline Resotation – Hard Practices (rip rap)		\$150-\$200 per Linear foot (LF)
Shoreline Resotation – Hard Practices (bio logs, sandbags, prevegetated fabrics)		\$75-\$150 per LF
Detention Facility (Wet or Dry)		\$70,000 per acre

<p>Catch Basin</p>		<p>\$5,000 Per structure</p>
<p>Sediment Trap</p>	 <p>Image courtesy of KY DOT</p>	<p>\$7,500 per 500 Square Foot(SF)</p>
<p>Vegetative Filter/Buffer Strip</p>		<p>\$4,000 per 2,500 SF</p>
<p>Bioswale</p>		<p>\$350 per LF</p>
<p>Vegetated Swale</p>	 <p>Image courtesy Pittsburgh Post Gazette</p>	<p>\$100-\$150 per LF</p>

<p>Infiltration Trench</p>		<p>\$100 per LF</p>
<p>Native Vegetation</p>		<p>\$12 per SF</p>

#### 4 LAUDERDALE LAKE DISTRICT CONTINUED EDUCATION

As mentioned earlier, as part of the development of the watershed plan, bi-monthly meetings were held with the LLLMD, interested stakeholders, collaborators, and open to members of the public. The meetings were intended to enhance public understanding of the project and encourage their early and continued participation in selecting, designing, and implementing the NPS management measures that will be implemented. Appendix D includes the slides from each meeting and the LLLMD has provided access to the slides and various presentation videos online:

<https://www.lauderdalelakedistrict.com/>

The LLLMD continues to host quarterly meetings which are open to the public. The LLLMD also hosts an annual meeting which will be used to inform those in attendance a platform to review the progress of the plan implementation.

#### 5 CONCLUSION

The LLLMD has undertaken this watershed planning initiative for the Lauderdale Lakes (Green, Middle, Mill) in an effort to update previous planning efforts and remain eligible for priority funding through the State of Wisconsin DNR programs. This planning effort was partially paid for by a lake planning grant through the WDNR Surface Water Grant (SWG) program. The primary goal of this effort is to update previous studies by the LLLMD, and USGS in reviewing the baseline pollutants (primarily TSS and phosphorus) impacting the

lake chain and assess the pathways in which they enter Green, Middle, and Mill lakes. The baseline assessment has identified that most watershed constituents enter the lake chain through Green Lake and are primarily associated with agricultural land use.

From the baseline assessment, this document further provides a review of BMP resources that may be implemented to reduce runoff-related pollutants from entering the lakes. The BMPs listed within this plan are meant to provide flexibility to the LLLMD as they carry out the implementation of this plan, however, a prepared Prioritized Action Plan (PAP) is also provided to serve as an example of how a series of projects may be executed in a preplanned manner and budgeted for accordingly.

The LLLMD also provided a public forum for stakeholder education and input. During the development of this watershed plan, four (4) meetings were held online. Presentation materials are made available via the LLLMD's website with limited video coverage to assist those interested in revisiting the content or continuing to remain engaged or network with the LLLMD and the numerous lake stakeholders.

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## **APPENDICES**

**Appendix A: Supporting Figures**

**Appendix B: September 2021 Site Visit**

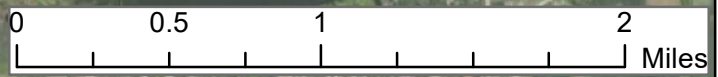
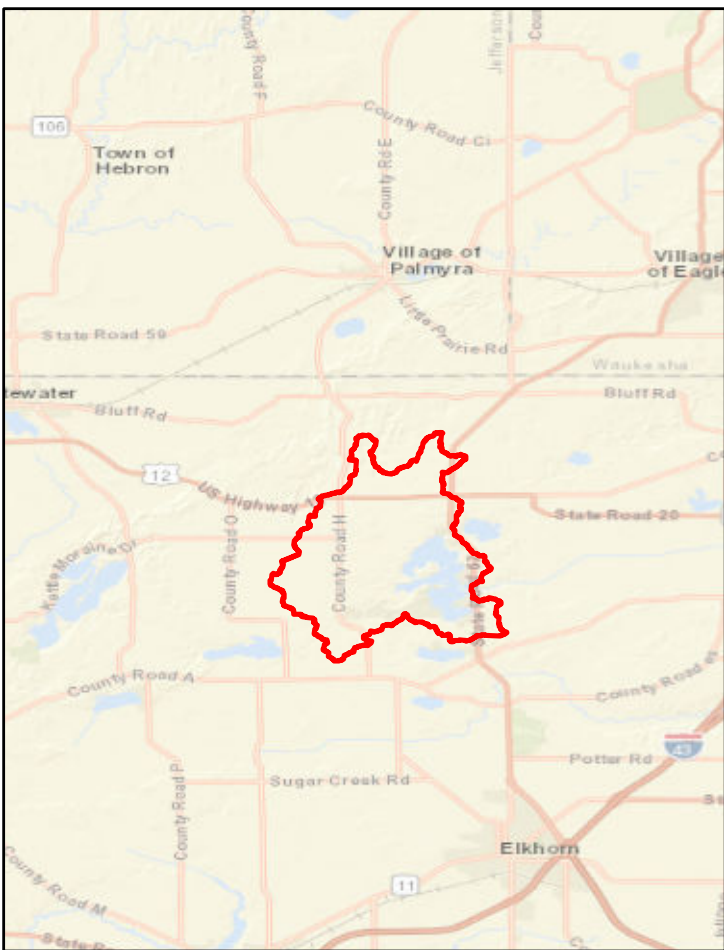
**Appendix C: Previous Studies**

**Appendix D: Lauderdale Lake Meeting Summaries**


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## **Appendix A: Supporting Figures**





**Legend**

 Watershed Boundary

Watershed Boundary to Route 12 Outlet = 13.1 square miles

Delineation performed by USGS Stream Stats

Website: <https://streamstats.usgs.gov/ss/>



**Lauderdale Lakes  
Location Map**

Lauderdale Lakes Lake Management District (LLMD)  
Walworth County, Wisconsin

**Geosyntec**  
consultants

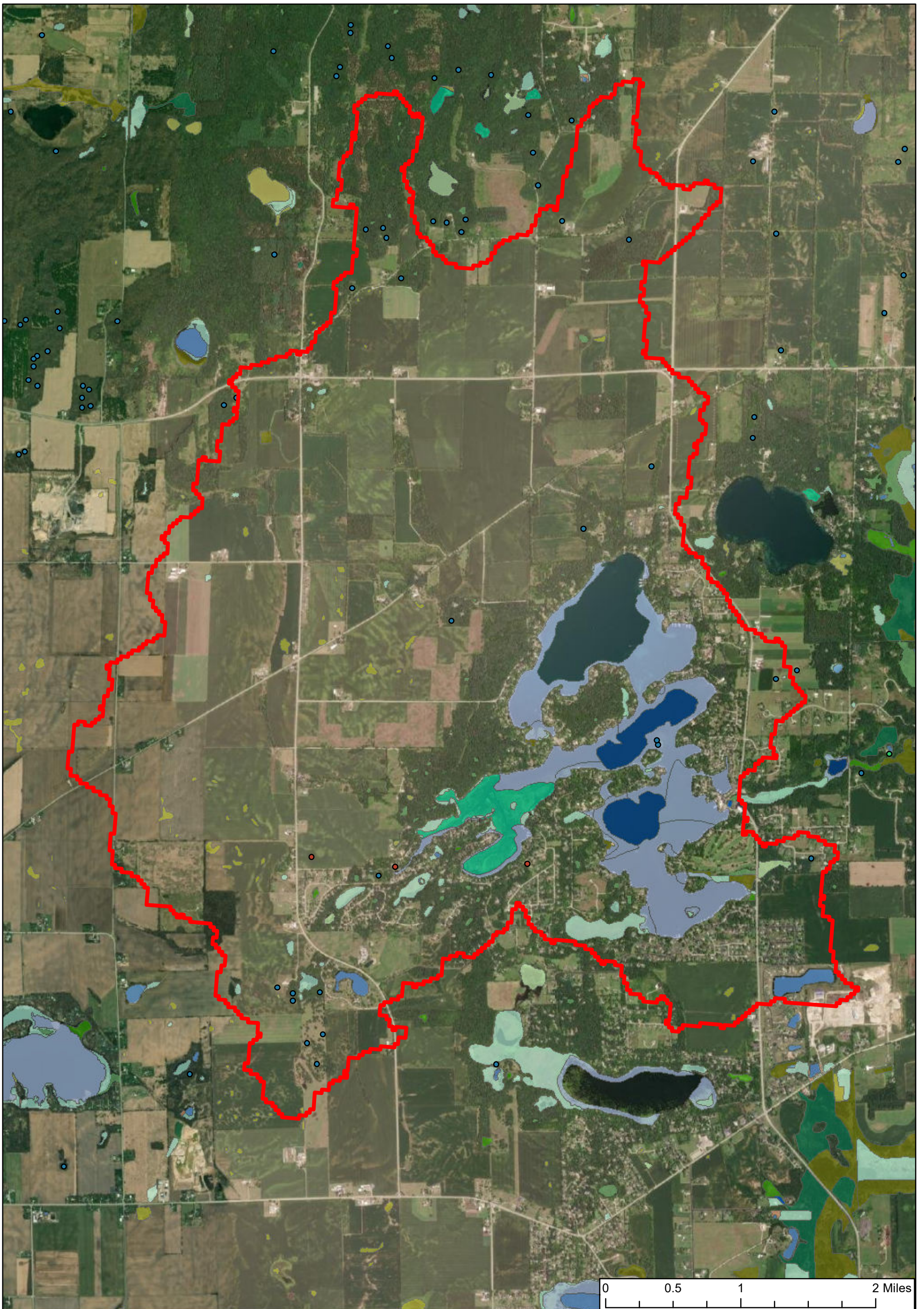
**Figure**

**1**

Mequon, WI - MOW5536

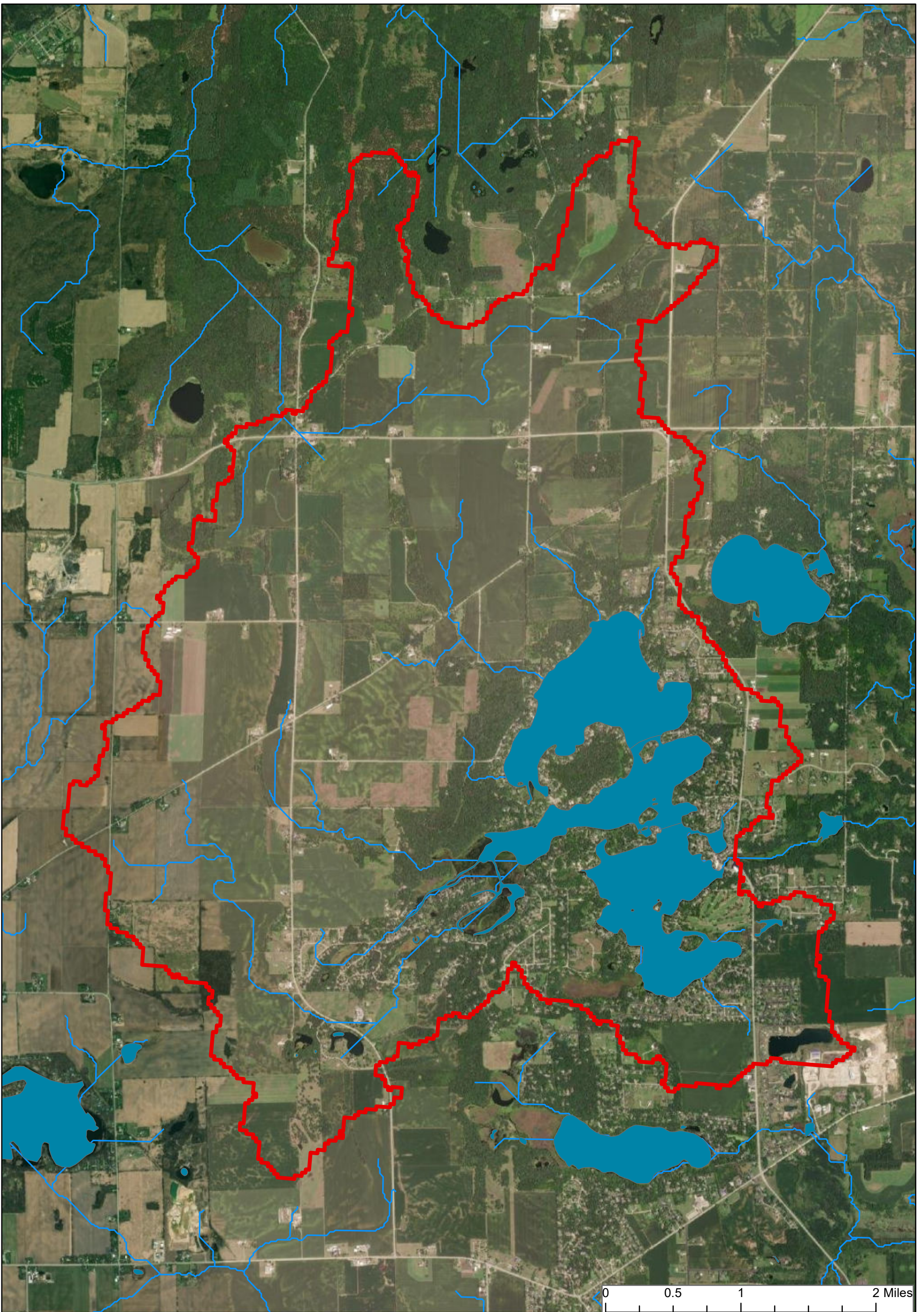
November 2021





<ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #ADD8E6; border: 1px solid black; margin-right: 5px;"></span> Aquatic bed</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #4682B4; border: 1px solid black; margin-right: 5px;"></span> Aquatic bed, Open Water</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #00008B; border: 1px solid black; margin-right: 5px;"></span> Deep water lake</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #90EE90; border: 1px solid black; margin-right: 5px;"></span> Emergent/wet meadow</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #00CED1; border: 1px solid black; margin-right: 5px;"></span> Emergent/wet meadow, Aquatic bed</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #7FFFD4; border: 1px solid black; margin-right: 5px;"></span> Emergent/wet meadow, Flats/unvegetated wet soil</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #90EE90; border: 1px solid black; margin-right: 5px;"></span> Emergent/wet meadow, Open Water</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #FFDAB9; border: 1px solid black; margin-right: 5px;"></span> Filled/draind wetland, Emergent/wet meadow</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #FFD700; border: 1px solid black; margin-right: 5px;"></span> Filled/draind wetland, Flats/unvegetated wet soil</li> </ul>	<ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #D2B48C; border: 1px solid black; margin-right: 5px;"></span> Filled/draind wetland, Forested</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #C8A2C8; border: 1px solid black; margin-right: 5px;"></span> Filled/draind wetland, Forested, Emergent/wet meadow</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #F5DEB3; border: 1px solid black; margin-right: 5px;"></span> Filled/draind wetland, Scrub/shrub</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #FFDAB9; border: 1px solid black; margin-right: 5px;"></span> Filled/draind wetland, Scrub/shrub, Emergent/wet meadow</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #90EE90; border: 1px solid black; margin-right: 5px;"></span> Flats/unvegetated wet soil</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #90EE90; border: 1px solid black; margin-right: 5px;"></span> Forested</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #90EE90; border: 1px solid black; margin-right: 5px;"></span> Forested, Emergent/wet meadow</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #90EE90; border: 1px solid black; margin-right: 5px;"></span> Forested, Open Water</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #90EE90; border: 1px solid black; margin-right: 5px;"></span> Forested, Scrub/shrub</li> </ul>	<ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #ADD8E6; border: 1px solid black; margin-right: 5px;"></span> Open Water</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #90EE90; border: 1px solid black; margin-right: 5px;"></span> Scrub/shrub</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #90EE90; border: 1px solid black; margin-right: 5px;"></span> Scrub/shrub, Emergent/wet meadow</li> <li><span style="border: 2px dashed red; width: 15px; height: 10px; display: inline-block; margin-right: 5px;"></span> Lauderdale Lake Watershed Boundary (Stream Stats)</li> <li><span style="display: inline-block; width: 0; height: 0; border-left: 5px solid transparent; border-right: 5px solid transparent; border-bottom: 8px solid black; margin-right: 5px;"></span> Excavated pond</li> <li><span style="display: inline-block; width: 0; height: 0; border-left: 5px solid transparent; border-right: 5px solid transparent; border-bottom: 8px solid black; margin-right: 5px;"></span> Filled excavated pond</li> <li><span style="display: inline-block; width: 0; height: 0; border-left: 5px solid transparent; border-right: 5px solid transparent; border-bottom: 8px solid black; margin-right: 5px;"></span> Filled/draind wetland</li> <li><span style="display: inline-block; width: 0; height: 0; border-left: 5px solid transparent; border-right: 5px solid transparent; border-bottom: 8px solid black; margin-right: 5px;"></span> Wetland too small to delineate</li> </ul>	<p><b>Lauderdale Lakes Wetland Inventory</b></p> <p>Lauderdale Lakes Lake Management District (LLMD) Walworth County, Wisconsin</p> <p><b>Geosyntec</b> consultants</p> <p>Mequon, WI - MOW5536      November 2021</p>	<p><b>Figure</b></p> <p><b>2</b></p>
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- WDNR Identified Lakes/Ponds
- Lauderdale Lake Watershed Boundary (Stream Stats)
- Overland Flow Path

Overlad flow paths defined using ArcGIS builtin Arc Hydro function and Walworth County one foot contours.



0 0.5 1 2 Miles

**Lauderdale Lakes  
Existing Hydrology**

Lauderdale Lakes Lake Management District (LLMD)  
Walworth County, Wisconsin

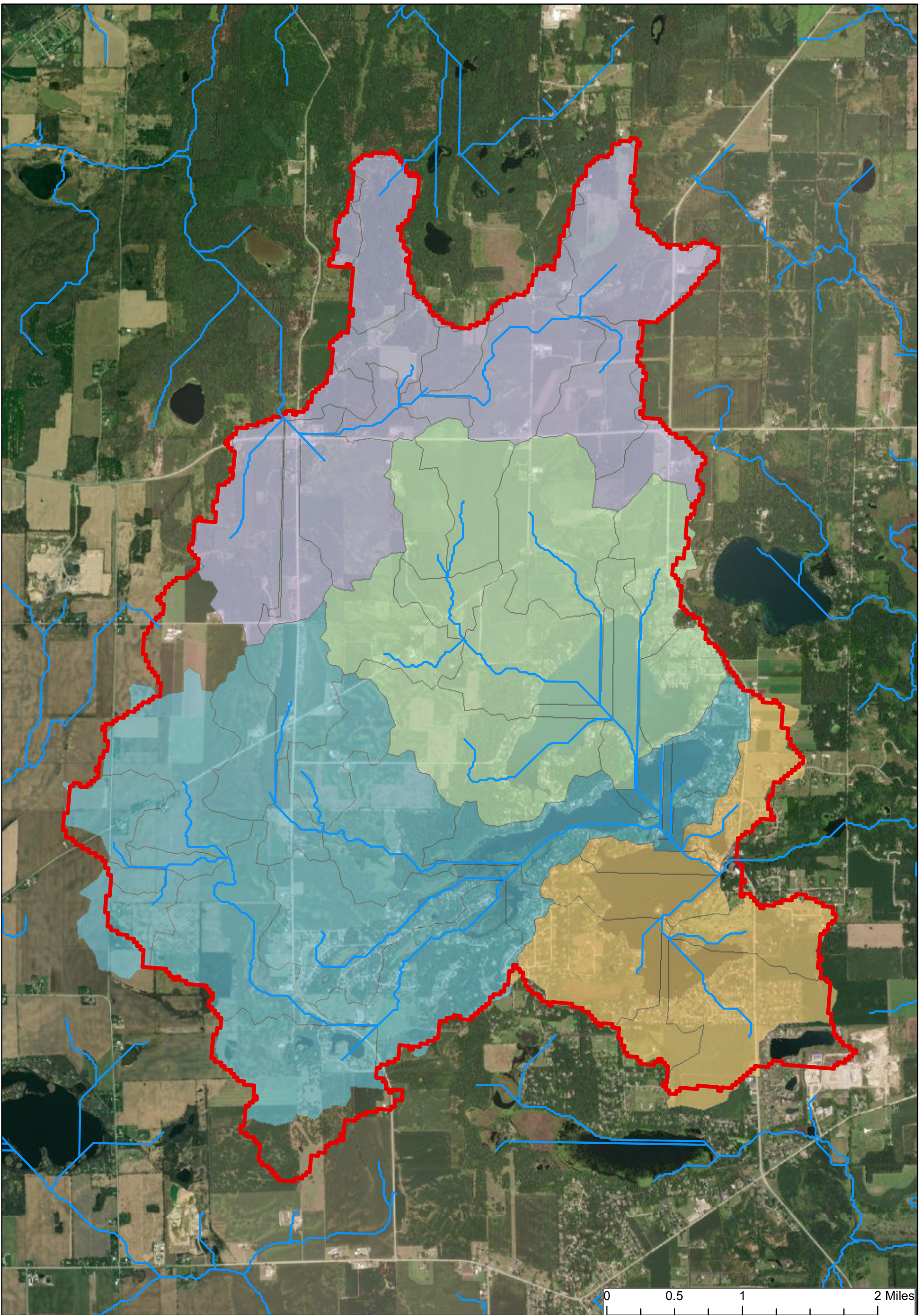
**Geosyntec**  
consultants

**Figure  
3**

Mequon, WI - MOW5536

November 2021





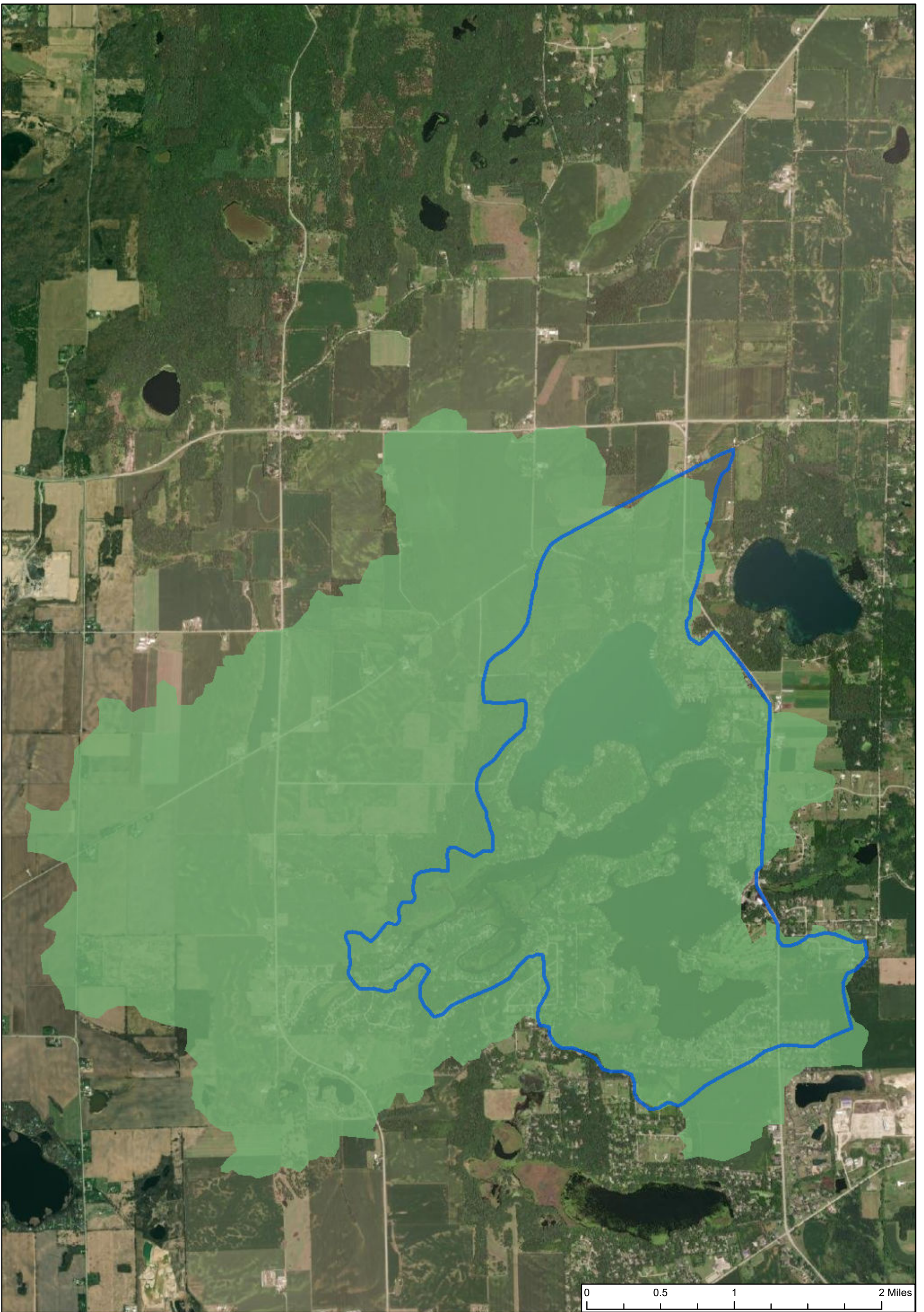
- Middle Lake Watershed
- Green Lake Watershed
- Mill Lake Watershed
- Not Tributary
- Lauderdale Lake Watershed Boundary (Stream Stats)
- Overland Flow Path

Overlad flow paths defined using ArcGIS builtin Arc Hydro function and Walworth County one foot contours.



<p><b>Lauderdale Lakes Updated Tributary Areas</b></p> <p>Lauderdale Lakes Lake Management District (LLMD) Walworth County, Wisconsin</p>	
<p><b>Geosyntec</b>  consultants</p>	
<p>Mequon, WI - MOW5536</p>	<p>November 2021</p>
<p><b>Figure</b> <b>4</b></p>	



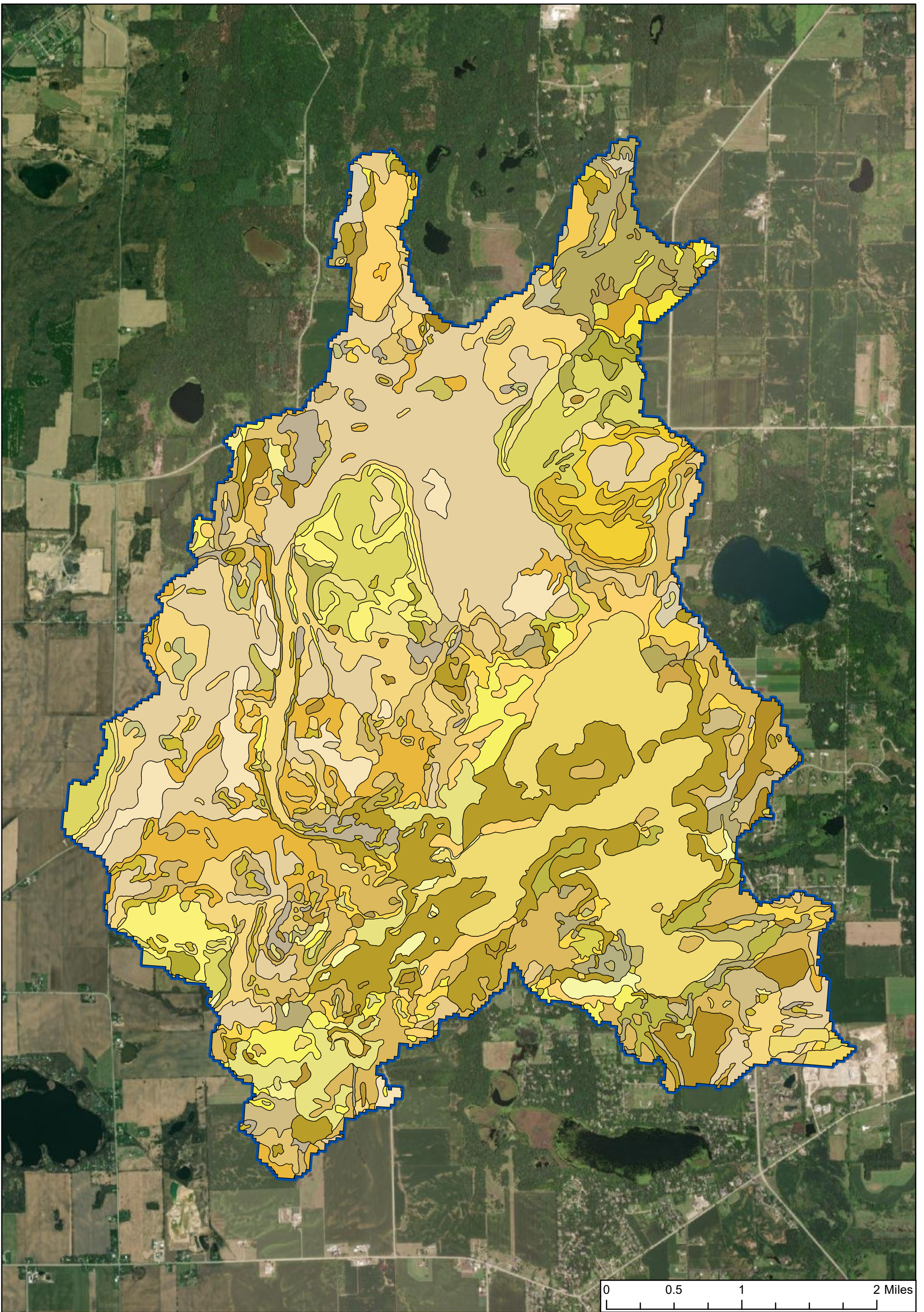


Geosyntec Study Area  
 USGS Study Area

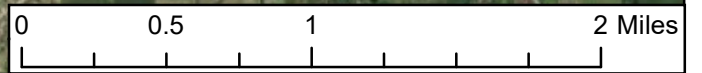


<b>Lauderdale Lakes USGS Study Area Boundary VS Geosyntec Study Areas</b> Lauderdale Lakes Lake Management District (LLMD) Walworth County, Wisconsin	
	<b>Figure 5</b>
Mequon, WI - MOW5536	November 2021



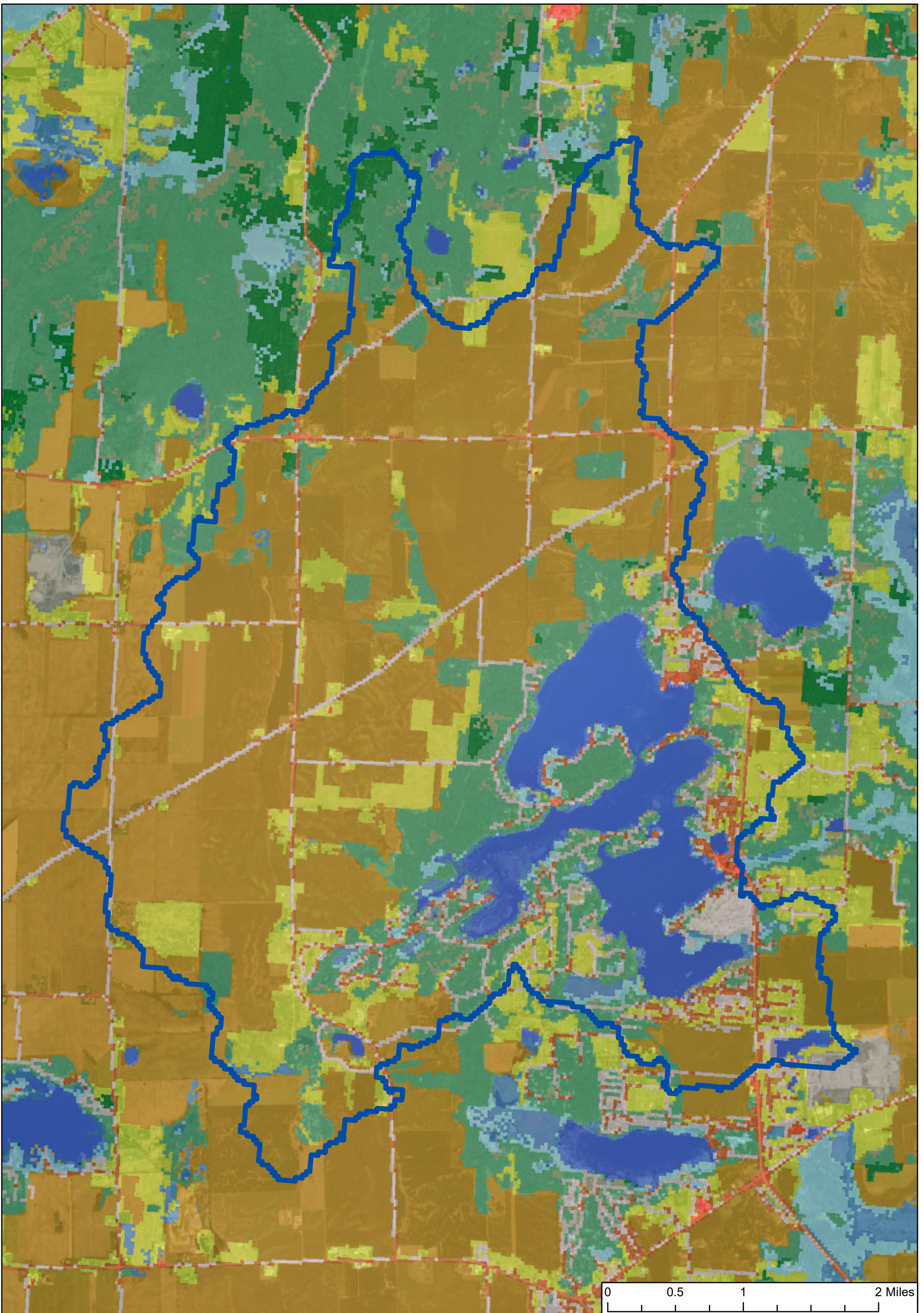


Soil Type	CrE2	GP	MpB	PsC	WhA
Ac	CtB	GsB	MpC2	PTA	WhB
BpB	CtE	GsC2	MuA	PtB	WhC2
BpC2	Dt	GsD2	MuB	PtC2	Lauderdale Lake Watershed
CeB2	EgA	HeB	MvB	RaA	Boundary (Stream Stats)
CeC2	FmB	HfE	MwD2	RsF	
CeD2	FmC2	Ht	MxC2	SeA	
CfC3	FoB	JuA	MxD2	SeB	
CfD3	FoC2	LyB	Pa	Sm	
CkD2	FsA	LyC2	Ph	TxA	
CiC2	FsB	LzD2	PsA	W	
CrD2	FsC2	Mf	PsB	WeA	



<b>Lauderdale Lakes Soils Map</b> Lauderdale Lakes Lake Management District (LLMD) Walworth County, Wisconsin	
	<b>Figure 6</b>
Mequon, WI - MOW5536	November 2021





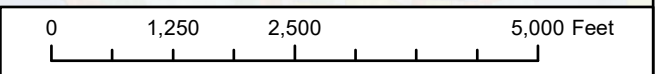
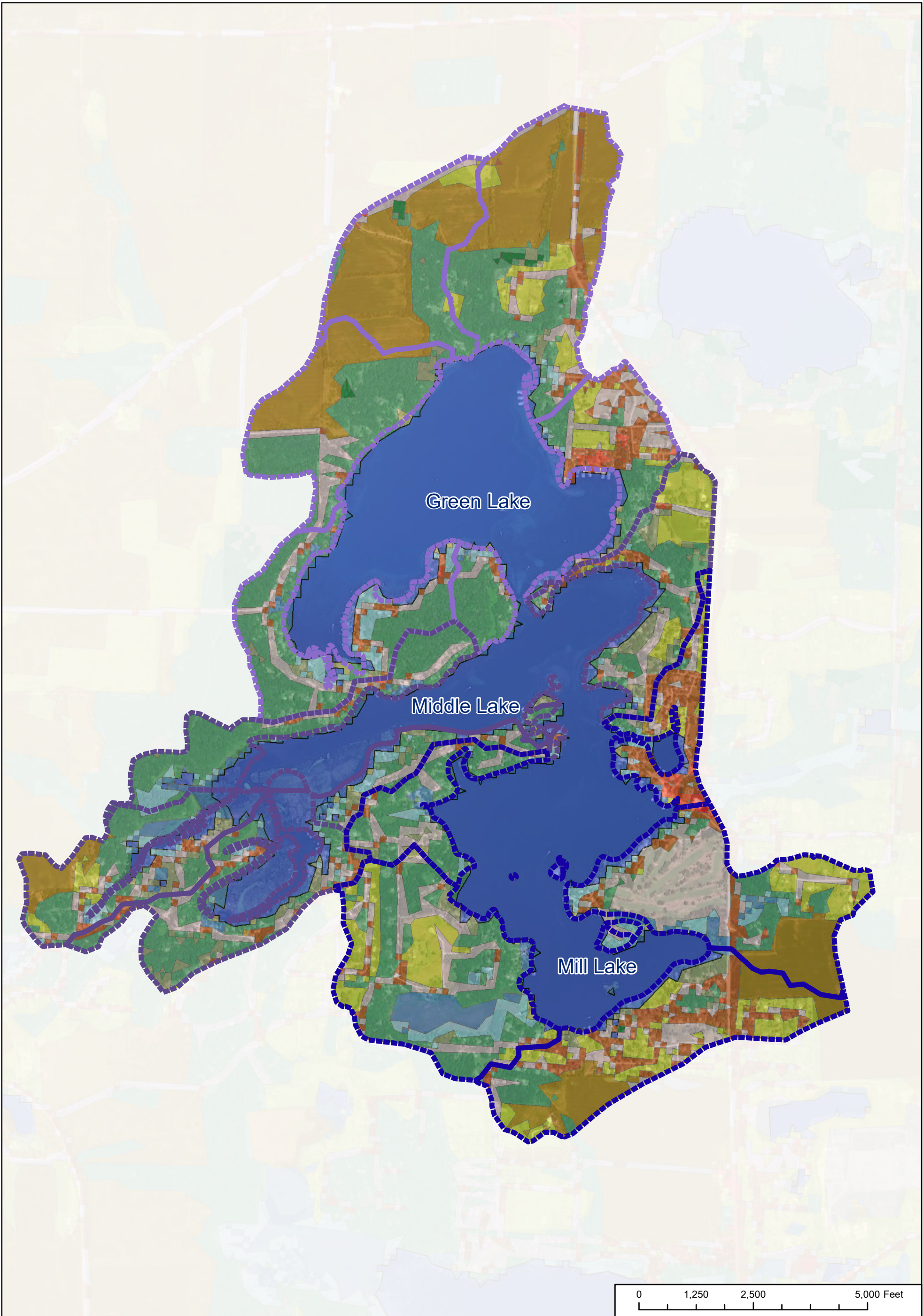
**2016 National Land Cover Database**

- |                |                              |   |
|----------------|------------------------------|---|
| Woody Wetlands | Hay/Pasture                  | Cultivated Crops                                  |
| Shrub/Scrub    | Evergreen Forest             | Barren Land                                       |
| Open Water     | Emergent Herbaceous Wetlands | Lauderdale Lake Watershed Boundary (Stream Stats) |
| Mixed Forest   | Developed, Open Space        |   |
| Herbaceous     | Developed, Medium Intensity  |   |
|                | Developed, Low Intensity     |   |
|                | Developed, High Intensity    |   |
|                | Deciduous Forest             |   |



<p><b>Lauderdale Lakes Land Cover</b></p> <p>Lauderdale Lakes Lake Management District (LLMD) Walworth County, Wisconsin</p>	
<p><b>Geosyntec</b> consultants</p>	<p><b>Figure</b> <b>7</b></p>
Mequon, WI - MOW5536	November 2021





**Watershed**  
 Green Lake  
 Middle Lake  
 Mill Lake

**2016 National Land Cover Database**

Barren Land	Developed, Medium Intensity	Herbaceous
Cultivated Crops	Developed, Open Space	Mixed Forest
Deciduous Forest	Emergent Herbaceous Wetlands	Open Water
Developed, High Intensity	Evergreen Forest	Shrub/Scrub
Developed, Low Intensity	Hay/Pasture	Woody Wetlands



**Lauderdale Lakes  
Tributary Area Land Cover Overview**

Lauderdale Lakes Lake Management District (LLMD)  
Walworth County, Wisconsin

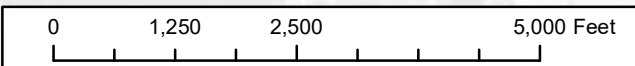
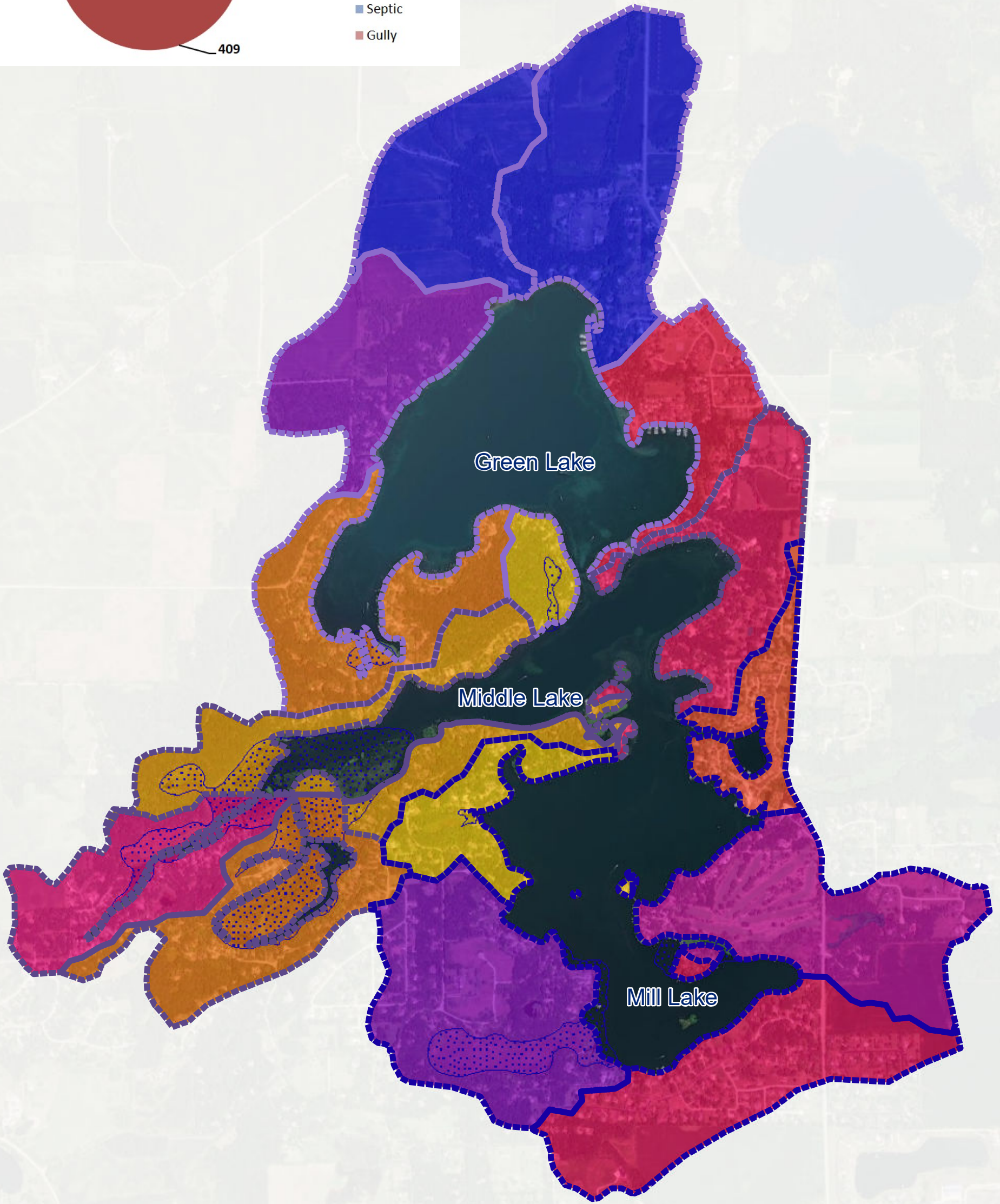
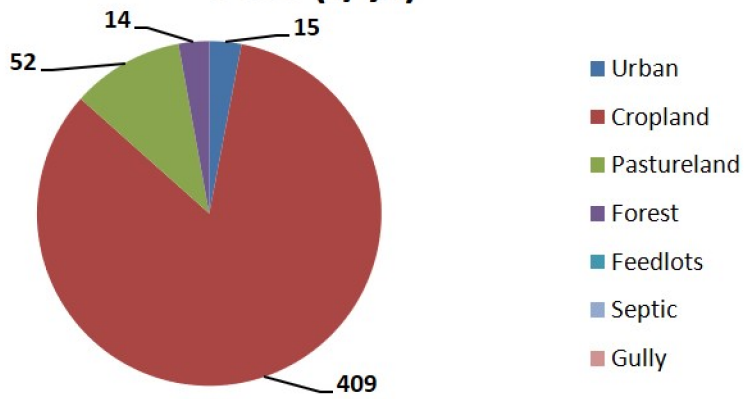
Geosyntec  
consultants

**Figure**  
**8**

Mequon, WI - MOW5536	December 2021
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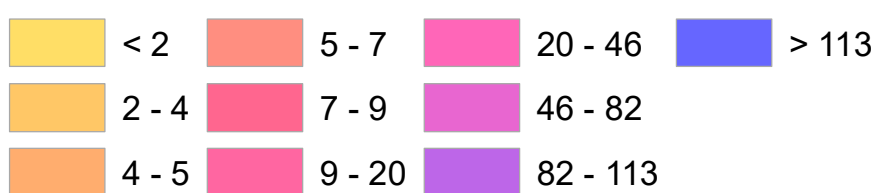


### LLLD Total Sediment Load by Land Uses (t/yr)



- Sensitive Areas
- Watershed**
- Green Lake
- Middle Lake
- Mill Lake

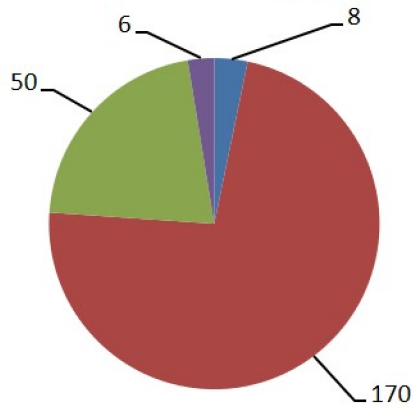
#### TSS Load (tons/yr)



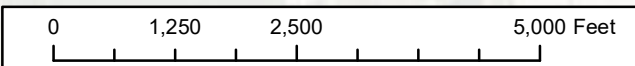
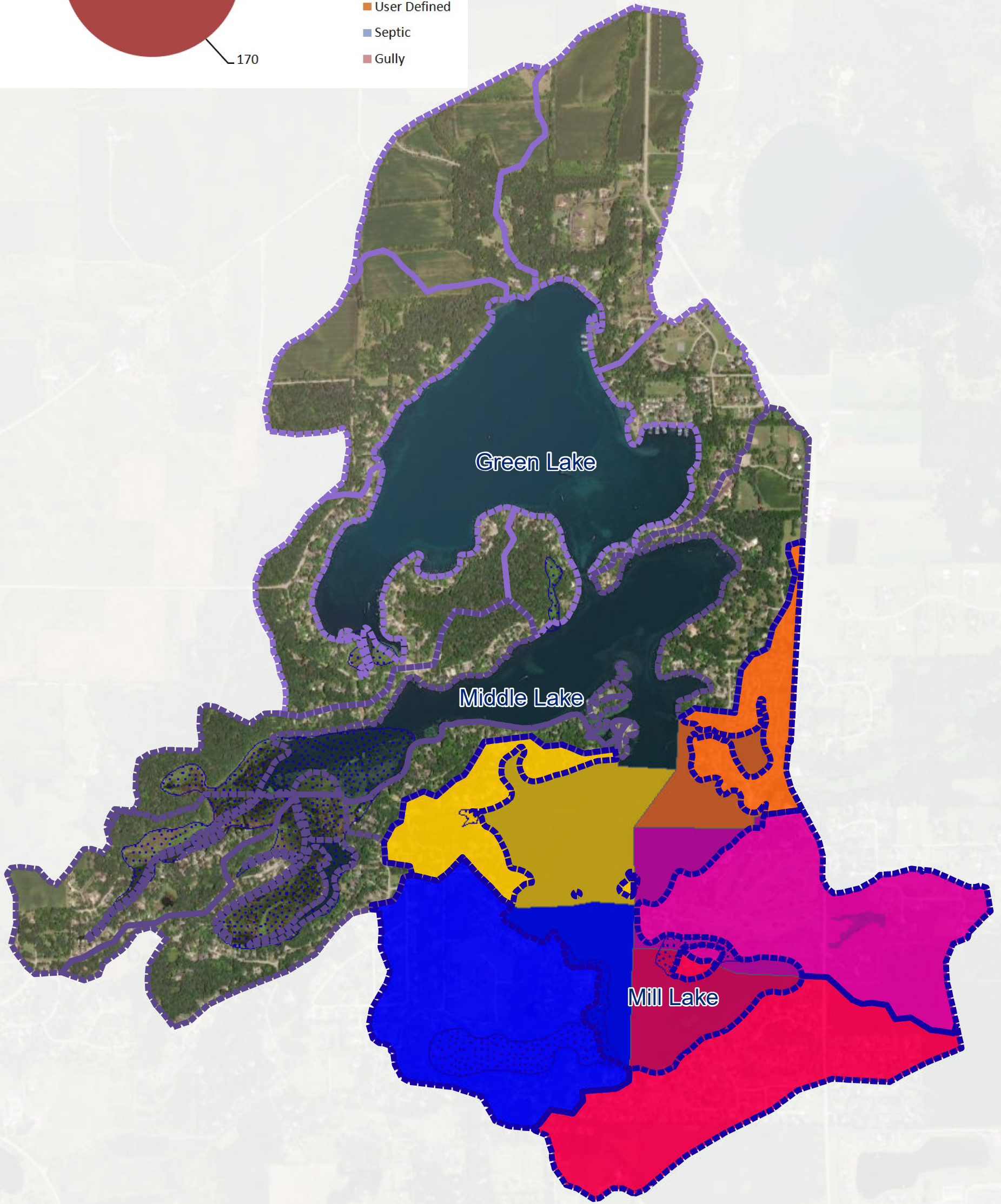
<b>Lauderdale Lakes TSS Loadings Map</b>	
Lauderdale Lakes Lake Management District (LLMD) Walworth County, Wisconsin	
 Geosyntec consultants	<b>Figure</b> <b>9</b>
Mequon, WI - MOW5536	November 2021



### Total Sediment Load by Land Uses (t/yr)

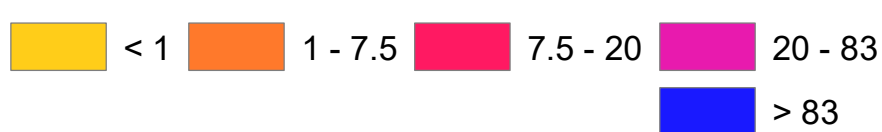


- Urban
- Cropland
- Pastureland
- Forest
- Feedlots
- User Defined
- Septic
- Gully



- Sensitive Areas
- Watershed**
- Green Lake
- Middle Lake
- Mill Lake

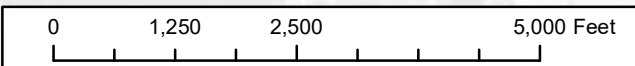
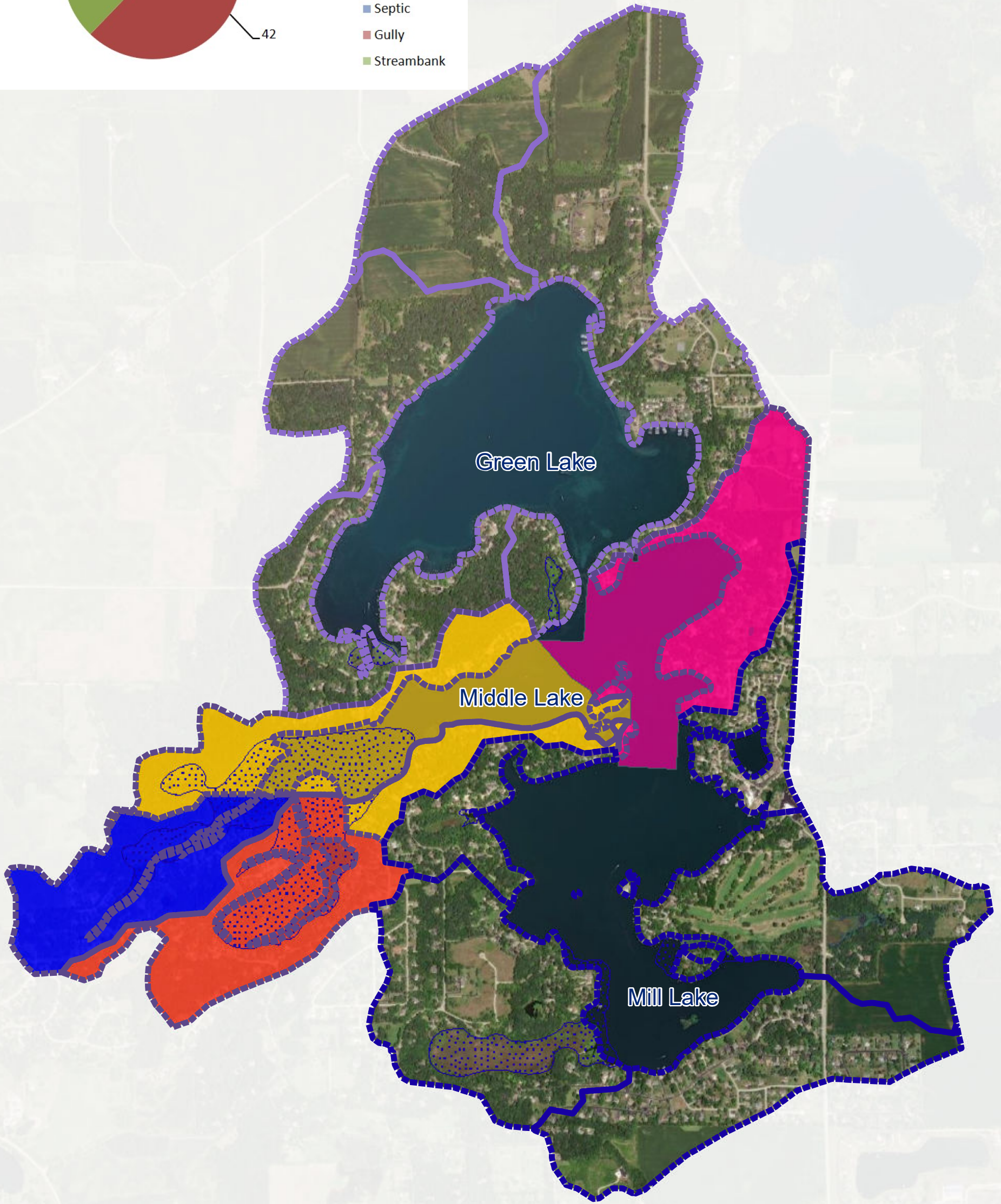
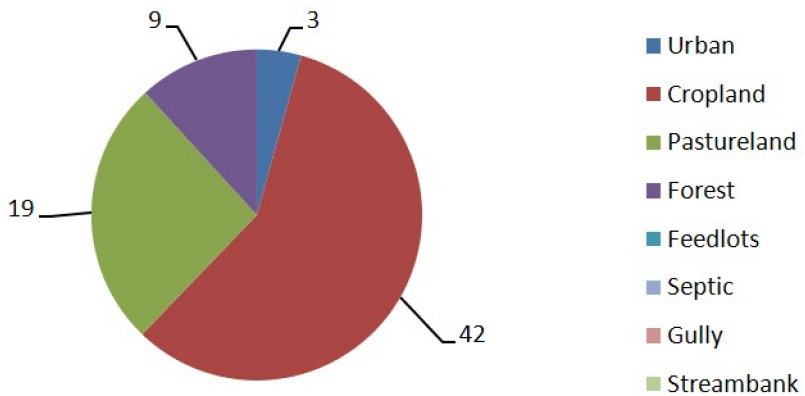
#### TSS Load (tons/yr)



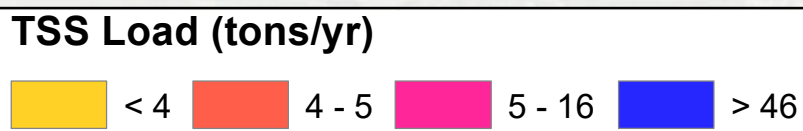
<b>Lauderdale Lakes Mill Lake TSS Loadings</b>	
Lauderdale Lakes Lake Management District (LLMD) Walworth County, Wisconsin	
 Geosyntec consultants	<b>Figure 9A</b>
Mequon, WI - MOW5536	November 2021



### Total Sediment Load by Land Uses (t/yr)



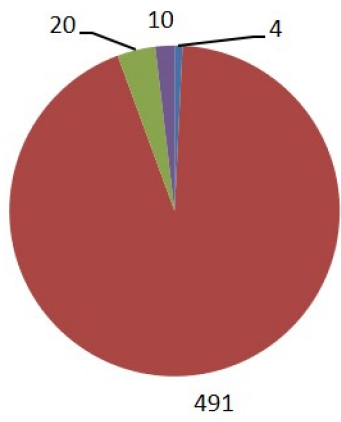
- Sensitive Areas
- Watershed**
- Green Lake
- Middle Lake
- Mill Lake



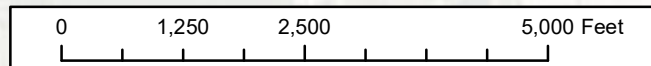
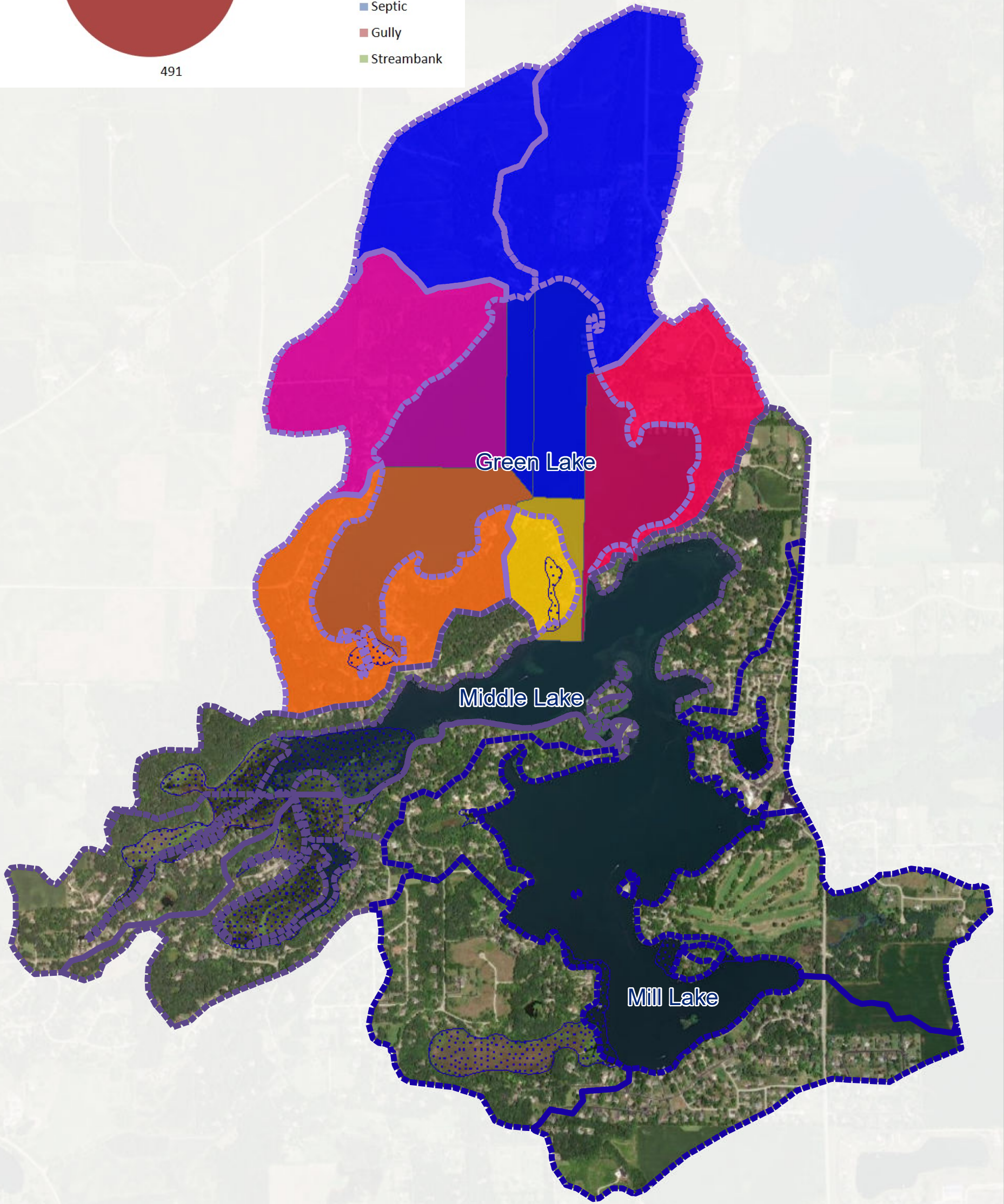
<b>Lauderdale Lakes Middle Lake TSS Loadings</b>	
Lauderdale Lakes Lake Management District (LLMD) Walworth County, Wisconsin	
 Geosyntec consultants	<b>Figure 9B</b>
Mequon, WI - MOW5536	November 2021



# Total Sediment Load by Land Uses (t/yr)

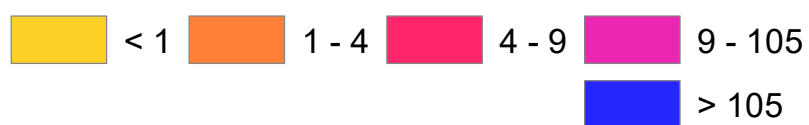


- Urban
- Cropland
- Pastureland
- Forest
- Feedlots
- Septic
- Gully
- Streambank



- Sensitive Areas
- Watershed**
- Green Lake
- Middle Lake
- Mill Lake

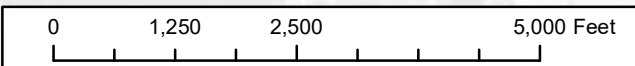
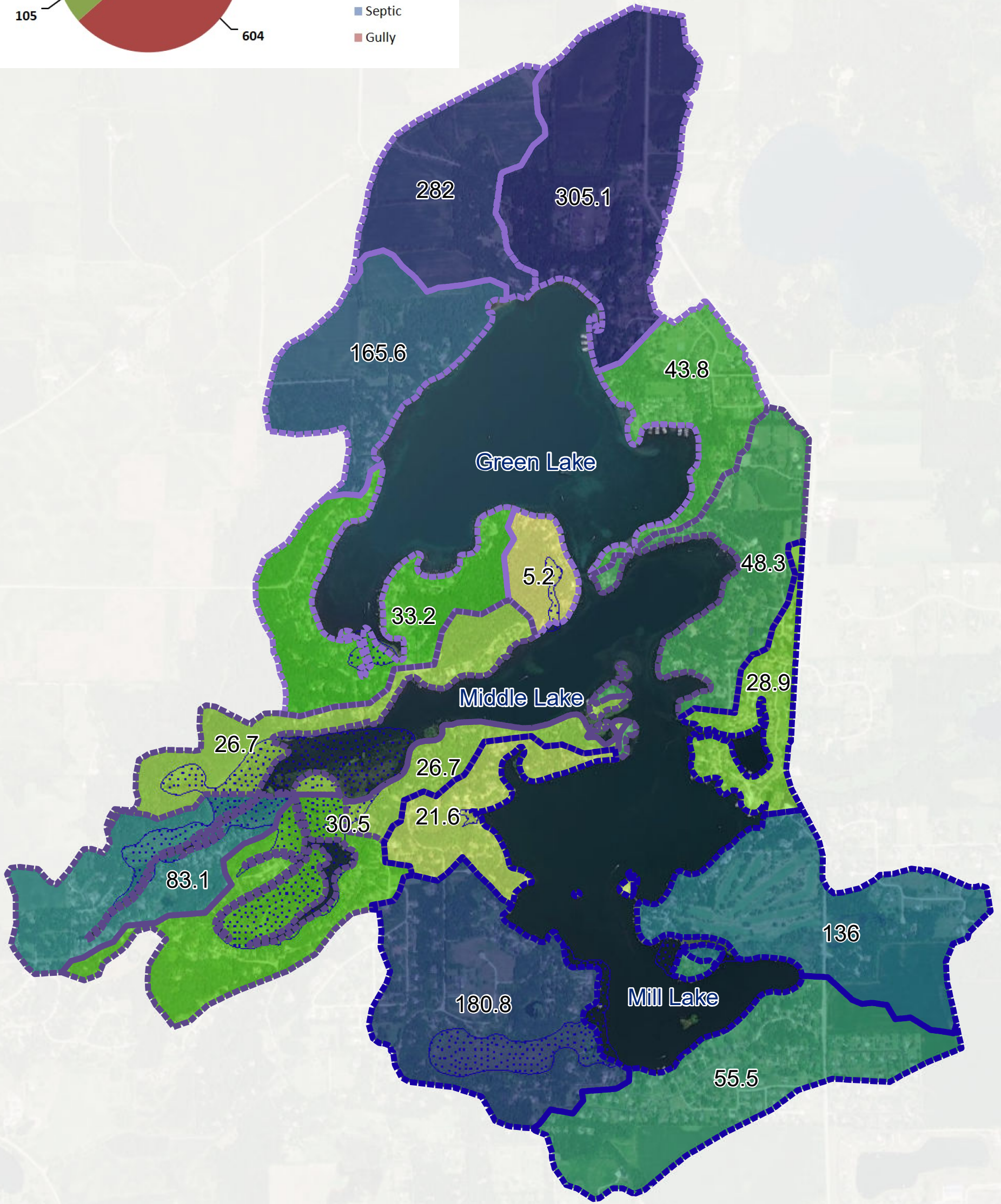
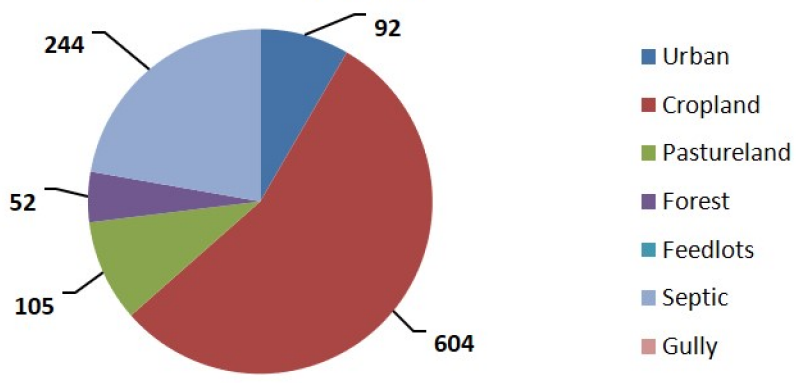
## TSS Load (tons/yr)



<b>Lauderdale Lakes Green Lake TSS Loadings</b> Lauderdale Lakes Lake Management District (LLMD) Walworth County, Wisconsin	
	<b>Figure 9C</b>
Mequon, WI - MOW5536	November 2021



### LLLD Total P Load by Land Uses (lb/yr)



Sensitive Areas		Phosphorus Load (lb/yr)			
	Green Lake	5	30 - 31	49 - 56	167 - 181
	Middle Lake	6 - 22	32 - 33	57 - 83	182 - 282
	Mill Lake	23 - 27	34 - 44	84 - 136	283 - 305
		28 - 29	45 - 48	137 - 166	



**Lauderdale Lakes  
Total Phosphorus Loadings**

Lauderdale Lakes Lake Management District (LLLMD)  
Walworth County, Wisconsin

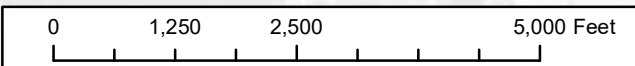
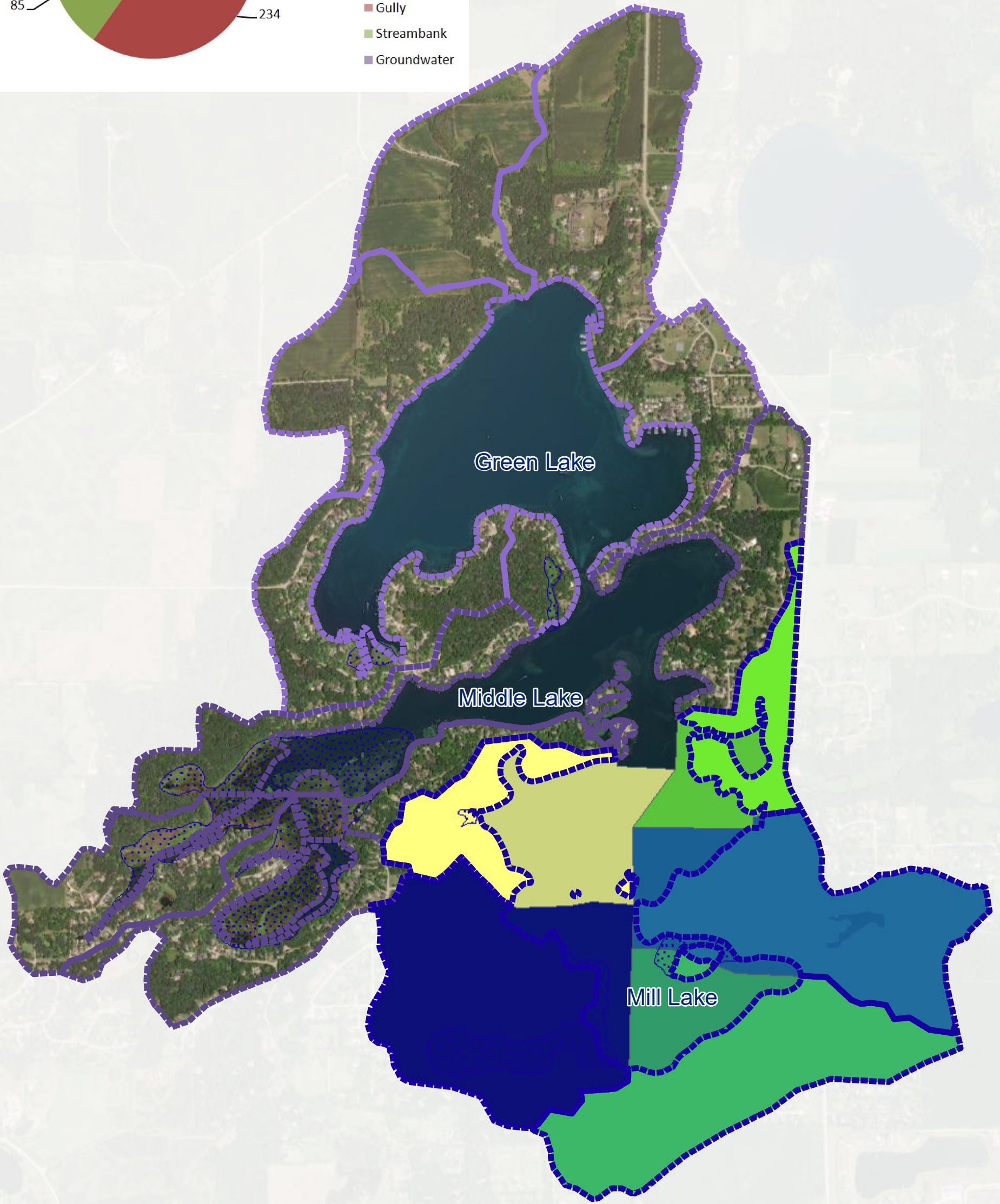
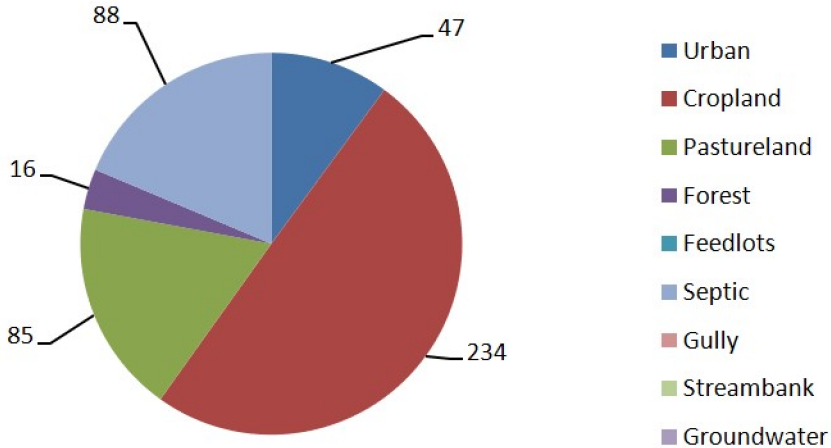
**Geosyntec**  
consultants

**Figure  
10**

Mequon, WI - MOW5536      November 2021

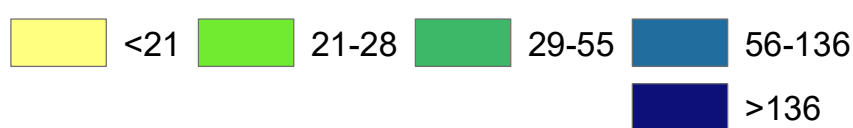


### Total P Load by Land Uses (lb/yr)



- Sensitive Areas
- Watershed**
- Green Lake
- Middle Lake
- Mill Lake

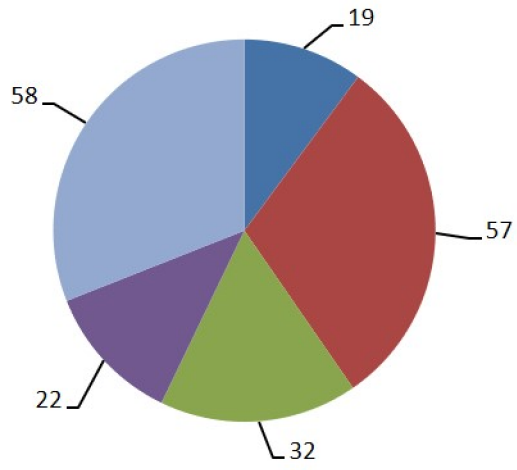
### Phosphorus Load (lb/yr)



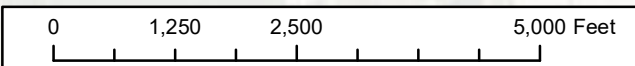
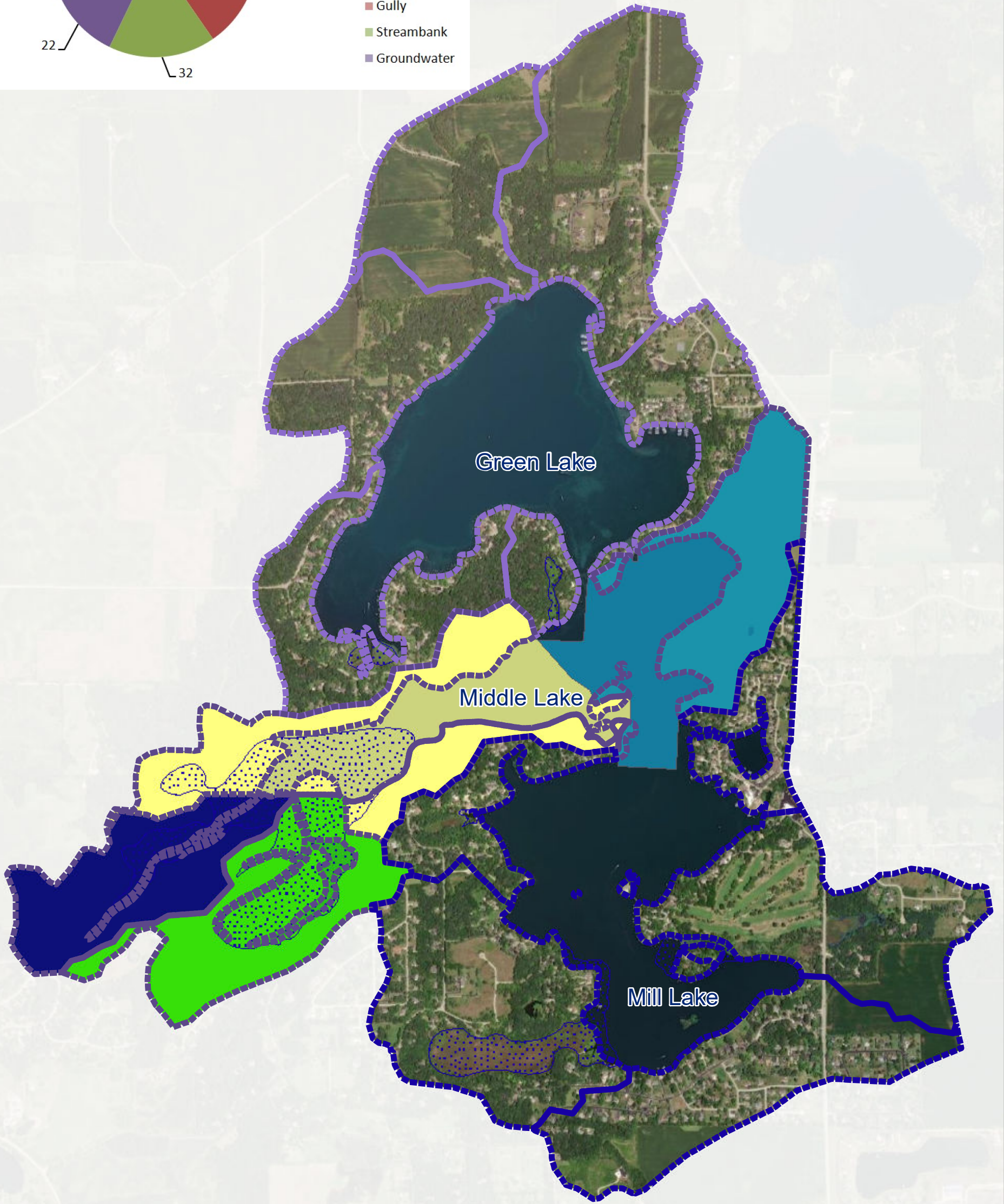
<b>Lauderdale Lakes Mill Lake Phosphorus Loading</b> Lauderdale Lakes Lake Management District (LLMD) Walworth County, Wisconsin	
	<b>Figure 10A</b>
Mequon, WI - MOW5536	November 2021



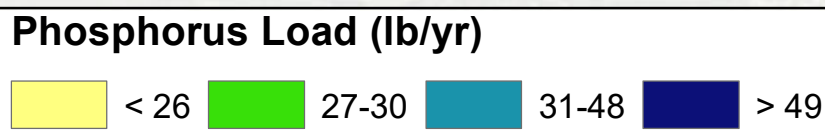
### Total P Load by Land Uses (lb/yr)



- Urban
- Cropland
- Pastureland
- Forest
- Feedlots
- Septic
- Gully
- Streambank
- Groundwater



- Sensitive Areas
- Watershed**
- Green Lake
- Middle Lake
- Mill Lake



**Lauderdale Lakes  
Middle Lake Phosphorus Loading**

Lauderdale Lakes Lake Management District (LLMD)  
Walworth County, Wisconsin

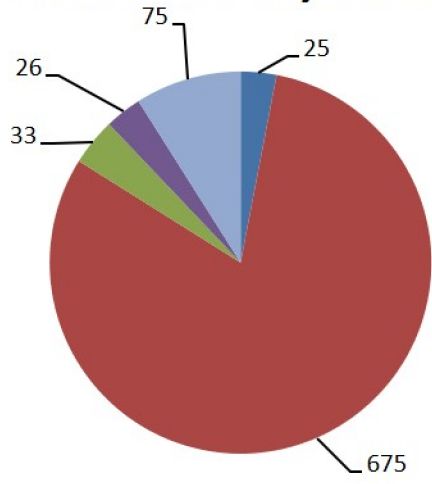
**Geosyntec**  
consultants

Mequon, WI - MOW5536      November 2021

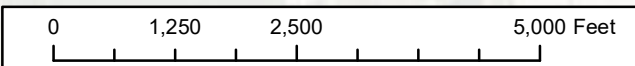
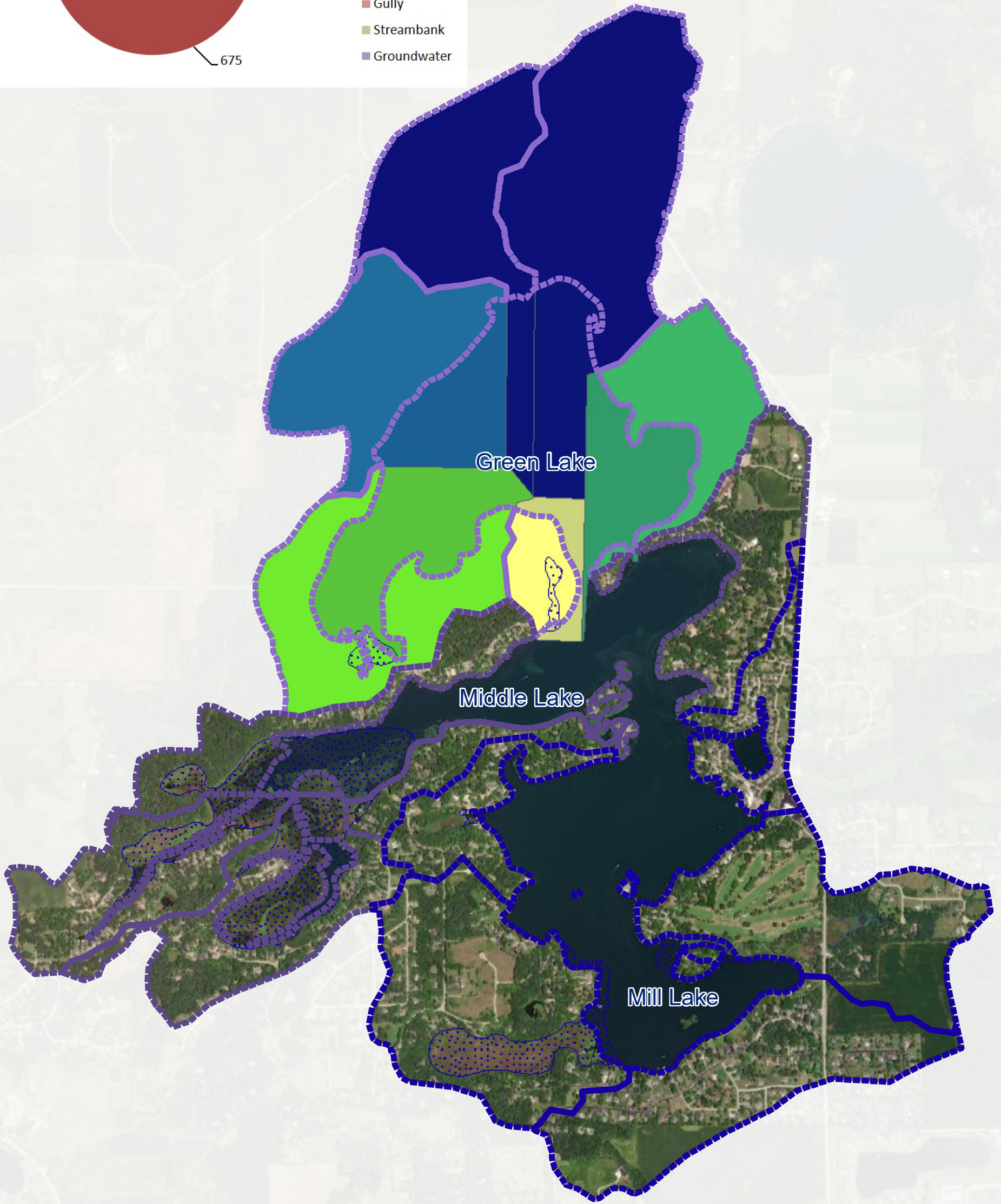
**Figure  
10B**



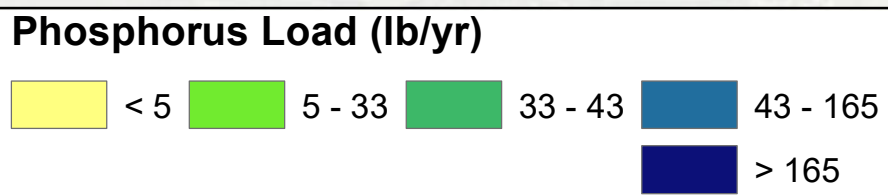
### Total P Load by Land Uses (lb/yr)



- Urban
- Cropland
- Pastureland
- Forest
- Feedlots
- Septic
- Gully
- Streambank
- Groundwater



- Sensitive Areas
- Watershed**
- Green Lake
- Middle Lake
- Mill Lake



**Lauderdale Lakes  
Green Lake Phosphorus Loading**

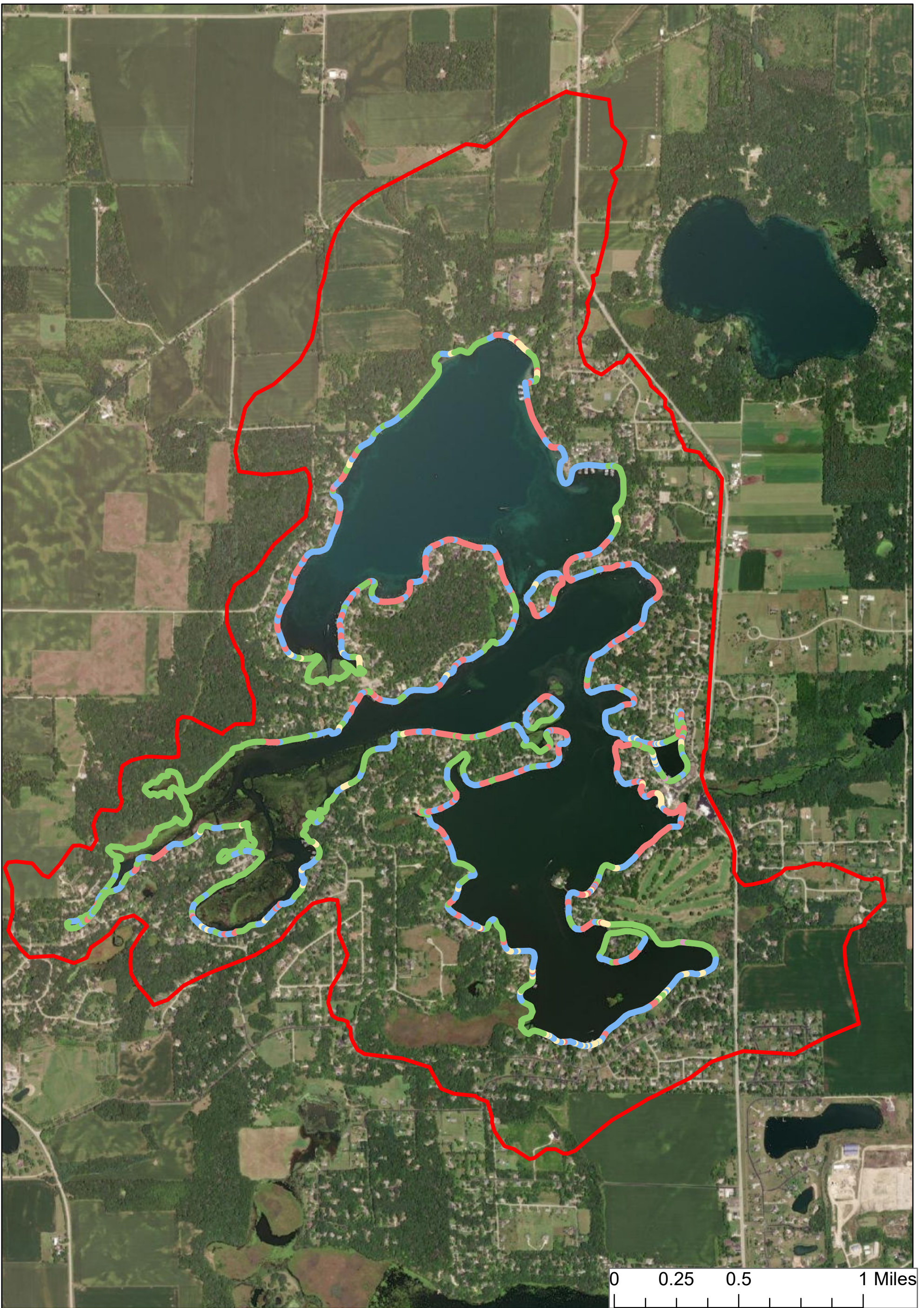
Lauderdale Lakes Lake Management District (LLMD)  
Walworth County, Wisconsin

**Geosyntec**  
consultants

**Figure  
10C**

Mequon, WI - MOW5536      November 2021





- Beach
- Bulkhead
- Natural
- Revetment
- RipRap
- USGS Direct Runoff



0 0.25 0.5 1 Miles

**Lauderdale Lakes  
Shoreline Summary**

Lauderdale Lakes Lake Management District (LLMD)  
Walworth County, Wisconsin

**Geosyntec**  
consultants

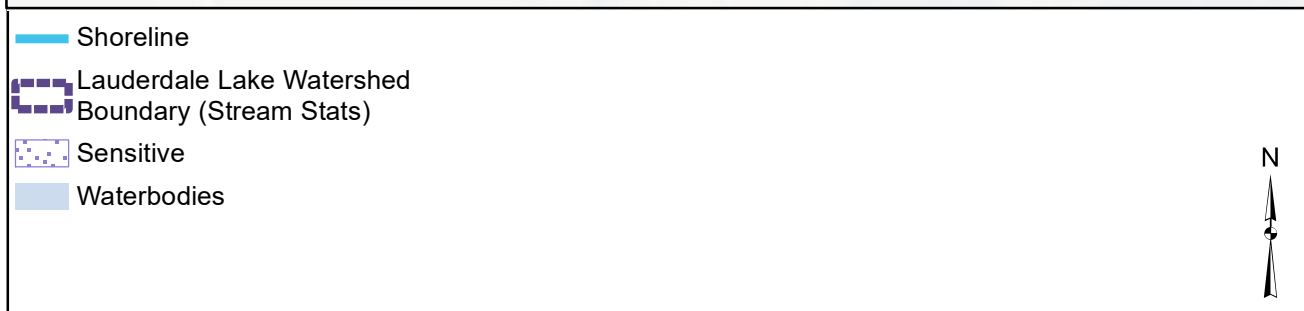
**Figure**


**11**

Mequon, WI - MOW5536

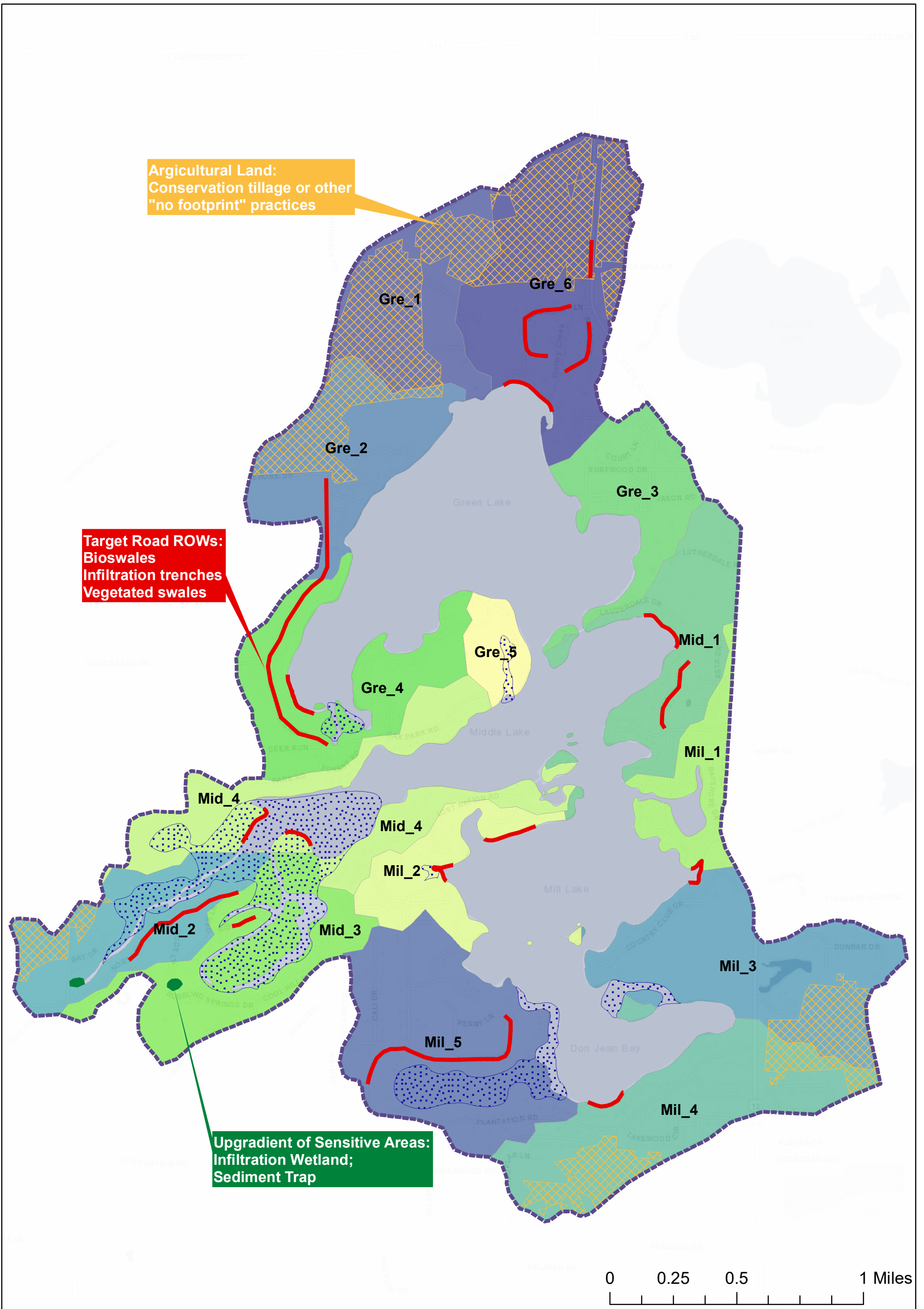
November 2021





<b>Lauderdale Lakes Wave Analysis</b> Lauderdale Lakes Lake Management District (LLMD) Walworth County, Wisconsin	
 Geosyntec consultants	<b>Figure 12</b>
Mequon, WI - MOW5536	November 2021

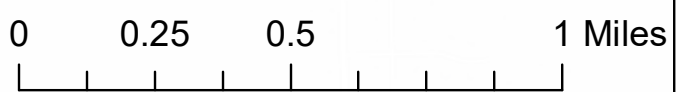




**Agricultural Land:**  
Conservation tillage or other  
"no footprint" practices

**Target Road ROWs:**  
Bioswales  
Infiltration trenches  
Vegetated swales

**Upgradient of Sensitive Areas:**  
Infiltration Wetland;  
Sediment Trap



<b>Phosphorus Load (lb/yr)</b>	32 - 33	167 - 181	Lauderdale Lake Watershed Boundary (Stream Stats)
5	34 - 44	182 - 282	Sensitive Areas
6 - 22	45 - 48	283 - 305	Waterbodies
23 - 27	49 - 56	LinearBMPs	BMPs
28 - 29	57 - 83	BMPs	Cropland BMPs
30 - 31	84 - 136	Cropland BMPs	
	137 - 166		

<b>Lauderdale Lakes BMP Placement</b>	
Lauderdale Lakes Lake Management District (LLMD) Walworth County, Wisconsin	
	<b>Figure 13</b>
Mequon, WI - MOW5536	December 2021

March 2, 2022

Mr. Jim Kroeplin, Commissioner  
Lauderdale Lakes Lake Management District  
N7511 Sterlingworth Drive  
Elkhorn, WI 53121

**Subject: Bid Assistance for Shoreline Restoration - Don Jean Bay Phases I and II  
Lauderdale Lakes – Walworth County, WI**

Dear Mr. Kroeplin:

Geosyntec Consultants, Inc. (Geosyntec) is pleased to provide The Lauderdale Lakes Lake Management District (LLLMD) with this proposed Scope of Work (SOW) to provide bidding assistance for the construction of shoreline improvements in Don Jean Bay. The scope of work as identified below is provided in support of received Surface Water Grant (SWG) funding from the Wisconsin Department of Natural Resources (WDNR) and previously submitted and approved engineering design plans by Geosyntec dated October 2020, developed in conjunction with the LLLMD. Geosyntec proposes the following SOW:

**Task 1 – Bidding Assistance:** Geosyntec will solicit bids concurrently for Don Jean Bay Phase 1 (Phase 1) and Don Jean Bay Phase 2 (Phase 2). Phase 1 will consist of previously identified and permitted bioengineered stone treatments (312 feet) and Phase 2 will consist of soft shoreline stabilization treatment only using coir fiber logs (635 feet). To evaluate competitive pricing and meet the requirements of the awarded SWGs, Geosyntec will identify and obtain competitive bids from a minimum of 3 qualified contractors. Each contractor offered to submit a bid will be required to provide minimum qualifications and representative projects with references. A summary memo will be prepared by Geosyntec for LLLMD to select a contractor.

Assumptions:

- No revisions to the approved engineering plans are anticipated.
- Permitting services are not included. These were obtained during the design phase in 2020.
- Construction Observation services are not included.
- The LLLMD will contract directly with the selected contractor
- LLLMD will coordinate with Geosyntec to establish functional contractor access to the site for Phase II restoration. Phase I has been previously established to be via boat.

DJB\_P2\_022822

**PROFESSIONAL SERVICES FEE**

We are prepared to conduct the above scope of work on a time and materials basis in accordance with the attached Service Agreement. Estimated cost of these services is \$2,000, for which shall not be exceeded without prior written approval. Individual task related costs are provided in the following table below:

TASK	Budget
Task 1 – Bidding Assistance	\$2,000
Total	\$2,000

**SCHEDULE**

Geosyntec can begin work upon your written authorization by signing below. If you have any comments or questions or if you need additional information, please call Brian at (224) 634-0562.

Sincerely,



Brian Valleskey, CLP, CFM  
Senior Scientist



Matt Bardol, P.E., CFM, CPESC, D. WRE  
Senior Principal

\*\*\*\*\*

**By its signature below and/or authorizing Geosyntec Consultants to proceed in accordance with this Proposal The Lauderdale Lakes Lake Management District (LLMD) accepts and agrees to the Services, Schedule and Compensation described above and the attached terms and conditions.**

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Title

\_\_\_\_\_  
Date

ATTACHMENT A  
PROFESSIONAL SERVICES AGREEMENT

This Professional Services Agreement (“Agreement”) is attached to and made a part of the proposal submitted to **The Lauderdale Lakes Lake Management District** (“Client”) by Geosyntec Consultants, Inc., and its subsidiaries and affiliates<sup>1</sup> (collectively “Geosyntec”), dated March 2, 2022 (“Proposal”). Geosyntec shall perform the scope of services described in the Proposal, subject to the following terms and condition upon acceptance of the Proposal or Client’s authorization to proceed. The Client and Geosyntec are referred to herein individually as “Party” and collectively as “Parties”.

**1. ACCEPTANCE OF TERMS:** The terms and conditions set forth below and the contents of the Proposal shall constitute the full Agreement between the Client and Geosyntec and shall be deemed mutually accepted and effective upon Client’s signing the Proposal, issuing an authorization to proceed with the Proposal or by payment of an invoice submitted by Geosyntec. Any changes or amendment to these terms and conditions, or conflicting terms introduced by the Client in a purchase order or other document, are expressly rejected unless both Parties agree to the changes in writing and they are incorporated into this Agreement. Any amendment must be in writing signed by Client and Geosyntec.

**2. SCOPE OF SERVICES:** The services to be provided by Geosyntec pursuant to this Agreement (“Services”) are described in the Proposal, and any amendments thereto, which shall set forth the schedule and estimated charges for the Services. If the Services are to be rendered in connection with a specific location, the Proposal shall also describe the site (“Project Site”).

**3. CLIENT RESPONSIBILITY:** Client shall provide Geosyntec, in writing, all information relating to Client’s requirements for the Project in a timely manner, give Geosyntec prompt written notice of any suspected deficiency in the Services and with reasonable promptness to avoid impacts to the progress of the Project, provide Geosyntec with approvals and decisions. When the Services include on-site activities, Client shall also correctly identify the location of subsurface structures, such as pipes, tanks, cables, and utilities and notify Geosyntec of any potential hazardous substances or other health and safety hazards or conditions known to Client existing on or near the Project Site. Client shall be responsible for obtaining all necessary permits required to execute the Services and Project work. If included in the Services, Geosyntec will assist Client with permit applications, however all impacts and obligations will be the responsibility of the Client, and Geosyntec shall not be liable for any delays related to obtaining permits, whether caused by the Client, regulatory bodies, or other third parties. In addition, Client agrees to hold Geosyntec harmless from any claim related to or arising from circumstances, acts or omissions in connection with the Project Site which occurred prior to Geosyntec providing any Services under this Agreement.

**4. COMPENSATION, INVOICING AND PAYMENT:** The method of compensation shall be identified in the Service Order. When the method of compensation is on a time and materials basis, Geosyntec shall submit invoices to Client reflecting the number of hours worked multiplied by the hourly rate reflected in Geosyntec’s rate schedule attached to the Service Order, along with any pre-approved expenses for reimbursement. The rates and rate schedule for projects lasting more than one year may be adjusted annually. The rates are inclusive of all taxes except such value added, sales, service or withholding taxes that are imposed by some jurisdictions, and which shall be explicitly identified. Any such applicable taxes will be added to the invoice and shall be paid by the Client. Geosyntec shall not be liable for taxes imposed outside the U.S., Canada, Australia, Ireland, and the United Kingdom. Where compensation

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<sup>1</sup> The defined term “Geosyntec” refers to Geosyntec Consultants, Inc., except where Services are rendered in Michigan it refers to Geosyntec Consultants of Michigan, Inc.; in New York it refers to B&B Engineers and Geologists of New York, P.C.; in Puerto Rico it refers to Geosyntec Consultants of Puerto Rico, P.C.; in North Carolina it refers to Geosyntec Consultants of NC, P.C.; in Canada it refers to Geosyntec Consultants International, Inc.; in the United Kingdom it refers to Geosyntec Consultants, Ltd.; and in Australia it refers to Geosyntec Consultants Pty. Ltd. The applicable entity shall be identified on the Service Order. Client may be billed by Geosyntec Consultants, Inc. on behalf of the affiliate.

is subject to a “not to exceed” budget such limit shall only apply to the total approved budget. Any amount allocated to a task or milestone may be exceeded without Client authorization as long as the total budget limit is not exceeded. Rates for days of actual testimony at depositions, trials, or hearings will be two times the rate shown on the rate schedule. All costs incurred and time spent by Geosyntec responding to subpoenas related to litigation which Geosyntec is not a named party shall be reimbursable in accordance with Geosyntec’s then current rate schedule.

Geosyntec shall periodically submit invoices to Client and Client shall pay each invoice within thirty (30) days of the date of the invoice. Payment shall not be conditioned upon Client’s receipt of payment from any other parties. No deductions shall be made from Geosyntec’s compensation on account of penalty, liquidated damages or other sums withheld from payments to Client or others, or on account of the cost of changes in the Services. If Client objects to all or any portion of any invoice, Client shall notify Geosyntec in writing of the objection within fifteen (15) calendar days from the date of the invoice, give reasons for the objection, and pay that portion of the invoice not in dispute.

Geosyntec may invoice Client for any expense authorized by the Client exceeding \$5,000 before the expense has been incurred by Geosyntec. Client shall pay the greater of an additional charge of one percent (1%) of the amount of the invoice per month or the maximum percentage allowed by law for any payment received by Geosyntec more than thirty (30) days from the date of the invoice. Payment thereafter shall first be applied to accrued interest and then to the unpaid principal. The additional charge shall not apply to any disputed portion of any invoice resolved in favor of Client. In the event of a legal action brought by Geosyntec against Client for invoice amounts not paid, attorneys’ fees, court costs, and other related expenses shall be paid to the prevailing party by the other Party. No deductions shall be made from Geosyntec’s compensation on account of penalty, liquidated damages or other sums withheld from payments to Client or others, or on account of the cost of changes in the Services.

In addition to the above, if payment of Geosyntec invoices is not maintained on a thirty (30) day current basis, Geosyntec may, by ten (10) days’ written notice to Client, suspend further performance and withhold any and all deliverables and data from Client until such invoice payments are restored to a current basis. If the Project Site is located in a jurisdiction which requires Geosyntec to pay any subcontractors within a stated period of time, the Client shall make payment to Geosyntec within five (5) days prior to the lapse of such time period.

**5. CHANGES:** In the event services beyond those specified in the Scope of Services are provided by Geosyntec or requested by the Client, the Parties shall negotiate an adjustment to the scope, schedule or fee, and the Service Order shall be equitably adjusted to represent such changes.

**6. RECOGNITION OF RISK:** Client recognizes that services and opinions relating to environmental, geologic, and geotechnical conditions are based on limited data and that actual conditions may vary from those encountered at the times and locations where data are obtained, and that the limited data results in uncertainty with respect to the interpretation of these conditions, despite the use of due professional care. In addition, any estimate of costs prepared by Geosyntec represents judgment as a design professional and is supplied for the general guidance of the Client. Since Geosyntec has no control over the cost of labor and material, or over competitive bidding or market conditions, Geosyntec does not guarantee the accuracy of such estimates as compared to Contractor bids or actual cost to the Client. Accordingly, any estimates, forecasts and predictions provided as part of the Services are presented solely on the basis of the assumptions accompanying the estimates, forecasts and predictions.

**7. STANDARD OF CARE:** Geosyntec shall render its Services in a manner consistent with the level of care and skill ordinarily exercised by other firms rendering the same services under similar circumstances at the time the Services are performed. The representations provided herein are provided expressly in lieu of all other warranties or conditions, express or implied. All statutory or implied warranties and conditions including but not limited to those of merchantability and fitness for a purpose are hereby expressly negated and excluded. Should an error or omission become apparent in the Services during the term of the Agreement or within ninety (90) days following the completion



of the Services, Geosyntec's liability shall be limited to the correction of the error or omission shall be contingent upon Geosyntec being notified promptly of the defect.

**8. INDEMNIFICATION:** To the fullest extent permitted by law, the Parties shall indemnify and hold harmless each other (and each of their respective officers, directors, shareholders, partners, employees, and representatives) from and against all claims, demands, causes of actions, suits, based upon or arising from allegations of illness, injuries to persons, destruction of or damage to property, costs, expenses and all reasonable expenses, legal or otherwise, to the extent arising out of the indemnifying Party's negligent acts or omissions. In addition, the Parties shall indemnify, defend, and hold harmless the other party against all loss, cost, expense, royalties, claims for damages or liability in law or in equity, including without limitation, attorney fees, court costs, and other litigation expenses that may at any time arise or be set up for any infringement (or alleged infringement) of any patent, copyright, trade secret, or other proprietary right of any person or entity in consequence of the use by indemnifying Party of any documents or materials.

**9. LIMITATION OF LIABILITY:** To the fullest extent permitted by law, the liability of Geosyntec, its employees, agents, and subcontractors for claims of loss, injury, death, damage, or expense incurred by the Client, including, without limitation, third party claims for contribution and indemnification, arising out of or relating to Services rendered or obligations imposed under this Agreement or any Service Order issued hereunder, shall not exceed, in the aggregate, the greater of \$100,000 or the amount paid to Geosyntec under the applicable Service Order. The Client shall indemnify and defend Geosyntec against any third party claims against Geosyntec exceeding the limitation of liability. In addition, neither Party shall be entitled to recover consequential damages, including, without limitation, loss of use or loss of profits, from the other Party, their employees, representatives, agents, subsidiaries, affiliates, successors or assigns. The foregoing limitations of liability shall apply regardless of whether the allegation is based on a theory of breach of contract, negligence or other wrongful act, but shall not apply if caused by gross negligence or willful misconduct.

**10. INSURANCE:** Geosyntec shall maintain during the term of this Agreement the following minimum insurance coverage:

- |       |                                    |                                     |
|-------|------------------------------------|-------------------------------------|
| (i)   | Workers' Compensation              | Statutory                           |
|       | Employer's Liability               | - \$1,000,000 per occurrence        |
| (ii)  | Commercial General Liability or    |                                     |
|       | Public Liability Insurance         | - \$1,000,000 per occurrence        |
| (iii) | Comprehensive Automobile Liability | - \$1,000,000 combined single limit |
| (iv)  | Professional Liability             | - \$1,000,000 per claim             |

Geosyntec shall provide Client with an insurance certificate upon Client's request.

**11. DISPUTES:** The Parties agree to promptly resolve their differences through good faith negotiations as a condition precedent to filing a formal claim. In the event disputes remain following such good faith negotiations between the Parties, the remaining dispute shall be submitted to a senior representative of each Party who shall have the authority to enter into an agreement to resolve the dispute ("Representative"). The Representatives shall not have been directly involved in the performance of the Subcontracted Services and shall negotiate in good faith. If the Representatives are unable to resolve the dispute within three weeks or within such longer time period as the Representatives may agree, the dispute shall be mediated by an independent third-party agreed to by both parties. Any disputes or portions thereof remaining following mediation shall be determined by remedies at law or equity, as they may be available, subject to the limitations in this Agreement. Any applicable statute of limitations on any claim in

any way related to Agreement shall commence to run and alleged cause of action shall be deemed to have accrued no later than the date of either Geosyntec's final invoice or termination of this Agreement by either Party. Both Parties agree that the applicable statute of limitations for any claims in any way related to this Agreement shall be shortened to a period not longer than two years, unless a shorter statute of limitations would otherwise apply.

**12. RIGHT OF ENTRY:** Client grants to Geosyntec, and, if the Project Site is not owned by Client, will provide that permission for a right of entry from time to time for Geosyntec, its employees, agents, and subcontractors for the purpose of providing the Services. If Geosyntec is required to enter into agreements with third parties to obtain access to property to perform the Services, such agreements must be consistent with the obligations imposed on Geosyntec under this Agreement and the Compensation, Schedule and terms and conditions of this Agreement shall be subject to an equitable adjustment to reflect additional obligations imposed thereunder. If the provisions of any written access agreement between Client and the property owner require the Client's agents, such as Geosyntec, to name the property owner as an additional insured, those provisions shall be incorporated into this Agreement. Client shall indemnify and defend Geosyntec for any liabilities or claims that may result from a right of entry agreement with legal obligations imposed upon Geosyntec greater than those in this Agreement.

**13. PROJECT SITE RESPONSIBILITIES:** If included in the Services, Geosyntec shall visit the Project Site as needed to complete the Services. Construction Observation responsibilities will occur at appropriate intervals to allow Geosyntec to become generally familiar with the progress, quality of work (contractors' work), to determine if the work is proceeding in general accordance with the contract documents. Visits to the Project Site and observations made by Geosyntec shall not make Geosyntec responsible for, nor relieve the construction contractor(s) of the full responsibility for all construction means, methods, techniques, sequences, and procedures necessary for coordinating and completing all portions of the work under the construction contract(s) and for all safety precautions incidental thereto. Geosyntec shall incur no liability for unforeseen costs and/or claims relating to the Services that arise from Project Site conditions that differ from anticipated conditions, including without limitation for any subsurface conditions or systems and/or utility configurations.

**14. HAZARDOUS SUBSTANCES:** "Hazardous Substances" shall refer to any hazardous, toxic, or dangerous substance that cannot be introduced back into the environment under existing law without additional treatment. In the event that Geosyntec encounters unanticipated Hazardous Substances, it may suspend work for safety reasons until mutually agreeable arrangements are made, including but not limited to amendments to this Agreement. Solely upon Client's request, Geosyntec may assist Client in identifying options for off-site treatment, storage or disposal of the Hazardous Substances. Geosyntec will not make any independent determination relating to the selection of a treatment, storage, or disposal facility nor subcontract such activities through transporters or others. Client shall sign all necessary manifests for the disposal of Hazardous Substances. In the event Parties mutually agree that Geosyntec will sign manifests, Geosyntec will only sign as agent on behalf of Client, and Geosyntec will not be a generator, transporter, or disposer of the Hazardous Substances. Client shall indemnify, defend, and hold harmless Geosyntec against any claim or loss resulting from such signing and from Geosyntec's handling of Hazardous Substances.

**15. CONFIDENTIALITY:** Geosyntec will maintain as confidential the provisions of this Agreement and any business information that is not generally known to, and cannot be readily ascertained by others, and which a reasonable person under the circumstances would consider confidential and will not release, distribute, or publish same or Geosyntec's test results to any third party without prior permission from Client, unless required by law, order of a court or regulatory body of competent jurisdiction. Such release will occur only after prior notice to Client.

**16. INTELLECTUAL PROPERTY AND USE OF DOCUMENTS:** Provided that Geosyntec has been fully paid for the Services, Client shall have a perpetual, non-transferable license and right to use the documents, maps, photographs, drawings, and specifications resulting from Geosyntec's efforts on the Project. Except where necessary to give effect to the foregoing limited license, Geosyntec is not granting Client any license for Geosyntec's patents, patent applications, patent disclosures, inventions and improvements (whether patentable or not), copyrights,

copyrightable works (including computer programs), trade secrets, trademarks, service marks, know-how, database rights, or any other form of intellectual property created, developed, or conceived outside the performance of Services. Geosyntec shall have the right to retain copies of all such materials. Work products delivered in electronic form are subject to anomalies, errors, misinterpretation, deterioration, and unauthorized modification, or may be draft or incomplete work products, electronic documents provided by Geosyntec are furnished solely for convenience and only those professional work products in hard-copy format bearing Geosyntec's signature or professional stamp may be relied upon by Client or other recipients approved in writing. Geosyntec may rely upon data provided by Client or other third parties without independent verification unless otherwise provided in the Service Order. If the Services include the use of a GIS database Client acknowledges that any changes to the information contained in the database will result in different results. The Client will be solely responsible for any modifications to the database made by Client.

Geosyntec is performing the Services under this Agreement solely for Client and solely with respect to the Project, and not for any other party or purpose. No party other than Client shall be entitled to rely on any reports or recommendations provided by Geosyntec as part of the Services ("Reports") without Geosyntec's separate written consent, and Geosyntec shall have no liability for the use of any Reports by any party for any purpose other than the Project. Client will indemnify, defend and hold Geosyntec harmless from any claims by third parties arising from the use of any Reports.

**17. DELAYS AND FORCE MAJEURE:** Geosyntec shall not be responsible for any delays resulting from actions or inactions of the Client or third parties. In the event that Geosyntec field or technical work is interrupted due to causes reasonably outside of its control, Geosyntec's schedule for performance and compensation shall be equitably adjusted (in accordance with Geosyntec's current Rate Schedule) for the additional labor, equipment, time, and other charges associated with maintaining its work force and equipment available during the interruption, and for such similar charges that are incurred by Geosyntec for demobilization and subsequent remobilization.

Except for the foregoing provision, neither Party shall hold the other responsible for damages or delays in performance caused by force majeure, acts of God, or other events beyond the reasonable control of the other Party. Delays within the scope of this Section which cumulatively exceed forty-five (45) days shall, at the option of either Party, make the applicable Service Order subject to termination for convenience or to renegotiation.

**18. SUSPENSION/TERMINATION:** If a Service Order or Geosyntec's Services are suspended by the Client for more than thirty (30) days, upon resumption of Services the Client shall compensate Geosyntec for expenses incurred as a result of the suspension and resumption of Services and Geosyntec's schedule and fees for the remainder of the Services shall be equitably adjusted. If the Services are suspended for more than ninety days, consecutive or in the aggregate, Geosyntec may terminate the Service Order upon giving not less than five (5) days written notice to the Client.

Either Party can terminate this Agreement for cause if the other commits a material and uncured breach of this Agreement, including untimely payment, or becomes insolvent, has a receiver appointed, or makes a general assignment for the benefit of creditors. Termination for cause shall be effective five (5) calendar days after receipt of a written notice of termination, unless a later date is specified in the notice of termination. The notice of termination for cause shall contain specific reasons for termination, and both Parties shall cooperate in good faith to cure the causes for termination stated in the notice of termination. Termination for cause shall not be effective if reasonable action to cure the breach has been taken before the effective date of the termination. Client shall pay Geosyntec upon invoice for services performed and charges incurred prior to suspension or termination, plus suspension and termination charges. Termination charges shall include, without limitation, the putting of Project documents and analyses in order and all other related charges incurred which are directly attributable to termination. In the event of termination for



cause, the Parties shall have their remedies at law as to other rights and obligations between them, subject to the other terms and conditions of this Agreement.

**19. ASSIGNMENT AND THIRD PARTY RIGHTS:** Neither Party to this Agreement shall assign its duties and obligations hereunder without the prior written consent of the other Party. This Agreement shall not create any rights or benefits to Parties other than Client and Geosyntec.

**20. VALIDITY, SEVERABILITY AND GOVERNING LAW:** The provisions of this Agreement shall be enforced to the fullest extent permitted by law. If any provision of this Agreement is found to be invalid or unenforceable, the provision shall be construed and applied in a way that comes as close as possible to expressing the intention of the Parties with regard to the provisions and that saves the validity and enforceability of the provision. This Agreement shall be governed by the laws of the place of the Project Site unless expressly provided otherwise in the Service Order. In the event that any provision or portion of this Agreement is held to be unenforceable or invalid the remaining provisions or portions shall remain in full force and effect.

**21. INTEGRATED WRITING:** This Agreement constitutes a final and complete repository of the agreements between Client and Geosyntec. It supersedes all prior or contemporaneous communications, representations, or agreements, whether oral or written, relating to the subject matter of this Agreement. Modifications to the terms and conditions of this Agreement shall not be binding unless made in writing and agreed to by both Parties. Any written authorization or notice to proceed given by the Client to Geosyntec regarding Services shall be incorporated into the relevant Service Order and shall have the effect of attaching this Agreement to the authorized Services.

**22. NOTICES, SIGNATURES AND AUTHORIZED REPRESENTATIVES:** The following signatories of this Agreement are the authorized representatives of Client and Geosyntec for the execution of this Agreement. Each Service Order shall set forth the name and address of the respective authorized representatives of the Parties for the administration of that Service Order. Any information or notices required or permitted under this Agreement or any Service Order shall be deemed to have been sufficiently given if in writing and delivered to the authorized representative identified in the applicable Service Order. Notice given by mail may also be transmitted electronically at the time of mailing.

February 22, 2022

Lauderdale Lakes Lake Management District (LLMD)  
c/o Jim Kroeplin, Commissioner  
N7498 Country Club Drive  
Elkhorn, WI 53121

**Subject: Proposal for Dam Inspection & Documentation  
Town of LaGrange, Walworth County, Wisconsin**

Dear Jim:

Thank you for this opportunity to submit a proposal to you for providing professional consulting services as outlined herein to perform a dam inspection with report for the Lauderdale Lakes Dam as requested by the WDNR. Geosyntec Consultants (Geosyntec) offers the following services described in detail below for the LLMD:

**Task 1 – Dam Inspection and Report:** Geosyntec will notify the LLMD and the Wisconsin Department of Natural Resources (WDNR) that Geosyntec intends to perform the dam inspection at the main outfall, the Sterlingworth Drive embankment, and lagoon culvert area. Geosyntec will inspect the dam structure(s), the dam embankment, wing-walls, spillway, approach, and downstream confluence with Honey Creek in accordance with WDNR dam safety guidelines. Geosyntec will prepare a written report suitable for submittal to WDNR as required for their dam safety program. Geosyntec will provide recommendations to the LLMD should there be any specific concerns regarding the operations and maintenance of the dam.

**Task 2 – Meetings & Reimbursables:** Attendance at meetings, such as client, governmental, village, or other meeting not directly associated with the proposal scope defined above. This includes any prep work needed to attend those meetings such as generating exhibits, agendas, presentations, or the like. Reimbursables shall include outside consultant's fees, vehicle mileage, reproduction costs, messenger or special mail service, or other project-related expenses.

#### **PROFESSIONAL SERVICES FEE**

We are prepared to conduct the above scope of work on a lump sum basis in accordance with the attached Service Agreement. The total estimated cost to perform the outlined services is \$2,450.

LLMD 2022(1)

PHASE 1 TASKS	Budget
Task 1 – Dam Inspection and Documentation	\$2,300
Task 2 – Meetings and Reimbursables	\$150
Total	\$2,450

**SCHEDULE**

Geosyntec can begin work under each phase of the project upon your written authorization by signing below. If you have any comments or questions or if you need additional information, please call Brian at (224) 634-0562.

Sincerely,



Brian Valleskey, CLP, CFM  
Senior Scientist



Matt Bardol, P.E., CFM, CPESC, D. WRE  
Senior Principal

\*\*\*\*\*

By its signature below, Lauderdale Lakes Lake Management District accepts and agrees to the Services, Schedule and Compensation described above and authorizes Geosyntec Consultants to proceed with the outlined Scope of Work and Cost Estimate.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Title

\_\_\_\_\_  
Date

ATTACHMENT A  
PROFESSIONAL SERVICES AGREEMENT

This Professional Services Agreement (“Agreement”) is attached to and made a part of the proposal submitted to **the Lauderdale Lakes Lake Management District** (“Client”) by Geosyntec Consultants, Inc., and its subsidiaries and affiliates<sup>1</sup> (collectively “Geosyntec”), dated February 22, 2022 (“Proposal”). Geosyntec shall perform the scope of services described in the Proposal, subject to the following terms and condition upon acceptance of the Proposal or Client’s authorization to proceed. The Client and Geosyntec are referred to herein individually as “Party” and collectively as “Parties”.

**1. ACCEPTANCE OF TERMS:** The terms and conditions set forth below and the contents of the Proposal shall constitute the full Agreement between the Client and Geosyntec and shall be deemed mutually accepted and effective upon Client’s signing the Proposal, issuing an authorization to proceed with the Proposal or by payment of an invoice submitted by Geosyntec. Any changes or amendment to these terms and conditions, or conflicting terms introduced by the Client in a purchase order or other document, are expressly rejected unless both Parties agree to the changes in writing and they are incorporated into this Agreement. Any amendment must be in writing signed by Client and Geosyntec.

**2. SCOPE OF SERVICES:** The services to be provided by Geosyntec pursuant to this Agreement (“Services”) are described in the Proposal, and any amendments thereto, which shall set forth the schedule and estimated charges for the Services. If the Services are to be rendered in connection with a specific location, the Proposal shall also describe the site (“Project Site”).

**3. CLIENT RESPONSIBILITY:** Client shall provide Geosyntec, in writing, all information relating to Client’s requirements for the Project in a timely manner, give Geosyntec prompt written notice of any suspected deficiency in the Services and with reasonable promptness to avoid impacts to the progress of the Project, provide Geosyntec with approvals and decisions. When the Services include on-site activities, Client shall also correctly identify the location of subsurface structures, such as pipes, tanks, cables, and utilities and notify Geosyntec of any potential hazardous substances or other health and safety hazards or conditions known to Client existing on or near the Project Site. Client shall be responsible for obtaining all necessary permits required to execute the Services and Project work. If included in the Services, Geosyntec will assist Client with permit applications, however all impacts and obligations will be the responsibility of the Client, and Geosyntec shall not be liable for any delays related to obtaining permits, whether caused by the Client, regulatory bodies, or other third parties. In addition, Client agrees to hold Geosyntec harmless from any claim related to or arising from circumstances, acts or omissions in connection with the Project Site which occurred prior to Geosyntec providing any Services under this Agreement.

**4. COMPENSATION, INVOICING AND PAYMENT:** The method of compensation shall be identified in the Service Order. When the method of compensation is on a time and materials basis, Geosyntec shall submit invoices to Client reflecting the number of hours worked multiplied by the hourly rate reflected in Geosyntec’s rate schedule attached to the Service Order, along with any pre-approved expenses for reimbursement. The rates and rate schedule for projects lasting more than one year may be adjusted annually. The rates are inclusive of all taxes except such value added, sales, service or withholding taxes that are imposed by some jurisdictions, and which shall be explicitly

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<sup>1</sup> The defined term “Geosyntec” refers to Geosyntec Consultants, Inc., except where Services are rendered in Michigan it refers to Geosyntec Consultants of Michigan, Inc.; in New York it refers to B&B Engineers and Geologists of New York, P.C.; in Puerto Rico it refers to Geosyntec Consultants of Puerto Rico, P.C.; in North Carolina it refers to Geosyntec Consultants of NC, P.C.; in Canada it refers to Geosyntec Consultants International, Inc.; in the United Kingdom it refers to Geosyntec Consultants, Ltd.; and in Australia it refers to Geosyntec Consultants Pty. Ltd. The applicable entity shall be identified on the Service Order. Client may be billed by Geosyntec Consultants, Inc. on behalf of the affiliate.

identified. Any such applicable taxes will be added to the invoice and shall be paid by the Client. Geosyntec shall not be liable for taxes imposed outside the U.S., Canada, Australia, Ireland, and the United Kingdom. Where compensation is subject to a “not to exceed” budget such limit shall only apply to the total approved budget. Any amount allocated to a task or milestone may be exceeded without Client authorization as long as the total budget limit is not exceeded. Rates for days of actual testimony at depositions, trials, or hearings will be two times the rate shown on the rate schedule. All costs incurred and time spent by Geosyntec responding to subpoenas related to litigation which Geosyntec is not a named party shall be reimbursable in accordance with Geosyntec’s then current rate schedule.

Geosyntec shall periodically submit invoices to Client and Client shall pay each invoice within thirty (30) days of the date of the invoice. Payment shall not be conditioned upon Client’s receipt of payment from any other parties. No deductions shall be made from Geosyntec’s compensation on account of penalty, liquidated damages or other sums withheld from payments to Client or others, or on account of the cost of changes in the Services. If Client objects to all or any portion of any invoice, Client shall notify Geosyntec in writing of the objection within fifteen (15) calendar days from the date of the invoice, give reasons for the objection, and pay that portion of the invoice not in dispute.

Geosyntec may invoice Client for any expense authorized by the Client exceeding \$5,000 before the expense has been incurred by Geosyntec. Client shall pay the greater of an additional charge of one percent (1%) of the amount of the invoice per month or the maximum percentage allowed by law for any payment received by Geosyntec more than thirty (30) days from the date of the invoice. Payment thereafter shall first be applied to accrued interest and then to the unpaid principal. The additional charge shall not apply to any disputed portion of any invoice resolved in favor of Client. In the event of a legal action brought by Geosyntec against Client for invoice amounts not paid, attorneys’ fees, court costs, and other related expenses shall be paid to the prevailing party by the other Party. No deductions shall be made from Geosyntec’s compensation on account of penalty, liquidated damages or other sums withheld from payments to Client or others, or on account of the cost of changes in the Services.

In addition to the above, if payment of Geosyntec invoices is not maintained on a thirty (30) day current basis, Geosyntec may, by ten (10) days’ written notice to Client, suspend further performance and withhold any and all deliverables and data from Client until such invoice payments are restored to a current basis. If the Project Site is located in a jurisdiction which requires Geosyntec to pay any subcontractors within a stated period of time, the Client shall make payment to Geosyntec within five (5) days prior to the lapse of such time period.

**5. CHANGES:** In the event services beyond those specified in the Scope of Services are provided by Geosyntec or requested by the Client, the Parties shall negotiate an adjustment to the scope, schedule or fee, and the Service Order shall be equitably adjusted to represent such changes.

**6. RECOGNITION OF RISK:** Client recognizes that services and opinions relating to environmental, geologic, and geotechnical conditions are based on limited data and that actual conditions may vary from those encountered at the times and locations where data are obtained, and that the limited data results in uncertainty with respect to the interpretation of these conditions, despite the use of due professional care. In addition, any estimate of costs prepared by Geosyntec represents judgment as a design professional and is supplied for the general guidance of the Client. Since Geosyntec has no control over the cost of labor and material, or over competitive bidding or market conditions, Geosyntec does not guarantee the accuracy of such estimates as compared to Contractor bids or actual cost to the Client. Accordingly, any estimates, forecasts and predictions provided as part of the Services are presented solely on the basis of the assumptions accompanying the estimates, forecasts and predictions.

**7. STANDARD OF CARE:** Geosyntec shall render its Services in a manner consistent with the level of care and skill ordinarily exercised by other firms rendering the same services under similar circumstances at the time the Services are performed. The representations provided herein are provided expressly in lieu of all other warranties or conditions, express or implied. All statutory or implied warranties and conditions including but not limited to those of



merchantability and fitness for a purpose are hereby expressly negated and excluded. Should an error or omission become apparent in the Services during the term of the Agreement or within ninety (90) days following the completion of the Services, Geosyntec's liability shall be limited to the correction of the error or omission shall be contingent upon Geosyntec being notified promptly of the defect.

**8. INDEMNIFICATION:** To the fullest extent permitted by law, the Parties shall indemnify and hold harmless each other (and each of their respective officers, directors, shareholders, partners, employees, and representatives) from and against all claims, demands, causes of actions, suits, based upon or arising from allegations of illness, injuries to persons, destruction of or damage to property, costs, expenses and all reasonable expenses, legal or otherwise, to the extent arising out of the indemnifying Party's negligent acts or omissions. In addition, the Parties shall indemnify, defend, and hold harmless the other party against all loss, cost, expense, royalties, claims for damages or liability in law or in equity, including without limitation, attorney fees, court costs, and other litigation expenses that may at any time arise or be set up for any infringement (or alleged infringement) of any patent, copyright, trade secret, or other proprietary right of any person or entity in consequence of the use by indemnifying Party of any documents or materials.

**9. LIMITATION OF LIABILITY:** To the fullest extent permitted by law, the liability of Geosyntec, its employees, agents, and subcontractors for claims of loss, injury, death, damage, or expense incurred by the Client, including, without limitation, third party claims for contribution and indemnification, arising out of or relating to Services rendered or obligations imposed under this Agreement or any Service Order issued hereunder, shall not exceed, in the aggregate, the greater of \$100,000 or the amount paid to Geosyntec under the applicable Service Order. The Client shall indemnify and defend Geosyntec against any third party claims against Geosyntec exceeding the limitation of liability. In addition, neither Party shall be entitled to recover consequential damages, including, without limitation, loss of use or loss of profits, from the other Party, their employees, representatives, agents, subsidiaries, affiliates, successors or assigns. The foregoing limitations of liability shall apply regardless of whether the allegation is based on a theory of breach of contract, negligence or other wrongful act, but shall not apply if caused by gross negligence or willful misconduct.

**10. INSURANCE:** Geosyntec shall maintain during the term of this Agreement the following minimum insurance coverage:

(i)	Workers' Compensation	Statutory
	Employer's Liability	- \$1,000,000 per occurrence
(ii)	Commercial General Liability or Public Liability Insurance	- \$1,000,000 per occurrence
(iii)	Comprehensive Automobile Liability	- \$1,000,000 combined single limit
(iv)	Professional Liability	- \$1,000,000 per claim

Geosyntec shall provide Client with an insurance certificate upon Client's request.

**11. DISPUTES:** The Parties agree to promptly resolve their differences through good faith negotiations as a condition precedent to filing a formal claim. In the event disputes remain following such good faith negotiations between the Parties, the remaining dispute shall be submitted to a senior representative of each Party who shall have the authority to enter into an agreement to resolve the dispute ("Representative"). The Representatives shall not have been directly involved in the performance of the Subcontracted Services and shall negotiate in good faith. If the Representatives are unable to resolve the dispute within three weeks or within such longer time period as the Representatives may agree, the dispute shall be mediated by an independent third-party agreed to by both parties. Any

disputes or portions thereof remaining following mediation shall be determined by remedies at law or equity, as they may be available, subject to the limitations in this Agreement. Any applicable statute of limitations on any claim in any way related to Agreement shall commence to run and alleged cause of action shall be deemed to have accrued no later than the date of either Geosyntec's final invoice or termination of this Agreement by either Party. Both Parties agree that the applicable statute of limitations for any claims in any way related to this Agreement shall be shortened to a period not longer than two years, unless a shorter statute of limitations would otherwise apply.

**12. RIGHT OF ENTRY:** Client grants to Geosyntec, and, if the Project Site is not owned by Client, will provide that permission for a right of entry from time to time for Geosyntec, its employees, agents, and subcontractors for the purpose of providing the Services. If Geosyntec is required to enter into agreements with third parties to obtain access to property to perform the Services, such agreements must be consistent with the obligations imposed on Geosyntec under this Agreement and the Compensation, Schedule and terms and conditions of this Agreement shall be subject to an equitable adjustment to reflect additional obligations imposed thereunder. If the provisions of any written access agreement between Client and the property owner require the Client's agents, such as Geosyntec, to name the property owner as an additional insured, those provisions shall be incorporated into this Agreement. Client shall indemnify and defend Geosyntec for any liabilities or claims that may result from a right of entry agreement with legal obligations imposed upon Geosyntec greater than those in this Agreement.

**13. PROJECT SITE RESPONSIBILITIES:** If included in the Services, Geosyntec shall visit the Project Site as needed to complete the Services. Construction Observation responsibilities will occur at appropriate intervals to allow Geosyntec to become generally familiar with the progress, quality of work (contractors' work), to determine if the work is proceeding in general accordance with the contract documents. Visits to the Project Site and observations made by Geosyntec shall not make Geosyntec responsible for, nor relieve the construction contractor(s) of the full responsibility for all construction means, methods, techniques, sequences, and procedures necessary for coordinating and completing all portions of the work under the construction contract(s) and for all safety precautions incidental thereto. Geosyntec shall incur no liability for unforeseen costs and/or claims relating to the Services that arise from Project Site conditions that differ from anticipated conditions, including without limitation for any subsurface conditions or systems and/or utility configurations.

**14. HAZARDOUS SUBSTANCES:** "Hazardous Substances" shall refer to any hazardous, toxic, or dangerous substance that cannot be introduced back into the environment under existing law without additional treatment. In the event that Geosyntec encounters unanticipated Hazardous Substances, it may suspend work for safety reasons until mutually agreeable arrangements are made, including but not limited to amendments to this Agreement. Solely upon Client's request, Geosyntec may assist Client in identifying options for off-site treatment, storage or disposal of the Hazardous Substances. Geosyntec will not make any independent determination relating to the selection of a treatment, storage, or disposal facility nor subcontract such activities through transporters or others. Client shall sign all necessary manifests for the disposal of Hazardous Substances. In the event Parties mutually agree that Geosyntec will sign manifests, Geosyntec will only sign as agent on behalf of Client, and Geosyntec will not be a generator, transporter, or disposer of the Hazardous Substances. Client shall indemnify, defend, and hold harmless Geosyntec against any claim or loss resulting from such signing and from Geosyntec's handling of Hazardous Substances.

**15. CONFIDENTIALITY:** Geosyntec will maintain as confidential the provisions of this Agreement and any business information that is not generally known to, and cannot be readily ascertained by others, and which a reasonable person under the circumstances would consider confidential and will not release, distribute, or publish same or Geosyntec's test results to any third party without prior permission from Client, unless required by law, order of a court or regulatory body of competent jurisdiction. Such release will occur only after prior notice to Client.

**16. INTELLECTUAL PROPERTY AND USE OF DOCUMENTS:** Provided that Geosyntec has been fully paid for the Services, Client shall have a perpetual, non-transferable license and right to use the documents, maps, photographs, drawings, and specifications resulting from Geosyntec's efforts on the Project. Except where necessary

to give effect to the foregoing limited license, Geosyntec is not granting Client any license for Geosyntec's patents, patent applications, patent disclosures, inventions and improvements (whether patentable or not), copyrights, copyrightable works (including computer programs), trade secrets, trademarks, service marks, know-how, database rights, or any other form of intellectual property created, developed, or conceived outside the performance of Services. Geosyntec shall have the right to retain copies of all such materials. Work products delivered in electronic form are subject to anomalies, errors, misinterpretation, deterioration, and unauthorized modification, or may be draft or incomplete work products, electronic documents provided by Geosyntec are furnished solely for convenience and only those professional work products in hard-copy format bearing Geosyntec's signature or professional stamp may be relied upon by Client or other recipients approved in writing. Geosyntec may rely upon data provided by Client or other third parties without independent verification unless otherwise provided in the Service Order. If the Services include the use of a GIS database Client acknowledges that any changes to the information contained in the database will result in different results. The Client will be solely responsible for any modifications to the database made by Client.

Geosyntec is performing the Services under this Agreement solely for Client and solely with respect to the Project, and not for any other party or purpose. No party other than Client shall be entitled to rely on any reports or recommendations provided by Geosyntec as part of the Services ("Reports") without Geosyntec's separate written consent, and Geosyntec shall have no liability for the use of any Reports by any party for any purpose other than the Project. Client will indemnify, defend and hold Geosyntec harmless from any claims by third parties arising from the use of any Reports.

**17. DELAYS AND FORCE MAJEURE:** Geosyntec shall not be responsible for any delays resulting from actions or inactions of the Client or third parties. In the event that Geosyntec field or technical work is interrupted due to causes reasonably outside of its control, Geosyntec's schedule for performance and compensation shall be equitably adjusted (in accordance with Geosyntec's current Rate Schedule) for the additional labor, equipment, time, and other charges associated with maintaining its work force and equipment available during the interruption, and for such similar charges that are incurred by Geosyntec for demobilization and subsequent remobilization.

Except for the foregoing provision, neither Party shall hold the other responsible for damages or delays in performance caused by force majeure, acts of God, or other events beyond the reasonable control of the other Party. Delays within the scope of this Section which cumulatively exceed forty-five (45) days shall, at the option of either Party, make the applicable Service Order subject to termination for convenience or to renegotiation.

**18. SUSPENSION/TERMINATION:** If a Service Order or Geosyntec's Services are suspended by the Client for more than thirty (30) days, upon resumption of Services the Client shall compensate Geosyntec for expenses incurred as a result of the suspension and resumption of Services and Geosyntec's schedule and fees for the remainder of the Services shall be equitably adjusted. If the Services are suspended for more than ninety days, consecutive or in the aggregate, Geosyntec may terminate the Service Order upon giving not less than five (5) days written notice to the Client.

Either Party can terminate this Agreement for cause if the other commits a material and uncured breach of this Agreement, including untimely payment, or becomes insolvent, has a receiver appointed, or makes a general assignment for the benefit of creditors. Termination for cause shall be effective five (5) calendar days after receipt of a written notice of termination, unless a later date is specified in the notice of termination. The notice of termination for cause shall contain specific reasons for termination, and both Parties shall cooperate in good faith to cure the causes for termination stated in the notice of termination. Termination for cause shall not be effective if reasonable action to cure the breach has been taken before the effective date of the termination. Client shall pay Geosyntec upon invoice for services performed and charges incurred prior to suspension or termination, plus suspension and termination charges. Termination charges shall include, without limitation, the putting of Project documents and analyses in order

and all other related charges incurred which are directly attributable to termination. In the event of termination for cause, the Parties shall have their remedies at law as to other rights and obligations between them, subject to the other terms and conditions of this Agreement.

**19. ASSIGNMENT AND THIRD PARTY RIGHTS:** Neither Party to this Agreement shall assign its duties and obligations hereunder without the prior written consent of the other Party. This Agreement shall not create any rights or benefits to Parties other than Client and Geosyntec.

**20. VALIDITY, SEVERABILITY AND GOVERNING LAW:** The provisions of this Agreement shall be enforced to the fullest extent permitted by law. If any provision of this Agreement is found to be invalid or unenforceable, the provision shall be construed and applied in a way that comes as close as possible to expressing the intention of the Parties with regard to the provisions and that saves the validity and enforceability of the provision. This Agreement shall be governed by the laws of the place of the Project Site unless expressly provided otherwise in the Service Order. In the event that any provision or portion of this Agreement is held to be unenforceable or invalid the remaining provisions or portions shall remain in full force and effect.

**21. INTEGRATED WRITING:** This Agreement constitutes a final and complete repository of the agreements between Client and Geosyntec. It supersedes all prior or contemporaneous communications, representations, or agreements, whether oral or written, relating to the subject matter of this Agreement. Modifications to the terms and conditions of this Agreement shall not be binding unless made in writing and agreed to by both Parties. Any written authorization or notice to proceed given by the Client to Geosyntec regarding Services shall be incorporated into the relevant Service Order and shall have the effect of attaching this Agreement to the authorized Services.

**22. NOTICES, SIGNATURES AND AUTHORIZED REPRESENTATIVES:** The following signatories of this Agreement are the authorized representatives of Client and Geosyntec for the execution of this Agreement. Each Service Order shall set forth the name and address of the respective authorized representatives of the Parties for the administration of that Service Order. Any information or notices required or permitted under this Agreement or any Service Order shall be deemed to have been sufficiently given if in writing and delivered to the authorized representative identified in the applicable Service Order. Notice given by mail may also be transmitted electronically at the time of mailing.



PROFESSIONAL SERVICES AGREEMENT  
BETWEEN CLIENT AND PROFESSIONAL

THIS IS AN AGREEMENT effective as of \_\_\_\_\_ ("Effective Date") between \_\_\_\_\_ ("Client") and R.A. Smith, Inc. ("Professional").

Client's Project, of which Professional's services under this Agreement are a part, is generally identified as follows:

\_\_\_\_\_ ("Project").

Professional's services under this Agreement are generally identified as follows:

\_\_\_\_\_ ("Services").

Client and Professional further agree as follows:

1.01 *Basic Agreement and Period of Service*

- A. Professional shall provide or furnish the Services solely for the benefit of Client as set forth in this Agreement and in the attached proposal. If authorized by Client, or if required because of changes in the Project, Professional shall furnish services in addition to those set forth above ("Additional Services").

2.01 *Payment Procedures*

- A. *Invoices:* Professional shall prepare invoices in accordance with its standard invoicing practices and submit the invoices to Client on a monthly basis. Invoices are due and payable within 30 days of invoice date. If Client fails to make any payment due Professional for Services, Additional Services, and expenses within 30 days after receipt of Professional's invoice, then (1) the amounts due Professional will be increased at the rate of 1.0% per month (or the maximum rate of interest permitted by law, if less) from said thirtieth day, and (2) in addition Professional may, after giving seven days written notice to Client, suspend Services under this Agreement until Professional has been paid in full all amounts due for Services, Additional Services, expenses, and other related charges. Client waives any and all claims against Professional for any such suspension.
- B. *Payment:* As compensation for Professional providing or furnishing Services and Additional Services, Client shall pay Professional as set forth in this agreement. If Client disputes an invoice, either as to amount or entitlement, then Client shall promptly advise Professional in writing of the specific basis for doing so, may withhold only that portion so disputed, and must pay the undisputed portion.

2.02 *Basis of Payment*

- A. Client shall pay Professional for Services in the amount and manner provided in the attached proposal.
- B. *Additional Services:* Unless specified in the attached proposal, for Additional Services, Client shall pay Professional an amount equal to the cumulative hours charged in providing the Additional Services by each class of Professional's employees, times standard hourly rates for each applicable billing class; plus reimbursement of expenses incurred in connection with providing the Additional Services and Professional's consultants' charges, if any.

3.01 *Suspension and Termination*

- A. The obligation to continue performance under this Agreement may be suspended:
1. *By Client:* Client may suspend the Project for up to 90 days upon seven days written notice to Professional.
  2. *By Professional:* Professional may, after giving seven days written notice to Client, suspend services under this Agreement if Client has failed to pay Professional for invoiced services and expenses, as set forth in this Agreement.
- B. The obligation to continue performance under this Agreement may be terminated:
1. For cause,
    - a. By either party upon 14 days written notice in the event of substantial failure by the other party to perform in accordance with the Agreement's terms through no fault of the terminating party. Failure to pay Professional for its services is a substantial failure to perform and a basis for termination.
    - b. By Professional:
      - 1) upon seven days written notice if Client demands that Professional furnish or perform services contrary to Professional's responsibilities as a licensed professional; or
      - 2) upon seven days written notice if the Professional's Services are delayed for more than 90 days for reasons beyond Professional's control, or as the result of the presence at the Site of undisclosed Constituents of Concern.
    - c. By Client, for convenience, effective upon Professional's receipt of written notice from Client



- d. Professional shall have no liability to Client on account of a termination for cause by Professional.
  - e. Notwithstanding the foregoing, this Agreement will not terminate as a result of a substantial failure under this section if the party receiving such notice begins, within seven days of receipt of such notice, to correct its substantial failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of notice; provided, however, that if and to the extent such substantial failure cannot be reasonably cured within such 30 day period, and if such party has diligently attempted to cure the same and thereafter continues diligently to cure the same, then the cure period provided for herein shall extend up to, but in no case more than, 60 days after the date of receipt of the notice.
- C. In the event of any termination under this section, Professional will be entitled to invoice Client and to receive full payment for all Services and Additional Services performed or furnished in accordance with this Agreement, plus reimbursement of expenses incurred through the effective date of termination in connection with providing the Services and Additional Services, and Professional's consultants' charges, if any.

#### 4.01 *Successors, Assigns, and Beneficiaries*

- A. Client and Professional are hereby bound and the successors, executors, administrators, and legal representatives of Client and Professional are hereby bound to the other party to this Agreement and to the successors, executors, administrators, and legal representatives (and said assigns) of such other party, in respect of all covenants, agreements, and obligations of this Agreement.
- B. Neither Client nor Professional may assign, sublet, or transfer any rights under or interest (including, but without limitation, money that is due or may become due) in this Agreement without the written consent of the other party, except to the extent that any assignment, subletting, or transfer is mandated by law. Unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under this Agreement.
- C. Unless expressly provided otherwise, nothing in this Agreement shall be construed to create, impose, or give rise to any duty owed by Client or Professional to any Constructor, other third-party individual or entity, or to any surety for or employee of any of them. All duties and responsibilities undertaken pursuant to this Agreement will be for the sole and exclusive benefit of Client and Professional and not for the benefit of any other party.

#### 5.01 *General Considerations*

##### A. Standard of Care

The standard of care for all professional engineering and related services performed or furnished by Professional under this Agreement will be the care and skill ordinarily used by members of the subject profession practicing under similar circumstances at the same time and in the same locality. Professional makes no warranties, express or implied, under this Agreement or otherwise, in connection with any services performed or furnished by Professional. Subject to the foregoing standard of care, Professional and its consultants may use or rely upon design elements and information ordinarily or customarily furnished by others, including, but not limited to, specialty contractors, manufacturers, suppliers, and the publishers of technical standards.

##### B. Design Without Construction Phase Services

Professional shall not at any time supervise, direct, control, or have authority over any Constructor's work, nor shall Professional have authority over or be responsible for the means, methods, techniques, sequences, or procedures of construction selected or used by any Constructor, or the safety precautions and programs incident thereto, for security or safety at the Project site, nor for any failure of a Constructor to comply with laws and regulations applicable to such Constructor's furnishing and performing of its work. Professional shall not be responsible for the acts or omissions of any Constructor. Professional neither guarantees the performance of any Constructor nor assumes responsibility for any Constructor's failure to furnish and perform its work.

##### C. Opinions of Cost

Professional's opinions (if any) of probable construction cost are to be made on the basis of Professional's experience, qualifications, and general familiarity with the construction industry. However, because Professional has no control over the cost of labor, materials, equipment, or services furnished by others, or over contractors' methods of determining prices, or over competitive bidding or market conditions, Professional cannot and does not guarantee that proposals, bids, or actual construction cost will not vary from opinions of probable construction cost prepared by Professional. If Client requires greater assurance as to probable construction cost, then Client agrees to obtain an independent cost estimate. Professional shall not be responsible for any decision made regarding the construction contract requirements, or any application, interpretation, clarification, or modification of the construction contract documents other than those made by Professional or its consultants.

##### D. Use of Documents

All documents prepared or furnished by Professional are instruments of service, and Professional retains an ownership and property interest (including the copyright and the right of reuse) in such documents, whether or not the Project is completed. Client shall have a limited license to use the documents on the Project, extensions of the Project, and for related uses of the Client, subject to receipt by Professional of full payment due and owing for all Services and Additional Services relating to preparation of the documents and subject to the following limitations:

1. Client acknowledges that such documents are not intended or represented to be suitable for use on the Project unless completed by Professional, or for use or reuse by Client or others on extensions of the Project, on any other project, or for any other use or purpose, without written verification or adaptation by Professional;

2. Any such use or reuse, or any modification of the documents, without written verification, completion, or adaptation by Professional, as appropriate for the specific purpose intended, will be at Client's sole risk and without liability or legal exposure to Professional or to its officers, directors, members, partners, agents, employees, and consultants;
3. Client shall indemnify and hold harmless Professional and its officers, directors, members, partners, agents, employees, and consultants from all claims, damages, losses, and expenses, including attorneys' fees, arising out of or resulting from any use, reuse, or modification of the documents without written verification, completion, or adaptation by Professional; and
4. Such limited license to Client shall not create any rights in third parties.

E. Liability

To the fullest extent permitted by Laws and Regulations, and notwithstanding any other provision of this Agreement, the total liability, in the aggregate, of Professional and Professional's officers, directors, employees, and Consultants, to Client and anyone claiming by, through, or under Client for any and all injuries, claims, losses, expenses, costs, or damages whatsoever arising out of, resulting from, or in any way related to the Project, Professional's or its Consultants services or this Agreement from any cause or causes whatsoever, including but not limited to the negligence, professional errors or omissions, strict liability, breach of contract, indemnity obligations, or warranty express or implied of Professional or Professional's officers, directors, employees, or Consultants shall not exceed the total amount of \$100,000 or the total compensation received by Professional under this Agreement, whichever is less.

F. Indemnification

To the fullest extent permitted by Laws and Regulations, Client shall indemnify and hold harmless Professional and Professional's officers, directors, employees, and Consultants from and against any and all claims, costs, losses and damages (including but not limited to all fees and charges of Professionals, architects, attorneys, and other professionals, and all court, arbitration, or other dispute resolution costs) arising out of or relating to the Project, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, but only to the extent caused by any negligent act or omission of the Client or Client's officers, directors, members, partners, agents, employees, consultants, or others retained by or under contract to the Client with respect to this Agreement or to the Project.

G. Dispute Resolution

Client and Professional agree to negotiate each dispute between them in good faith during the 30 days after written notice of dispute. If negotiations are unsuccessful in resolving the dispute, then the dispute shall be mediated. If mediation is unsuccessful, then the parties may exercise their rights at law. The venue for all disputes shall be the state of Wisconsin. Attorney fees will be borne by the non-prevailing party.

H. Governing Law

This Agreement is to be governed by the law of the state of Wisconsin.

6.01 *Agreement*

- A. This Agreement (including any expressly incorporated attachments), constitutes the entire agreement between Client and Professional and supersedes all prior written or oral understandings. This Agreement may only be amended, supplemented, modified, or canceled by a duly executed written instrument. Nothing in this Agreement between Professional and Client shall create a contractual relationship between either Professional and Client and an outside third party.

7.01 *Lien Notice*

- A. As required by the Wisconsin construction lien law, Professional hereby notifies Client that persons or companies performing, furnishing, or procuring labor, services, materials, plans, or specifications for the construction on Client's land may have lien rights on Client's land and buildings if not paid. Those entitled to lien rights, in addition to the undersigned Professional, are those who contract directly with the Client or those who give the Client notice within 60 days after they first perform, furnish, or procure labor, services, materials, plans or specifications for the construction. Accordingly, Client probably will receive notices from those who perform, furnish, or procure labor, services, materials, plans, or specifications for the construction, and should give a copy of each notice received to the mortgage lender, if any. Professional agrees to cooperate with the Client and the Client's lender, if any, to see that all potential lien Professionals are duly paid.



IN WITNESS WHEREOF, the parties hereto have executed this Agreement, the Effective Date of which is indicated on page 1.

Project Name: \_\_\_\_\_

Client: \_\_\_\_\_

Professional: \_\_\_\_\_

By: \_\_\_\_\_

By: \_\_\_\_\_

Print name: \_\_\_\_\_

Print name: \_\_\_\_\_

Title: \_\_\_\_\_

Title: \_\_\_\_\_

Date Signed: \_\_\_\_\_

Date Signed: \_\_\_\_\_

Address for Client's receipt of notices:

Address for Professional's receipt of notices:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

R.A. Smith, Inc.  
\_\_\_\_\_  
16745 West Bluemound Road  
\_\_\_\_\_  
Brookfield, WI 53005  
\_\_\_\_\_

Client's Phone: \_\_\_\_\_

Professional's Phone: \_\_\_\_\_

Client's Email: \_\_\_\_\_

Professional's Email: \_\_\_\_\_

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The purpose of this policy is to establish guidelines to be followed during the use of mobile audio and video recording equipment.

## I. POLICY

All sworn officers on patrol will wear department issued mobile audio/video recording equipment at all times unless unavailable.

## II. DISCUSSION

## III. DEFINITIONS

- A. **USE OF FORCE INCIDENT:** Any amount of force beyond cooperative handcuffing used by an officer to control an uncooperative person.
- B. **MOBILE AUDIO/VIDEO RECORDING EQUIPMENT:** Portable, wireless, electronic devices designed for capturing audio and/or video recordings. This includes mobile audio/video recording equipment s.

## IV. PROCEDURE

- A. Care and use of the mobile audio/video recording equipment is the responsibility of the officer assigned to that equipment and shall be used in conformity with LLLEP policy and training.
- B. Prior to each shift, officers shall determine whether their recording equipment is working properly and shall report any problems to a Sergeant as soon as practical.
- C. Mobile audio/video recording equipment should generally be worn on or near the officer's chest and worn near the officer's centerline.
  - 1. The purpose is to put the camera in the best position to record as much audio/video information as possible.
  - 2. Officers are not expected to jeopardize their safety in exchange for obtaining better audio/video recordings.
- D. The mobile audio/video recording equipment shall be turned on prior to contacting the public. Officers shall record their interactions while in direct or indirect (telephonic) contact with the public. Continuous, non-stop recording during all official citizen contacts or incidents of an enforcement nature is required. Examples include but are not limited to:
  - 1. All officer/subject contacts during traffic stops.
  - 2. All officer/subject contacts during an arrest including approach, custody, statements, transportation, police department booking process and release.
  - 3. All officer/subject contacts of arrested subjects taken to the

- 
- Walworth County Jail. Recordings will cease upon entry to these facilities unless approved by facility staff.
4. Any other contacts with persons under circumstances that lead the officer to believe that the specifics of the contact may need to be retrieved or reviewed.
  5. When responding "Lights and Siren" to any call.
  6. All official telephonic conversations.
- E. Unless in conflict with Section D, the mobile audio/video recording equipment may be deactivated during non-enforcement activities such as:
1. Officer-to-officer conversations about items such as charging issues and other general conversations,
  2. Protecting accident scenes from other traffic,
  3. Conducting extended traffic or crowd control,
  4. Awaiting a service vehicle,
  5. Rescue calls not of enforcement nature,
  6. Other routine non-official citizen contact incidents.
  7. During attendance at public functions or meetings.
- F. Officers shall document in all pertinent reports whenever recordings are made during an incident.
- G. Each officer equipped with a mobile audio/video recording equipment shall record enforcement contacts they are participating in. If multiple officers are involved in an enforcement contact, all officers will record the contact. Officers are encouraged to inform supervisory staff of any recorded sequences that may be of value for training purposes.
- H. Officers shall not intentionally alter recordings in any way.
- I. Officers shall not use mobile audio/video recording equipment to record personal conversations, i.e. disciplinary actions, administrative discussions, union discussions, supervisor's directives, or talks between employees.
- J. Use of mobile audio/video recording equipment for on-duty, official police business only.
1. Officers are reminded of the restrictions in Wisconsin State Statute 175.22 prohibiting audio or video recording in locker rooms. In the event of such recording being created, those recordings may be



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deleted by the Chief of Police prior to 120 days.

V. RECORDING CONTROL AND MANAGEMENT

- A. Recordings are subject to existing State of Wisconsin open records laws.
  - 1. A reproduction fee for the duplication of recordings will be established by LLE, the Lauderdale Lake District and/or Town of LaGrange.
  - 2. Recordings may be duplicated for another criminal justice agency when required for trial, or otherwise authorized by the Chief or the Chief's designee.
- B. Recordings may be shown to LLE employees for training, quality assurance and evaluation purposes.
  - 1. Recordings may be shown to persons other than LLE employees provided prior approval is obtained from the Chief or the Chief's designee.
  - 2. Recordings will be provided to the respective District Attorney's Offices for purpose of evidence and upon mutual aid requests from other law enforcement agencies.
- C. There are four levels of recording control and management located within the digital storage system.
  - 1. Download Folder
    - a. All video files will be downloaded automatically to this folder.
    - b. This folder is for immediate downloads and temporary storage only until the officer determines the proper storage of the video file.
    - c. Officers will need to review these files as soon as possible to determine if the files need to be saved, downloaded to other saved locations and/or placed in the appropriate folders. All files in this folder need to be addressed in some manner within fourteen (14) days of download.
    - d. Officers will have 120 days to determine if the video files need to be saved and take proper filing action.
  - 2. General Folder
    - a. All video files of contact with the public that have no immediate evidentiary value at the time they were taken will be saved in this file.

- b. This file will be purged only when deemed appropriate by the Chief of Police or designated Sergeant.

3. Evidence Folder

- a. Evidentiary recordings will be saved in the "Video Evidence" file and maintained as required by law and subject to corresponding open record requests.
- b. All recordings that have the potential for use in court will be saved in the evidence folder under the appropriate file number and deleted as per open records policies only by the Chief or appointed Sergeant.
- c. All recordings of use of force incidents, pursuits and arrests will be maintained as evidence.

4. Administrative Hold Folder

- a. Recordings not otherwise denoted above may be placed on administrative hold by a supervisor.

5. 120 Day Hold

Recordings in the "Download" file will be saved for 120 days.

----- Original Message -----

Subject: Fwd: US Highway 12

Date: 2022-02-17 12:05

From: G Petersen <[garwood2@elknet.net](mailto:garwood2@elknet.net)>

To: Jack Sorenson <[jackn7481@gmail.com](mailto:jackn7481@gmail.com)>, Debbie Ferrari <[Debbie8725@aol.com](mailto:Debbie8725@aol.com)>, [dbostrom@lauderdalelakedistrict.com](mailto:dbostrom@lauderdalelakedistrict.com)

Evidently the DOT has taken the "Red Line" off their projects list and appears unwilling to consider restarting the Environmental Study terminated in 2016. Do you have any ideas on how we could get it restarted?

Jerry Petersen

----- Forwarded Message -----

SUBJECT:  
US Highway 12

DATE:  
Thu, 17 Feb 2022 14:55:52 +0000

FROM:  
Jenks, Julie - DOT <[Julie.Jenks@dot.wi.gov](mailto:Julie.Jenks@dot.wi.gov)>

TO:  
[garwood2@elknet.net](mailto:garwood2@elknet.net) <[garwood2@elknet.net](mailto:garwood2@elknet.net)>

CC:  
Quesnell, Chris <[chris.quesnell@lakesideengineers.com](mailto:chris.quesnell@lakesideengineers.com)>

Mr. Petersen,

Thank you for the email in response to . The US 12 bypass is not in the program and the Department of Transportation does not plan to add it to the program due to higher priorities elsewhere in the region and state.

This corridor went through the Majors Alpha Study process a few years ago. It was legislatively mandated in the 13-15 biennium to commence the environmental study process, without fiscal constraint. The study was stopped in 2016 because it was determined a new freeway on alternate alignment was not warranted or justified. It was removed from the Majors study projects list in Fall 2016.

At the December 2020 Transportation Projects Commission (TPC) meeting, the Department of Transportation recommended this study be removed from

the list of approved Major Highway Studies. The TPC concurred with the recommendation and the realignment of US 12, Whitewater to Elkhorn, is no longer being studied.

Both projects on US 12 between County P and US 12/WIS 67 split have been reviewed for crash trends and will include improvements based on the review recommendations. The improvements related to safety for the section between County P and WIS 20/67 include removing sight obstructions in the southwest quadrant of US 12 and County H intersection and applying High Friction Surface Treatment to the curve near WIS 20/67 intersection.

Please let Chris or I know if you have any additional questions about the project.

Sincerely,

Julie Jenks

WisDOT Project Manager

[Julie.jenks@dot.wi.gov](mailto:Julie.jenks@dot.wi.gov)

262-548-6462

From: G Petersen <[garwood2@elknet.net](mailto:garwood2@elknet.net)>  
Sent: Saturday, February 5, 2022 4:31 PM  
To: Chris Quesnell <[chris.quesnell@lakesideengineers.com](mailto:chris.quesnell@lakesideengineers.com)>  
Subject: US Highway 12

I received your flier today on DOT's plans to resurface Hwy 12 from WS 20/67 to Whitewater. I did also receive an earlier DOT flier re: similar planned improvements to Hwy 12 from Elkhorn to WS20/67 in about the same time frame. Living along Hwy 12 between Elkhorn and WS 20/67, this is of great importance to me and over a thousand of us with homes on Lauderdale Lakes. However, the much delayed construction of the "Red Line" from Elkhorn to Whitewater is of even more importance to our entire community. I understand that the Environmental Impact Statement for that project was started and then stopped. With the added Federal Funds now available for Infrastructure, why isn't that project moving along in at least the same time frame? Traffic of Hwy 12 from Elkhorn to Whitewater to Elkhorn is approaching safety concerns; especially in rush-hours between the two cities. That project has received multiple requests for priority from Walworth County and several of our Townships.

Please let me know that that project schedule now looks like.

Gerald Petersen