



MEMORANDUM

TO: Lewisboro Lakes Committee
Tony Goncalves, Town Supervisor
Chris Burdick, State Assembly Member

FROM: Ken Kohlbrenner, P.E.

DATE: June 8, 2023

RE: Lewisboro Proposed Sewer and Septic Plan

Woodard & Curran is pleased to submit this summary memo as part of the East of Hudson Watershed Corporation (EOHWC) initiative in developing a conceptual level wastewater treatment design for the previously identified areas of concern in the Town of Lewisboro. This summary memo focuses on lakes located within the Town of Lewisboro and presents relevant background information, methodology, and initial findings with regards to the protection of surface water and groundwater quality.

BACKGROUND

A detailed review of available Lewisboro documents was completed to prepare initial alternative options. The information reviewed included the Lewisboro Concept Plan and respective studies of the lakes mentioned in this memo. Below is a list of available documents that were reviewed as a part of this evaluation.

- 2023 Lewisboro Concept Plan
- 2021 Lake Kitchawan Study
- 2021 Truesdale Lake Study
- 2021 Lake Waccabuc Study

METHODOLOGY

Based upon background information from previous studies, two major alternative options were noted: sewer focus and septic focus. All previous studies utilized existing topography, parcel size, soil data, depth to groundwater, septic age, etc. in order to show the suitability of septic systems in the identified lake communities. Most parcels surrounding the lakes in Lewisboro have been deemed not suitable for septic systems, therefore leading to advanced sewer alternative options.

Septic system suitability for current design standards and regulations is limited, thus requiring a more in depth feasibility analysis for the Lewisboro lakes. Below is a list of limitations that have been developed based on applicable State and County septic system design guidelines:

- Parcel Size – Septic systems must maintain separation between any well, home, and property line: 100/200-foot separation for wells, 20-foot separation for homes, and 10-



foot separation for property lines. Also, a 100-foot buffer between any waterbody or wetland is required. Typically, parcels less than 0.5 acres are considered unsuitable based on the parcel size limitations.

- Soil Type – Soils that have excessively rapid and excessively slow percolation rates are not suitable for septic systems.
- Slopes – Any parcel that has slopes greater than 15% is unsuitable for septic.
- Depth to Groundwater/Ledge Rock – Septic systems must maintain separation with respect to the groundwater table and/or ledge rock: the absorption area shall contain useable soil for a depth of not less than seven (7) feet above ledge rock, impervious soil, or high seasonal groundwater with or without site drainage improvements. A 2-foot minimum separation must be maintained between the bottom of the absorption system and the groundwater table and/or ledge rock.
- Floodplains – Any area that falls within the 10-year flood elevation is unsuitable for septic.

The 2021 Lake Waccabuc Study and the 2021 Truesdale Lake study both identified potential Wastewater Treatment Plant (WWTP) sites within the surrounding areas of these lakes. Both studies also noted that based on the size and location of the identified sites, a WWTP with a capacity of approximately 140,000 gallons per day (GPD) could be constructed. After discussion with the Town of Lewisboro, a parcel located on the southwest side of Truesdale Lake (Lake Shore Drive/Main Street) was selected as an optimal spot for construction of a WWTP. The Main Street WWTP site size and location are similar to the identified sites within both reports.

Total flow was based on the methodology used for the 2021 Lake Kitchawan Study, which assumed 2.7 people per household and a flow of 75 GPD per capita applied to each parcel to estimate flows. Vacant properties were excluded from the analysis.

To estimate initial costs, a linear-foot cost was taken from recent bid costs received in May 2023 for a low-pressure sanitary sewer construction project in Westchester County. The linear-foot cost was used to calculate a collection system cost estimate for the proposed project. The estimated WWTP cost was escalated using the Engineering News-Record Construction Cost Index values from a 120,000 GPD WWTP constructed in 2011. The adjusted cost was then scaled appropriately to reflect the cost of a 62,000 GPD WWTP in 2023 dollars.

Based upon previous alternatives developed for Lake Waccabuc and Truesdale Lake, a combined approach between both lakes, as well as Lake Rippowam and Lake Oscaleta, was used to develop updated project extents. Parcels chosen to connect to the proposed sewer system were identified based on septic limitations and impact to the lakes. Limitations for septic include steep slopes, floodplains, and small parcel sizes. Parcels closer to lakes and nearby streams are assumed to have greater impact to the water quality of the lakes. Properties with limiting factors including steep slopes and close proximity to the lake and contributing waterbodies are shown for Lake Waccabuc and Truesdale Lake in Figure 1 and Figure 2, respectively.

Since Lake Kitchawan is approximately 4.5 miles away from the Main Street WWTP location, the lake has not been included in the sewer analysis. This distance would increase the cost of transmission, and thus create an unaffordable alternative. Refer to the end of this memo for a



discussion on the septic repair and replacement project for the area surrounding Lake Kitchawan.

INITIAL FINDINGS

The methodology described previously was used to develop the recommended project which includes construction of a new low-pressure sewer system and WWTP, illustrated in Figure 3. The areas selected for Sewer Phase 1 around Lake Waccabuc, Lake Rippowam, Lake Oscaleta, and Truesdale Lake have high parcel densities, indicating that a sewer system would be more cost-effective and have the greatest positive impact on both lakes. This would include the formation of the Lewisboro Sewer District (Sewer District) which would be administered by the Town of Lewisboro. The Sewer District would be responsible for administering the project and for all maintenance of the sewer system and sewer services on individual properties.

For Phase 1 of the proposed wastewater collection system, a total of 304 developed parcels around the four lakes were selected to connect to the proposed WWTP based on the existing septic limitations. By providing sewer to these parcels, the nutrient loading on the lakes would decrease. This results in a total projected flow of 61,965 GPD.

Low-pressure sewer pipes will be installed in both lake communities to convey wastewater to the Main Street WWTP site. Each property will have a low-pressure lateral and grinder pump to pump wastewater into the sewer main. The individual grinder pumps will be furnished, installed, owned, and maintained by the Sewer District. The sewer pipes will convey wastewater to a new WWTP at the Main Street WWTP site.

Additional lakefront parcels and parcels along the proposed sewer main will connect to the WWTP as part of a future phase. Based on potential funding sources identified, it is not feasible to provide sewer to these properties at this time, but eliminating these additional septic systems in the future would continue to reduce nutrient loading to the lakes.

There are also properties surrounding Lake Waccabuc and Truesdale Lake that may be suitable for advanced septic systems. Generally, these properties are larger and further from the lakes which makes them more suitable for septic systems. It is recommended that a Septic Maintenance District be formed in the future to enforce maintenance of the advanced septic systems. Areas for potential future sewer phases as well as septic maintenance district are identified in Figure 4.

COST SUMMARY

Failing septic systems are impacting the water quality of the lakes in Lewisboro, and therefore it is important to determine a cost-effective solution to the ongoing concerns around wastewater treatment in these areas. The estimated cost associated with the proposed project is outlined in Table 1. The costs are based on estimates for the collection system and WWTP with an additional 20% allocated for engineering, legal, and administrative costs. The cost range provided in the table represents a 30% contingency, which is consistent with the level of detail available at this point.



TABLE 1: SUMMARY OF PROPOSED SEWER PROJECT

Low-Pressure Sewer to Main Street WWTP	
Flow (GPD)	61,560
Number of Developed Parcels	304
Total Pipe Length (LF)	27,887
Collection System Cost	\$8,740,000
Grinder Pumps and Laterals	\$7,600,000
WWTP Cost	\$9,500,000
Construction Subtotal:	\$25,840,000
Engineering, Legal, and Admin (20%)	\$5,012,000
Estimated Capital Cost	\$30,852,000
Contingency (30%)	\$9,101,000
Total Project Cost	\$39,953,000
Maximum Estimated Cost (per property)	\$131,424

The costs shown in Table 1 are representative of the capital costs associated with the construction of the collection system and WWTP. The system will also have annual operation and maintenance (O&M) costs associated with labor and material costs for treatment equipment, sewer pipes, service laterals, and grinder pumps. The estimated annual O&M costs to be paid by the Sewer District are shown in Table 2.

TABLE 2: SEWER DISTRICT O&M COSTS

Operation and Maintenance Costs	
Estimated Annual O&M Cost	\$440,000
Number of Developed Parcels	304
Estimated Annual O&M Cost Per Property	\$1,450



SEPTIC DISCUSSION

As mentioned previously, the Lake Kitchawan community is approximately 4.5 miles away from the Main Street location which makes it unaffordable for parcels to connect to this treatment location. There are limited parcels available to build a WWTP near Lake Kitchawan, so a septic replacement program is proposed for this community. This will replace conventional septic systems at each property with a more advanced treatment and disposal system. Multiple treatment and disposal options are being considered at this point, including but not limited to:

- Advanced Septic Treatment Systems:
 - FujiClean Advanced Septic System
 - PhosRID Advanced Septic System
 - SeptiTech Residential Tricking Filter System
- Advanced Septic Disposal Field Systems:
 - Eljen Geotextile Sand Filter
 - Geomat Leaching System
 - SoilAir Leaching System

Further discussions are required with WCDOH to determine the most suitable advanced treatment approach for the Lake Kitchawan community and to obtain approval for use of these systems for this project.

Once an advanced treatment and disposal method is identified, this project will require the Town of Lewisboro to establish a septic system replacement program. This would encompass the formation of the Lake Kitchawan Septic District (Septic District). The Septic District would be administered by the Town of Lewisboro and will be responsible for enforcing maintenance of the advanced septic systems. This project will focus on 187 properties east of Lake Kitchawan since previous studies identified this area as having the most significant impact on Lake Kitchawan's water quality. This area consists of small parcels with slopes greater than 15% which direct flow toward the lake, therefore providing reasoning to prioritize these properties for septic replacement. The properties included in this focus area are shown in Figure 5. The costs associated with this project are outlined in Table 3.



TABLE 3: SUMMARY OF SEPTIC COSTS

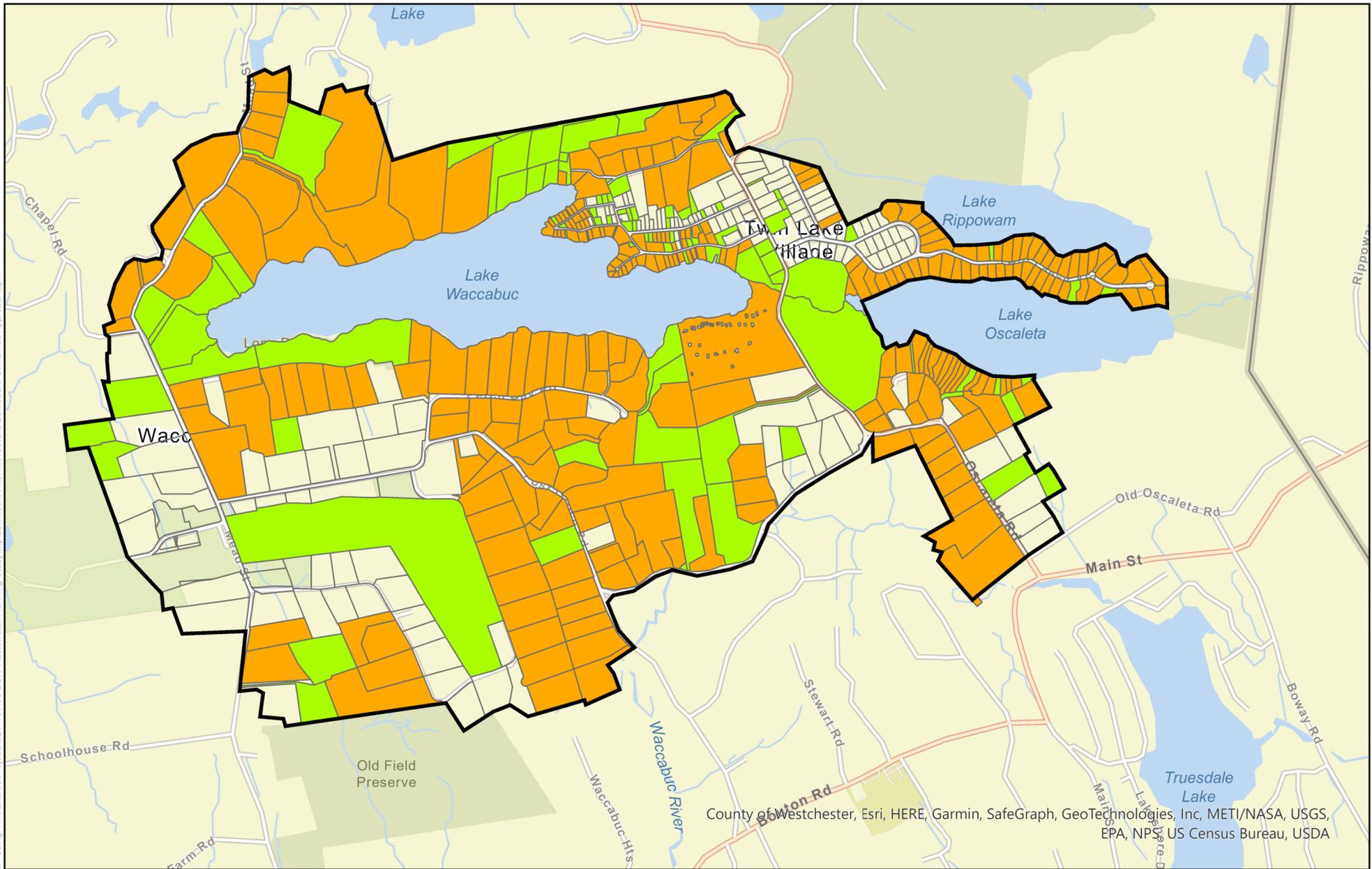
Lake Kitchawan Septic Costs	
Number of Properties	187
Site Investigation (per property)	\$1,000
Design (per property)	\$3,500
Construction Administration (per property)	\$1,200
Enhanced Treatment Unit (per property)	\$12,000
Disposal System Replacement (per property)	\$9,000
Total Septic Cost	\$5,000,000
Reserve Fund (25%)	\$1,250,000
Total Septic Cost	\$6,250,000

The costs shown in Table 3 are representative of the capital costs associated with the installation of the advanced treatment units. This includes investigation, design, and construction administration for each property to determine the recommended system, as well as coordination with Westchester County Department of Health for approval. An estimated cost to furnish and install an enhanced treatment unit and disposal system repair is included as well. The costs include a 25% reserve fund that will provide an initial balance for future replacement or Septic District expansion should that be needed. In addition, the Septic District will be responsible for operation and maintenance of the advanced treatment units. The homeowners will only be responsible for the power costs, which are estimated at a cost of \$5.00 per month. The estimated annual O&M costs to be paid by the Town are shown in Table 4.

TABLE 4: SEPTIC DISTRICT O&M COSTS

Lake Kitchawan Septic Operation and Maintenance Costs			
Description	Quantity	Annual Cost Per Property	Cost (\$/yr)
Labor – Service Visits	187	\$500	\$93,500
Spare Parts, Consumables, Tools, etc.	187	\$500	\$18,700
Total Estimated Annual O&M Cost			\$112,200
Total Estimated Annual O&M Cost (Per Property)			\$600

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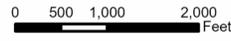
Lake Waccabuc Septic Evaluation

EOH Study

Legend

Legend

- Waccabuc_Parcel_Bound
- No Limiting Factor
- Limiting Factor
- Vacant

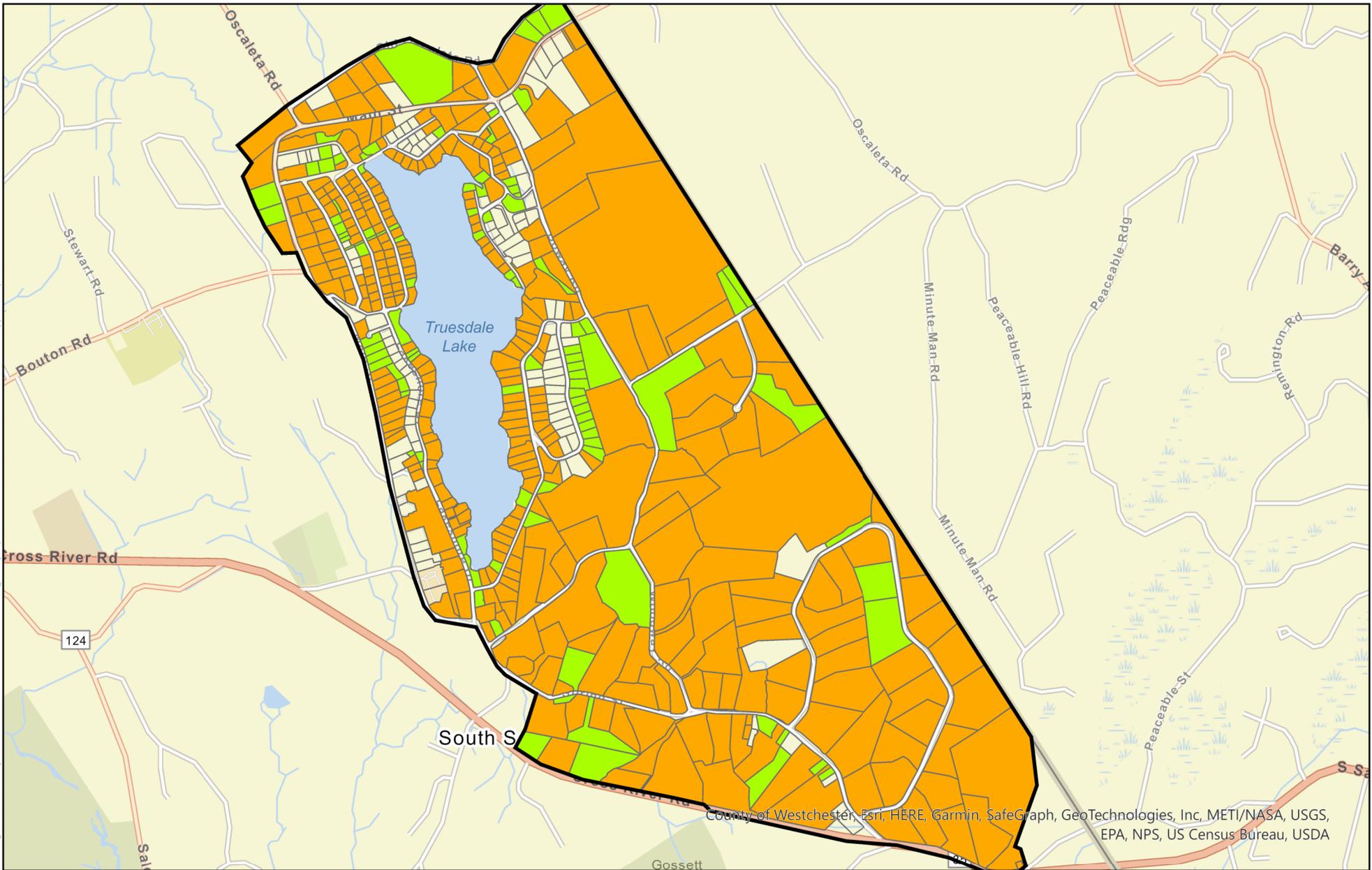


Project #: 0214797.00
Map Created: June 2023

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County of Westchester, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA

Truesdale Lake Septic Evaluation

EOH Study

Legend

Legend

- Truesdale_Parcel_Bound
- Limiting Factor
- No Limiting Factor
- Vacant

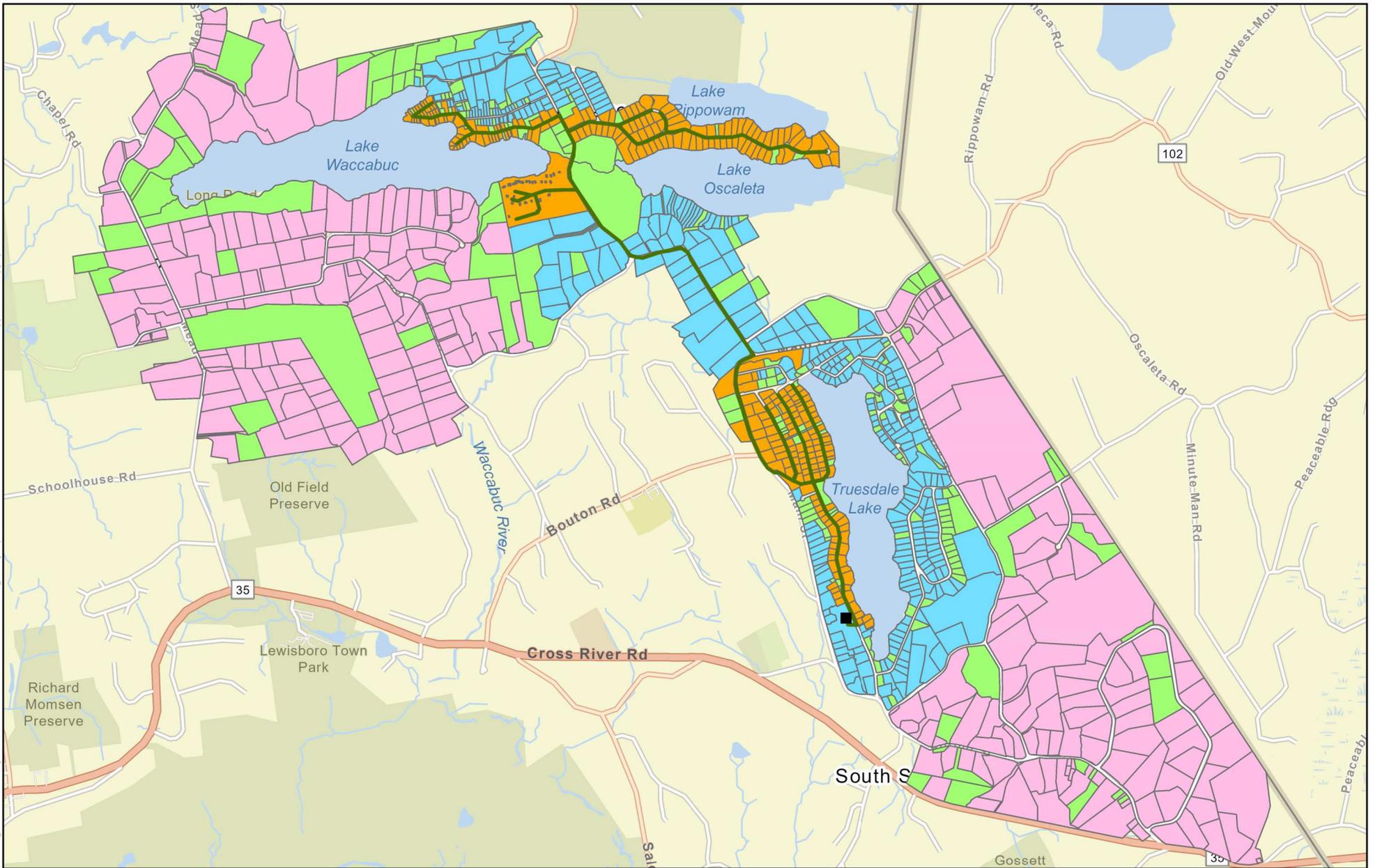


**Woodard
& Curran**

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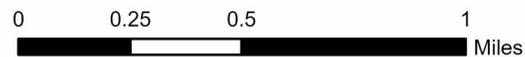


Lewisboro Lakes Proposed Sewer and Septic Plan

EOH Study

Legend

- Main Street WWTP
- Low Pressure Sewer Pipe
- Sewer Phase 1
- Future Sewer Phase
- Potential Septic Maintenance District
- Vacant



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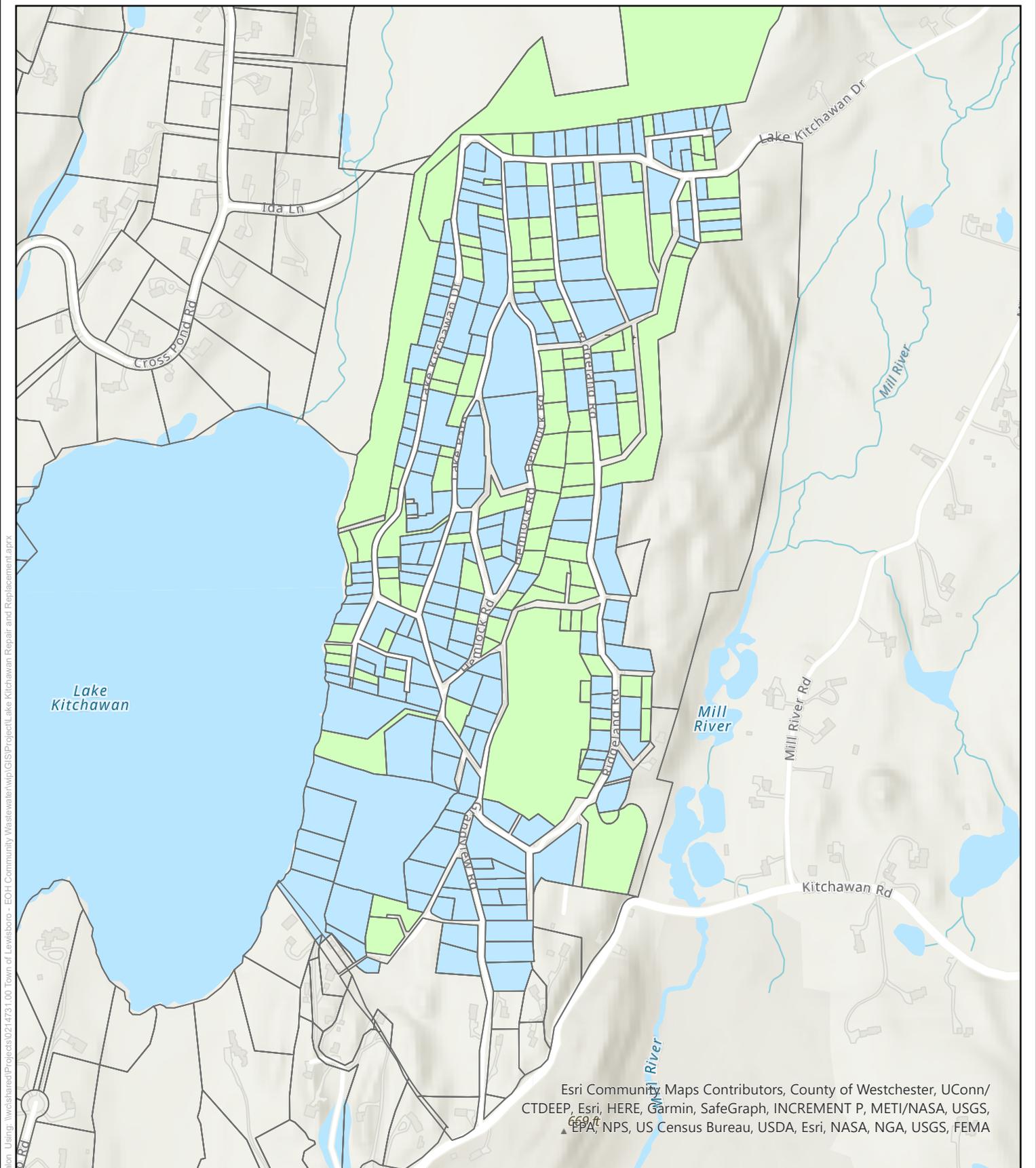


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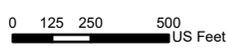
Lake Kitchawan Septic Evaluation
 Town of Lewisboro, NY
 Proposed Septic Replacement

Legend

- Parcels**
- Included in Septic District
 - Undeveloped
 - Not Included in Septic District



Project #: 0214731.00
 Map Created: July 2021



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