Preliminary Engineering Report

East Chautauqua Lake Sewer Extension

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1. Executive Summary

Chautauqua Lake is a vital natural resource in Western New York that is essential to Chautauqua County's environmental health, tourism, and local economy. Known for its scenic beauty, summer resorts, and recreational activities, the Lake is a destination for visitors from across the northeast. Over the last 50 years, Chautauqua Lake has been the subject of numerous water quality studies. These studies have indicated that substantial health and environmental problems were occurring, and private on-site sewage treatment systems were a major contributor to phosphorus and nitrogen loadings. Due to several studies and significant sampling, the New York State Department of Environmental Conservation (NYSDEC) designated the Lake as an impaired water body per Section 303(d) of the federal Clean Water Act in 2004. Then in 2012, the NYSDEC implemented a Total Maximum Daily Load (TMDL) for phosphorus allocation for the Lake aimed at improving water quality and reducing the common occurrence of harmful blue-green algal blooms. The TMDL requires significant reductions in nutrient sources across the watershed, including runoff from agricultural/urban lands and from failing septic systems or wastewater treatment facilities.

As a result of these studies, Chautauqua County has been proactive in providing public sewers around most of the Lake. Chautauqua County has even, at times, limited development in lakeside areas until public sewers were constructed. However, one area on the northeastern side of the lake remains without public sewers. This Preliminary Engineering Report (PER) evaluates the feasibility, benefits, and engineering considerations for a proposed sewer extension along the northeast side of Chautauqua Lake. The area represents the last unsewered region around the Chautauqua Lake shoreline, and its completion would fulfill Chautauqua County's goal of implementing comprehensive municipal sewer coverage for the entire lake perimeter. The PER reviewed three wastewater treatment alternatives that included treatment by the South and Center Chautauqua Lake Sewer District (SCCLSD), treatment by the North Chautauqua Lake Sewer District (NCLSD), and the construction of a new wastewater treatment plant. The PER also reviewed two collection and conveyance system alternatives that considered utilizing both gravity and low-pressure sewers.

After analyzing the pros and cons of each alternative, including both monetary and non-monetary factors, the report recommends the County pursue Treatment System Alternative No. 1 – Treatment by SCCLSD WWTP and Collection System Alternative No. 1 – "Hybrid" Collection System. The total estimated probable project cost for the construction of this project is approximately $35,637,000. This project will require significant grant funding to be affordable to users. Based on projected funding scenarios, the estimated annual sewer charge within the study area is estimated to range from $715 to $2,861 per EDU (or typical single-family home). Once implemented, this project will complete the County's goal of installing sewer around the entirety of Chautauqua Lake and further protect the water quality of Chautauqua Lake.

2. Background

2.1. Project Location

This report assesses the feasibility of installing a municipal sanitary sewer system along the northeast portion of Chautauqua Lake that spans portions of the Town of Chautauqua and Town of Ellery, Chautauqua County, New York. The project area is located between two existing County sewer systems: the North Chautauqua Lake Sewer District (NCLSD) located to the north and the South and Center Chautauqua Lake Sewer District (SCCLSD) located south of the project area. A Project Location and Existing Facilities map is included as Figure 1.

2.2. Environmental Resources

Refer to Appendix A for the various environmental mapping described in this section.

2.2.1. Geologic Conditions

Utilizing the USDA Natural Resource Conservation Service's online Web Soil Survey system the following geological characteristics were found to be prominent in the project area. Soil and geological mapping is included in Appendix A.

- Exact soil types vary throughout the project area, but soil types generally consist of Busti silt loam (0-8% slopes), Chautauqua silt loam (3-15% slopes), and Pompton silt loam.
- The depth to bedrock may vary throughout the project area, but bedrock depths appear to be almost exclusively over 200 cm deep.
- The depth to the groundwater table varies throughout the project area. The average depth to groundwater is 60 cm, with 12% of the project area having a depth greater than 200 cm.
- Soil slopes throughout the project area vary. Slopes generally consist of the following:
  - 0 to 5% slopes – 22.4% of the project area
  - 5 to 10% slopes – 57.8% of the project area
  - 10% to 15% slopes – 15.8% of the project area
  - 15% to 20% slopes – 2.5% of the project area
  - Water – 1.7% of the project area
- According to the NYSDEC Environmental Resource mapper, there are not any unique geological features in the project area.

2.2.2. Waterbodies and Wetlands

Waterbodies and wetlands in the project area were located utilizing the NYSDEC Environmental Resource Mapper. Based on this online resource the Dewittville Creek and Minor Tribs to Chautauqua Lake waterbodies are present in portions of the project area. There are no State regulated freshwater wetlands in the project area, but the presence of smaller federally regulated wetlands is likely. Refer to the mapping included in Appendix A.

2.2.3. *Species and Significant Natural Communities*

Utilizing the NYSDEC Environmental Resource mapper, rare plants and animals, significant natural communities, and imperiled mussels were mapped. Based on this online resource rare plants and animals, and imperiled mussels could be located along Chautauqua Lake. Refer to the mapping included in Appendix A for additional information.

2.2.4. *Archaeological Sensitive Areas*

Utilizing the Cultural Resource Information System (CRIS) mapper, it was discovered that portions of the project site are located in potentially archaeological sensitive areas (listed below). Refer to the mapping included in Appendix A for locations.

- Midway State Park
- Point Chautauqua Historic District

2.2.5. *Agricultural Districts*

Utilizing the available online mapping of NYS Agricultural Districts, it was discovered that sections of the proposed project location are located within a New York State Agricultural District. Refer to the mapping included in Appendix A.

2.2.6. *Flood Plains*

Utilizing FIRM maps available on the FEMA Flood Map Service Center, portions of the proposed project location are located in a flood plain. These areas are located near the Chautauqua Lake and Dewittville Creek. Refer to Appendix A for available flood plain mapping.

2.2.7. *Disadvantaged Community or Environmental Justice Areas*

Utilizing the DECinfo Locator, disadvantaged communities (DAC) and environmental justice (EJ) areas were mapped. Based on this online resource it appears no portion of the proposed project location is located within both DAC or EJ areas.

2.3. Ownership and Service Area

2.3.1. Ownership and Service Area

The project area is located along the northeastern shoreline area of Chautauqua Lake. This area does not currently have access to a centralized public sewer system. Sewage disposal for the area generally consists of several small private on-site treatment systems for the various residences, camps, private communities, and developments. For purposes of analyzing alternatives and to better plan improvements, the project area was broken into several smaller sewer sub-areas. A map depicting the entire project area broken down by sub-areas is included as Figure 2.

2.3.2. Population and Income Data

The following demographic data was analyzed for Chautauqua County:

- Chautauqua County:
  - 2010 Census Population: 134,905
  - 2020 Census Population: 127,657
  - 2021 ACS 5-year Population: 128,042
  - 2019 ACS 5-year Median Household Income: $46,820
  - 2021 ACS 5-year Median Household Income: $50,408
  - 2021 ACS Families Below Poverty Rate: 11.3%
  - Low-to-Moderate Income Percentage: 45.74%

Based on an estimated 366 residential EDUs and an average of 2.5 people per EDU, the service area has an estimated population of 915 people. This population will increase in summer months due to the various camps within the service area, however this increase will be temporary. Based on the above demographic data and comparing to the requirements of major potential funding agencies, it appears that Chautauqua County meets the requirements of a NYSEFC hardship community, and the project could be eligible for hardship financing.

2.3.3. Potential Growth and Future Development

The population of Chautauqua County as a whole has declined slightly over the past 10 years, but shorelines of the Lake have continued to become more developed. In recent months, a land developer has approached the Town of Chautauqua about constructing various townhomes, condominiums, detached homes, and mixed used buildings on a former golf course that sits vacant within the project area. This development would add a considerable amount of sanitary waste and is currently under review by the Town of Chautauqua Town Board. The potential users, flows, and infrastructure for this development were considered when completing this study and various alternatives were analyzed. Additionally, the number of both buildable and non-buildable vacant parcels in the study area have been considered when completing this study to account for other future development.

2.3.4. Equivalent Dwelling Unit Assessment

An equivalent dwelling unit (EDU) is the unit to which a community charges a customer for utility service. An EDU generally equates all customers to a typical single family home, with one single family being assessed one EDU. NYS Property Class Codes from Chautauqua County GIS data and review of Chautauqua County's current EDU structure were utilized to develop an EDU assessment for the study area. In general, the following EDU assessment structure was utilized:

- 1 EDU per Single Family Home
- 1 EDU per additional dwelling unit
- 0.5 EDUs per temporary living quarters (i.e. campsite)
- 1 EDU per 17,500 gal. of quarterly water use for other properties (i.e. commercial)
- Vacant parcels were not assessed any EDUs. The County charges vacant parcels a flat annual rate as a sewer benefit charge.

The table below summarizes the estimated number of EDUs within the study area. A detailed breakdown is included in Appendix B.

Table 2-1: **Estimated Number of EDUs**

Property Type	No. of Parcels	No. of EDUs
Agriculture	2	0
Residential – Single Family	290	290
Residential – Multi-Family	6	13
Residential – Other	63	63
Commercial	11	11
Community Services	7	10
Public Services	1	0
Recreation	17	435.2
Vacant – Buildable (>0.46 acres)(1)	73	0(2)
Vacant – Non-Buildable (<0.46 acres)(1)	147	0(2)
TOTAL	618	822.2

(1) Minimum Lot Size of 20,000 sq. ft. per Town of Chautauqua Zoning Code 143-13 and Town of Ellery Zoning Code Section 403

(2) Chautauqua County currently charges vacant buildable parcels $100 per property, but does not charge vacant non-buildable parcels. Per the NYS comptroller all vacant parcels must contribute to any capital debt expenditures.

2.3.5. Existing Sewer Rates

The project area does not have existing sanitary sewer and therefore there is no existing sewer rates. Nearby sewer districts include the South and Center Chautauqua Lake Sewer District (SCCLSD) and the North Chautauqua Lake Sewer District (NCLSD). The NCLSD and SCCLSD both have existing sewer rates structures for the existing districts they service. The sewer rates for these districts are as follows:

- NCLSD
  - All users: $135 per EDU per quarter ($540 Annually)
- SCCLSD
  - Residential: $88.50 per EDU per quarter ($354 Annually)
  - Commercial: $88.50 per 17,500 gal. of water use per quarter
  - Vacant Buildable: $100 per year

3. Existing Conditions

This section provides existing condition information related to existing private on-site wastewater facilities within the district, as well as nearby municipal sewer infrastructure within the Town of Chautauqua, North Chautauqua Lake Sewer District (NCLSD) and South and Center Chautauqua Lake Sewer District (SCCLSD). Supporting appendices related to this section included:

- Appendix C – Existing Private Wastewater System Data
- Appendix D – Existing Collection System Process Flow
- Appendix E – NCLSD WWTP SPDES Permit
- Appendix F – NCLSD WWTP DMR Data
- Appendix G – SCCLSD WWTP SPDES Permit
- Appendix H – SCCLSD WWTP DMR Data
- Appendix I – SCCLSD Pump Station Data
- Appendix J – Existing Theoretical Gravity Sewer Capacity

3.1. Existing Private Treatment Systems within Project Area

The project area includes a variety of private wastewater disposal systems that are inclusive of individual residential septic systems, community septic systems, and even community wastewater treatment plants for larger private developments. For purposes of this study, information was obtained from NYSDEC, the Chautauqua County Department of Health Department, and directly from property owners when possible. The data available for this study and details on major community systems within the project area is described below and within Appendix C.

3.1.1. *Residential On-Site Wastewater Treatment Systems*

Private residential homes within the project area (that are not part of a private community) generally utilize individual septic systems for on-site wastewater treatment. In general, septic systems require large lot sizes and should be located away from surface waterbodies and private drinking water wells to effectively treat sanitary waste without polluting the environment or drinking water. Lakeside septic systems are often ineffective in controlling nutrient pollution due to their proximity to the lake, smaller lot sizes, the limitations of soil filtration, and a septic systems inability to effectively treat phosphorus. Lakeside areas are also often accompanied by high groundwater tables which allow nutrients, like phosphorus and nitrogen, to leach from septic systems directly into the lake, bypassing the natural soil filtration processes that would occur further inland. Additionally, aging, improperly maintained septic systems, or septic systems constructed prior to current standards can exacerbate nutrient loading issues, as these systems may provide an extremely reduced level of treatment. Over time, this results in a steady accumulation of nutrients in the lake, fueling algae growth and degrading water quality. Per the 2012 TMDL "Short-circuited systems (those systems in close proximity to surface waters where there is limited opportunity for phosphorus adsorption to take place) also contribute significant phosphorus loads; septic systems within 250 feet of the Lake are subject to potential short-circuiting, with those closer to the Lake more likely to contribute greater loads." The 2012 TMDL noted that 100% of the septic systems within 50 feet of the shoreline were found to be short-circuiting, and 40% of the systems within 50-250 feet were short-circuiting.

In addition to contaminating the lake, the areas private septic systems pose a contamination risk to private drinking water wells. There is no public municipal water for large portions of the project area. Therefore, most properties utilize private groundwater wells for water service. NYSDOH requires individual groundwater wells to be located a minimum of 50 feet from septic tanks and 100 feet from absorption fields for sanitary reasons. Many of the lot sizes on the lakeside properties are too small to achieve this required separation and the private on-site wastewater treatment systems pose a contamination risk to the areas groundwater wells.

3.1.2. Creek & Lake Campground

The Creek & Lake Campground is located at 5344 Meadows Road, Dewittville, NY 14728. There are an estimated 47 permanent campers/mobile homes located at the campground that utilize three centralized septic tank and absorption bed treatment systems. This community septic treatment system does not provide treatment for phosphorus. Neither water nor sewer flow data from this campground was available at the time of this study. For the purposes of this study, estimated flows from the Creek and Lake Campground were calculated utilizing other nearby campground data and NYSDEC standards for campsites. We have estimated flows to be approximately 4,700 gpd for the average day and approximately 7,000 gpd for a peak day.

3.1.3. YMCA Camp Onyasha

The YMCA Camp Onyasha is located at 5411 East Lake Road (State Route 430), Dewittville, NY 14728. There are two centralized onsite treatment systems that treat wastewater from a total of nine (9) buildings. One of the treatment systems is located closer to the Lake and utilizes four Myers Simplex Grinder Pump Stations to convey sewage from five of the buildings to a septic tank and absorption bed for treatment. The other treatment system is located closer to State Route 430 and utilizes two grinder pump stations to treat sewage from the other four buildings. The treatment system located at the YMCA Camp is not designed for phosphorus removal. Neither water usage nor sewer flow data from the YMCA Camp was available at the time of this study. For the purposes of this study, estimated flows from the YMCA camp were calculated utilizing other nearby campground data and NYSDEC standards for usage per person for camps. We have estimated flows to be approximately 4,500 gpd for the average day and approximately 7,500 gpd for a peak day.

3.1.4. Bayberry Landing

Bayberry Landing is located at 5301 East Lake Road (State Route 430), Dewittville, NY 14728. There are an estimated 34 condominiums within Bayberry Landing. Sewage treatment is provided by a small centralized treatment plant located near State Route 430. The treatment system is not designed for phosphorus removal. Sewage on the property is conveyed by gravity to a grinder pump station that conveys waste to the treatment plant. The treatment system is permitted for an average daily flow of 11,200 gallons. Treated water from the plant is discharged directly to Chautauqua Lake. The plant operates under SPDES permit NY0060348 and a copy of the permit is included in Appendix C. Based on limited discharge monitoring reports (DMRs) provided by NYSDEC from September 2020 to May 2022, estimated flows from the Bayberry Landing treatment plant are as follows:

- Average Day Flow (Entire Year): 2,650 GPD (1.84 GPM)
- Average Day Flow (Summer): 4,750 GPD (3.30 GPM)
- Max. Day Flow (Entire Year/Summer): 14,500 GPD (10.07 GPM)

3.1.5. KOA Campground

The Chautauqua Lake KOA Campground is located at 5652 Thum Road, Dewittville, NY 14728. There are an estimated 251 campsites/cabins located at the campground. Approximately 24 sites do not have sewer, and the other 227 have sewer hookups. Sewage from the campground is treated by a lagoon style treatment system located on the KOA Campground property. The treatment system is not designed for phosphorus removal. The treatment system is permitted for an average daily flow of 10,000 gallons. Treated water is discharged to a small creek that flows directly to Chautauqua Lake. The plant operates under SPDES permit NY0128163 and a copy of the permit is included in Appendix C. We have estimated sewer use of the campground based on discussions with the Operator who stated the KOA utilizes approximately 3,000-5,000 gallons of water per day during the summer.

3.1.6. Crosswinds Marina Community

The Crosswinds Marina Community is located at the intersection of State Route 430 and Marina Drive in the Town of Ellery. The community is comprised of an estimated 42 homes that utilize a centralized extended aeration treatment system. The treatment system is not designed for phosphorus removal. The treatment system is permitted for an average daily flow of 20,800 gallons. Treated water is discharged directly to Chautauqua Lake. The plant operates under SPDES permit NY0203807 and a copy of the permit is included in Appendix C. Based on limited DMRs provided by NYSDEC from September 2020 to May 2022 and January 2024 to May 2024, estimated flows from Crosswinds Marina Community treatment plant are as follows:

- Average Day Flow (Entire Year): 3,700 GPD (2.5 GPM)
- Average Day Flow (Summer): 5,100 GPD (3.5 GPM)
- Max. Day Flow (Feb. 2022) 21,200 GPD (15 GPM)
- Max. Day Flow (Summer): 6,800 GPD (5 GPM)

3.1.7. Camp Mission Meadows

Camp Mission Meadows is located at 5201 East Lake Road (State Route 430), Dewittville, NY 14728. The camp is comprised of multiple cabins and three community buildings that serve a variety of camps throughout the year. All wastewater is conveyed to a community septic treatment system that is comprised of a septic tank and absorption bed. The treatment system is not designed for phosphorus removal. The Camp's treatment system is permitted for an average daily flow of 15,000 gallons. Treated water is discharged directly to Chautauqua Lake. The septic system operates under SPDES permit NY0125954 and a copy of the permit is included in Appendix C. Sewer use has been estimated utilizing water usage data provided by the Camp from July 2023 to June 2024 is summarized below:

- Avg. Day Usage (Year Round): 1,700 GPD
- Avg. Day Summer Usage (June-Aug.): 2,700 GPD

3.1.8. Chedwell Club

The Chedwell Club is located at 5149 East Lake Road (State Route 430), Dewittville, NY 14728. There are an estimated 14 residences located at the Chedwell Club that utilize a centralized privately owned wastewater treatment plant. The treatment system is not designed for phosphorus removal. The Club's treatment system is permitted for an average daily flow of 13,000 gallons. The plant operates under SPDES permit NY0203696 and a copy of the permit is included in Appendix C. Flow data for this facility was not available at the time of this study. For the purposes of this study, estimated flows from the Chedwell Club camp were calculated utilizing flow data from similar residential communities along Chautauqua Lake. We have estimated flows to be approximately 2,500 gpd for the average day and approximately 4,900 gpd for a peak day.

3.1.9. Lake Chautauqua Lutheran Center

The Lake Chautauqua Lutheran Center is located at 5013 East Lake Road (State Route 430), Bemus Point, NY 14712. There are an estimated 10 trailers, one small cabin, and three large cabins/community buildings that utilize two separate community septic treatment systems for wastewater treatment. One of the systems was installed in 2012, is comprised of a septic tank, distribution box, and leach field and services the 10 trailers and small cabin. The treatment system is not designed for phosphorus removal. This system is permitted for an average daily flow of 1,000 gallons. The other treatment system is comprised of gravity sewer, a septic tank, distribution boxes, three separate sand filter beds, and services the three larger cabins/community buildings. This system is permitted for an average daily flow of 10,000 gallons. This treatment system is also not designed for phosphorus removal. Both systems operate under SPDES Permit NY0102580 and the permit is included in Appendix C. Flow data for this facility was not available at the time of this study. For the purposes of this study, estimated flows from the Lake Chautauqua Lutheran Center were calculated utilizing other nearby campground data and NYSDEC standards for campsites. We have estimated average day flows to be approximately 1,400 gpd and peak day flows to be approximately 2,100 gpd.

3.1.10. The Boys JIM Club of America

The Boys JIM Club of America is located at 4929 State Route 430, Bemus Point, NY 14712. The property consists of four occupied structures that each have their own septic treatment system. The treatment system is not designed for phosphorus removal. Each of the septic systems are sized for average daily flows of 1,000 to 1,500 gallons per day. Three of the septic systems were originally permitted in 1983 under SPDES Permit NY0126144. A copy of this original permit is included in Appendix C. The property is served by two groundwater wells, one of which recently had a water meter installed. The Club does not regularly record water usage data, however they reported that the typical water usage in the summer months is approximately 2,000 gpd which was utilized to estimate sewer usage. We were told by Club staff that water and sewer usage outside of June, July, and August is minimal. Three of the four buildings are only occupied from late May to early September. The fourth building is utilized sparingly in the winter.

3.1.11. Viking Lodge Lake Park

The Viking Lodge Lake Park is located at 4293 State Route 430, Bemus Point, NY 14712. The park is comprised of 125 permanent campsites and 16 temporary campsites for a total of 141 sites. Each site has its own water service, however this water is for non-potable use only. Approximately 25 sites have a 1,000 gallons sanitary sewer holding tank located on the site. The remaining 100 sites utilize six bathrooms/shower facilities that are spread throughout the property. Four of the bathrooms utilize 1,000 gallon holding tanks for sanitary sewer storage that must be pumped out on a regular basis.

The other two bathrooms contain showers and utilize a septic tank and leach field treatment system. One of these treatment systems is located closer to Chautauqua Lake and also treats wastewater from a restaurant that is open year-round. The treatment system is not designed for phosphorus removal. This treatment system is permitted for an average daily flow of 2,500 gallons and operated under SPDES Permit NY0127507. A copy of the SPDES permit is included in Appendix C.

Detailed flow data for the Viking Lodge Lake Park was not available at the time of the study. For purposes of this study, staff recorded water usage from August 9, 2024 to August 29, 2024 which averaged approximately 3,900 gallons per day. This water use data was utilized in calculating estimated sewer use.

3.1.12. Vacant Golf Course

A vacant, former golf course property is located at 5693 State Route 430, Dewittville, NY 14728. A developer has purchased the vacant land and has submitted plans to the Town of Chautauqua to develop the property. The submitted plans include the potential addition of 138 townhomes, 40 condominiums, 39 single family lots, and commercial space. It is likely that the developer will begin construction prior to a sewer district extension, however the construction of the development will take multiple years and all residential units would not be occupied immediately. Flows from the potential development are anticipated to slowly increase over the course of a few years. For the purposes of this study, estimated flows from the potential development were calculated utilizing flow data from similar residential communities along Chautauqua Lake. We have estimated flows to be approximately 40,000 gpd for the average day and approximately 80,000 gpd for a peak day.

3.2. Town of Chautauqua Sewer Infrastructure

The Town of Chautauqua manages a small sewer district that conveys its waste to the NCLSD WWTP. It is the Town's intention to one day dedicate this sewer district to the County as an extension of the NCLSD. Existing sewer infrastructure within the Town District includes the Chautauqua Heights Pump Station and a 6-inch force main that conveys waste to the NCLSD WWTP. The Town of Chautauqua owns the infrastructure, however the NCLSD provides all operation and maintenance. Details on the existing sewer district, pump station, and force main are provided below. A conceptual process flow diagram of the existing infrastructure from the Chautauqua Heights Pump Station to the NCLSD WWTP is depicted in Appendix D.

3.2.1. Town of Chautauqua Sewer District No. 1

The Town of Chautauqua Sewer District No. 1 is comprised of two distinct areas, the Chautauqua Lake Estates and the Villas at Chautauqua Point. The Chautauqua Lake Estates are located at 5690 East Lake Road (State Route 430), Chautauqua, NY 14772. There are an estimated 151 townhomes that utilize a gravity sanitary sewer system and the Chautauqua Heights Pump Station to convey sewage to the NCLSD WWTP. The Villas at Chautauqua Point are located immediately south of the Chautauqua Lake Estates along the shore of Chautauqua Lake. There are an estimated 20 users within the Villas community. Wastewater from the Villas is pumped to the Chautauqua Lake Estates gravity collection system, then to the Chautauqua Heights Pump Station for conveyance to the NCLSD WWTP for treatment.

3.2.2. Town of Chautauqua Sewer District No. 1 - Extension 1 - North

The Town of Chautauqua is in the process of completing a sewer district extension to the north of the Chautauqua Lake Estates. The project has been bid and awarded to a contractor and construction is anticipated to be completed in 2025. Wastewater from the district extension will be conveyed to the NCLSD WWTP utilizing the Chautauqua Heights Pump Station located at the Chautauqua Lake Estates. The infrastructure within the district will also be owned by the Town of Chautauqua and operated and maintained by the NCLSD. According to the Basis of Design Report completed by Ramboll dated June 2024, the following infrastructure and flow is included in the district extension:

Infrastructure

- Approximately 66 grinder pumps
- Approximately 5,000 LF of 1.5-inch sewer force main (grinder pump laterals)
- Approximately 6,900 LF of 2-inch sewer force main
- Approximately 900 LF of 3-inch sewer force main

Estimated Flows (per Basis of Design completed by Ramboll)

- Average Daily Flow 31,500 GPD (22 GPM)
- Peak Hourly Flow 105,000 GPD (73 GPM)

3.2.3. Chautauqua Heights Pump Station

The Chautauqua Heights Pump Station is located near Chautauqua Lake on the Chautauqua Lake Estates property. The pump station was constructed in 2018 when the small treatment plant that serviced the Chautauqua Lake Estates and Villas at Chautauqua Point was decommissioned. The pump station is comprised of a 5' by 8' wet well with two submersible sewage pumps with a design point of 235 gallons per minute (GPM) at 158 feet of total dynamic head (TDH). A valve vault with isolation valves and check valves is located adjacent to the wet well. The design drawings for the pump station depict the capability to install a third pump should additional capacity at the pump station be required, but the current design point with 158 feet of TDH approaches the head limitations of a typical solids handling pump. Flow from the pump stations is metered at the force main discharge point at the NCLSD WWTP. A summary of recent flows and run hour data from the Chautauqua Heights Pump Station are summarized below:

Flows:

- Avg. Day Flow (Feb. 2022 to July 2024): 17,300 GPD (12 GPM)
- Avg. Summer Day Flow: 20,250 GPD (14 GPM)
  (June 2022/23/24, July 2022/23/24, Aug. 2022/23)
- Max. Day Flow (Feb. 2022) 60,400 GPD (42 GPM)
- Est. Max. Summer Day Flow (Week of July 2-9, 2024): 46,400 GPD (32 GPM)

Run Hours:

- Avg. Day Total Runtime: 1.1 hours (0.55 per pump)
- Est. Max. Day Total Runtime: 2.55 hours (1.275 per pump)

3.2.4. Chautauqua Height Force Main

The pump station conveys sewage to the NCLSD WWTP through approximately 22,000 feet of 6-inch HDPE force main located along the north end of Chautauqua Lake generally following State Route 430 and a Chautauqua Rails-to-Trails path. The force main discharges to a manhole at the NCLSD WWTP, where flow is metered and then conveyed via gravity to the head of the WWTP. Per 10 State Standards, velocities through sanitary sewer force mains should range from 2 ft/s to 8 ft/s. In a 6-inch force main, this equates to 150 gpm to 610 gpm. Although it may appear that the flow rate through the force main can be increased, the 22,000 foot length of the force main proves this to be challenging. Increases to the flow rate will lead to sizeable increases in total dynamic head for pumps that already are approaching typical head limitations for solid handling.

3.3. NCLSD Sanitary Sewer Infrastructure

A brief analysis of existing NCLSD sanitary sewer infrastructure including relevant collection, conveyance, and pumping infrastructure was completed as part of this study. A concurrent and more detailed analysis of the NCLSD WWTP is being completed under a separate report titled “North Chautauqua Lake Sewer District WWTP Capacity Analysis Study”. A summary of relevant information is included in the sections below.

3.3.1. Wastewater Treatment Plant Overview

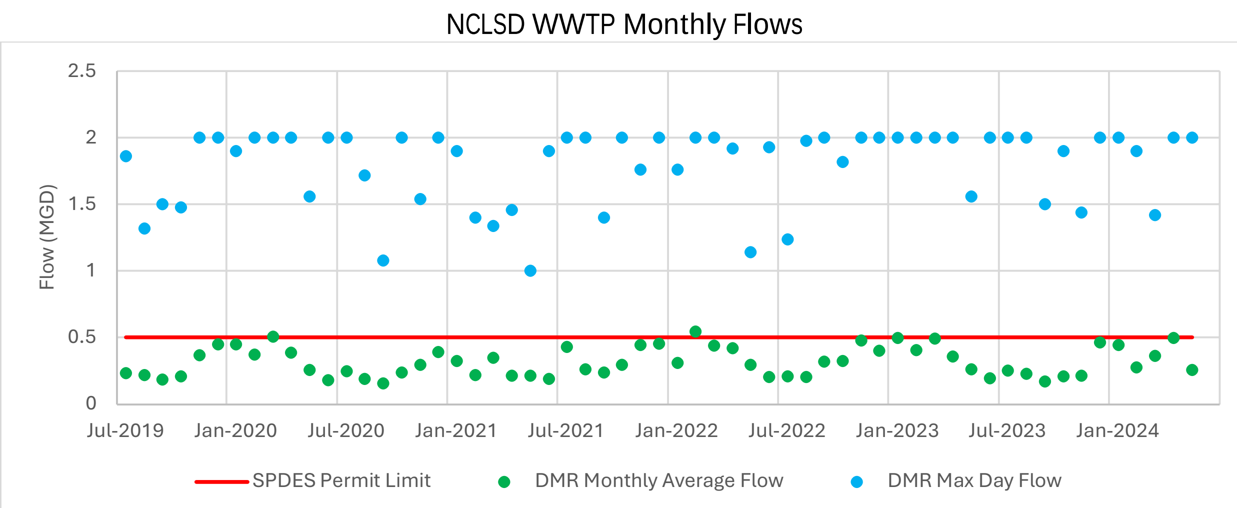
The NCLSD WWTP (SPDES Permit No. NY0020826) is located in the Village of Mayville and discharges to Mud Creek, which flows directly to the north end Chautauqua Lake. It should be noted that flows in Chautauqua Lake move from the north to south and therefore flow from this plant contributes to the loading on the Lake. The NCLSD WWTP SPDES permit is summarized below and included in Appendix E.

Table 3-1: NCLSD SPDES Permit Summary			
Parameter	Type	Effluent Limit	Sample Frequency
Flow	Monthly Avg.	0.5 mgd	Continuous
Flow	Daily Max.	Monitor (mgd)	Continuous
BOD_5	Monthly Avg.	30 mg/l (125 lbs/day)	2/month
BOD_5	7-Day Average	45 mg/l (188 lbs/day)	
Suspended Solids	Monthly Avg.	30 mg/l (125 lbs/day)	2/month
Suspended Solids	7-Day Avg.	45 mg/l (188 lbs/day)	
Settleable Solids	Daily Max.	0.3 ml/l	1/day
pH	Range	6-9 SU	1/day
Temperature	Daily Max.	Monitor (°F)	1/day
Nitrogen, Ammonia (June 1 to October 31)	Monthly Avg.	4.9 mg/l	2/month
Nitrogen, Ammonia (Nov. 1 to May 31)	Monthly Avg.	7.6 mg/l	2/month
Total Phosphorus (as P)	Monthly Avg.	1.0 mg/l Monitor (lbs/day)	2/month
Total Phosphorus (as P)	12 Month Total	339.5 lbs/year	2/month
Total Phosphorus (as P) Aggregate Load	12 Month Total	375.6 lbs/year	Per event
Fecal Coliform	30-Day Mean	200 No./100 ml	2/month
Fecal Coliform	7-Day Mean	400 No./100 ml	

3.3.2. *Existing Wastewater Treatment Plant Flows*

Effluent average monthly flows and maximum day flows from the WWTP were reviewed from July 2019 to May 2024 and displayed in a figure below. Additionally, the table below summarizes when the WWTP exceeded or was within 10% of exceeding its SPDES permit. As shown, monthly average flows exceeded the SPDES permit twice within the past 5 years and was within 10 percent of its permitted flow six times. These flows do not include future planned flows from the Town of Chautauqua Sewer District Extension No. 1 project that is currently underway. Additional DMR data for the NCLSD WWTP is included in Appendix F.

Table 3-2: NCLSD WWTP SPDES Flow Limit Summary		
Month	Monthly Average Day Flow (MGD)	SPDES Permit Limit Percentage
March 2020	0.4493	101%
December 2021	0.4548	91%
February 2022	0.546	109%
November 2022	0.4763	95%
January 2023	0.4987	100%
March 2023	0.4909	98%
December 2023	0.4653	93%
April 2024	0.4955	99%



3.3.3. *WWTP Capacity Analysis*

A detailed capacity analysis of the NCLSD WWTP has been completed separately from this study, but an overview of the capacity limitations of the treatment plant is discussed within this section. In general, the NCLSD plant is at capacity and cannot accept more flow from a sizeable sewer extension without significant improvements. In addition to current flows approaching and at times exceeding permitted limits, several unit processes within the plant are undersized or are lacking redundancy per current standards. A summary of the capacity of each process at the WWTP from that report is summarized in the table below:

Table 3-3: **Summary of Existing Plant Capacity**

Treatment Process	**Existing** Peak Flow (MGD)	Rated Hydraulic Capacity (MGD)	Peak Hydraulic Capacity (MGD) (No Redundancy)
Headworks Mechanical Screen	~2.60	2.00(1)	2.00(1)
Influent Screw Pumps(2)	~2.60	1.60	2.40
Primary Clarifiers	2.40	1.96(1)	1.96(1)
RBCs	2.40	0.5 ADF	2.40+
Secondary Clarifiers	2.40	1.70(1)	1.70(1)
Secondary Pump Station(2)	2.40	2.52	3.36
Tertiary Filters(2)	2.40	2.00	4.00
UV Disinfection(2)	2.40	2.00	4.00

(1) Even though this process is not compliant with recommended standards, the process is able to pass peak flows without violating SPDES permit effluent limits.

(2) Redundancy (i.e. one unit offline) required per Code when determining rated capacity

3.4. SCCLSD Sanitary Sewer Infrastructure

A high level review of existing SCCLSD sanitary sewer infrastructure including collection, conveyance, and pumping infrastructure was completed as part of this study. This review included capacity discussions with plant operators and a review of existing capacity information. Previous engineering studies including the “Sewer Extension for West Side Chautauqua Lake” report dated July 2015 by O’Brien and Gere Engineers, Inc. also reviewed the capacity plant, however plant improvements and collection system extensions have been completed since the completion of this studies.

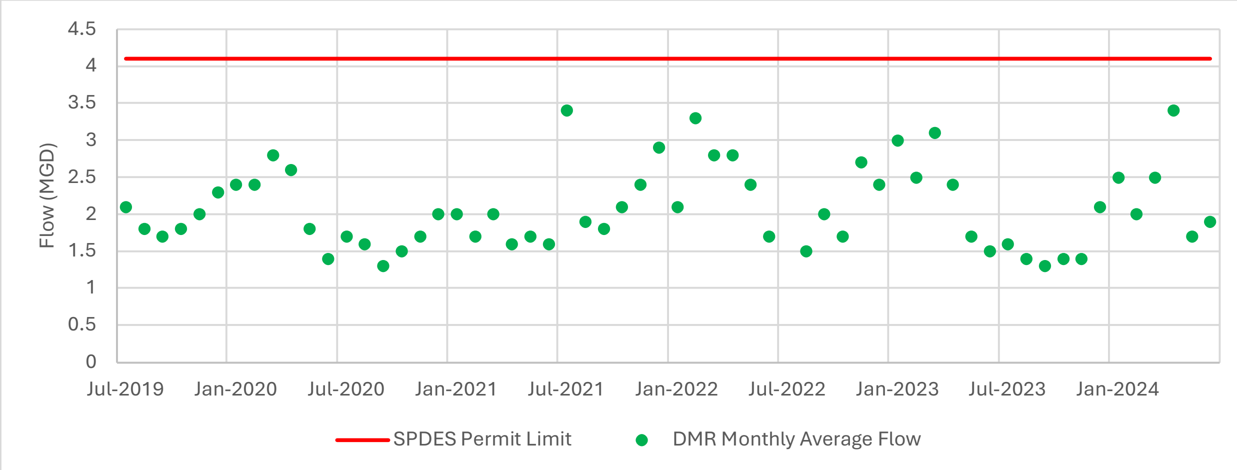
3.4.1. Wastewater Treatment Plant Overview

The SCCLSD WWTP (SPDES Permit No. NY0106895) is located at the south end of Chautauqua Lake in the Village of Celeron and discharges sewage directly to Chautauqua Lake. Considering the location of the outfall is at the south end of the Lake (and the Lake flows to the south), nutrient loading impacts on the Lake as a whole are significantly reduced as compared to northern outfall locations. The SCCLSD WWTP SPDES permit is summarized below. The full SPDES permit is included in Appendix G.

Table 3-4: SCCLSD SPDES Permit Summary			
Parameter	Type	Effluent Limit	Sample Frequency
Flow	Monthly Avg.	4.1 mgd	Continuous
$CBOD_5$	Monthly Avg.	25 mg/l 854 lbs/day	1/week
$CBOD_5$	7-Day Average	40 mg/l 1367 lbs/day	1/week
UBOD (June 1 to Oct. 31)	Daily Max.	48 mg/l 1640 lbs/day	1/week
Suspended Solids	Monthly Avg.	30 mg/l 1025 lbs/day	1/week
Suspended Solids	7-Day Avg.	45 mg/l 1538 lbs/day	1/week
Settleable Solids	Daily Max.	0.1 ml/l	2/day
pH	Range	6-9 SU	2/day
Nitrogen, TKN (as N)	Daily Max.	Monitor (mg/l)	1/week
Ammonia (as N) (June 1 to Oct. 31)	Monthly Avg.	1.24 mg/l	1/week
Ammonia (as N) (Nov. 1 to May 31)	Monthly Avg.	1.56 mg/l	1/week
Temperature	Daily Max.	Monitor (°F)	2/day
Total Phosphorus (as P)	Monthly Avg.	0.8 mg/l	1/week
Total Phosphorus (as P)	12 Month Rolling Avg.	27.4 lbs/day	1/week
Dissolved Oxygen (June 1 to Oct. 31)	Daily Min.	7 mg/l	2/day
Mercury	Daily Max.	50 ng/l	Quarterly
Fecal Coliform	30-Day Mean	200 No./100 ml	1/week
Fecal Coliform	7-Day Mean	400 No./100 ml	1/week
Chlorine, Total Residual	Daily Max.	0.034 mg/l	2/day

Effluent average monthly flows and maximum day flows from the WWTP were reviewed between July 2019 and May 2024 and are shown in the figure below. The SCCLSD WWTP has not exceeded its monthly SPDES permit flow in the past 5 years, which is indicative of having additional capacity. Detailed DMR data for the SCCLSD WWTP is included in Appendix H.

SCCLSD WWTP Monthly Flows



3.4.2. *WWTP Capacity Analysis*

A capacity analysis of the existing SCCLSD WWTP was completed by O'Brien & Gere in a July 2015 report titled "Sewer Extension for West Side Chautauqua Lake". The report completed a detailed analysis of WWTP infrastructure to determine if the plant had sufficient capacity for a sewer extension along the west side of Chautauqua Lake. The plant was determined to have adequate capacity for west side extensions. Operators state that actual flow from the recent west side extension has been less than originally anticipated and they believe there is adequate capacity to service the remaining unsewered eastern side. A review of the July 2015 report largely supports this belief, however, should this project proceed into the design phase, a detailed capacity analysis would be recommended to confirm capacity using the most up to date flow data. For purposes of this study and based on preliminary date review, the SCCLSD is plant is assumed to have enough available capacity to service the remaining eastern shores.

3.4.3. *Collection System Infrastructure*

The SCCLSD owns, operates, and maintains several miles of collection system infrastructure along the east side of Chautauqua Lake from the City of Jamestown to Midway State Park. The existing collection system along the east side of the Lake is comprised of a combination of gravity, low pressure, and vacuum sewers, as well as, both vacuum sewer and centralized sewer pump stations. A high level analysis of the major infrastructure relevant to the potential sewer extension was completed as part of this study. An existing collection system process flow diagram is depicted in Appendix D.

3.4.3.1. <u>Pump Stations and Force Mains</u>

There are several sewer pump stations located along the eastern side of Chautauqua Lake that convey sewage to the SCCLSD WWTP that would be utilized by a potential northeastern lake sewer extension. The largest and last pump station on the east side of Chautauqua Lake is the Bonita pump station which conveys all sewage from the area through a 14-inch force main beneath Chautauqua Lake and to the SCCLSD WWTP. This is the only pump station along the east side of the Lake that has a flow meter. For purposes of this study, Operators provided existing pump station record data (drawings, curves, original design points), pump run hour data, completed pump draw down tests, and obtained pressure gauge readings while pumping for purposes of preliminary capacity review. This data is detailed in Appendix I and summarized in the table below.

Table 3-**5: Existing Pump Station Data**

Name	Desing Point per Record Drawings	Drawdown Test Pumping Rate (gpm)	Discharge Pressure	**Daily Runtime (hours)**	Discharge Force Main per Record Drawings
Maple Springs	275 GPM @ 107 TDH	Not Completed	Not Measured	Avg: 1.49 99th Percentile: 3.59 Peak: 4.42	8” & 10” PVC
Bemus Point	360 GPM @ 56 TDH	Not Completed	Not Measured	Avg: 2.68 99th Percentile: 4.39 Peak: 15.62	10” PVC
Colburns	990 GPM @ 32 TDH	Not Completed	62 PSI 142 feet	Avg: 2.37 99th Percentile: 4.26 Peak: 6.11	10” DIP
Dutch Hollow	1,150 GPM @ 26 TDH	954	23 PSI 53 feet	Avg: 4.93 99th Percentile: 11.99 Peak: 22.35	14” PVC
Townline	1,500 GPM @ 31 TDH	1,165	21 PSI 49 feet	Avg: 3.86 99th Percentile: 9.00 Peak: 15.78	16” PVC
Bonita	1,900 GPM @ 64 TDH	Not Completed	27 PSI 62 feet	Avg: 6.93 99th Percentile: 15.54 Peak: 18.48	14” HDPE

In review of the data, various inconsistencies were discovered that could not be logically explained. When pump run hours were multiplied by estimated pumping rates to get total flow, the total flow upstream of Bonita often exceeded the total flow from the Bonita Pump Station. This is not logical as all flow is conveyed to the Bonita Pump Station. It was attempted to overcome this major data anomaly through draw down tests, pressure gauge readings, and reviewing pump curves, but the errors in the data could not definitively be identified.

As a result, and for purposes of this study, we have utilized average pump run hours as the method for determining likely pump station capacity. In general, the average run time of a pump station should vary between 2 to 8 hours per day. This range helps ensure that the pumps operate efficiently without short-cycling and also allows the pump station to appropriately handle peak flow rates with one pump out of service. Average run times of less than 8 hours per day is indicative of available capacity, while average run times that exceed 8 hours per day is a sign that the pump station's ability to handle peak flow events may be compromised, posing a higher risk of sewer backups or overflows. In review of the pump station run hour data, each pump station has an average run times of less than 8 hours per day and it is believed each station is likely to have sufficient capacity for additional flow with minimal upgrades provided flows are equalized at the last pump station of the district extension, but a detailed capacity analysis inclusive of flow monitoring should be completed during a design phase of the project to confirm. It would be recommended that flows influent or effluent to each pump station are metered for at least a one month period.

3.4.3.2. Gravity Sewer Main

For purposes of this study, a preliminary review of gravity trunkline sewers that could be utilized by a northeastern sewer district to convey sewage to the SCCLSD WWTP was completed. From the Maple Springs Pump Station to the Bonita Pump Station, there are three major sections of gravity sewer trunkline. The sections of gravity sewer trunkline are primarily 18-inch diameter pipe and are believed to be comprised of either reinforced concrete pipe (RCP) or PVC. The final few sections of gravity main near the treatment plant are larger 30-inch or 36-inch diameter reinforced concrete pipe. Based on record drawings and GIS information provided by the SCCLSD, preliminary capacity calculations of the major sections of gravity main was completed and is included in Appendix J. These capacity calculations were completed utilizing manning's equation for open channel flow and assume the record drawings and GIS data is accurate. We recommend for flow/level monitoring along these gravity mains to be completed during the design phase of the project to verify suspected capacity. A summary of the capacity of the 18" diameter gravity main is provided below.

- Average Capacity 4.09 MGD (2,840 GPM)
- Lowest Capacity Section 1.48 MGD (1,027 GPM)

4. Definition of the Problem

4.1. Health, Sanitation, and/or Security

Constructing municipal sanitary sewer around the entirety of Chautauqua Lake has been a high priority for Chautauqua County, USEPA, and the NYSDEC for several decades as studies dating back to the 1970's have indicated substantial health and environmental problems were occurring. High nutrient loading and a degradation in Lake water quality has been extremely visible with the regular occurrence of harmful algal blooms (HABs). As a result of several studies and significant sampling, the New York State Department of Environmental Conservation (NYSDEC) designated the Lake as an impaired water body per Section 303(d) of the federal Clean Water Act in 2004. Then in 2012, the NYSDEC implemented a Total Maximum Daily Load (TMDL) phosphorus allocation for the Lake aimed at improving water quality and reducing the common occurrence of harmful blue-green algal blooms. The TMDL requires significant reductions in nutrient sources across the watershed, including runoff from agricultural/urban lands and from failing septic systems or wastewater treatment facilities.

According to the 2012 TMDL for Phosphorous in Chautauqua Lake, an estimated 975.4 lbs/year of phosphorous is discharged into the northern portion of the lake from septic systems and treatment plants without phosphorus removal. All of this loading would be removed if municipal sewers are installed. Since that report was completed, multiple major sanitary sewer system extensions along the Lake have occurred, but the project area in this report still lacks municipal sewers. Constructing municipal sewer around the entirety of Chautauqua Lake is critical to improving the water quality and safety of the Lake.

Private septic systems also pose a health and sanitation risk to the areas private drinking water wells. Since there is no public municipal water for large portions of the project area, most properties utilize private groundwater wells for water service. NYSDOH requires individual groundwater wells to be located a minimum of 50 feet from septic tanks and 100 feet from absorption fields for sanitary reasons. Many of the lot sizes on the lakeside properties are too small to achieve this required separation and the private on-site wastewater treatment systems pose a contamination risk to the areas groundwater wells.

4.2. Aging, Failing, or Inadequate Infrastructure

It is believed that many of the private wastewater treatment systems within the project area are aging, inadequate, not properly maintained, do not meet current design standards, and need replacement. Additionally, many of the lot sizes along the shoreline are not large enough and are located too close to the shores of Chautauqua Lake to contain adequate treatment systems that include phosphorous removal. In order to meet the TMDL for phosphorous, significant and comprehensive improvements to treatment infrastructure located along the lake would be required.

5. Study Area Description

The study area is located along the northeast side of Chautauqua Lake between Midway State Park and the Chautauqua Lake Estates community. The area is comprised of a variety of different property types including typical residential neighborhoods, campsites, summer camps, and private townhome/condominium properties. As previously discussed in Section 3.1, several of these properties have small private owned wastewater treatment plants or community septic systems. A description of how the study area was analyzed including EDU estimates and preliminary flow/load estimates is described in this section.

5.1. Sub-Area Breakdown and EDU Assessment

Due to its size and complexity, the project area was divided into sub-areas to better assess EDUs, flows, loads, and infrastructure requirements. A list of the sub-areas, including neighborhood breakdowns and major users within each sub-area and their associated EDU assessment is included below. A map depicting each sub-area is included as Figure 2 and a full EDU assessment is contained in Appendix B.

- Potential Golf Course Development – Up to 227 EDUs
  - 188 EDUs for Planned Townhomes, Condominiums, and Commercial Space
  - 39 EDUs for Future single-family lots
- Point Chautauqua – 104 EDUs
- Dewittville
  - Neighborhood Areas – 96 EDUs
  - Creek & Lake Campground – 23.5 EDUs
- Southern Town of Chautauqua
  - Neighborhood Areas – 15 EDUs
  - YMCA Camp Onysha – 5.5 EDUs
  - Bayberry Landing – 33 EDUs
  - KOA Campground – 125.5 EDUs
- North Ellery 1
  - Neighborhood Areas – 13 EDUs
  - Crosswinds Marina Community – 44 EDUs
  - Camp Mission Meadows – 12.1 EDUs
- North Ellery 2
  - Neighborhood Areas – 38 EDUs
  - Chedwell Club – 14 EDUs
  - Lake Chautauqua Lutheran Center – 7 EDUs
- North Ellery 3
  - Neighborhood Areas – 23 EDUs
  - The Boys JIM Club of America – 7.1 EDUs
  - Viking Lodge Lake Park – 73.5 EDUs

5.2. Preliminary Flows & Loads Estimate

Detailed preliminary flow and load estimates were completed and are detailed in Appendix K. Design standards for estimating flows and loads from new sanitary collection systems are often conservative compared to actual flow and load data after completion. However, design standards allow an engineer to utilize water use data or other data to justify different flow/load estimates. As part of this study, various available data sources were analyzed to more accurately estimate projected flows and loads. This data included recommendations for various current design standards (10 States, TR-16, Metcalf and Eddy, NYSDEC Intermediate Standards), a USDA Forest Service study titled "Water Use in Forest Service Recreation Areas: Guidelines for Water System Designers" completed in September 2007, DMR's from the NCLSD and SCCLSD WWTPs, private water use data in project area, and any available DMR data provided for the various private treatment systems in the project. Flows from the newly constructed SCCLSD West Side Extension were also individually reviewed to better estimate actual flows from lakeside districts constructed using modern construction techniques and standards.

Based on this data, it was found that actual flows and loads experienced are often significantly less than suggested in various design standards. However, this data can and is being utilized to justify estimating flows and loads differently than stated in the standards. Utilizing real world data will generally result in a less conservative design, but also a more cost-effective project as oversizing infrastructure can be extremely expensive. Should this project proceed into the design phase, estimated flow and load data contained in this report should be revisited and confirmed by the design engineer. For purposes of this study, we have utilized available real world to more accurately estimate projected flows and loads. A summary of the flows for each sub-area and loads from the entire project area is provided in the tables below.

Table 5-1: Summary of **Estimated Flows**

Sub-Area	**Estimated Flows**		
	Average Day Flow (gpd)	Max. Day Flow (Summer) (gpd)	Max. Day Flow **(Entire Year) (gpd)**
Potential Golf Course Development	39,700	62,400	79,400
Point Chautauqua	23,400	33,800	46,800
Dewittville	26,300	38,300	50,300
Southern Town of Chautauqua	28,200	51,400	53,300
North Ellery 1	9,500	17,800	33,500
North Ellery 2	12,400	18,300	24,100
North Ellery 3	14,600	23,100	25,900
TOTAL	154,100	245,100	313,300

Table 5-2: **Summary of Estimated Loads**			
	Average Day Flow	Max. Day Flow (Summer)	Max. Day Flow **(Entire Year)**
Biochemical Oxygen Demand, 5-Day (BOD_5)	309 ppd 240 mg/L	981 ppd 480 mg/L	627 ppd 240 mg/L
Total Suspended Solids (TSS)	309 ppd 240 mg/L	981 ppd 480 mg/L	627 ppd 240 mg/L
Nitrogen (NH_4)	31 ppd 24 mg/L	98 ppd 48 mg/L	63 ppd 24 mg/L
Total Phosphorus (TP)	7 ppd 5.6 mg/L	23 ppd 11.2 mg/L	15 ppd 5.6 mg/L

6. **Alternative Analysis**

As part of this study, various treatment and collection alternatives were considered on both a high level and a detailed basis. Treatment alternatives initially considered treatment by the NCLSD, SCCLSD, and treatment by a new plant. However, after a review of the NCLSD plant capacity and available space on site at its plant, it was determined that it was not practical to expand the plant to receive flow from such a large collection system extension, but the NCLSD could receive flow from a portion of the service area. As a result, treatment alternatives were initially shortlisted to the following:

Treatment System Alternatives:

- Alternative No. 1 – Treatment by SCCLSD WWTP
- Alternative No. 2 – Split Treatment (via SCCLSD WWTP and NCLSD WWTP)
- Alternative No. 3 – Construction of a New WWTP

Collection System alternatives initially considered included gravity, low-pressure, and vacuum sewer collection systems. However, after a review of the area's topography, it was determined that an all-gravity collection system would not be feasible. Also, after discussions with the County, it was also determined that a vacuum sewer system should not be considered based on their experiences with vacuum sewers. As a result, collection alternatives were initially shortlisted to the following. A hybrid collection system is considered a collection system inclusive of sections of gravity and low-pressure sewers. Considering the golf course development is only conceptual and not yet constructed, we have provided variations of each collection system alternative to understand infrastructure sizing with and without this proposed development.

Collection System Alternatives:

- Alternative No. 1 – "Hybrid" Collection System
  - Option 1 – Conveyance to SCCLSD WWTP (with Golf Course Development)
  - Option 2 – Conveyance to SCCLSD WWTP (without Golf Couse Development)

- Alternative No. 2 – Low-Pressure Collection System
  - Option 1 – Conveyance to SCCLSD WWTP (with Golf Course Development)
  - Option 2 – Conveyance to SCCLSD WWTP (without Golf Couse Development)

6.1. No Action Alternative

This alternative is a baseline comparison for the other alternative. This alternative has the lowest initial cost; however, it does not result in the construction of public sewers in the project area. Taking no action will not completely address the County's goals of protecting and improving the water quality of Chautauqua Lake. The Lake would experience sustained higher nutrient and phosphorus loadings from the project contributing to potential harmful algal blooms and making meeting the TMDL more difficult.

6.2. Treatment System Alternative Analysis

Three treatment system alternatives were analyzed, each of which have their own advantages and disadvantages. A detailed description of each alternative is provided in the sections below.

6.2.1. Treatment System Alternative No. 1 – Treatment by SCCLSD WWTP

This alternative includes conveying all wastewater to the south for treatment at SCCLSD WWTP. Recommendations and improvements required for this alternative are described in the section below.

6.2.1.1. SCCLSD Treatment Plant Improvements

It is believed that the SCCLSD has adequate capacity to handle the estimated flows and loads for the new service area and still meet its SPDES permit limits. Any upgrades required to the SCCLSD WWTP would largely be minor in nature and only applicable during the absolute peak flow events. According to operators, the plant's largest capacity limitation discovered during extreme events is passing flow through the primary clarifiers. As a result, the SCCLSD is already planning to install a primary clarifier bypass for use during extreme rain/snow melt events regardless of if this project moves ahead. Other minor upgrades may include adding redundant or upsizing piping in a few critical areas to ensure the plant can handle peak hydraulic flow days when there is significant inflow and infiltration from large rainfall events or snowmelt.

6.2.1.2. SCCLSD Collection and Conveyance Improvements

Various improvements within the existing SCCLSD collection system are projected to be necessary to convey flow to the treatment plant. To start, the northern most portions of the existing collection system largely include vacuum sewer collection which would be bypassed due to capacity limitations. It is envisioned that the new sewer district would tie into the existing 10-inch force main at Long Point State Park. The new sewer district would then only utilize larger force mains, gravity trunkline sewers, and main pump stations to convey the added flow. These pump stations include the Colburns, Dutch Hollow, Townline, and Bonita pump stations

The exact capacity of each impacted existing pump station is unknown. Based on each pump station's run hours, it appears that all stations would have capacity to take additional flow provided that the flow is equalized. Flow equalization can be provided by a large, covered equalization tank approximately 315,000 gallons to size. The sizing is equivalent to a peak flow day for the district. The tank would be installed in advance of the last new main pump station and would help reduce hydraulic surges on downstream infrastructure by storing and gradually releasing it at manageable and predictable flow rate. The equalization structure will largely be required during heavy rain or snow melt events but could also be utilized to evenly distribute flows during an average flow day and to store wastewater during downstream emergencies. The equalization tank is likely to eliminate the need for significant downstream pump station upgrades, although some downstream pump station upgrades may be required (i.e. pump replacement, control system optimization). As previously stated, additional flow metering within the existing collection system will be required during final design to verify and confirm these recommendations. Project impacts to pump run hours based on assumed pumping rates are provided in the table below:

Table 6-**1: Existing Pump Station Run Hour Impact**

Name	Colburns	Dutch Hollow	Townline	Bonita
Design Point per Record Drawings	990 GPM @ 32 TDH	1,150 GPM @ 26 TDH	1,500 GPM @ 31 TDH	1,900 GPM @ 64 TDH
Current Average Day Run Hours	2.37 hours	4.93 hours	3.86 hours	6.93 hours
Future Average Day Run Hours(1)	4.96 hours (+2.59 hrs)	7.16 hours (+2.23 hrs)	5.57 hours (+1.71 hrs	8.28 hours (+1.35 hrs)
Current 99th **Percentile** Day Run Hours	4.26 hours	11.99 hours	9.00 hours	15.54 hours
Future 99th **Percentile** Day Run Hours(1)	9.53 hours (+5.27 hrs)	16.53 hours (+4.54 hrs)	12.48 hours (+3.48 hrs)	18.29 hours (+2.75 hrs)

(1) Future run hours are calculated using the design point flow rate for each pump station and the estimated flow from the service area.

In addition to flow equalization, pump station upgrades, and additional collection system flow metering, we recommend for the critical sections of gravity sewer to be televised during design to verify the pipes are in acceptable condition. Any pipes found to have major defects should be rehabilitated in advance of adding additional flow. If the construction of flow equalization allows peak pump station flow rates to be largely maintained, only infrastructure north of the Colburns pump station would experience elevated peak flow rates. In review of the least pitched gravity sewer north of the Colburns Pump Station, the added flow may only utilize approximately 15% to 30% of the pipe's theoretical capacity. Although flow monitoring during final design should be completed to confirm capacity, minimal upgrades are projected to be required within the gravity portions of the existing collection system. Upgrades, if necessary, would include installing a few short, strategically located sections of redundant sewer main to increase capacity. Overall, based on a review of available data and discussion with system operators, the existing SCCLSD collection and conveyance infrastructure should be able to accommodate the additional flows with minimal improvements provided flows are equalized.

6.2.2. Treatment System Alternative No. 2 – Split Treatment (via SCCLSD and NCLSD WWTP)

As previously discussed, the NCLSD is at capacity and lacks significant room to expand. After a review of the size of the eastern service area, it is not practical to convey all flow to the north. A logical topographical location for a flow split would be at Dewittville Creek. This alternative would include treatment by both the NCLSD and SCCLSD WWTPs with a flow split located in the Dewittville Creek area.

6.2.2.1. SCCLSD Improvements

As mentioned in Section 6.2.1, minor upgrades to the SCCLSD WWTP, pump stations, and conveyance sewer are anticipated in order for it to handle the anticipated peak flows from the new service area. The improvements described in Section 6.2.1 for the SCCLSD infrastructure would be similar for this alternative. The equalization tank may be able to be slightly reduced in size.

6.2.2.2. NCLSD Treatment Plant Improvements

Unlike the SCCLSD WWTP, the NCLSD WWTP is at capacity for many of its major unit processes and would require significant upgrades to handle peak flows from a major new service area. A detailed analysis of the WWTP was completed under a separate report, but this report provided two alternatives for increasing the capacity of the NCSLD plant. The first alternative included upgrades to the existing Rotating Biological Contactor plant unit processes. This would include expansion of the influent pump station, an additional primary clarifier, an additional rotating biological contactor, an additional secondary clarifier, an additional tertiary filter, UV capacity improvements, reinstatement of a sludge digestion process, and the replacement of various antiquated assets. The second alternative included the replacement of the existing biological process (RBC's and clarifiers) with a Sequencing Batch Reactor (SBR) activated sludge treatment process. Although projected to be more expensive, it is believed that a SBR plant may better serve the district long term. The exact extent of the required upgrades to the NCLSD WWTP is dependent on various factors including true flows from current district expansions and the potential golf course development, the location of a flow split, and the success of a major inflow-infiltration project that is currently underway in the district.

6.2.2.3. NCLSD Collection and Conveyance Improvements

There are two alternatives to convey wastewater to the NCLSD WWTP. The first option would be to utilize and upgrade the existing Chautauqua Heights Pump Station, while the second option would be to construct a new pump station that only utilizes the existing Chautauqua Heights Pump Station force main. For Option 1, the existing Chautauqua Heights Pump Station would require significant upgrades including increasing the size of the pump station wet well, providing flow equalization, and adding a third pump (per original design). Based on the limitations of solids handling pumps and the size of the existing Chautauqua Heights force main, it would be very difficult to increase the flow rate of the pump station due to its impact on total dynamic head. For Option 2, the existing Chautauqua Height Pump Station would be bypassed. A new pump station would be installed along State Route 430 and wastewater would instead be pumped directly into the existing Chautauqua Heights 6-inch force main. Considering the Chautauqua Heights pump station has extremely low run hours, communication between the pump station and the Chautauqua Heights Pump Station would be installed to reduce simultaneous operation and allow for more efficient pumping. Based on a review of each alternative and various access/constructability issues associated with Option 1, we recommend for a new pump station to be added as described under Option 2.

6.2.3. Treatment System Alternative No. 3 – Construction of a New WWTP

This alternative includes the construction of a new wastewater treatment plant to provide treatment from the sewer extension. It is anticipated that the new WWTP would be located in the Hamlet of Dewittville and discharge to Dewittville Creek. The main treatment process would be comprised of an activated sludge process such as a Sequencing Batch Reactor (SBR) process. Brief descriptions of the major unit processes anticipated to be required at the plant are included below:

6.2.3.1. Influent Pump Station

It is anticipated that a dedicated influent pump station will be required to pump sanitary sewage to the WWTP. The pump station would lift sewage to the screening/headworks building where it would receive its first level of treatment.

6.2.3.2. Headworks/Screening

The headworks would be comprised of a mechanical bar screen followed by a grit channel. The main purpose of headworks is to remove inorganic waste like rags, flushable wipes, grit, and other non-biodegradable objects that may clog pumps, damage equipment, or settle out in downstream treatment process tankage.

6.2.3.3. Sequencing Batch Reactor (SBR)

The SBR would be the main biological process at the WWTP. Flow from the headworks would be conveyed to a splitter box where it will be split into two parallel treatment trains located in a shared concrete tank with a divider wall. For the purposes of this study, it is assumed a continuous flow SBR would be utilized. Each SBR train would have dedicated blowers and fine bubble diffusers for the aeration process. The blowers would be located in a separate building and operate on VFDs to increase the treatment plant's overall efficiency. Following treatment, water would be decanted via a plunging style decanter to an equalization tank prior to discharge to other downstream processes. This equalization tank would reduce sizing of downstream filtration and disinfection infrastructure.

6.2.3.4. Tertiary Filtration

Considering a discharge to the creek will require phosphorus removal, tertiary effluent filtration would be required. The filters would be a cloth-disk style filter with automated controls and backwashing. The filters would be located inside a building to be protected from weather. The backwash waste from the filters would be routed back to the head of the plant.

6.2.3.5. Disinfection

There are two main alternatives for providing effluent disinfection: a chlorination/de-chlorination process and an ultraviolet (UV) disinfection process. It is anticipated that the new WWTP would utilize UV disinfection because it eliminates the need to store and handle chemical, is a more predictable disinfection process, eliminates the need to meet effluent chlorine residual requirements, and is more environmentally friendly. The UV disinfection process would include a concrete channel that houses banks of UV lights to treat effluent for viruses and pathogens. Effluent from the filter units would pass through the channel, be treated by the UV light, and then proceed to the plant outfall at Dewittville Creek.

6.2.3.6. Sludge Digestion

Waste sludge from each SBR would be pumped to an aerobic digester for further reduction and treatment. Sludge pump controls would be automated and controlled by the SBR's master control panel to ensure proper sequencing and operation. Each digester would be equipped with a decanter to convey supernatant back to the head of the treatment plant. Thickened sludge (roughly 1.5% to 2.5%) would be drawn off the bottom of the digester and dewatered prior to landfilling. Like the SBR, the digesters would have dedicated blowers and operate on VFDs.

6.2.3.7. Solids Dewatering

For the purpose of this report, it is assumed a mechanical dewatering process would be installed to thicken sludge prior to final disposal. As an alternative to this, the County could elect to liquid haul sludge to a nearby wastewater treatment plant (like Westfield) similar to the NCLSD. However, the mechanical dewatering sludge on-site is believed to be easier to manage. The dewatering equipment would include a screw press, belt press, or similar piece of mechanical equipment capable of dewatering sludge to approximately 15% to 25% solids. Pressed sludge would be conveyed to a small drying bed for temporary storage before final disposal at a land fill. Sludge filtrate would be collected via drains pipes and conveyed back to the head of the WWTP.

6.2.3.8. Additional Infrastructure

In addition to all the major treatment processes described above, the WWTP would include various other building for controls and monitoring equipment, an office/lab space, and general storage. Various site improvements include site lighting, and access road, and a security fence would also be installed at the WWTP. A permanent emergency generator would also be located on site that would be capable of powering the entire plant should a power outage occur.

This alternative was reviewed on a conceptual level to determine preliminary cost estimates for comparison to the other two treatment alternatives. A high-level estimate for the construction of a new WWTP would be approximately $12 million. Although this alternative is feasible, it is not seriously considered due to both monetary and non-monetary factors including the high cost, addition of a new WWTP discharge the to the Lake, the access to two nearby County owned WWTPs, and County operation preference. Adding another wastewater discharge to Chautauqua Lake does not align with the project goal of reducing nutrient loading on Chautauqua Lake, especially since the new discharge would be in the northern portion of the Lake adding to the phosphorus loading. Therefore, more detailed discussion on Alternative 3 has been omitted from future sections of this report.

6.2.4. *Comparison of Treatment System Alternatives*

The table below summarizes the anticipated capital costs and existing O&M treatment charges for Treatment System Alternative Nos. 1 and 2. It should be noted that the NCLSD (due to its smaller size) has higher existing O&M charges than the SCCLSD. In discussions with both districts, it is anticipated that the O&M charges passed on to sewer users would be in line with their current district O&M charges.

Table 6-2: **Estimate of Probable Project Capital Cost – Treatment System Alternatives**

	Alt. No. 1 – SCCLSD WWTP	Alt. No. 2 – SCCLSD & NCLSD WWTP
Total Est. Probable Project Cost	SCCLSD: $4,445,000	SCCLSD: $4,445,000 NCLSD: $10,000,000
Existing Annual O&M Charges	SCCLSD: $354	SCCLSD: $354 NCLSD: $540

The table below summarizes non-monetary considerations for Treatment System Alternative Nos. 1 and 2. The most notable difference between the two alternatives is that the NCLSD WWTP discharges to the north end of Chautauqua Lake whereas the SCCLSD WWTP discharges at the south end where the lake and outlet meet. Conveying sewage south would remove all nutrient loading to Chautauqua Lake from the new service area.

Table 6-3 Non-**Monetary Considerations – Treatment System Alternatives**

Factor	Alt. No. 2 – SCCLSD WWTP	Alt. No. 1 – NCLSD & SCCLSD WWTP
Impact on **Existing Facilities**	• Minor upgrades to SCCLSD WWTP and conveyance infrastructure are anticipated with sufficient flow equalization.	• Will require major upgrades at the NCLSD WWTP to ensure sufficient capacity for new service area. • Minor upgrades to SCCLSD WWTP and conveyance infrastructure are anticipated with sufficient flow equalization.
Aesthetics	• Minimal Impacts	• Minimal Impacts.
Climate Resiliency	• Will be designed with climate change considerations.	• Will be designed with climate change considerations.

Personnel Impacts	• Would utilize existing County operation staff. No added personnel are anticipated to be required.	• Would utilize existing County operation staff. No added personnel are anticipated to be required.
Compliance with Standards	• Any improvements to SCCLSD infrastructure will comply with current design standards.	• Upgrades to NCLSD WWTP will be required to ensure compliance with current design standards for capacity.
Community **Objections**	• Public meetings will be held to discuss the project and allow community input.	• Public meetings will be held to discuss the project and allow community input.
Environmental **Impacts & Mitigation**	• Will reduce nutrient loading on Chautauqua Lake. • All new sewage will be discharged at downstream (south) end of the Lake.	• Will reduce nutrient loading on Chautauqua Lake. • Some portion of new flows will be discharged at upstream (north) end of the Lake. Flow to the south is more desirable and preferred by the County.
Schedule & Constructability	• Coordination for SCCLSD improvements will be necessary since pump stations and WWTP must stay operational.	• Improvements at NCLSD WWTP can be constructed offline with minimal impact to the existing system. • Coordination for SCCLSD improvements will be necessary since pump stations and WWTP must stay operational.
Government Efficiency	• County district would span multiple municipalities. • Use of existing WWTP promotes government efficiency. • Eliminates several private SPDES permits	• County district would span multiple municipalities. • Use of existing WWTPs promotes government efficiency. • Eliminates several private SPDES permits
Permitting Requirements	• All design documents and permit applications would be submitted to appropriate regulatory agencies. • Permitting issues are not anticipated	• All design documents and permit applications would be submitted to appropriate regulatory agencies. • NCLSD WWTP SPDES permit will need to be updated for new flows/loads.

6.2.4.1. Selection of Treatment System Alternative

Treatment plant alternative selection was essential to progressing the engineering report as it determined conveyance location and allowed for a more detailed preliminary collection system design. In review of both monetary and non-monetary considerations and an analysis of pros and cons for the various treatment alternatives, it was determined that Treatment System Alternative No. 1 - Treatment by the SSCLSD plant would be the most favorable alternative for the following reasons:

- The capital cost for treatment related upgrades was the lowest compared to the other alternatives.
- The base O&M charges by the SCCLSD were the lowest and therefore would result in less expensive total sewer use charge to the end user.
- The SCCLSD had treatment capacity and would require limited upgrades.
- The SCCLSD has a larger labor force than the NCLSD to operate the expanded district.
- There are environmental benefits to sending flow south in relation to nutrient loading on the lake as the lake flows to the south.

6.3. Collection System Alternatives

During the preparation of this report, various conceptual collection system layouts were prepared and reviewed based on the three treatment plant alternatives. It was discovered that regardless of the treatment alternative selected, the cost of collection system construction was comparable. Although there were differences, no single treatment system alternative created significant advantages when preparing collection system layouts. For purposes of brevity in this report, we have only provided detailed discussion and layouts for the selected treatment system alternative (Treatment Alternative No. 1 - Treatment via SCCLSD; refer to Section 6.2 for descriptions). The sections below discuss two alternatives for proposed collection system infrastructure that conveys flow to the South. Each of the two alternatives provides a design layout that includes the potential Golf Course Development and one that does not due to the unknown timing or feasibility of the project. Should the golf course development be constructed in advance of this project, it is likely flows from that development would initially be conveyed to the NCLSD plant.

As previously discussed, the two shortlisted sewer collections systems alternatives were a “Hybrid” Collection System (both gravity and low-pressure sewer) and a fully Low-Pressure Collection System. Although more expensive to initially construct, gravity sewer systems are typically preferrable in densely developed neighborhoods with favorable topographic and subsurface conditions due to their low long-term cost of operation. Gravity sewer systems largely utilize sloped piping to convey sewage and require minimal pumping. At times, strategically located centralized sewer pump stations designed at low points are needed to lift the sewage to prevent excessively deep sanitary mains. Gravity collection infrastructure largely includes SDR35 gasketed PVC sewer pipe and precast concrete manholes placed a maximum of every 400 feet or at changes in slope/direction. Gravity sewers constructed with modern materials can last for several decades with minimal maintenance required.

Conversely, low-pressure collection systems are preferable in areas of difficult topographic or subsurface conditions and generally are less expensive to construct, but much more expensive to operate due to the number of pumps required. Pumps not only require electricity to operate, but also require replacement after approximately 10 years of use. Developed parcels within a low-pressure collection system would typically convey waste to a grinder pump station via a gravity sewer lateral located at most developed properties. Each grinder pump individually grinds and pumps sanitary waste into a low-pressure force main with several other grinder pumps connected to it. The low-pressure force main is typically constructed from appropriately sized HDPE pipe.

Each of the two types of collection systems described above have their own unique advantages and disadvantages. A gravity system is more expensive to construct but is the least expensive and easier collection system to operate and maintain. A low-pressure collection system is often easier to utilize in topographically challenging areas. Low-pressure systems also typically utilize smaller diameter piping, are easier to install (shallower bury depth and can be horizontally directionally drilled), and are typically less expensive to install. The major drawback to a low-pressure system is that operation and maintenance is expensive and labor intensive due to the quantity of grinder pumps that require regular maintenance or replacement. Other disadvantages of a low-pressure system is that it requires electricity to operate and cannot easily be designed for expansion when compared to gravity.

6.3.1. Re-use of Existing Localized Collection Systems

The project area is inclusive of several private or community sanitary sewer treatment systems with existing localized collection systems. These existing local collection systems include both gravity and pressurized sewage infrastructure and it is intended to reuse this existing infrastructure where feasible to minimize costs, reduce environmental impact, and extend municipal sewer service with less disruption to the local community. In areas where private sewer systems are currently in place, assessments during the design phase of the project will determine whether those systems meet required standards and can be integrated into the public system. Where integration is possible, modifications or upgrades may be made to bring these systems into alignment with public health and environmental standards, ensuring consistent and reliable service. Conversely, several inadequate private systems will be phased out and eliminated as properties will be mandated to connect to the municipal system. This transition will help eliminate potential health and environmental risks associated with aging, non-compliant, and difficult to regulate systems. The reuse of existing localized collection systems and elimination of various private treatment systems will be completed under each collection system alternative.

6.3.2. *Collection System Alternative No. 1 – "Hybrid" Collection System*

This alternative generally includes the installation of gravity sewer mains in localized densely populated areas such as Point Chautauqua and Dewittville, with pressurized sewers being installed elsewhere. Alternative No. 1, Option 1 includes the potential golf course development, while Alternative No. 1, Option 2 does not.

6.3.2.1. Option 1 – Hybrid Conveyance to SCCLSD WWTP (with Golf Course Development)

Under this option the flow from the entire project area would be conveyed to the SCCLSD WWTP for treatment utilizing a hybrid collection system. This option assumes the potential golf course development will occur and will be part of the sewer district. An overview map depicting a preliminary layout for this alternative is included as Figure 3A and more detailed preliminary drawings are included in Appendix L. In general, this option would approximately require the following collection system infrastructure:

- 22,000 LF of 8-inch Gravity Sewer Main
- 9,600 LF of 6-inch Gravity Sewer Laterals
- 92 Manholes
- 193 Gravity Sewer Connections
- 2 Small Main Pump Stations
- 3 Medium Main Pump Stations
- 2 Large Main Pump Stations
- 20,400 LF of 10-inch HDPE Pressurized Sewer Main
- 8,500 LF of 8-inch HDPE Pressurized Sewer Main
- 10,500 LF of 4-inch HDPE Pressurized Sewer Main
- 4,400 LF of 3-inch HDPE Pressurized Sewer Main
- 6,350 LF of 2-inch HDPE Pressurized Sewer Main
- 24,800 LF of 1.25-inch HDPE Pressurized Sewer Laterals
- 110 Simplex Grinder Pump Stations
- 7 Duplex Grinder Pump Stations
- 4 Grinder Booster Pump Stations
- 29 Force Main Cleanouts
- 48 Force Main Valves
- 15 Air/Vacuum Release Manholes

6.3.2.2. Option 2 – Hybrid Conveyance to SCCLSD WWTP (without Golf Course Development)

Under this option the flow from the entire project area would be conveyed to the SCCLSD WWTP for treatment utilizing a hybrid collection system. This option assumes the potential golf course development would not occur or would be conveyed to the NCLSD sewer district due to project timing. An overview map depicting a preliminary layout for this alternative is included as Figure 3B and more detailed preliminary drawings are included in Appendix M. In general, this option would approximately require the following collection system infrastructure:

- 22,000 LF of 8-inch Gravity Sewer Main
- 9,600 LF of 6-inch Gravity Sewer Laterals
- 92 Manholes
- 193 Gravity Sewer Connections
- 2 Small Main Pump Stations
- 3 Medium Main Pump Stations
- 2 Large Main Pump Stations
- 8,300 LF of 10-inch HDPE Pressurized Sewer Main
- 15,500 LF of 8-inch HDPE Pressurized Sewer Main
- 2,100 LF of 6-inch HDPE Pressurized Sewer Main
- 10,400 LF of 4-inch HDPE Pressurized Sewer Main
- 4,500 LF of 3-inch HDPE Pressurized Sewer Main
- 6,350 LF of 2-inch HDPE Pressurized Sewer Main
- 25,000 LF of 1.25-inch HDPE Pressurized Sewer Laterals
- 106 Simplex Grinder Pump Stations
- 7 Duplex Grinder Pump Stations
- 4 Grinder Booster Pump Stations
- 23 Force Main Cleanouts
- 47 Force Main Valves
- 15 Air/Vacuum Release Manholes

6.3.2.3. Main Sewer Pump Stations for Hybrid Alternative

The “hybrid” collection system alternative would require an estimated seven (7) main sewage pump stations. The table below summarizes the preliminary design data and sizing for each pump station under each Option. Refer to Appendix N for detailed preliminary pump calculations and the pump station locations.

Table 6-4 **Preliminary Pump Station Design – Hybrid Collection System**

Name	Avg. Day Influent **Flow (Pump Station)**	Peak Influent Flow **(Pump Station)**	Design Flow (gpm)	Max. TDH **(ft)**
Option 1 – With Golf Course				
Point Chautauqua Pump Station	23,400 gpd 16 gpm	93,600 gpd 65 gpm	100	129
Dewittville Pump Station	26,300 gpd 18 gpm	105,200 gpd 73 gpm	100	118
KOA Campground Pump Station	17,745 gpd 12 gpm	70,980 gpd 49 gpm	75	45
Bayberry Landing Pump Station	2,600 gpd 2 gpm	15,600 gpd 11 gpm	30	58
Crosswinds Marina Pump Station	208,800 gpd 145 gpm	771,840 gpd 536 gpm	550	137
Overlook Avenue Pump Station	17,280 gpd 12 gpm	23,040 gpd 16 gpm	30	160
County Route 46 Pump Station	233,280 gpd 162 gpm	930,240 gpd 646 gpm	400 w/ Flow Equalization	115
Option 2 – Without Golf Course				
Point Chautauqua Pump Station	23,400 gpd 16 gpm	93,600 gpd 65 gpm	100	135
Dewittville Pump Station	26,300 gpd 18 gpm	105,200 gpd 73 gpm	100	104
KOA Campground Pump Station	17,745 gpd 12 gpm	70,980 gpd 49 gpm	75	45
Bayberry Landing Pump Station	2,600 gpd 2 gpm	15,600 gpd 11 gpm	30	50
Crosswinds Marina Pump Station	133,920 gpd 93 gpm	534,240 gpd 371 gpm	400	151
Overlook Avenue Pump Station	17,280 gpd 12 gpm	23,040 gpd 16 gpm	30	163
County Route 46 Pump Station	178,560 gpd 124 gpm	714,240 gpd 496 gpm	300 w/ Flow Equalization	111

6.3.3. Collection System Alternative No. 2 – Low-Pressure Collection System

This alternative solely includes the construction of a pressurized sewer system. Alternative No. 2, Option 1 includes the potential golf course development, while Alternative No. 2, Option 2 does not.

6.3.3.1. Option 1 – Low Pressure Conveyance to SCCLSD WWTP (with Golf Course Development)

Under this option the flow from the entire project area would be conveyed to the SCCLSD WWTP for treatment utilizing a low pressure collection system. This option assumes the potential golf course development will occur and be part of the sewer district. This option also includes a small portion of gravity sewer to serve 25 campsites located at the Viking Lodge Lake Park. Sewer for these sites would be conveyed via gravity to a small pump station and then pumped into the low pressure collection system. An overview map depicting a preliminary layout for this alternative is included as Figure 4A and more detailed preliminary drawings are included in Appendix O. In general, this option would approximately require the following collection system infrastructure:

- 900 LF of 8-inch Gravity Sewer Main
- 700 LF of 6-inch Gravity Sewer Laterals
- 5 Manholes
- 25 Gravity Sewer Connections
- 1 Small Main Pump Stations
- 2 Medium Main Pump Stations
- 2 Large Main Pump Stations
- 20,400 LF of 10-inch HDPE Pressurized Sewer Main
- 3,400 LF of 8-inch HDPE Pressurized Sewer Main
- 5,200 LF of 6-inch HDPE Pressurized Sewer Main
- 7,500 LF of 4-inch HDPE Pressurized Sewer Main
- 8,400 LF of 3-inch HDPE Pressurized Sewer Main
- 19,250 LF of 2-inch HDPE Pressurized Sewer Main
- 36,000 LF of 1.25-inch HDPE Pressurized Sewer Laterals
- 278 Simplex Grinder Pump Stations
- 5 Duplex Grinder Pump Stations
- 5 Grinder Booster Pump Stations
- 37 Force Main Cleanouts
- 62 Force Main Valves
- 25 Air/Vacuum Release Manholes

6.3.3.2. Option 2 – Low Pressure Conveyance to SCCLSD WWTP (without Golf Course Development)

Under this option the flow from the entire project area would be conveyed to the SCCLSD WWTP for treatment utilizing a hybrid collection system. This option assumes the potential golf course development would not occur or would be conveyed to the NCLSD sewer district due to project timing. This option also includes a small portion of gravity sewer to serve

25 campsites located at the Viking Lodge Lake Park. Sewer for these sites would be conveyed via gravity to a small pump station and then pumped into the low pressure collection system. An overview map depicting a preliminary layout for this alternative is included as Figure 4B and more detailed preliminary drawings are included in Appendix P. In general, this option would approximately require the following collection system infrastructure:

- 900 LF of 8-inch Gravity Sewer Main
- 700 LF of 6-inch Gravity Sewer Laterals
- 5 Manholes
- 25 Gravity Sewer Connections
- 1 Small Main Pump Stations
- 2 Medium Main Pump Stations
- 2 Large Main Pump Stations
- 20,400 LF of 8-inch HDPE Pressurized Sewer Main
- 5,500 LF of 6-inch HDPE Pressurized Sewer Main
- 7,500 LF of 4-inch HDPE Pressurized Sewer Main
- 7,200 LF of 3-inch HDPE Pressurized Sewer Main
- 20,450 LF of 2-inch HDPE Pressurized Sewer Main
- 36,300 LF of 1.25-inch HDPE Pressurized Sewer Laterals
- 274 Simplex Grinder Pump Stations
- 5 Duplex Grinder Pump Stations
- 5 Grinder Booster Pump Stations
- 35 Force Main Cleanouts
- 59 Force Main Valves
- 25 Air/Vacuum Release Manholes

6.3.3.3. Main Sewer Pump Stations for Low Pressure Alternatives

The low pressure collection system alternative would require an estimated five (5) main sewage pump stations. The table below summarizes the preliminary design data and sizing for each pump station under each Option. Refer to Appendix Q for detailed preliminary pump calculations and the pump station locations.

Table 6-5: **Preliminary Pump Station Design – Low Pressure Collection System**

Name	Avg. Day Flow **(Pump Station)**	Peak Flow **(Pump Station)**	Design Flow (gpm)	Max. **TDH (ft)**
Option 1 – With Golf Course				
Point Chautauqua Pump Station	23,400 gpd 16 gpm	93,600 gpd 65 gpm	100	84
KOA Campground Pump Station	17,745 gpd 12 gpm	70,980 gpd 49 gpm	75	45
Bayberry Landing Pump Station	2,600 gpd 2 gpm	15,600 gpd 11 gpm	30	56
Crosswinds Marina Pump Station	167,040 gpd 116 gpm	675,360 gpd 469 gpm	500	133
County Route 46 Pump Station	207,360 gpd 144 gpm	830,880 gpd 577 gpm	350 w/ Flow Equalization	113
Option 2 – Without Golf Course				
Point Chautauqua Pump Station	23,400 gpd 16 gpm	93,600 gpd 65 gpm	100	153
KOA Campground Pump Station	17,745 gpd 12 gpm	70,980 gpd 49 gpm	75	45
Bayberry Landing Pump Station	2,600 gpd 2 gpm	15,600 gpd 11 gpm	30	66
Crosswinds Marina Pump Station	113,760 gpd 79 gpm	459,360 gpd 319 gpm	350	142
County Route 46 Pump Station	154,080 gpd 107 gpm	614,880 gpd 427 gpm	300 w/ Flow Equalization	138

6.3.4. Comparison of Collection System Alternatives

The table below summarizes the anticipated capital costs for both Collection System Alternatives and associated options. A derailed breakdown of costs for each alternative is included in Appendix R.

Table 6-6: **Estimate of Probable Project Capital Cost – Collection System Alternatives**

	Alt. No. 1 – "Hybrid" System	Alt. No. 2 – Low-Pressure System
Option 1: Conveyance to SCCLSD WWTP (with Golf Course Development)	$31,192,000	$30,551,000
Option 2: Conveyance to SCCLSD WWTP (without Golf Course Development)	$30,316,000	$29,599,000

6.3.4.1. Short Lived Assets and Life Cycle Cost Comparison

Short Lived Assets (SLA) are assets that are anticipated to fail and will need replacement within the typical 20- to 30-year design life of a capital improvement project. Short lived assets are generally inclusive of mechanical equipment and infrastructure prone to “wear and tear.” For a sanitary sewer collection system this typically includes grinder pumps and main pump station pumps, generators, and control systems. The low pressure collection system alternative has a significantly higher number of grinder pumps, and therefore short lived assets that are at risk of failure and will need replacement.

When comparing monetary amounts of project alternatives, it is important to consider capital, operation and maintenance, and short-lived asset replacement costs. The lowest upfront capital cost of a project may not always result in the lowest total cost over time. Additionally, there are several grant and subsidized funding sources for projects upfront capital cost, but there are not funding sources for operation and maintenance and short-lived asset replacement costs. The table below provides an economic evaluation showing the cost impacts of the “hybrid” and low pressure alternatives for option 1 over time. Although the County is not likely to charge more or less for O&M/SLA based on the selected collection system alternative, it should still be understood that investing in more areas of gravity sewer would be less expensive to operate and maintain.

Table 6-7: Life Cycle Cost Analysis – **Collection System Alternatives**		
	Alt. No. 1 – "Hybrid" System (**Option 1**)	Alt. No. 2 – Low-Pressure System (**Option 1**)
Total Estimated Probable Project Cost	$31,192,000	$30,551,000
Plausible Funding Package	62.5% Grant 0% Interest	62.5% Grant 0% Interest
30-Year Total Project Capital Cost	$11,697,000	$11,456,625
Annualized Project Capital Cost	$389,900	$381,888
Annual O&M Cost and SLA Cost	$124,400	$206,800
O&M and SLA **Escalation Factor**	3%	3%
30 Year Total O&M Cost and SLA Cost	$2,438,295	$4,053,371
30 Year Total Cost of **Project Alternative**	$14,135,295	$15,509,996
Delta	$ -	$1,374,701

6.3.4.2. Monetary & Non-Monetary Considerations

The table below summarizes non-monetary considerations for Collection System Alternative Nos. 1 and 2.

Table 6-8: Non-**Monetary Considerations** – **Collection System Alternatives**

Factor	Alt. No. 1 – "Hybrid" System	Alt. No. 2 – Low-Pressure System
Aesthetics	• Grinder pump covers and panels visible on some properties. • 7 Main Pump Stations will be constructed	• Grinder pump covers and panels visible on all properties. • 5 Main Pump Stations will be constructed
Climate Resiliency	• Will be designed with climate change considerations. • Will be protected from flooding	• Will be designed with climate change considerations. • Will be protected from flooding
Personnel Impacts	• Lower O&M time commitment when compared to low-pressure system.	• Higher O&M due to higher number of grinder pumps which typically require more O&M than gravity sewer.

Compliance with Standards	• Will be designed to be compliant to current standards.	• Will be designed to be compliant to current standards.
Community **Objections**	• Public meetings will be held to discuss the project and allow community input.	• Public meetings will be held to discuss the project and allow community input.
Environmental **Impacts & Mitigation**	• Will reduce nutrient loading on Chautauqua Lake. • Surface conditions will be restored after construction since most infrastructure will be located below grade.	• Will reduce nutrient loading on Chautauqua Lake. • Surface conditions will be restored after construction since most infrastructure will be located below grade.
Schedule & Constructability	• Improvements can be constructed offline.	• Improvements can be constructed offline. • Likely shorter construction time
Land Requirements	• Will land purchase for centralized pump stations. • Will require easements for some properties.	• Will land purchase for centralized pump stations. • Will require easements for all properties.
Permitting Requirements	• All design documents and permit applications would be submitted to appropriate regulatory agencies. • Permitting issues are not anticipated	• All design documents and permit applications would be submitted to appropriate regulatory agencies. • Permitting issues are not anticipated
Seasonal Impacts	• Pump stations will be sized to accommodate both high and low flows seasons. • Seasonal variations in flow have no impact on gravity sewer	• Pipe diameters will be sized for high, summer flows. Flushing may be required in winter months when flows are lower.

6.3.4.3. Selection of Collection System Alternative

In review of both monetary and non-monetary considerations and an analysis of pros and cons for the various collection system alternatives, it was determined Collection System Alternative No. 1 - “Hybrid” Collection System with the golf course development would be the most favorable alternative for the following reasons:

- Utilizes the strengths of both a gravity sewer system and a low pressure sewer system.
- Fewer grinder pumps resulting in less labor intensive O&M, fewer pump replacements, and lower energy usage.
- Since the golf course is in the planning stage and under review by the Town of Chautauqua Board, it was included in the project. When developing large projects such as a sewer system extensions, it is important to account for planned growth. If the development does not move forward, it can be removed from this project.
- Lowest life cycle cost for the length of the loan (30 years)

7. Selection of Alternative

As discussed in Sections 6.2.4.1 and 6.3.4.3 it is recommended that the County proceed with Treatment System Alternative No. 1 – Treatment by SCCLSD and Collection System Alternative No. 1 – "Hybrid" Collection System with the Potential Golf Course Development.

7.1. Estimated Probable Project Cost

The estimated probable capital costs for the selected alternatives are shown below. A detailed cost estimate of the alternatives shown below is included in Appendix R.

Table 7-**1: Estimate of** Total Probable Project Capital Cost

Treatment System Alternative No. 1 – Treatment by SCCLSD WWTP	$4,445,000
Collection System Alternative No. 1 – "Hybrid" Collection System, With Golf Course Development	$31,192,000
TOTAL	$35,637,000

7.2. Anticipated O&M and Short Live Assets and Reserve Savings

The largest Operation and Maintenance (O&M) cost associated with the new district will be related to the maintenance, energy use, and short-lived asset savings related to all new pumping equipment. Additional O&M costs associated with treatment at the SCCLSD WWTP are anticipated to be minimal and just largely inclusive of additional energy usage for pumping and aeration. This project will increase flows to the plant by approximately 7.5% and energy use from pumping and aeration equipment would increase by no greater than a proportional percentage.

As discussed in Section 6.3.4.1, pump stations and grinder pumps are the main short lived assets for sanitary sewer collection systems. The SCCLSD is extremely experienced at budgeting for and maintaining these types of short lived assets as the system currently contains numerous main pump stations and hundreds of grinder pumps.

During project discussions with the County and the SCCLSD, new sewer users would be charged $354 per year per EDU for O&M and SLA costs. This is the current amount assessed to existing SCCLSD users, excluding debt charges. The district is very comfortable with extending the same rate for this district extension. Considering this sewer extension would be very comparable to other sewered areas around the lake, charging new users the current O&M and SLA rate will be sufficient to cover the additional costs associated with the new infrastructure.

7.3. Smart Growth Considerations

The capital improvement project is consistent with NYS Smart Growth principles and practices. The alternatives previously described all aim to protect the natural environment and improve the water quality of Chautauqua Lake. A completed NYSEFC Smart Growth form is included as Appendix S.

8. Plan of Finance

8.1. Current Municipal Sewer System Funding Opportunities

The following funding programs provide grant and loan funding for municipal sewer systems and could be a relevant source of funding to this project:

8.1.1. NYSEFC Managed Programs

The NYS Environmental Facilities Corporation programs is one of the most common funding agencies for municipal sewer projects. NYSEFC manages a variety of grant and loan programs including the following:

- Clean Water State Revolving Fund (CWSRF): The NYSEFC CWSRF program provides grant and loan funding for municipal sanitary sewer projects. Grant funding could be as much 50% (capped at $25 million) and loans could have an interest rate as low as 0% interest for a 30-year term. The exact type of funding a community qualifies for is determined through income-based hardship criteria as well as project-based scoring criteria. Utilizing the income-based criteria, the County does financially qualify for hardship funding which means the project is eligible for the best grant/loan package available.
- Bipartisan Infrastructure Law (BIL) Funding: BIL funding could provide up to 50% grant (capped at $25 million) and a 30-year, 0% interest loan. BIL funding is administered by NYSEFC and uses different scoring criteria from the CWSRF program to calculate a Blended Affordability Score to determine if a project is eligible for BIL funding. Only CWSRF hardship communities are eligible for BIL funding. Considering Chautauqua County is an EFC hardship community under the current criteria, the project could be eligible for BIL funding.
- Water Infrastructure Improvement Act (WIIA) Grant: The WIIA grant program is administered by NYSEFC but utilizes a separate application process than CWSRF or BIL. For clean water projects, a WIIA grant could provide a 25% grant (capped at $25 million). This program generally prioritizes hardship communities, projects addressing public health/water quality concerns, and shovel ready projects. NYSEFC also administers an enhanced WIIA program that could provide 50% grant for hardships communities with a population less than 3,500. Based on the estimated population of the service area (915 people), this project is eligible for an enhanced WIIA award.

8.1.2. NYSDEC Water Quality Improvement Project (WQIP) Program

The NYS Department of Environmental Water Quality Improvement Project (WQIP) program is a competitive, reimbursement grant program that funds projects that directly improve water quality. The grant is extremely competitive and has historically funded many sewer extensions in the vicinity of impaired waterbodies (like Chautauqua Lake). If awarded, this program could provide a grant of up to $10,000,000 or 80% of construction costs.

8.1.3. *Congressional Appropriations - Community Project Funding*

Congressional appropriations are funds earmarked for projects by Congress to be included within the yearly Presidential Budget. The process for selection is extremely political and the amount available funding can significantly vary on a year-to-year basis. The appropriations account for a sewer project would generally be the Department of Interior Environmental Protection Agency (EPA) State and Tribal Assistance Grant (STAG) program. If selected, a project could receive an estimated $1,000,000 to $2,000,000 in grant funding.

8.2. Plausible Funding Scenarios

Completing the recommended improvements will not be financially feasible without significant grant funding. Based on the project's scope and available funding, the following scenarios are all plausible:

- Scenario No. 1: NYSEFC 0% Hardship Loan and 75% Grant – This scenario includes the County receiving a 30-year, 0% interest hardship loan through the NYSEFC CWSRF program. The County would also receive grants totaling 75% of the total project cost through a combination of WIIA, CWSRF, BIL, WQIP, or Congressional Community Project funding.
- Scenario No. 2: NYSEFC 0% Hardship Loan and 62.5% Grant – This scenario includes the County receiving a 30-year, 0% interest hardship loan through the NYSEFC CWSRF program. The County would also receive grants totaling 62.5% of the total project cost through a combination of WIIA, CWSRF, BIL, WQIP, or Congressional Community Project funding.
- Scenario No. 3: NYSEFC 0% Hardship Loan and 50% Grant – This scenario includes the County receiving a 30-year, 0% interest hardship loan through the NYSEFC CWSRF program. The County would also receive grants totaling 50% of the total project cost through a combination of WIIA, CWSRF, BIL, or Congressional Community Project funding.
- Scenario No. 4: NYSEFC 0% Hardship Loan and 25% Grant – This scenario includes the County receiving a 30-year, 0% interest hardship loan through the NYSEFC CWSRF program. The County would also receive grants totaling 25% of the total project cost through a combination of WIIA, CWSRF, or Congressional Community Project funding.
- Scenario No. 5: NYSEFC Market Rate Loan and No Grant – This scenario includes the County receiving a 30-year, market rate loan (assumed 4% interest) through NYSEFC CWSRF program and no grant funding. If this scenario occurs, the County would likely not proceed with the project until it can receive grant funding. Without grant funding, this project will not be affordable to residents. This scenario should serve as a baseline scenario.

8.3. Estimated Annual User Cost Impacts

User cost impacts will depend on the final scope of the project and actual funding received. The tables below summarize user cost impacts for the plausible funding scenarios described above for the "hybrid" collection system alternative both with and without the golf course development moving forward. Refer to Appendix T for a detailed breakdown.

Table 8-1: Summary of Impacts on Annual User Costs – With Golf Course (822.2 EDUs)*

Potential Funding Package	Est. Annual Capital Debt per EDU	Est. Annual SCCLSD O&M Cost per EDU	Est. Total Annual User Cost per EDU	Est. One Time Cost for Sewer **Connection**
Scenario No. 1 Grant: 75% Loan: 30 year @ 0% Interest	$361	$354 ($88.50 per quarter)	$715	$5,000 to $7,00 One time connection Cost
Scenario No. 2 Grant: 62.5% Loan: 30 year @ 0% Interest	$542		$896	
Scenario No. 3 Grant: 50% Loan: 30 year @ 0% Interest	$722		$1,076	
Scenario No. 4 Grant: 25% Loan: 30 year @ 0% Interest	$1,084		$1,438	
Scenario No. 5 Grant: None Loan: 30 year @ 4% Interest	$2,507		$2,861	

Note: *Golf Course Development was assessed 188 EDUs (this does not include any EDU's for the potential 39 single family lots)*

Table 8-2: Summary of Impacts on Annual User Costs – Without Golf Course (634.2 EDUs)				
Potential Funding Package	Est. Annual Capital Debt per EDU	Est. Annual SCCLSD O&M Cost per EDU	Est. Total Annual User Cost per EDU	Est. One Time Cost for Sewer **Connection**
Scenario No. 1 Grant: 75% Loan: 30 year @ 0% Interest	$457	$354 ($88.50 per quarter)	$811	$5,000 to $7,00 One time connection Cost
Scenario No. 2 Grant: 62.5% Loan: 30 year @ 0% Interest	$685		$1,039	
Scenario No. 3 Grant: 50% Loan: 30 year @ 0% Interest	$914		$1,268	
Scenario No. 4 Grant: 25% Loan: 30 year @ 0% Interest	$1,370		$1,724	
Scenario No. 5 Grant: None Loan: 30 year @ 4% Interest	$3,170		$3,524	

8.4. Project Affordability

Historically, the County has viewed Sewer Districts as affordable when annual user costs are kept below $1,000 per year per EDU. The County will generally not move forward with a Sewer Project until enough funding is received to meet this cost threshold. For this project, the County would need to secure approximately 62.5% grant funding to keep the estimated user cost below $1,000 per year per EDU. If sufficient grant funding is not secured, the County may elect to phase the project or may consider an all low-pressure collection system alternative to keep initial user costs down.

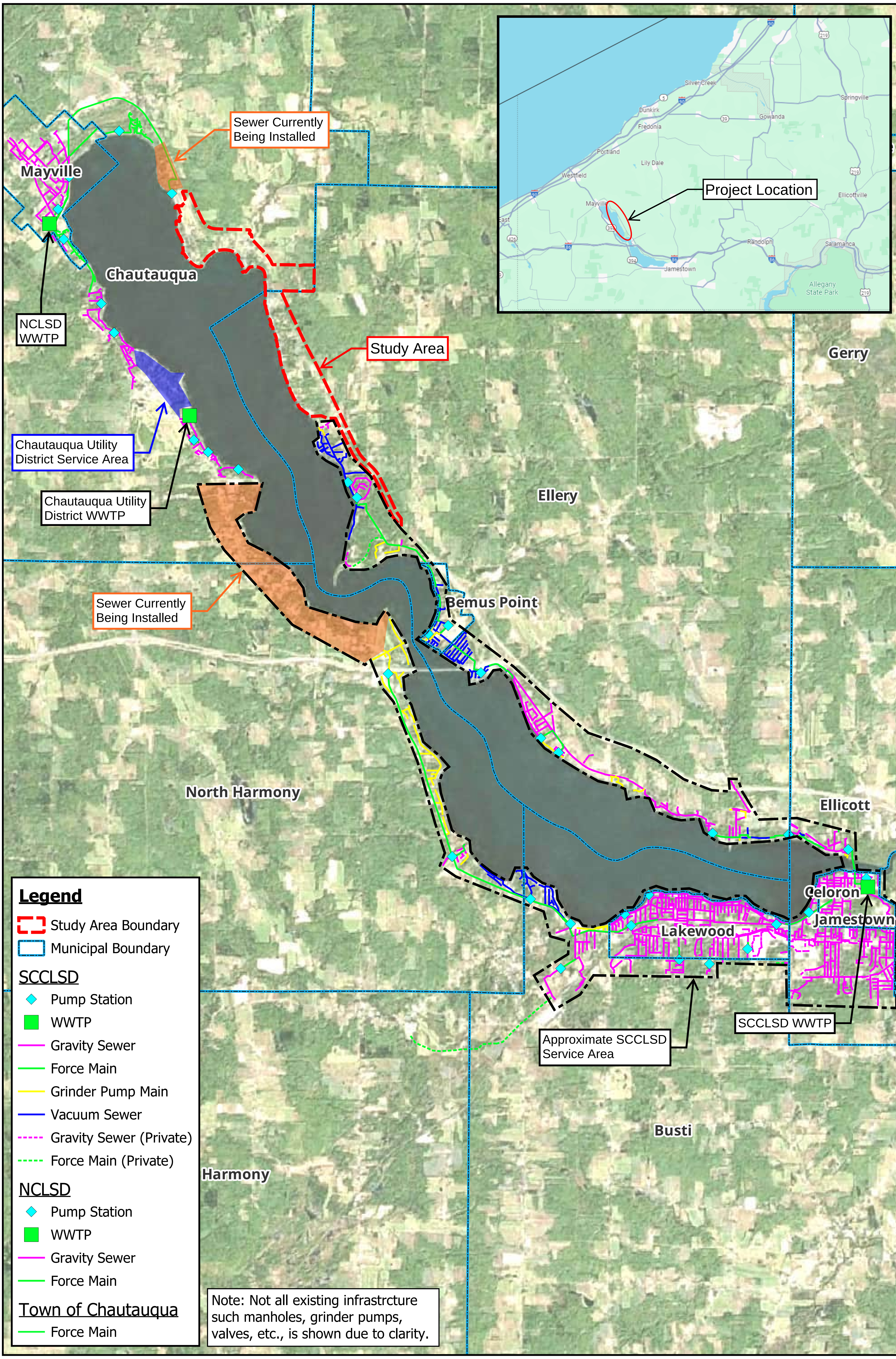
9. Recommended Next Steps

It is recommended for this to be presented to the Chautauqua County Legislature and as well as publicly at a public informational meeting to solicit feedback. If the project is viewed favorably, the County should consider immediately moving forward with the completion of a Map, Plan, and Report as well as the district formation process. This report should be submitted to NYS Environmental Facilities Corporation, NYS Department of Environmental Conservation, and other potential funding agencies for review and comment. The NYSEFC required Engineering Report Certification is included as Appendix U. An estimated project implementation schedule is included below:

Project Schedule	Estimated Date
Present Report to Legislative Board	December 2024
Environmental Review (SEQR/NEPA)	Early 2025
Develop Map, Plan, and Report	Early 2025
District Formation	Early 2025
Preliminary Engineering Report Submission	June 2025
Secure Project Funding Package	Late 2025 – 2026
Engineering Design	2026
Project Bidding and Construction Contract Award	Early 2027
Construction Start	Spring 2027
Construction Completion	Fall 2028

Figure 1

Project Location Map



N

0 6,000 12,000 ft

e square engineering

Chautauqua County

Figure 1

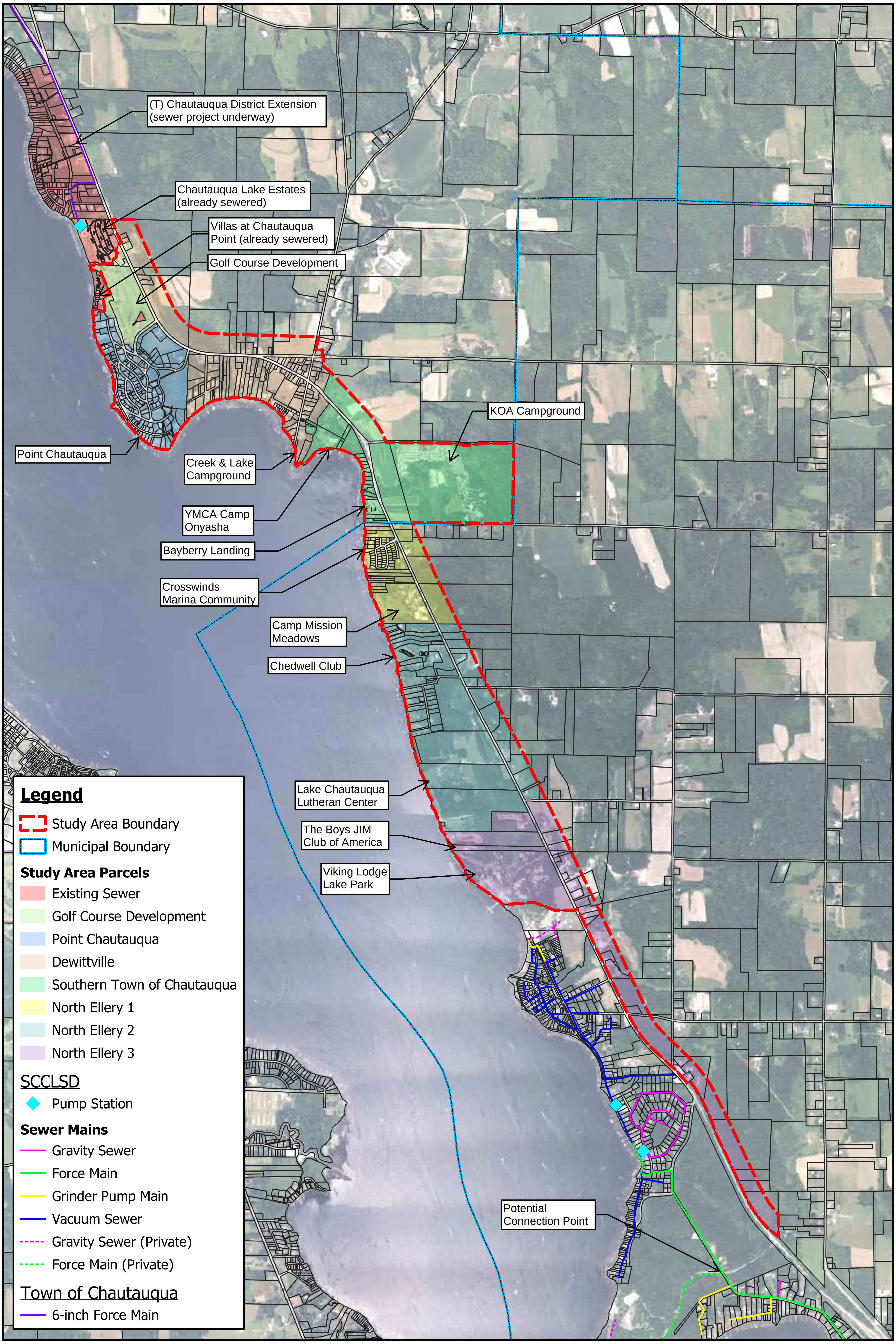
Project Location Map

Chautauqua County, New York 10/15/2024

Project No. 125.001

Figure 2

Sub-Area Breakdown



e square engineering

Chautauqua County

Figure 2

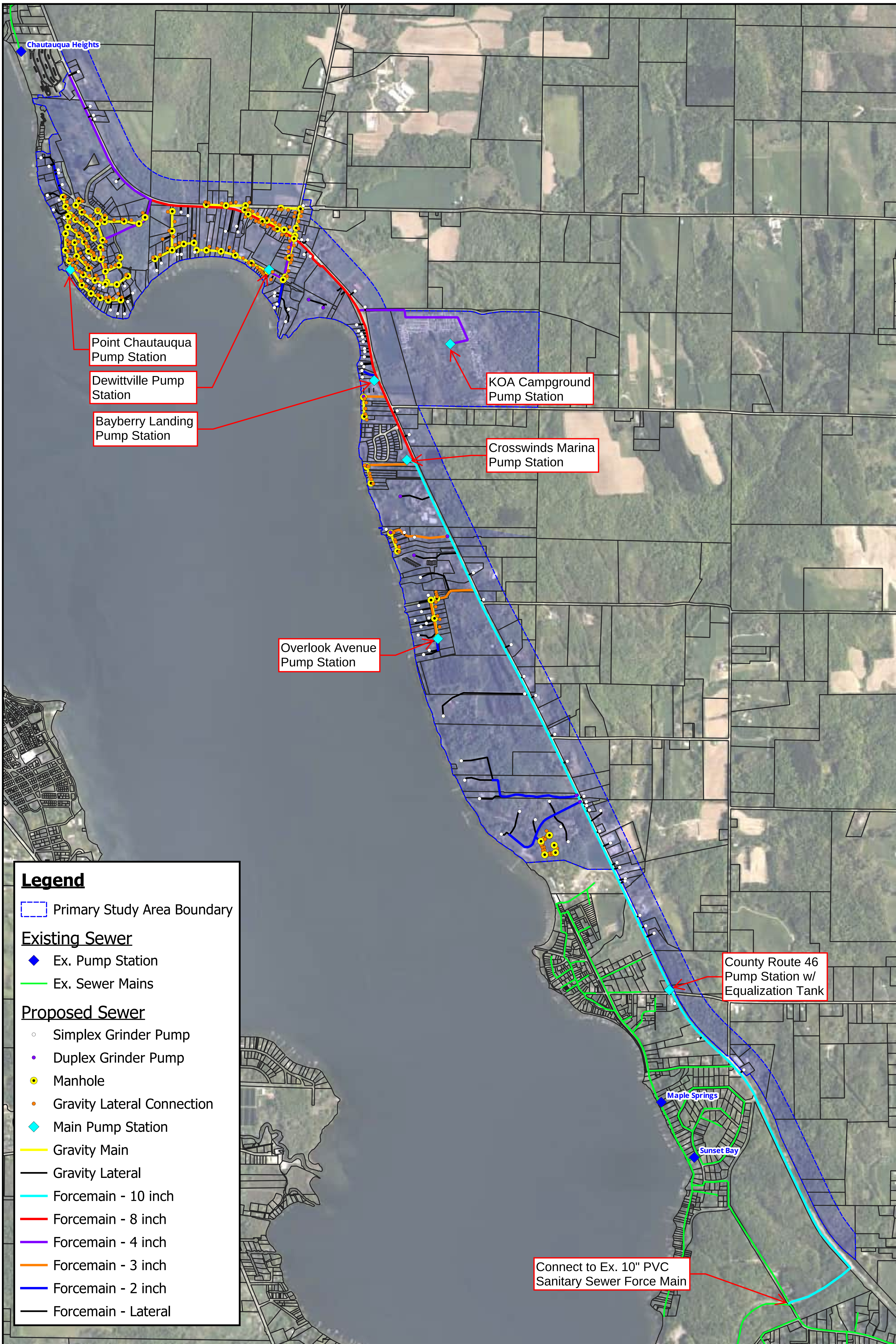
Project Sub-Area Breakdown Map

Chautauqua County, New York 10/01/2024

Project No. 125.001

Figure 3

“Hybrid” Collection System Alternative



e square engineering

N

0 1,000 2,000 ft

Chautauqua County

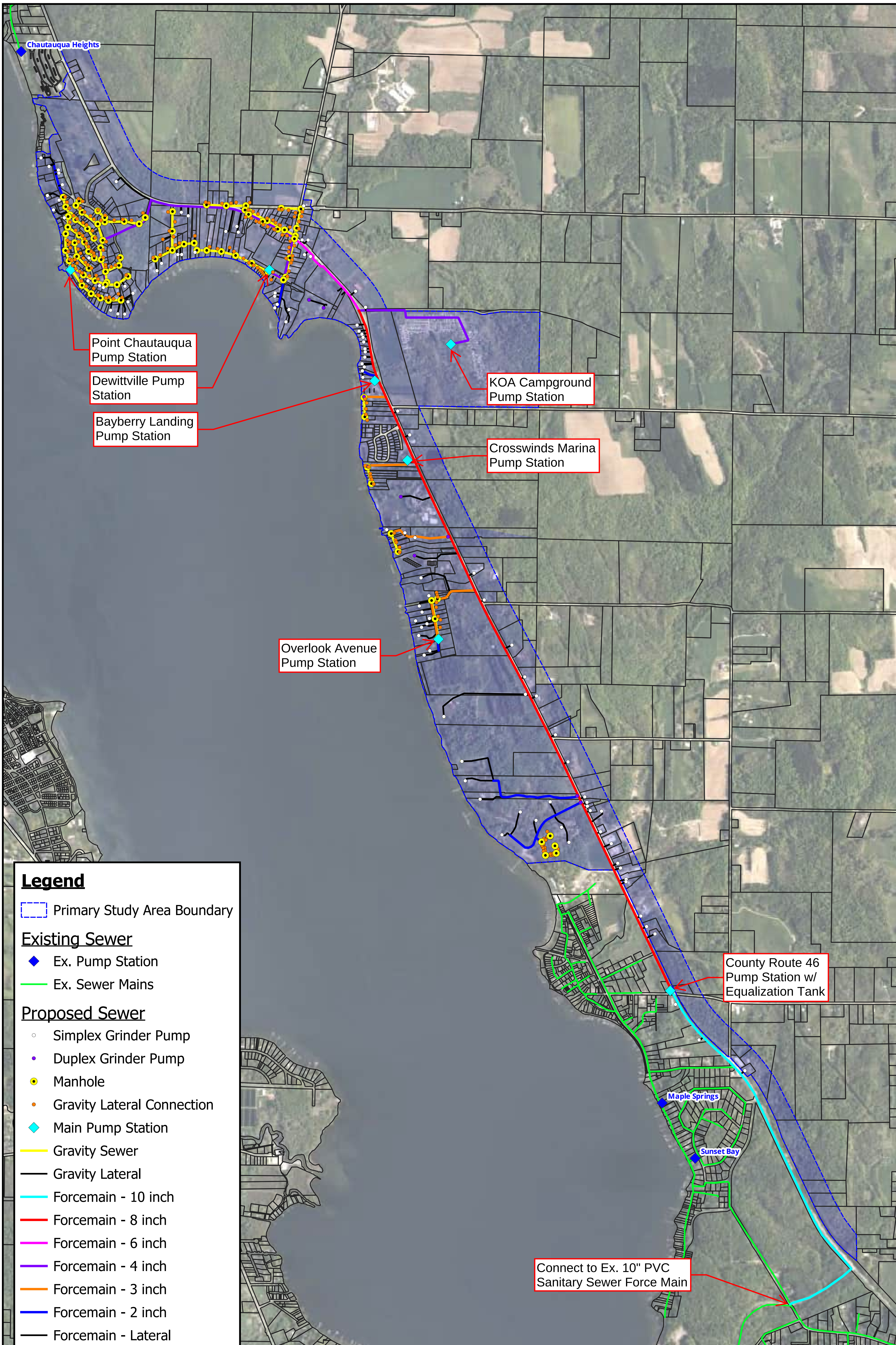
Figure 3A

"Hybrid" Collection System

Option 1 - With Golf Course

Chautauqua County, New York 11/18/2024

Project No. 125.001



e square engineering

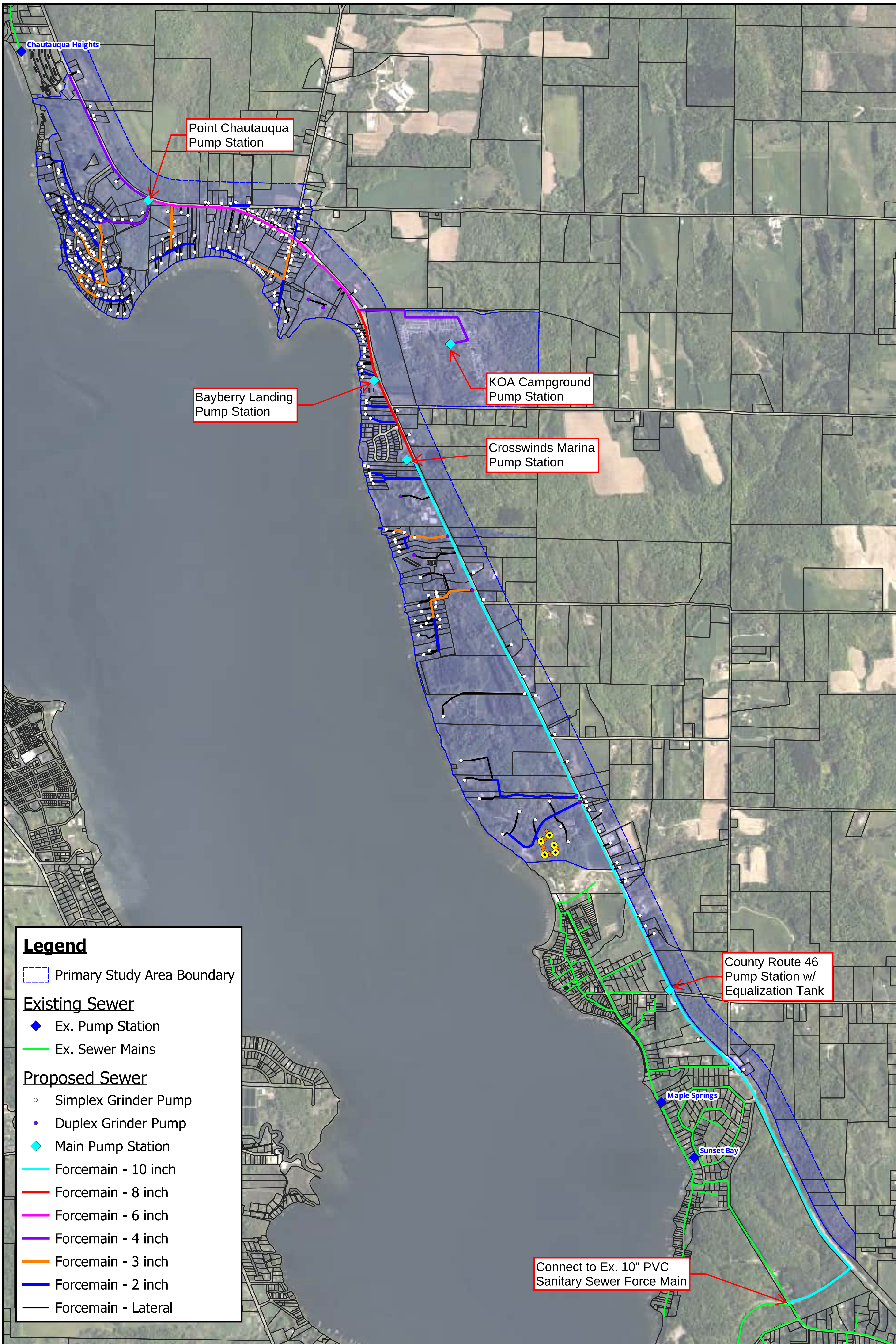
N

0 1,000 2,000 ft

Chautauqua County
Figure 3B
"Hybrid" Collection System
Option 2 - Without Golf Course
Chautauqua County, New York 11/18/2024
Project No. 125.001

Figure 4

Low-**Pressure Collection System Alternative**

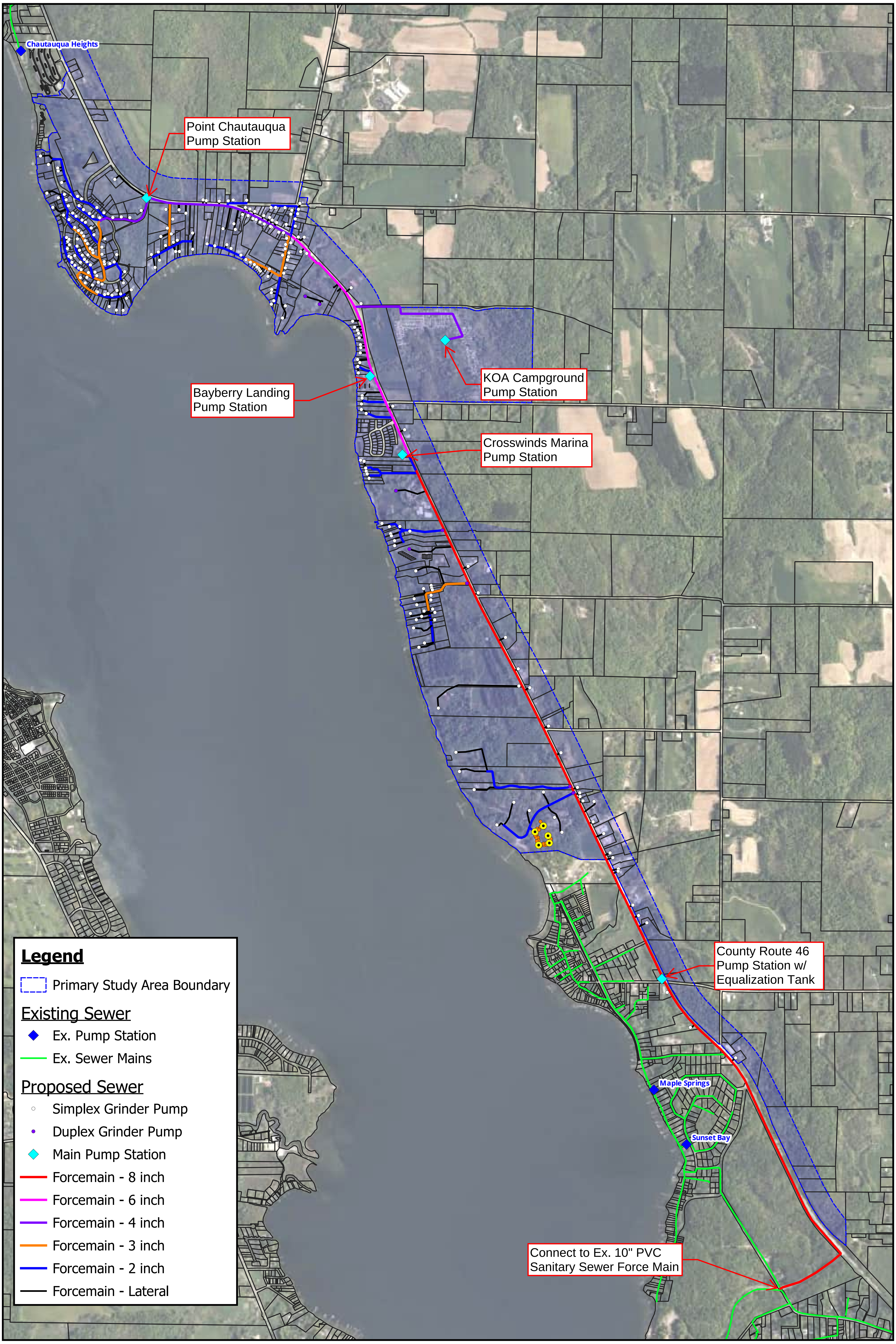


e square engineering

N

0 1,000 2,000 ft

Chautauqua County
Figure 4A
Low-Pressure Collection System
Option 1 - With Golf Course
Chautauqua County, New York 11/18/2024
Project No. 125.001



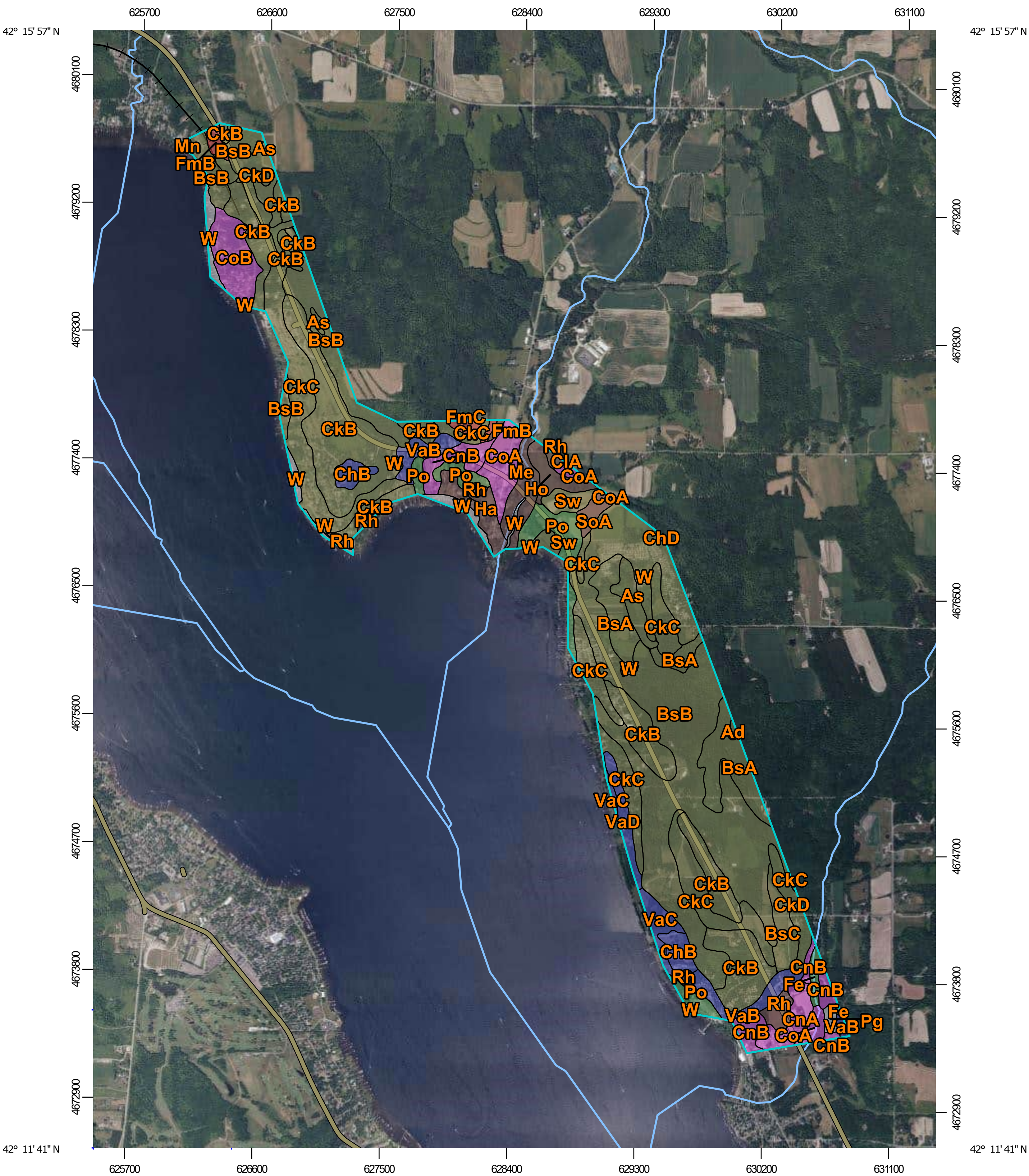
e square engineering

Chautauqua County
Figure 4B
Low-Pressure Collection System
Option 2 - Without Golf Course
Chautauqua County, New York 11/18/2024
Project No. 125.001

Appendix A

Environmental Resource Mapping

Hydrologic Soil Group—Chautauqua County, New York



Map Scale: 1:38,300 if printed on A portrait (8.5" x 11") sheet.

Meters: 0 | 500 | 1000 | 2000 | 3000

N

Feet: 0 | 1500 | 3000 | 6000 | 9000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Chautauqua County, New York
Survey Area Data: Version 21, Sep 5, 2023

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

Date(s) aerial images were photographed: Jun 17, 2020—Jul 5, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Ad	Alden mucky silt loam	C/D	1.5	0.1%
As	Ashville silt loam	C/D	20.1	1.3%
BsA	Busti silt loam, 0 to 3 percent slopes	C/D	81.5	5.3%
BsB	Busti silt loam, 3 to 8 percent slopes	C/D	481.4	31.1%
BsC	Busti silt loam, 8 to 15 percent slopes	C/D	20.9	1.4%
ChB	Chadakoin silt loam, 3 to 8 percent slopes	B	21.8	1.4%
ChD	Chadakoin silt loam, 15 to 25 percent slopes	B	0.6	0.0%
CkB	Chautauqua silt loam, 3 to 8 percent slopes	C/D	262.2	16.9%
CkC	Chautauqua silt loam, 8 to 15 percent slopes	C/D	200.6	13.0%
CkD	Chautauqua silt loam, 15 to 25 percent slopes	C/D	22.9	1.5%
ClA	Chenango silt loam, 0 to 3 percent slopes	A	2.8	0.2%
CnA	Chenango gravelly loam, 0 to 3 percent slopes	A	21.6	1.4%
CnB	Chenango gravelly loam, 3 to 8 percent slopes	A	38.6	2.5%
CoA	Chenango channery loam, fan, 0 to 3 percent slopes	A	36.8	2.4%
CoB	Chenango channery loam, fan, 3 to 8 percent slopes	A	38.2	2.5%
Fe	Fluvaquents-Udifluvents complex, frequently flooded	A/D	6.3	0.4%
FmB	Fremont silt loam, 3 to 8 percent slopes	D	7.5	0.5%
FmC	Fremont silt loam, 8 to 15 percent slopes	D	4.2	0.3%
Ge	Getzville silt loam	B/D	2.4	0.2%
Ha	Halsey mucky silt loam	B/D	3.5	0.2%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Ho	Holderton silt loam, 0 to 3 percent slopes, occasionally flooded 140	B/D	17.5	1.1%
Me	Middlebury silt loam	B/D	25.1	1.6%
Mn	Minoa fine sandy loam	B/D	1.5	0.1%
Pg	Pits, gravel		4.0	0.3%
Po	Pompton silt loam	A/D	53.8	3.5%
Rh	Red Hook silt loam	B/D	39.9	2.6%
ShB	Schuyler silt loam, 3 to 8 percent slopes	C/D	3.9	0.3%
SoA	Scio silt loam, 0 to 3 percent slopes	B/D	9.4	0.6%
Sw	Swormville silt loam	C/D	17.6	1.1%
VaB	Valois gravelly silt loam, 3 to 8 percent slopes	B	41.0	2.6%
VaC	Valois gravelly silt loam, 8 to 15 percent slopes	B	17.3	1.1%
VaD	Valois gravelly silt loam, 15 to 25 percent slopes	B	15.3	1.0%
W	Water		26.4	1.7%
Totals for Area of Interest			**1,548.0**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

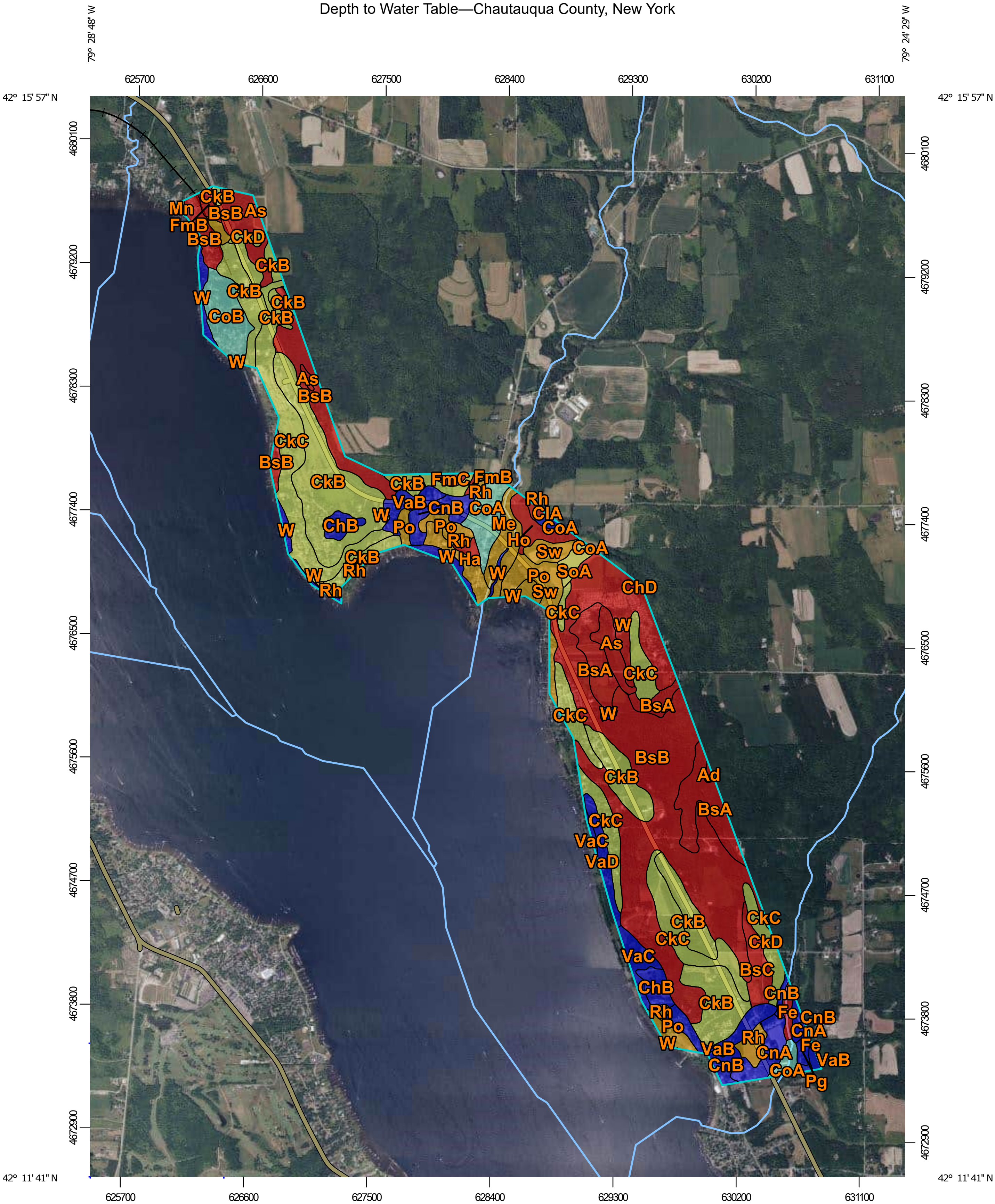
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



Map Scale: 1:38,300 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 500, 1000, 2000, 3000

Feet: 0, 1500, 3000, 6000, 9000

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Lines
- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Points
- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Chautauqua County, New York
Survey Area Data: Version 21, Sep 5, 2023

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

Date(s) aerial images were photographed: Jun 17, 2020—Jul 5, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Depth to Water Table

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
Ad	Alden mucky silt loam	0	1.5	0.1%
As	Ashville silt loam	15	20.1	1.3%
BsA	Busti silt loam, 0 to 3 percent slopes	25	81.5	5.3%
BsB	Busti silt loam, 3 to 8 percent slopes	25	481.4	31.1%
BsC	Busti silt loam, 8 to 15 percent slopes	25	20.9	1.4%
ChB	Chadakoin silt loam, 3 to 8 percent slopes	>200	21.8	1.4%
ChD	Chadakoin silt loam, 15 to 25 percent slopes	>200	0.6	0.0%
CkB	Chautauqua silt loam, 3 to 8 percent slopes	56	262.2	16.9%
CkC	Chautauqua silt loam, 8 to 15 percent slopes	56	200.6	13.0%
CkD	Chautauqua silt loam, 15 to 25 percent slopes	56	22.9	1.5%
ClA	Chenango silt loam, 0 to 3 percent slopes	>200	2.8	0.2%
CnA	Chenango gravelly loam, 0 to 3 percent slopes	>200	21.6	1.4%
CnB	Chenango gravelly loam, 3 to 8 percent slopes	>200	38.6	2.5%
CoA	Chenango channery loam, fan, 0 to 3 percent slopes	137	36.8	2.4%
CoB	Chenango channery loam, fan, 3 to 8 percent slopes	137	38.2	2.5%
Fe	Fluvaquents-Udifluvents complex, frequently flooded	0	6.3	0.4%
FmB	Fremont silt loam, 3 to 8 percent slopes	23	7.5	0.5%
FmC	Fremont silt loam, 8 to 15 percent slopes	23	4.2	0.3%
Ge	Getzville silt loam	8	2.4	0.2%
Ha	Halsey mucky silt loam	8	3.5	0.2%

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
Ho	Holderton silt loam, 0 to 3 percent slopes, occasionally flooded 140	25	17.5	1.1%
Me	Middlebury silt loam	38	25.1	1.6%
Mn	Minoa fine sandy loam	31	1.5	0.1%
Pg	Pits, gravel	>200	4.0	0.3%
Po	Pompton silt loam	46	53.8	3.5%
Rh	Red Hook silt loam	31	39.9	2.6%
ShB	Schuyler silt loam, 3 to 8 percent slopes	46	3.9	0.3%
SoA	Scio silt loam, 0 to 3 percent slopes	54	9.4	0.6%
Sw	Swormville silt loam	31	17.6	1.1%
VaB	Valois gravelly silt loam, 3 to 8 percent slopes	>200	41.0	2.6%
VaC	Valois gravelly silt loam, 8 to 15 percent slopes	>200	17.3	1.1%
VaD	Valois gravelly silt loam, 15 to 25 percent slopes	>200	15.3	1.0%
W	Water	>200	26.4	1.7%
Totals for Area of Interest			**1,548.0**	**100.0%**

Description

"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Rating Options

Units of Measure: centimeters

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Beginning Month: January

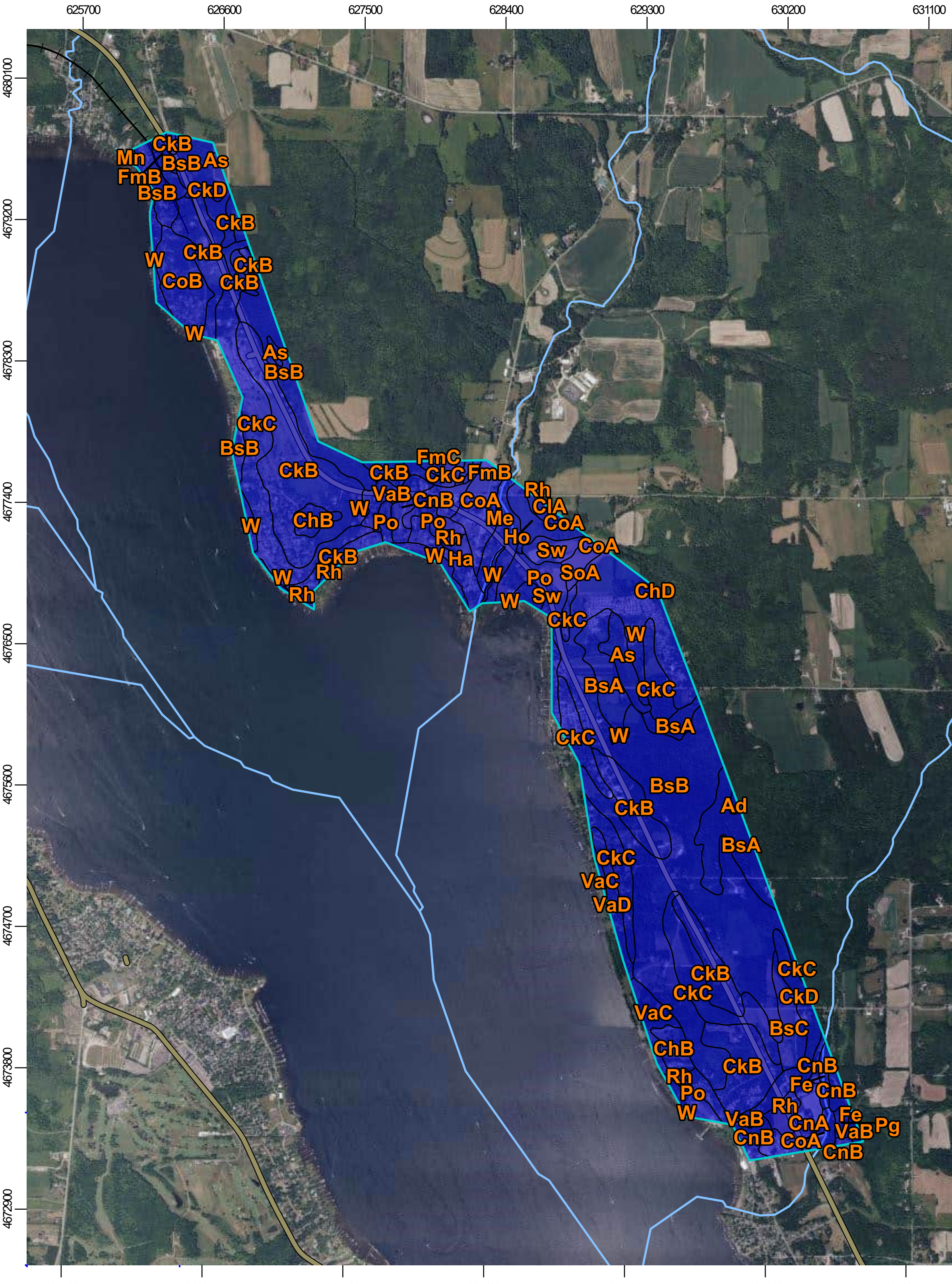
Ending Month: December

79° 28' 48" W

79° 24' 29" W

42° 15' 57" N

42° 15' 57" N



42° 11' 41" N

42° 11' 41" N

625700 626600 627500 628400 629300 630200 631100

79° 28' 48" W

79° 24' 29" W

Map Scale: 1:38,300 if printed on A portrait (8.5" x 11") sheet.

Meters: 0 500 1000 2000 3000

N

Feet: 0 1500 3000 6000 9000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Lines
- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Points
- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Chautauqua County, New York
Survey Area Data: Version 21, Sep 5, 2023

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

Date(s) aerial images were photographed: Jun 17, 2020—Jul 5, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Depth to Bedrock

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
Ad	Alden mucky silt loam	>200	1.5	0.1%
As	Ashville silt loam	>200	20.1	1.3%
BsA	Busti silt loam, 0 to 3 percent slopes	>200	81.5	5.3%
BsB	Busti silt loam, 3 to 8 percent slopes	>200	481.4	31.1%
BsC	Busti silt loam, 8 to 15 percent slopes	>200	20.9	1.4%
ChB	Chadakoin silt loam, 3 to 8 percent slopes	>200	21.8	1.4%
ChD	Chadakoin silt loam, 15 to 25 percent slopes	>200	0.6	0.0%
CkB	Chautauqua silt loam, 3 to 8 percent slopes	>200	262.2	16.9%
CkC	Chautauqua silt loam, 8 to 15 percent slopes	>200	200.6	13.0%
CkD	Chautauqua silt loam, 15 to 25 percent slopes	>200	22.9	1.5%
ClA	Chenango silt loam, 0 to 3 percent slopes	>200	2.8	0.2%
CnA	Chenango gravelly loam, 0 to 3 percent slopes	>200	21.6	1.4%
CnB	Chenango gravelly loam, 3 to 8 percent slopes	>200	38.6	2.5%
CoA	Chenango channery loam, fan, 0 to 3 percent slopes	>200	36.8	2.4%
CoB	Chenango channery loam, fan, 3 to 8 percent slopes	>200	38.2	2.5%
Fe	Fluvaquents-Udifluvents complex, frequently flooded	>200	6.3	0.4%
FmB	Fremont silt loam, 3 to 8 percent slopes	>200	7.5	0.5%
FmC	Fremont silt loam, 8 to 15 percent slopes	>200	4.2	0.3%
Ge	Getzville silt loam	>200	2.4	0.2%
Ha	Halsey mucky silt loam	>200	3.5	0.2%

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
Ho	Holderton silt loam, 0 to 3 percent slopes, occasionally flooded 140	>200	17.5	1.1%
Me	Middlebury silt loam	>200	25.1	1.6%
Mn	Minoa fine sandy loam	>200	1.5	0.1%
Pg	Pits, gravel	>200	4.0	0.3%
Po	Pompton silt loam	>200	53.8	3.5%
Rh	Red Hook silt loam	>200	39.9	2.6%
ShB	Schuyler silt loam, 3 to 8 percent slopes	>200	3.9	0.3%
SoA	Scio silt loam, 0 to 3 percent slopes	>200	9.4	0.6%
Sw	Swormville silt loam	>200	17.6	1.1%
VaB	Valois gravelly silt loam, 3 to 8 percent slopes	>200	41.0	2.6%
VaC	Valois gravelly silt loam, 8 to 15 percent slopes	>200	17.3	1.1%
VaD	Valois gravelly silt loam, 15 to 25 percent slopes	>200	15.3	1.0%
W	Water	>200	26.4	1.7%
Totals for Area of Interest			**1,548.0**	**100.0%**

Description

The term bedrock in soil survey refers to a continuous root and water restrictive layer of rock that occurs within the soil profile.

There are many types of restrictions that can occur within the soil profile but this theme only includes the three restrictions that use the term bedrock. These are:

1) Lithic Bedrock

2) Paralithic Bedrock

3) Densic Bedrock

Lithic bedrock and paralithic bedrock are comprised of igneous, metamorphic, and sedimentary rocks, which are coherent and consolidated into rock through pressure, heat, cementation, or fusion. Lithic bedrock represents the hardest type of bedrock, with a hardness of strongly coherent to indurated. Paralithic bedrock has a hardness of extremely weakly coherent to moderately coherent. It can occur as a thin layer of weathered bedrock above harder lithic bedrock. Paralithic bedrock can also be much thicker, extending well below the soil profile.

Densic bedrock represents a unique kind of bedrock recognized within the soil survey. It is non-coherent and consolidated, dense root restrictive material, formed by pressure, heat, and dewatering of earth materials or sediments. Densic bedrock differs from densic materials, which formed under the compaction of glaciers, mudflows, and or human-caused compaction.

If more than one type of bedrock is described for an individual soil type, the depth to the shallowest one is given. If no bedrock is described in a map unit, it is represented by the "greater than 200" depth class.

Depth to bedrock is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Rating Options

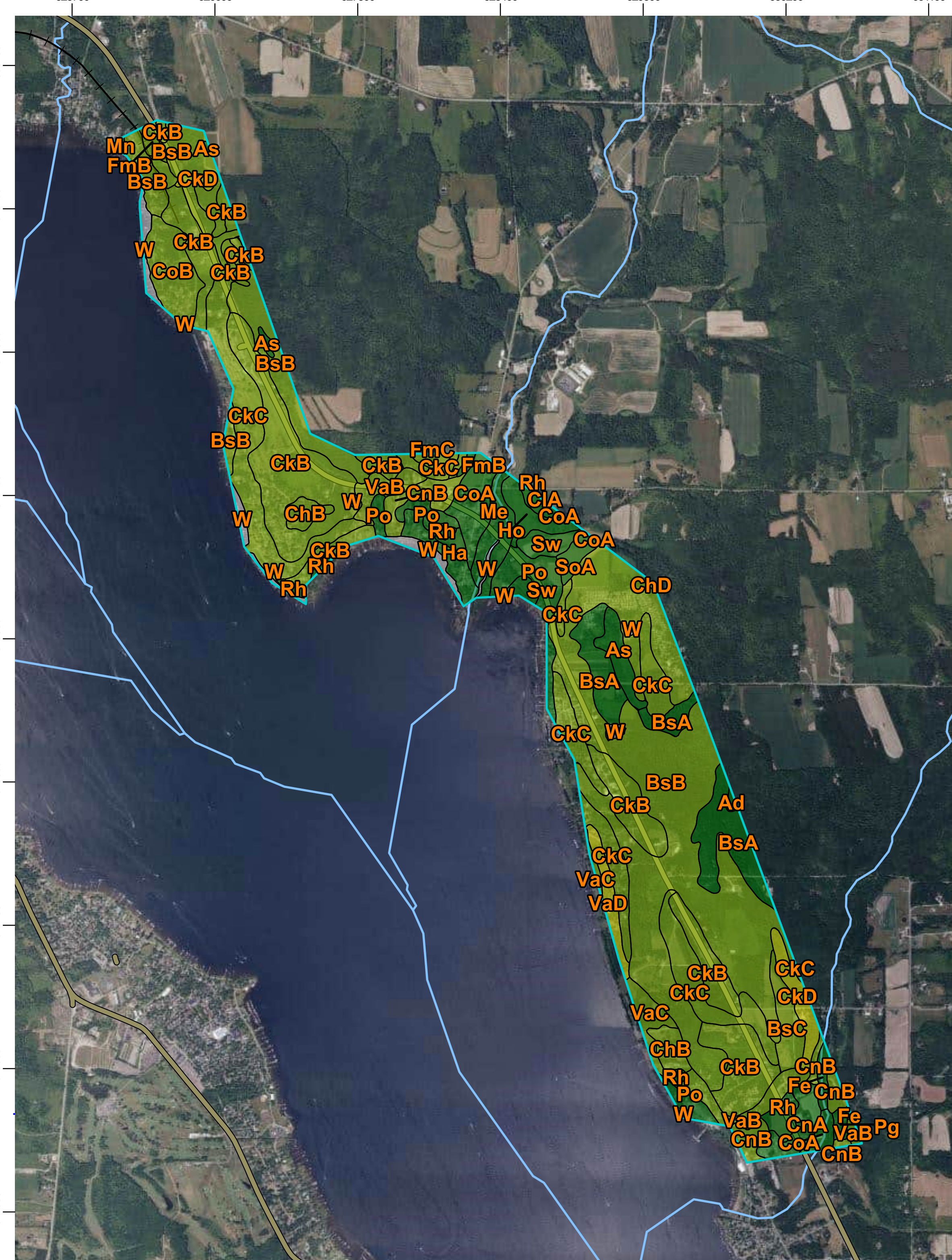
Units of Measure: centimeters

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No



Map Scale: 1:38,300 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 500, 1000, 2000, 3000

Feet: 0, 1500, 3000, 6000, 9000

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- 0 - 5
- 5 - 15
- 15 - 45
- 45 - 60
- 60 - 100
- Not rated or not available

Soil Rating Lines

- 0 - 5
- 5 - 15
- 15 - 45
- 45 - 60
- 60 - 100
- Not rated or not available

Soil Rating Points

- 0 - 5
- 5 - 15
- 15 - 45
- 45 - 60
- 60 - 100
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Chautauqua County, New York
Survey Area Data: Version 21, Sep 5, 2023

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

Date(s) aerial images were photographed: Jun 17, 2020—Jul 5, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Representative Slope

Map unit symbol	Map unit name	Rating (percent)	Acres in AOI	Percent of AOI
Ad	Alden mucky silt loam	2.0	1.5	0.1%
As	Ashville silt loam	2.0	20.1	1.3%
BsA	Busti silt loam, 0 to 3 percent slopes	2.0	81.5	5.3%
BsB	Busti silt loam, 3 to 8 percent slopes	6.0	481.4	31.1%
BsC	Busti silt loam, 8 to 15 percent slopes	12.0	20.9	1.4%
ChB	Chadakoin silt loam, 3 to 8 percent slopes	6.0	21.8	1.4%
ChD	Chadakoin silt loam, 15 to 25 percent slopes	20.0	0.6	0.0%
CkB	Chautauqua silt loam, 3 to 8 percent slopes	6.0	262.2	16.9%
CkC	Chautauqua silt loam, 8 to 15 percent slopes	12.0	200.6	13.0%
CkD	Chautauqua silt loam, 15 to 25 percent slopes	20.0	22.9	1.5%
ClA	Chenango silt loam, 0 to 3 percent slopes	2.0	2.8	0.2%
CnA	Chenango gravelly loam, 0 to 3 percent slopes	2.0	21.6	1.4%
CnB	Chenango gravelly loam, 3 to 8 percent slopes	6.0	38.6	2.5%
CoA	Chenango channery loam, fan, 0 to 3 percent slopes	2.0	36.8	2.4%
CoB	Chenango channery loam, fan, 3 to 8 percent slopes	6.0	38.2	2.5%
Fe	Fluvaquents-Udifluvents complex, frequently flooded	2.0	6.3	0.4%
FmB	Fremont silt loam, 3 to 8 percent slopes	6.0	7.5	0.5%
FmC	Fremont silt loam, 8 to 15 percent slopes	12.0	4.2	0.3%
Ge	Getzville silt loam	2.0	2.4	0.2%
Ha	Halsey mucky silt loam	2.0	3.5	0.2%

Map unit symbol	Map unit name	Rating (percent)	Acres in AOI	Percent of AOI
Ho	Holderton silt loam, 0 to 3 percent slopes, occasionally flooded 140	1.0	17.5	1.1%
Me	Middlebury silt loam	2.0	25.1	1.6%
Mn	Minoa fine sandy loam	2.0	1.5	0.1%
Pg	Pits, gravel	2.0	4.0	0.3%
Po	Pompton silt loam	2.0	53.8	3.5%
Rh	Red Hook silt loam	2.0	39.9	2.6%
ShB	Schuyler silt loam, 3 to 8 percent slopes	6.0	3.9	0.3%
SoA	Scio silt loam, 0 to 3 percent slopes	2.0	9.4	0.6%
Sw	Swormville silt loam	2.0	17.6	1.1%
VaB	Valois gravelly silt loam, 3 to 8 percent slopes	6.0	41.0	2.6%
VaC	Valois gravelly silt loam, 8 to 15 percent slopes	12.0	17.3	1.1%
VaD	Valois gravelly silt loam, 15 to 25 percent slopes	20.0	15.3	1.0%
W	Water		26.4	1.7%
Totals for Area of Interest			**1,548.0**	**100.0%**

Description

Slope gradient is the difference in elevation between two points, expressed as a percentage of the distance between those points.

The slope gradient is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Rating Options

Units of Measure: percent

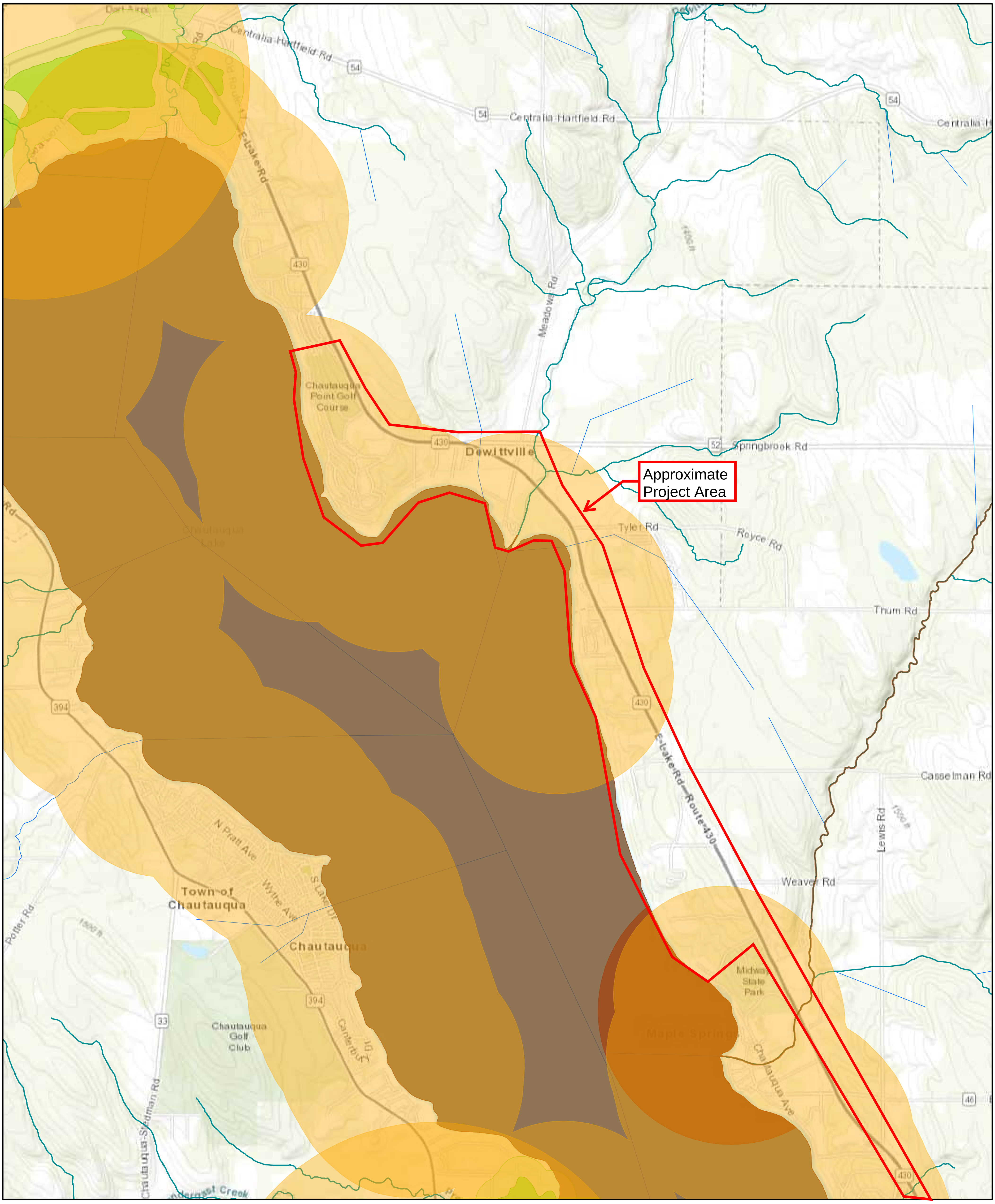
Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Interpret Nulls as Zero: No

Environmental Resource Mapper



July 15, 2024

1:36,112

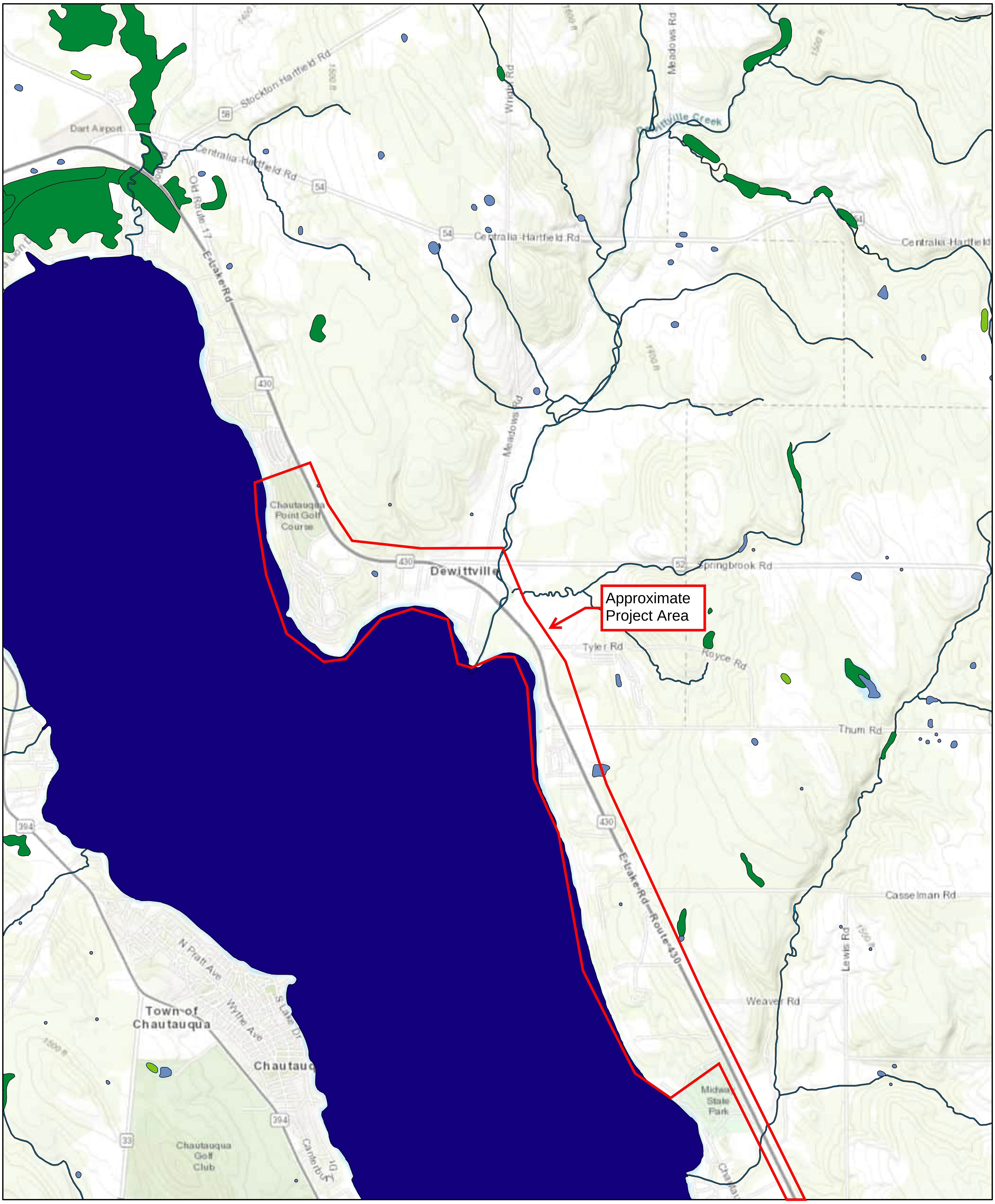
0 0.3 0.6 1.2 mi

0 0.5 1 2 km

Province of Ontario, Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA, AAFC, NRCan

NYS Department of Environmental Conservation
Not a legal document

National Wetlands Inventory



July 15, 2024

1:36,112

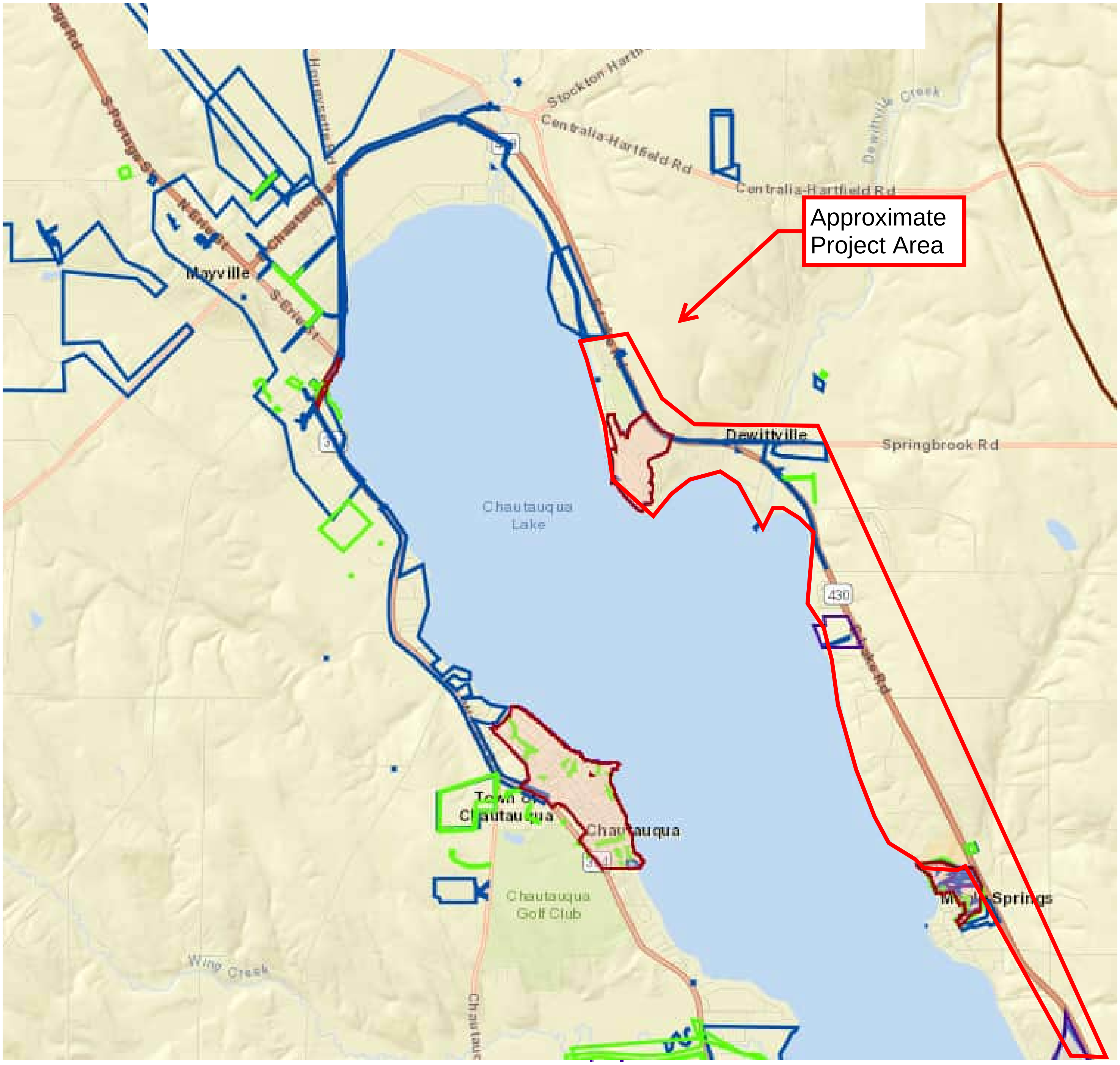
0 0.3 0.6 1.2 mi

0 0.5 1 2 km

Province of Ontario, Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA, AAFC, NRCan

NYS Department of Environmental Conservation
Not a legal document

East Chautauqua Lake Sewer Study - Cultural Resource Information System Map



Legend

Survey Building Areas (View)

Consultation Projects (View)

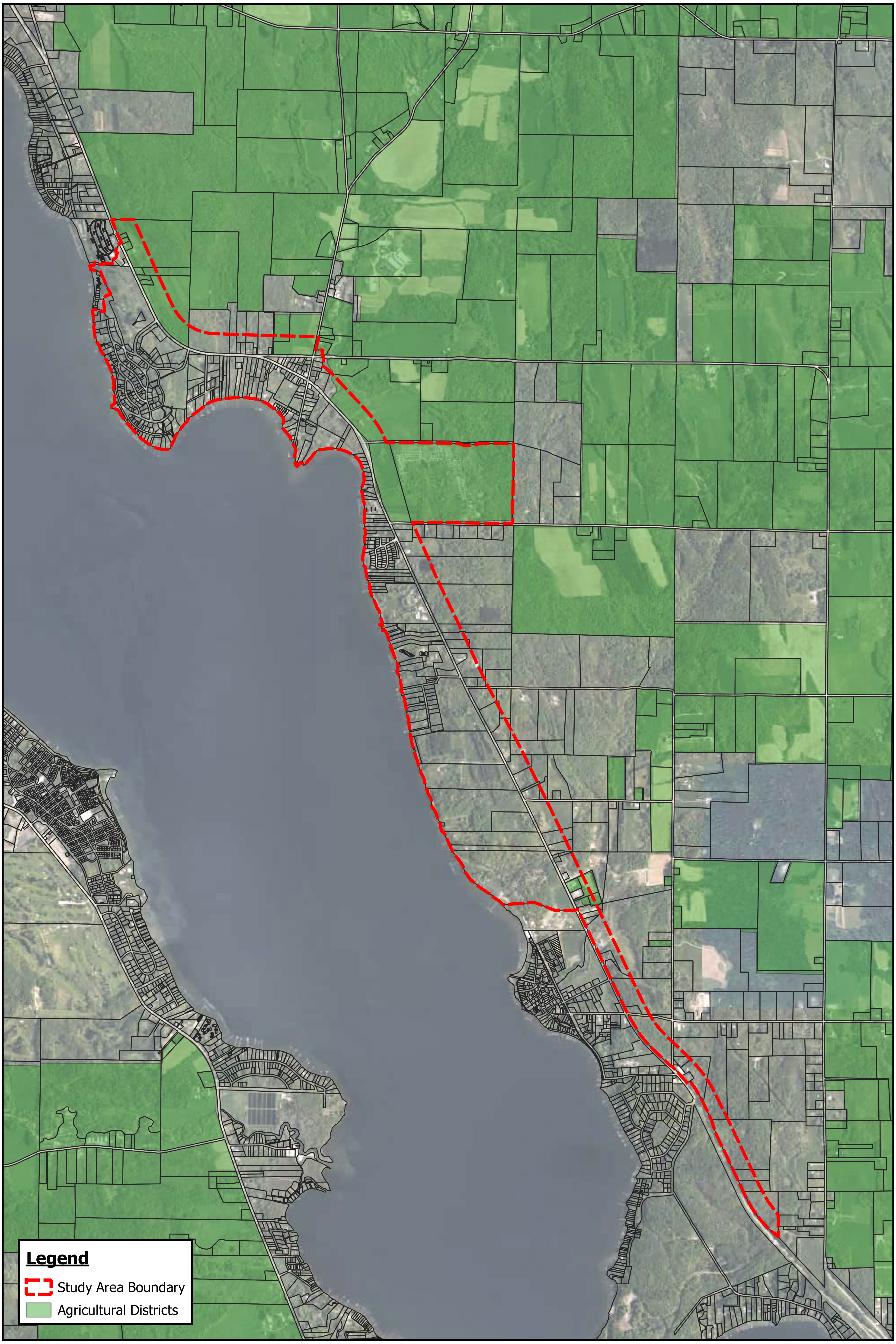
Survey Archaeology Areas (View)

USN Building Districts (View)

Eligible

others

National Register Building Sites (View)



e
square
engineering

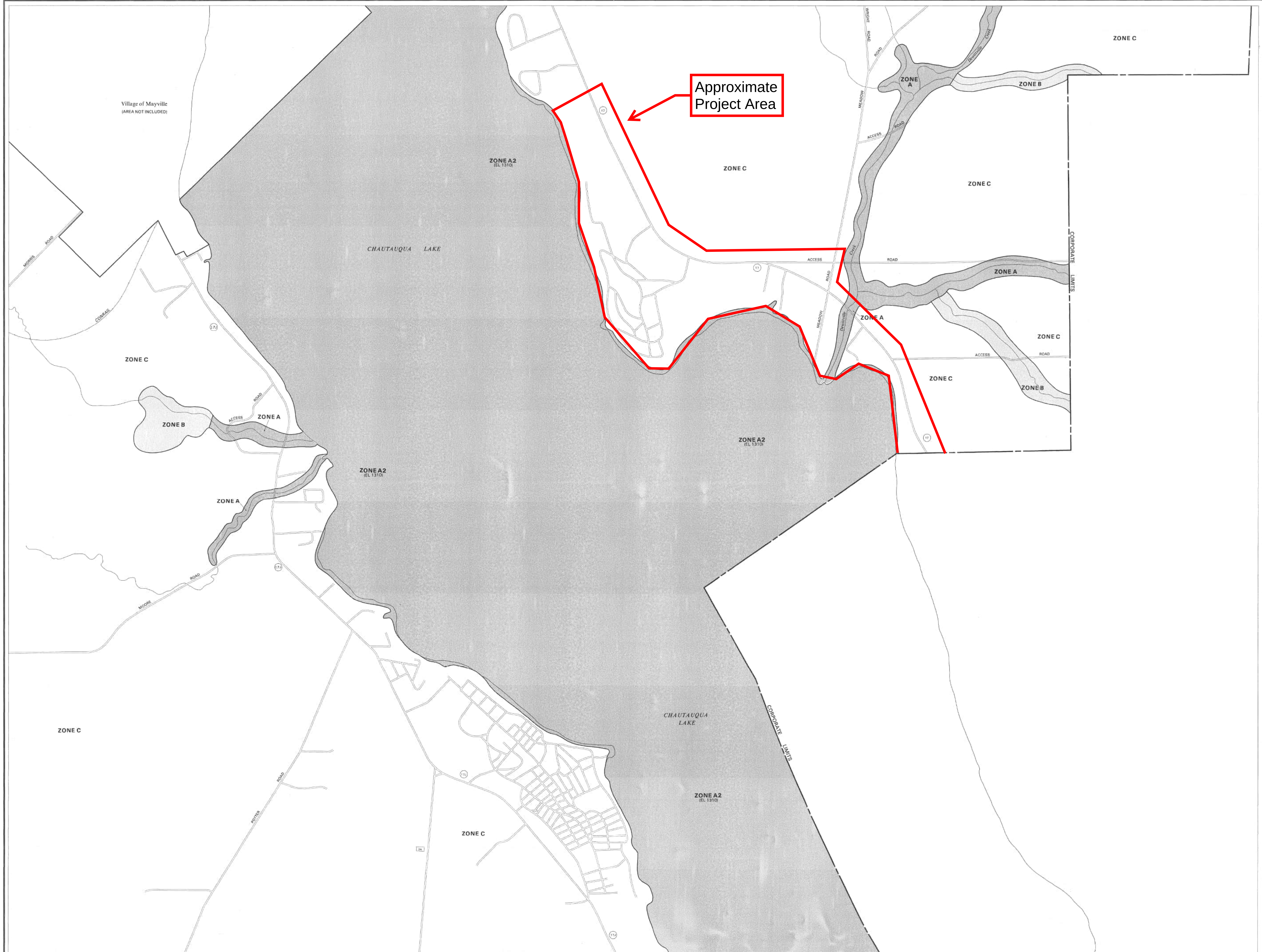
Chautauqua County

Appendix A

Agricultural District Map

Chautauqua County, New York 10/29/2024

Project No. 125.001



KEY TO MAP

500-Year Flood Boundary	ZONE B
100-Year Flood Boundary	ZONE A1
Zone Designations*	ZONE A5
100-Year Flood Boundary	ZONE B
500-Year Flood Boundary	
Base Flood Elevation Line With Elevation In Feet**	513
Base Flood Elevation in Feet Where Uniform Within Zone**	(EL 987)
Elevation Reference Mark	RM7×
Zone D Boundary	
River Mile	•M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
AO	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index To Map Panels.

INITIAL IDENTIFICATION:
JANUARY 24, 1975

FLOOD HAZARD BOUNDARY MAP REVISIONS:
NONE

FLOOD INSURANCE RATE MAP EFFECTIVE:
JUNE 15, 1984

FLOOD INSURANCE RATE MAP REVISIONS:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE date shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program, at (800) 638-6620.

N

APPROXIMATE SCALE
800 0 800 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

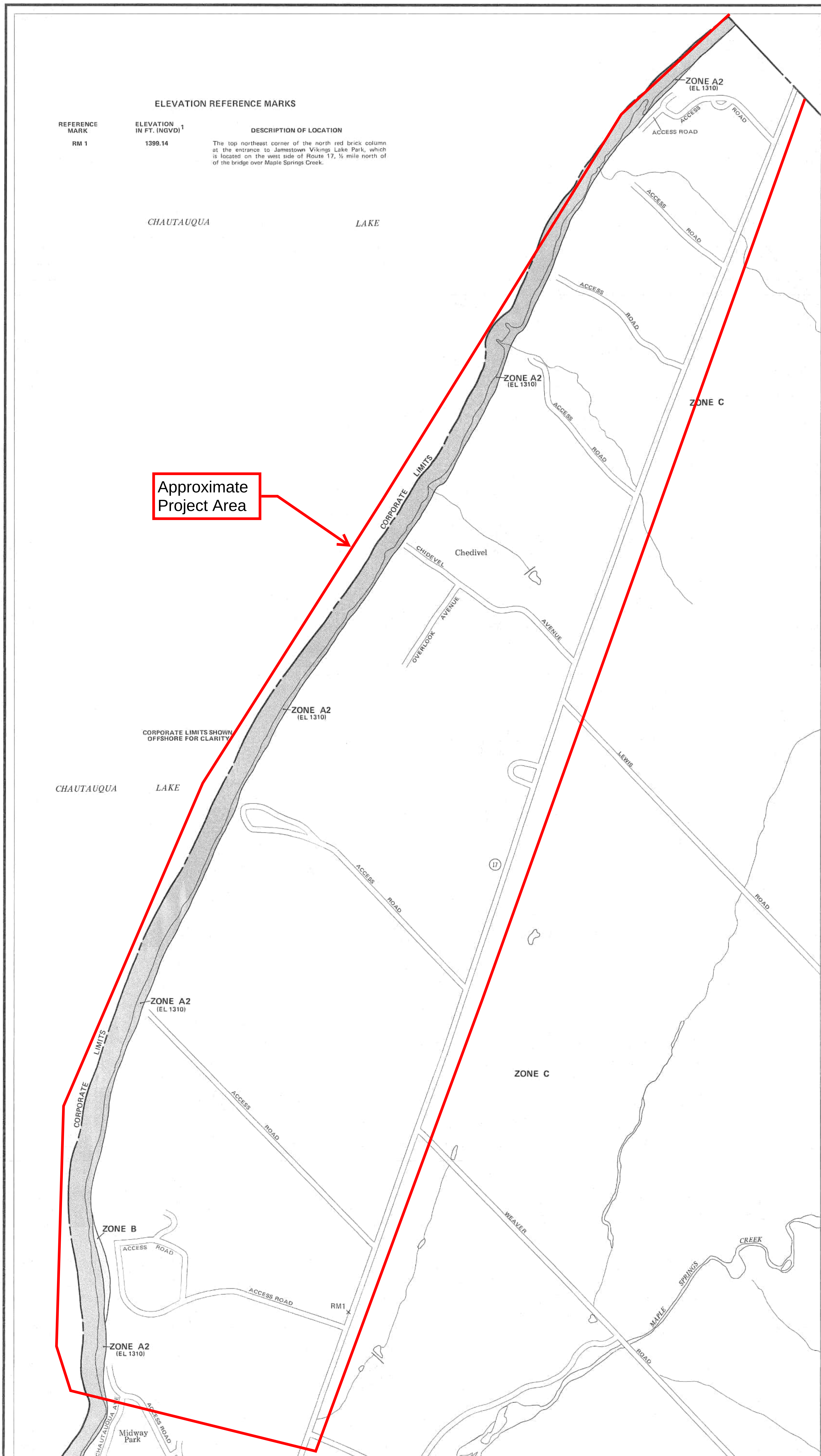
TOWN OF
CHAUTAUQUA, NEW YORK
CHAUTAUQUA COUNTY

PANEL 25 OF 35
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
361071 0025 A

EFFECTIVE DATE:
JUNE 15, 1984

Federal Emergency Management Agency



ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION IN FT. (NGVD)[1]	DESCRIPTION OF LOCATION
RM 1	1399.14	The top northeast corner of the north red brick column at the entrance to Jamestown Vikings Lake Park, which is located on the west side of Route 17, ½ mile north of of the bridge over Maple Springs Creek.

KEY TO MAP

500-Year Flood Boundary	
	ZONE B
100-Year Flood Boundary	
Zone Designations* With Date of Identification e.g., 12/2/74	ZONE A1 DATE / ZONE A5 DATE
100-Year Flood Boundary	
	ZONE B
500-Year Flood Boundary	
Base Flood Elevation Line With Elevation In Feet**	513
Base Flood Elevation in Feet Where Uniform Within Zone**	(EL 987)
Elevation Reference Mark	RM7×
River Mile	• M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index To Map Panels.

INITIAL IDENTIFICATION:
FEBRUARY 10, 1978
FLOOD HAZARD BOUNDARY MAP REVISIONS:

FLOOD INSURANCE RATE MAP EFFECTIVE:
MARCH 18, 1980
FLOOD INSURANCE RATE MAP REVISIONS:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE date shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program at (800) 638-6620, or (800) 424-8872.

APPROXIMATE SCALE
400 0 400 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

TOWN OF
ELLERY, NEW YORK
CHAUTAUQUA COUNTY

PANEL 6 OF 35
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
361072 0006 B

EFFECTIVE DATE:
MARCH 18, 1980

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION