Erosion Vulnerability Assessment for Agricultural Lands (EVAAL) Summary Report

Introduction

In 2021, the Lake Ripley Management District received a Surface Water grant from the Wisconsin Department of Natural Resources for ‘“Expanding the Scope of Lake Ripley Watershed Monitoring”. This grant worked towards gaining a better understanding of how much sediment and nutrients are being filtered through wetlands, and how much is making its way into Lake Ripley.

One of activities within the grant to help us work towards our goal was to run the Erosion Vulnerability Assessment for Agricultural Lands (EVAAL) toolset and the Spreadsheet Tool For Estimating Pollutant Loads (STEPL) to assist us in prioritizing areas within our watershed that may be vulnerable to water erosion, which may be contributing to our downstream water quality problems.

Methods

To support the prioritization and implementation of agricultural best management practices for improving surface water quality in the Lake Ripley watershed, an EVAAL analysis was performed by Gerry Kokkonen, Jefferson County’s GIS Specialist. The purpose of the EVAAL analysis is to identify locations of relative vulnerability to sheet, rill, and gully erosion using information about topography, soils, rainfall, and land cover. The EVAAL analysis works to assist watershed managers in locating fields with high sediment and nutrient export for implementation of best management practices (BMPs).

The EVAAL analysis was performed by Jefferson County’s GIS Specialist using the methods outlined in “EVAAL Tutorial Version 1.0” (September 2014) to identify agricultural fields with a high potential to export nutrients and sediments to Lake Ripley and the inlet creek.

Results

Building density was calculated for the watershed. Values ranged from undeveloped to medium to high density (Figure 1). The highest development in the watershed is around the immediate shoreline of Lake Ripley while the areas more distant from the lake are less developed.

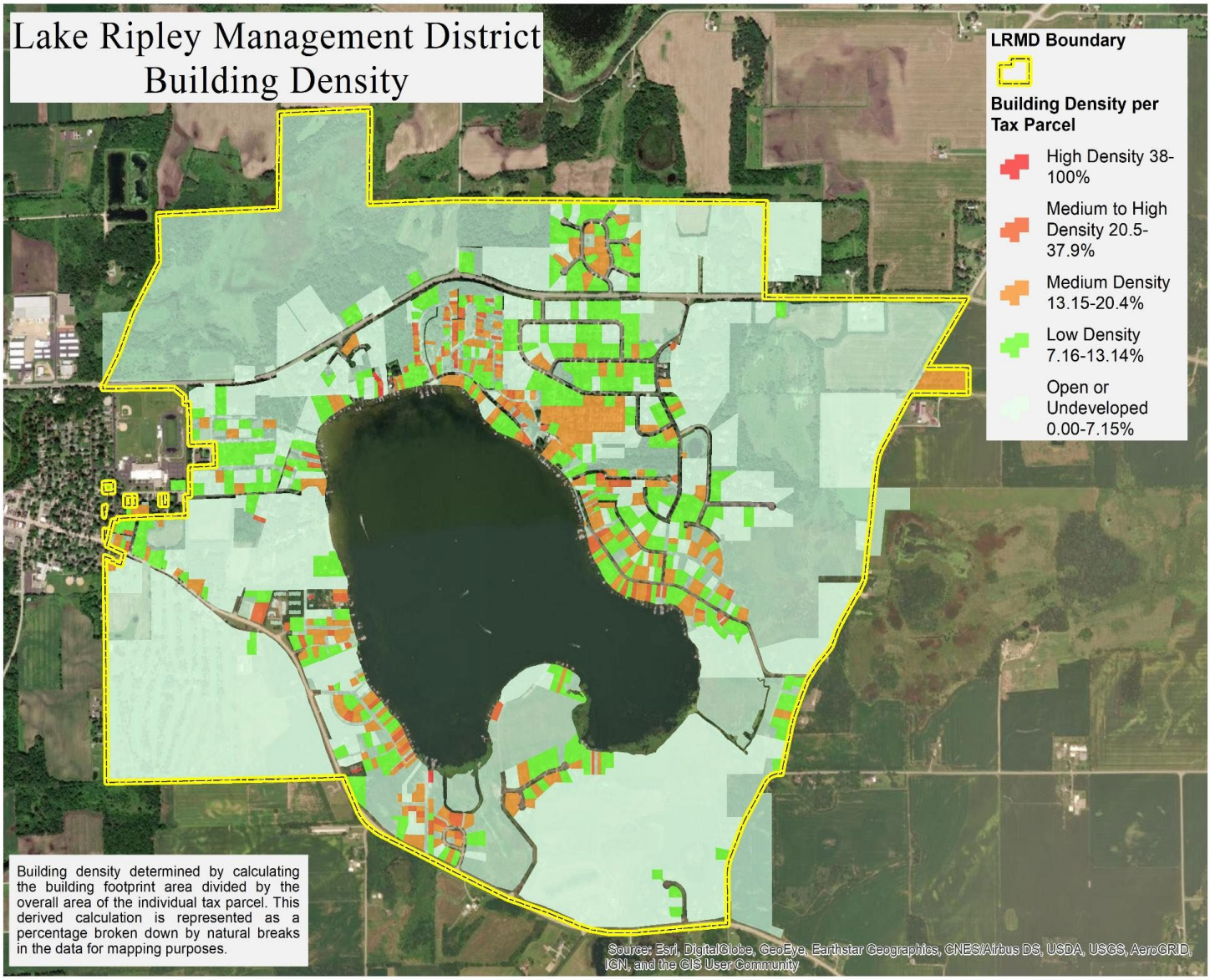

Figure 1: Lake Ripley Management District Building Density.

Potential flow paths and derived sub-basins are shown in Figure 2. This shows where water might move over the landscape during rain events causing erosion.

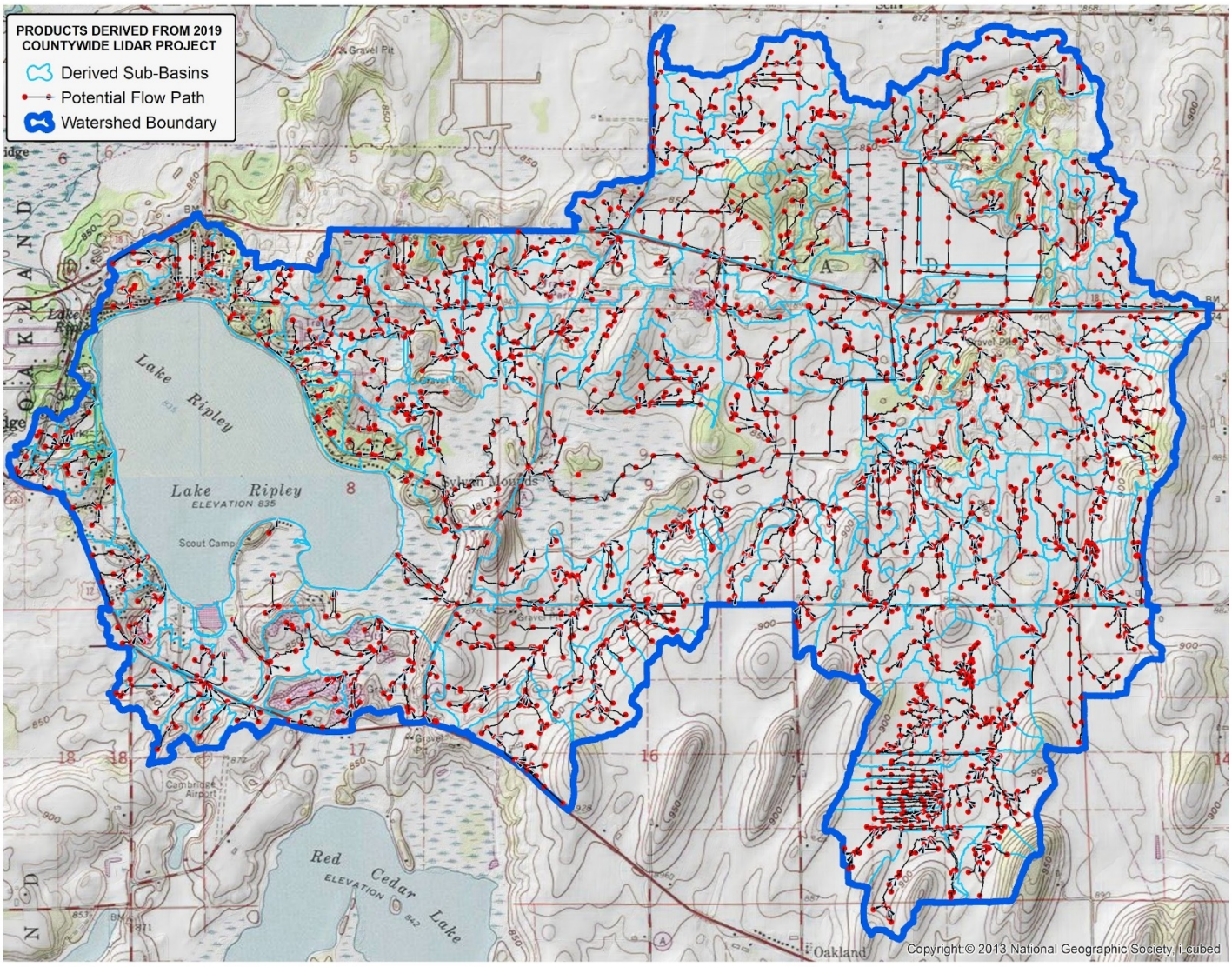

Figure 2: Sub-basins, Potential Flow Path and Watershed Boundary for Lake Ripley.

The soil types in the Lake Ripley watershed were mapped and are shown in Figure 3. Silt loam soils (49%) are the most common followed by loam (27%) and muck (16%).

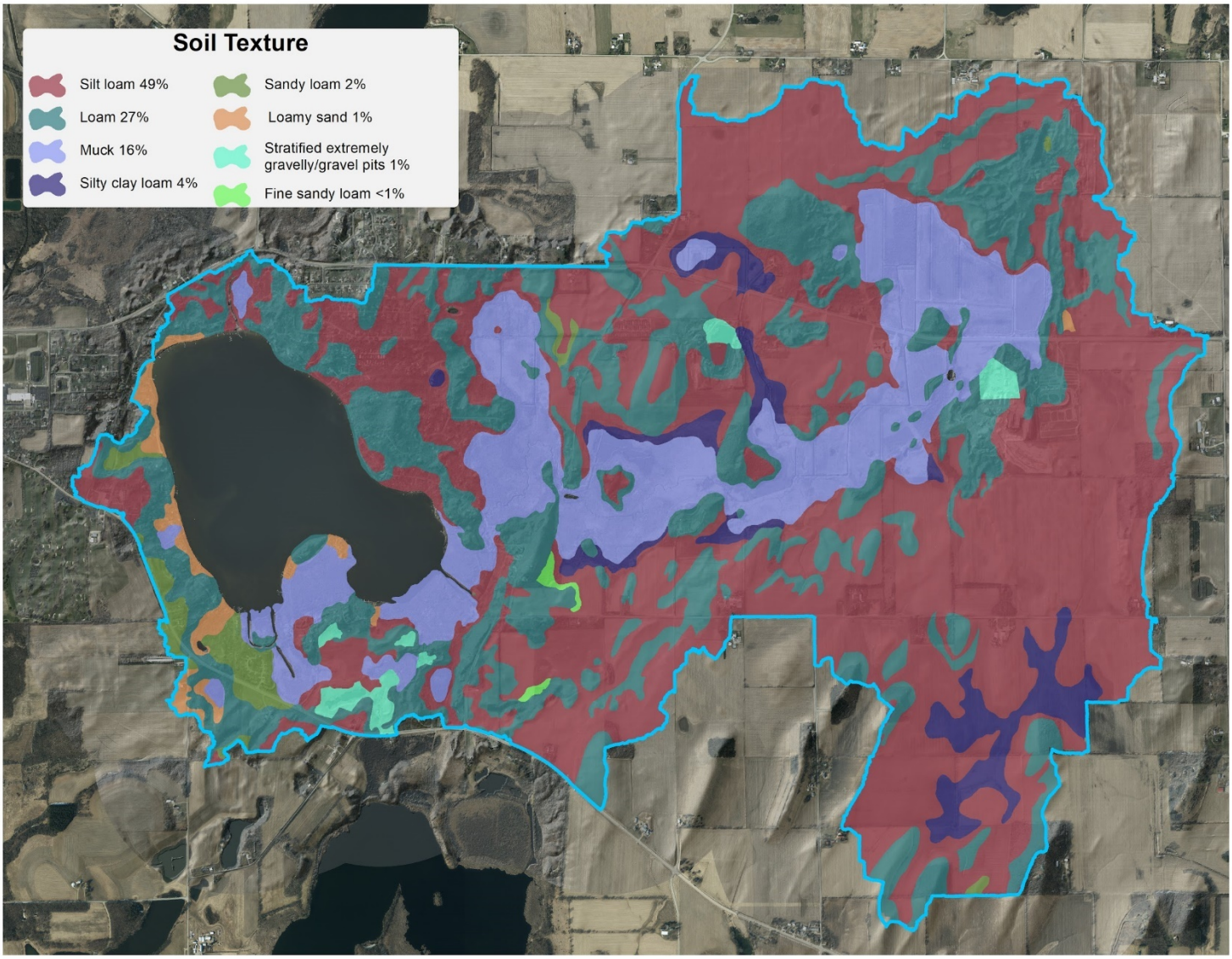

Figure 3: Soil Types in the Lake Ripley Watershed.

Land uses in the Lake Ripley watershed are shown in Figure 4. Most of the watershed is agricultural (45%), wetlands (13%) or single-family residences (12%). Surface water (9%) and woodlands (7%) are also relatively common land uses.

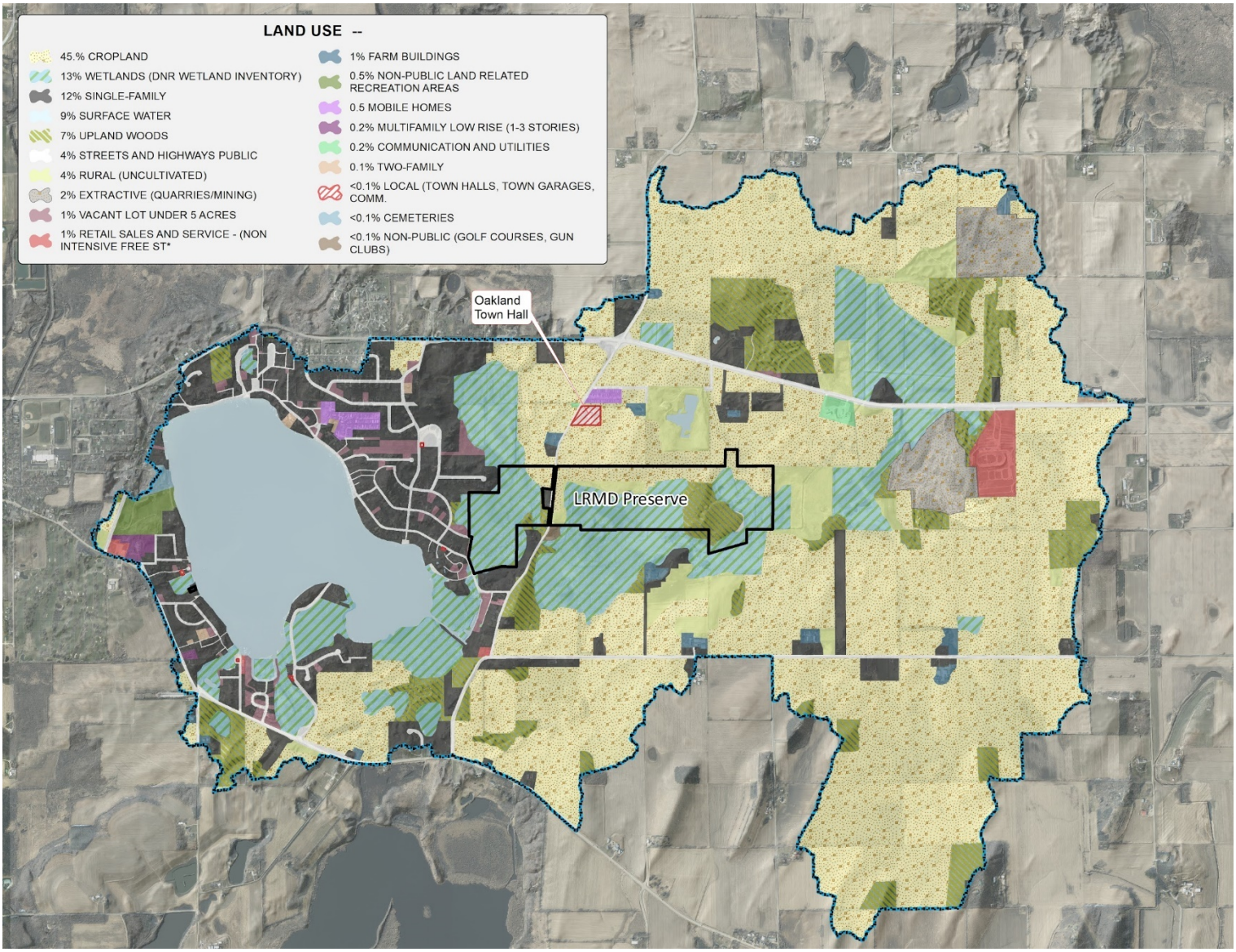

Figure 4: Lake Ripley Watershed Land Uses.

The drainage patterns including drainage districts, drainage ditches, streams and wetlands in the Lake Ripley watershed are shown in Figure 5.

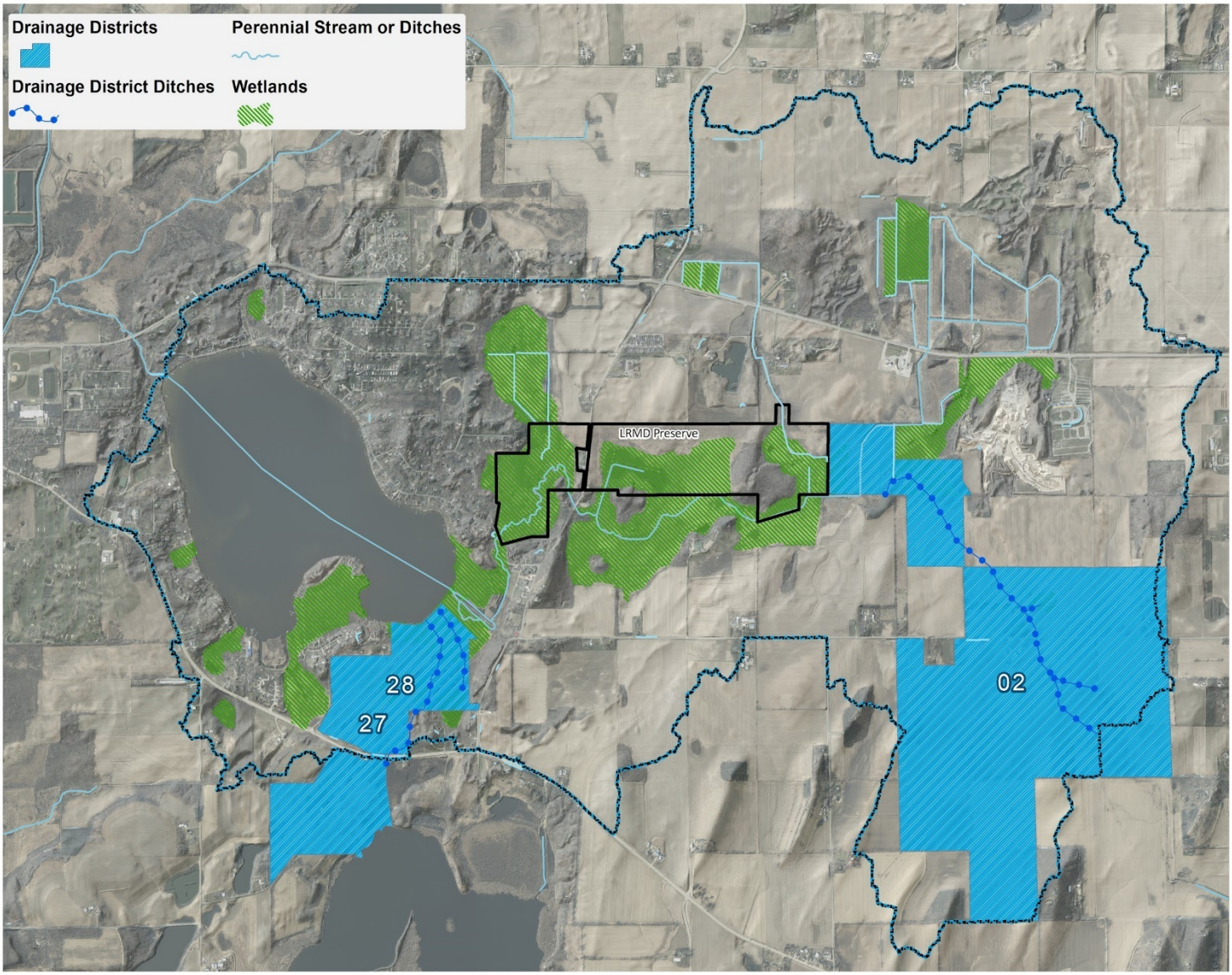

Figure 5: Lake Ripley Drainage Districts, Drainage Ditches, Streams and Wetlands.

Critical areas in the Lake Ripley watershed are shown in Figure 6 and identify areas with wetlands, hydric soils, 100-year flood zones, high slopes and upland woods.

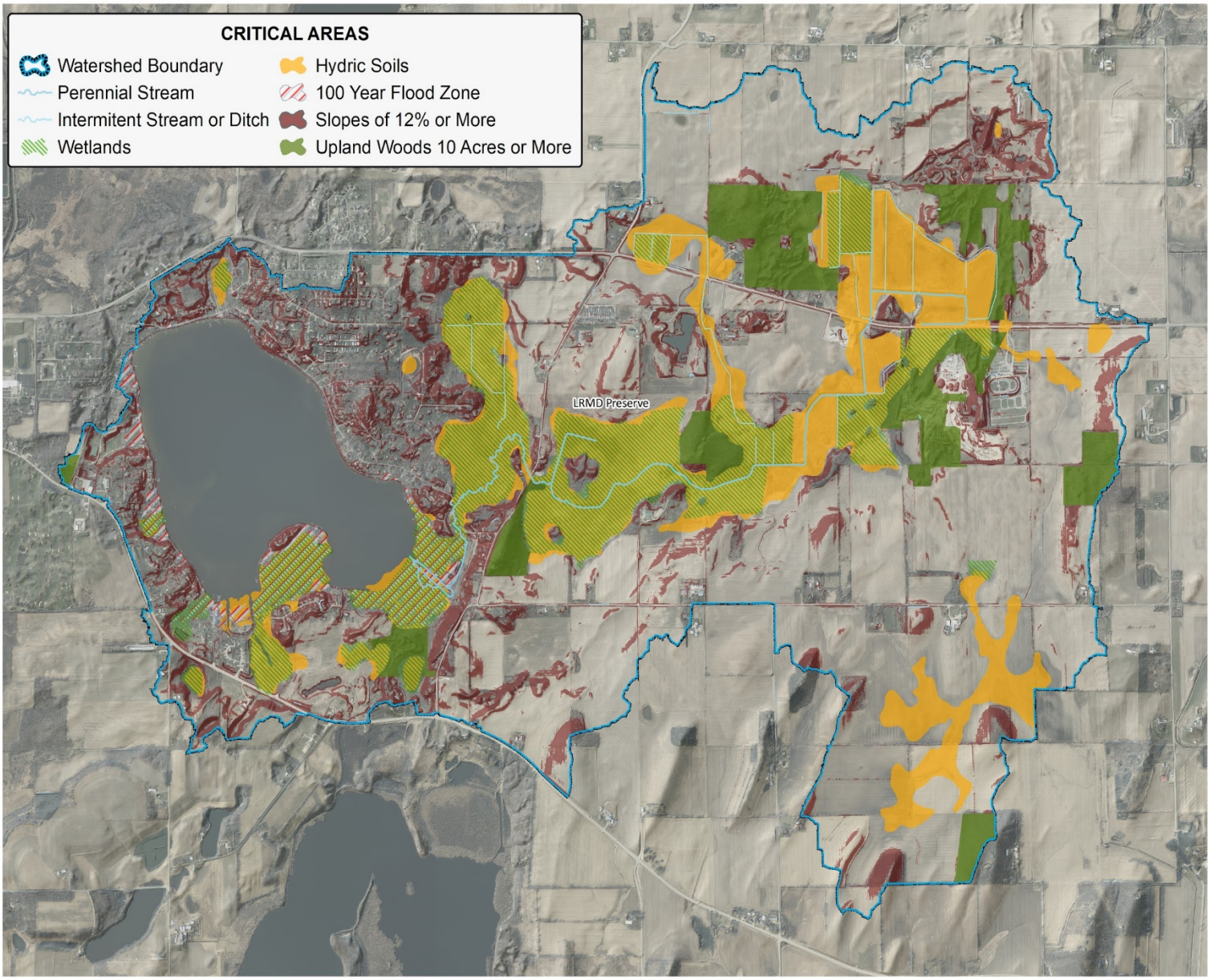

Figure 6: Lake Ripley Watershed Critical Areas.

Cropland, commercial operations and conservation status are shown in Figure 7. Approximately 46% of cropped fields are currently enrolled in the Farmland Preservation Program.

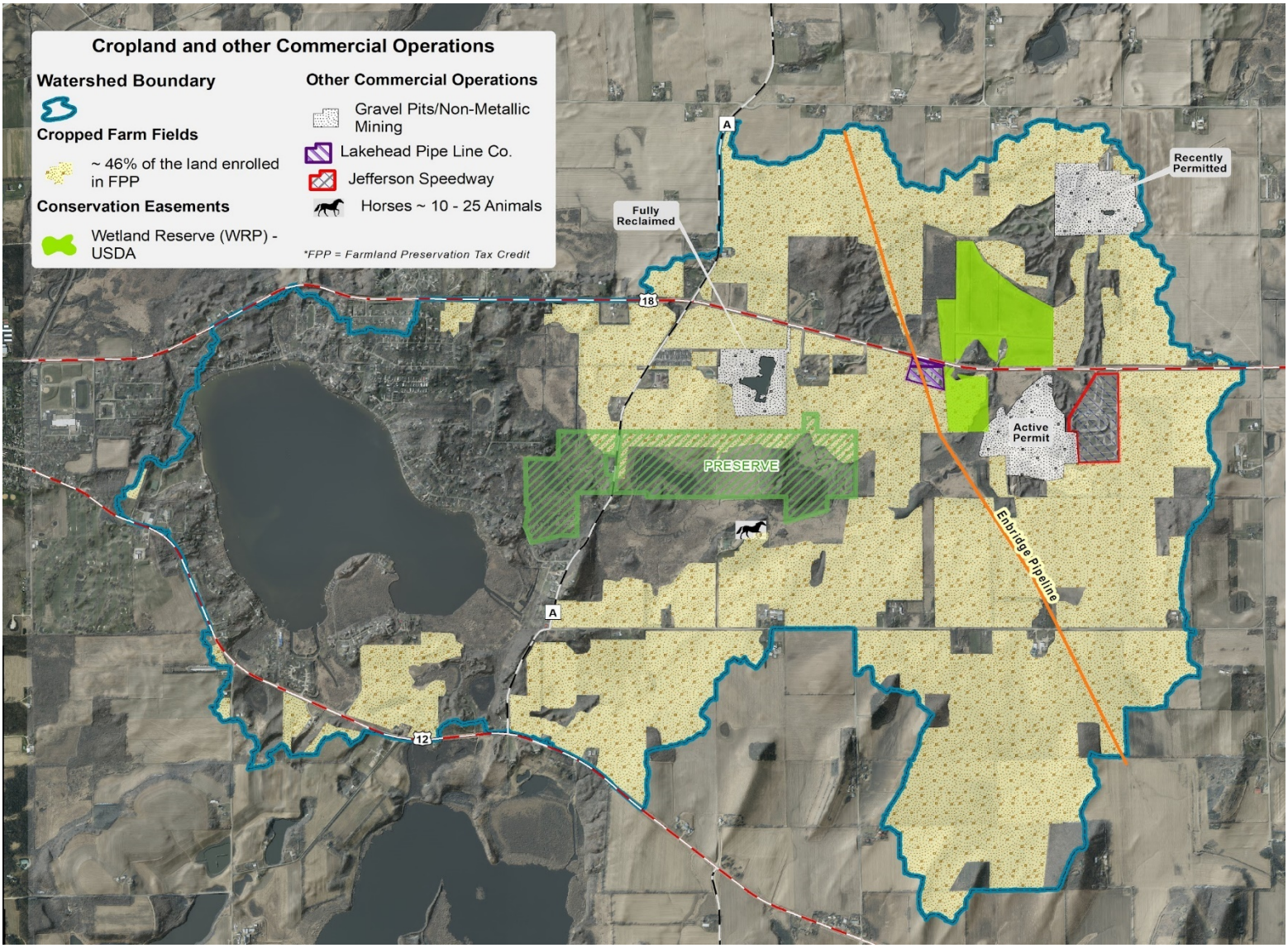

Figure 7: Lake Ripley Cropland, Commercial Operations and Conservation Status

The final erosion vulnerability of Lake Ripley's watershed is shown in Figure 8. The intent of this the map was to show the locations of potential problem areas and then overlay parcel ownership to gather and compile a mailing list of landowners where conservation-ag practices may be most useful or at least ground truth to see if there were any gully or soil transportation problems.

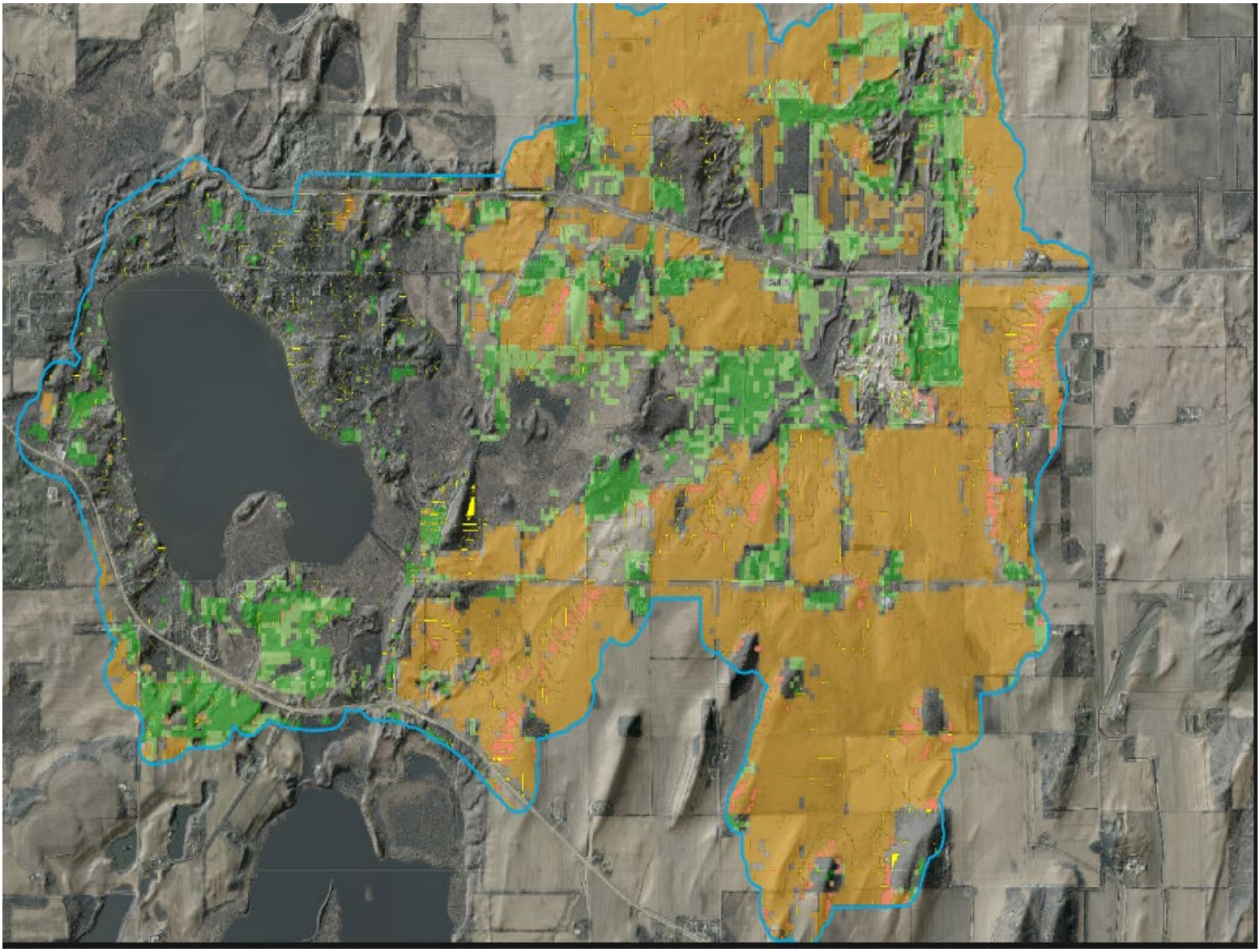

Figure 8: Lake Ripley Watershed Erosion Vulnerability.

Figure 9 shows the parcel ownership for areas of the watershed with a relatively high erosion vulnerability. Each of the owners of the erosion vulnerable parcels not currently enrolled in the Farmland Preservation Program have been contacted and provided informational materials on how to conserve soil on their property.

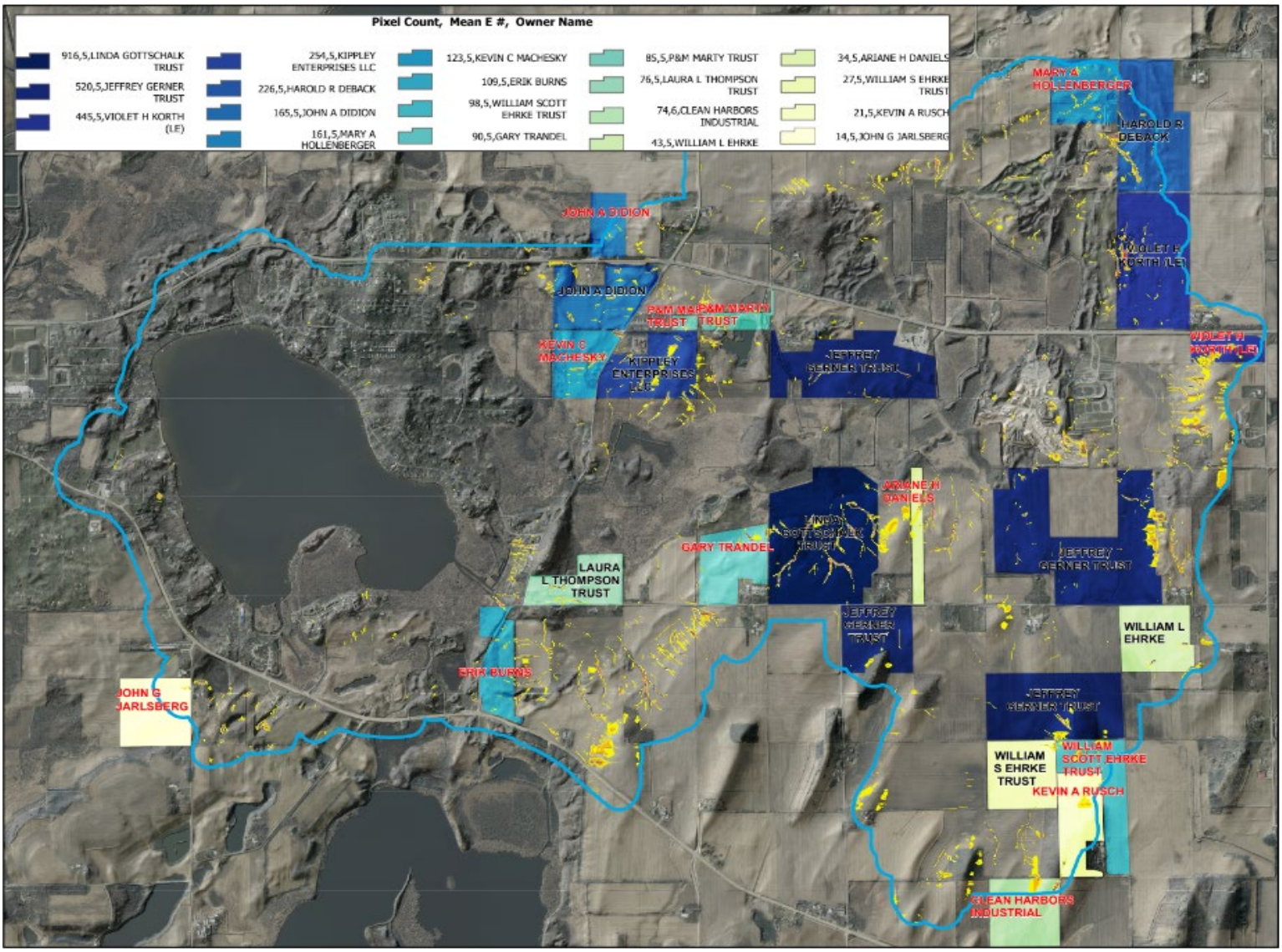

Figure 9: Parcels in the Lake Ripley Watershed With High Erosion Vulnerability

The larger, tan areas are agricultural intensive land use areas, while the green areas are woodlands, grassland or hay crops. The yellow line type features are overland flow collection locations, either the beginning of gullies or other water formed land scape changes. The pink areas are the results of running the EVVAL tools to the final step of finding those locations that have the most potential for erosion.

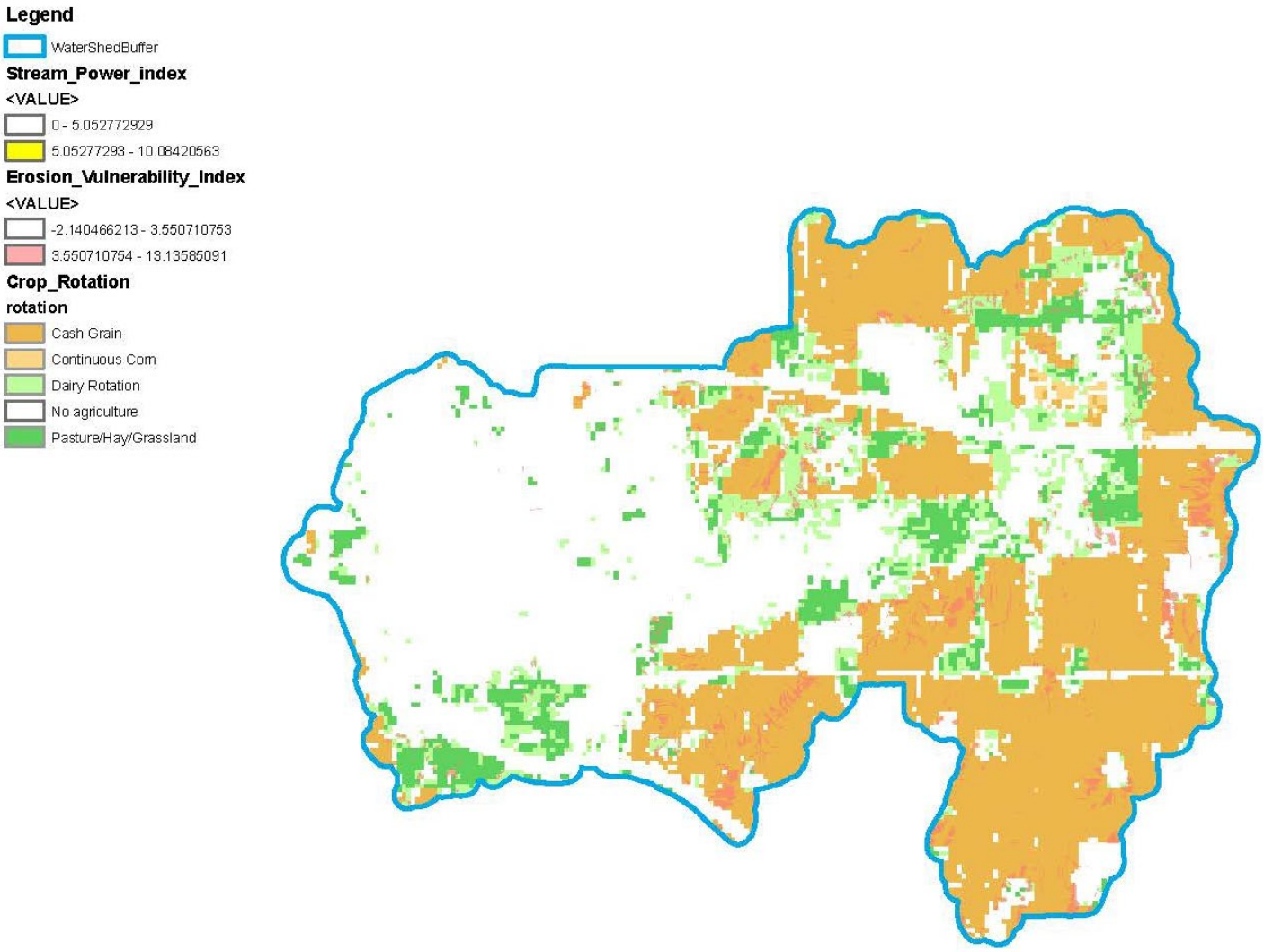

Figure 10: EVAAL output.

# of Parcels	Owner Name	Address	CITY	ZIP	FPP	Pixel Count	Mean Erosion Value
1	ARIANE H DANIELS	W8396 PERRY RD	FORT ATKINSON	53538	NO	34	5
1	CLEAN HARBORS INDUSTRIAL	PO BOX 92108	AUSTIN	78709	NO	74	6
1	ERIK BURNS	122 SANCTUARY CT	JOHNSON CREEK	53038	NO	109	5
1	GARY TRANDEL	PO BOX 533	CAMBRIDGE	53523	NO	90	5
2	HAROLD R DEBACK	W198 S10957 RACINE AVE	MUSKEGO	53150	NO	226	5
8	JEFFREY GERNER TRUST	W8215 PERRY RD	FORT ATKINSON	53538	NO	520	5
3	JOHN A DIDION	W8961 RIPLEY RD	CAMBRIDGE	53523	NO	165	5
1	JOHN G JARLSBERG	N4025 W CEDAR RD	CAMBRIDGE	53523	NO	14	5
1	KEVIN A RUSCH	N3717 OESTREICH LN	FORT ATKINSON	53538	NO	21	5
1	KEVIN C MACHESKY	N4425 COUNTY ROAD A	CAMBRIDGE	53523	NO	123	5
1	KIPPLEY ENTERPRISES LLC	5910 POELMA DR	WAUNAKEE	53597	NO	254	5
2	LAURA L THOMPSON TRUST	N4146 COUNTY ROAD A	CAMBRIDGE	53523	NO	76	5
4	LINDA GOTTSCHALK TRUST	W9063 COUNTY ROAD C	CAMBRIDGE	53523	NO	916	5
1	MARY A HOLLENBERGER	W8101 HOPE LAKE RD	LAKE MILLS	53551	NO	161	5
1	P&M MARTY TRUST	W8654 MICHAEL LN	WATERLOO	53594	NO	85	5
3	VIOLET H KORTH (LE)	JACOB L W KORTH	FORT ATKINSON	53538	NO	445	5
1	WILLIAM L EHRKE	W7934 US HIGHWAY 12	FORT ATKINSON	53538	NO	43	5
1	WILLIAM S EHRKE TRUST	N3859 EHRKE RD	FORT ATKINSON	53538	NO	27	5
1	WILLIAM SCOTT EHRKE TRUST	N3859 EHRKE RD	FORT ATKINSON	53538	NO	98	5

Table 1: This table represents the list of landowners that were contacted regarding possible erosion control issues on their property.

Conclusions and Management Recommendations

Spreadsheet Tool for Estimating Pollutant Loads - STEPL

One of the goals of this grant was to run a Spreadsheet Tool for Estimating Pollutant Loads (STEPL) process. After conversations with Andrew Craig, WDNR's Nonpoint Source Watershed Planning Coordinator, we decided that the STEPL output wouldn't advance our objectives any more than the EVAAL. It was suggested that we focus on the EVAAL results and attempt to get landowners to install BMPs on their property.

Erosion Vulnerability Assessment for Agricultural Lands (EVAAL)

The maps and figures that were created during the EVAAL process were useful in helping the District determine where to start. After conversations with Gerry Kokkonen, we decided that the best next steps were to complete visual inspections of the parcels that were considered hot spots for erosion vulnerability through the EVAAL output.

Once the parcels had been reviewed, the District sent out informational letters to twenty different landowners within the District's watershed. These letters explained the data we had collected and why we thought their land would qualify to participate in the County's or the District's cost-share program to help implement best management practices and therefore help protect the inlet creek. Once the letters were sent, three homeowners reached out to us with follow-up questions. Although the have yet to install any best management practices on their property, they now know that there are funds and organizations available that will help you throughout the process.

The District will continue monitoring these properties for erosion vulnerability and will continue to offer cost-share programs that would provide funds to fix most erosion issues. We will continue to work with the County to continue educational efforts in our watershed.