

**New York City Department of Environmental Protection
Bureau of Water Supply**

**Summary Report of Preliminary Planning Studies Under the EOH
Community Wastewater Planning Assistance Grant Program**

June 2022

*Prepared in accordance with Section 4.9 of the NYSDOH
2017 Filtration Avoidance Determination*



Prepared by: DEP, Bureau of Water Supply

Overview

The 2017 Filtration Avoidance Determination (FAD) required the New York City Department of Environmental Protection (DEP) to contract with an organization approved by the New York State Department of Health (NYSDOH) to develop and administer a \$3 million grant program to support preliminary planning for community wastewater solutions for areas in the East of Hudson (EOH) FAD basins where septic systems may have the potential to impact water quality. The Community Wastewater Planning Assistance Program (“Program”) financed engineering studies to assist those municipalities in evaluating potential wastewater solutions to mitigate water quality impacts. The intent was to generate reports that local municipal officials can use to seek financing through state and federal funding sources, such as the 2017 Clean Water Infrastructure Act or its successors.

The FAD identified eight areas, which based on preliminary studies by the New York State Department of Environmental Conservation (NYSDEC), have the potential to impact water quality from substandard individual septic systems. These areas include the basins surrounding Lake Waccabuc, Truesdale Lake, and Lake Kitchawan in the Cross River Reservoir basin in the towns of Lewisboro and Pound Ridge; and Palmer Lake, Lake Gilead, Lake Casse, Lake View Road, and Mud Pond Brook in the Croton Falls Reservoir basin in the towns of Carmel and Kent.

In April 2022, NYSDOH issued a Draft Revised 2017 FAD that requires DEP to prepare a summary report of the preliminary planning studies from the identified municipalities that participated in the Program by June 30, 2022; this report fulfills that new FAD obligation.

Program Implementation

In 2019, DEP executed a contract with NEIWPCC (formerly known as the New England Interstate Water Pollution Control Commission) to administer the Program. In early 2020, NEIWPCC and DEP met with local town officials to inform them of the availability of funding and to briefly describe the Program. In May 2020, NEIWPCC solicited grant applications from eligible municipalities. The solicitation included information on how to apply, Program timelines, and an outline of required report content (see Attachment A). The report outline was developed by reviewing similar studies in the watershed as well as the New York State Environmental Facilities Corporation (NYSEFC) template outline for engineering reports. The purpose of the outline was to ensure that common baseline information was collected and that the resulting engineering reports would contain sufficient information to allow eligible communities to apply for funding through the NYSEFC or similar entities.

In July and August 2020, NEIWPCC received applications for all eight study areas, awarded grants to eligible municipalities, and entered into Program agreements with those municipalities. In September 2020, municipalities issued Requests for Proposals for engineering consulting services to complete the studies. In December 2020, municipalities reviewed proposals and awarded contracts for consulting services to the selected firms.

Once under contract, the engineering consultants worked with municipalities to generate the necessary data and produce the engineering reports. The local municipalities directly managed the work necessary to produce the final engineering reports. Under direction of the municipalities, individual consultants prepared Quality Assurance Project Plans, collected baseline data, held monthly progress meetings, administered public surveys, and hosted public

information sessions for residents as necessary. DEP, NEIWPCC, the host municipality and applicable counties provided information to consultants as requested, including data on septic system pump outs and repairs, local zoning maps, comprehensive planning documents, and other information and guidance related to local municipal laws. DEP provided GIS layers such as watershed basin boundaries, subbasin boundaries, streams, wetlands and other water features, topography, geology, tax parcels, wastewater service areas, and existing wastewater infrastructure. DEP also provided consultants with files, coding, and input data for the DEP's GWLF-VSA model to assist with modeling efforts and searched DEP files for relevant water quality sampling data. Final engineering reports were submitted to NEIWPCC on or before December 1, 2021.

Study Area Summaries

Below is a summary of findings from each of the eight grant reports. A summary table and area maps can be found in Attachments B and C respectively.

Lake Waccabuc

Lake Waccabuc is in the Town of Lewisboro, Westchester County. It is approximately 128 acres in area with a maximum depth of 46.6 feet and a mean depth of 23.9 feet. The Lake Waccabuc drainage basin is approximately 913 acres and is tributary to the Cross River Reservoir.

There are a total of 369 parcels in the study area, of which 289 parcels are developed and 80 are undeveloped. There are approximately 285 homes in the study area as well as a golf course, post office, and chapel. Census data estimates 2.7 persons per household for a total study area population of approximately 770 persons. Total estimated wastewater flow from developed parcels is 128,000 gallons per day (gpd).

Based on data obtained from the Westchester County Health Department (WCHD), a total of 26 septic systems failed in the past 13 years, which equates to a failure rate of two systems per year, or less than 1% per year for all developed parcels.

The Town's engineering consultant evaluated several possible alternatives including repair and replacement of individual septic systems, decentralized community systems, connection to existing wastewater treatment plants (WWTPs), and construction of a new WWTP. The consultant considered various service area configurations and locations for treatment facilities. Based on the analysis of cost and feasibility, the final report recommended construction of a new WWTP on Benedict Road that would initially treat flow from 218 parcels in the eastern portion of the study area, which is thought to be at highest risk for septic failure based on site conditions. The study recommended continued management of septic systems for the remainder of the study area.

The engineering consultant estimated the cost of the new collection system and WWTP to be \$17,200,000. The cost to replace failing and poorly functioning individual septic systems for the remainder of the area, with phosphorus treatment systems where needed, will be an additional \$2,700,000. Annual operation and maintenance (O&M) costs would be approximately \$263,000.

Truesdale Lake

Truesdale Lake is in the Town of Lewisboro, Westchester County. It is approximately 95 acres in area with a maximum depth of 14 feet and a mean depth of 3.6 feet. The Truesdale Lake drainage basin, which is tributary to the Cross River Reservoir, is approximately 2,400 acres and spans a small portion of southwestern Connecticut. The study area included only the approximate 1,100 acres of the basin located in New York State.

There are a total of 513 parcels in the study area, of which 419 are developed and 94 are undeveloped. All 419 developed parcels are occupied by residential homes ranging from one to six bedrooms. Census data estimates 2.7 persons per household for a total study area population of approximately 1,131 persons. Current estimated wastewater flow from developed parcels is 178,100 gpd.

Based on data obtained from the WCHD, a total of 10 septic systems failed in the past 13 years, which equates to a failure rate of 0.8 systems per year, or less than 1% per year for all developed parcels.

The Town's engineering consultant evaluated several possible alternatives including continued on-site treatment using conventional septic systems, enhanced treatment units, off-site collection and conveyance using several collection methods, cluster systems, and treatment at an existing WWTP. Based on the analysis of cost, need, and feasibility, the final report recommended construction of a low-pressure sewer collection system and the expansion of the WWTP at Lewisboro Elementary School for the 274 developed parcels within 800 feet of the Lake (Zone 1) and upgraded septic systems as part of a septic remediation program for the remaining 145 developed parcels (Zone 2).

The engineering consultant estimated the capital costs of a low-pressure sewer collection system and an expanded WWTP to serve the customer base of Zone 1 to be \$31,246,400 with annual O&M cost of \$412,960. The estimated cost to implement a septic remediation program for Zone 2 is \$9,445,800 with annual O&M cost of \$227,500.

Lake Kitchawan

Lake Kitchawan is in the Towns of Lewisboro and Pound Ridge, Westchester County. It is approximately 90 acres in area with a maximum depth of 14.2 feet and a mean depth of 5.7 feet. The Lake Kitchawan drainage basin is approximately 1,160 acres and is tributary to the Cross River Reservoir.

There are a total of 633 parcels in the study area, of which 474 parcels are developed and 159 are undeveloped. Most parcels are residential with a small number of parcels being recreational, cemetery, or institutional uses. Census data estimates 2.7 persons per household for a total study area population of approximately 1,280 persons. Total estimated wastewater flow from developed parcels is 125,000 gpd.

Based on data obtained from the WCHD, a total of 28 septic systems failed or needed repair in the past 13 years, which equates to a failure rate of 2.2 systems per year, or less than 1% per year for all developed parcels.

The Town's engineering consultant evaluated several possible alternatives including no action (i.e., continue individual septic system use and repair should failures occur), repair and replacement program using advanced treatment units, centralized treatment involving a low-

pressure collection system connected to a new WWTP, and decentralized treatment of four cluster areas using nearby vacant land. Based on the analysis of cost, need, and feasibility, the final report recommended implementation of a repair and replacement program administered by the Town of Lewisboro and focused on 187 parcels located east of Lake Kitchawan. The repair and replacement program would replace conventional septic systems with an advanced treatment unit for enhanced nutrient removal.

The projected cost of the proposed septic repair and replacement program is \$3,900,000. Annual O&M cost is estimated to be \$119,000.

Palmer Lake

Palmer Lake is in the Towns of Kent and Carmel, Putnam County. It is approximately 14 acres in area with a maximum depth of seven feet and a mean depth of four feet. The Palmer Lake drainage basin is approximately 460 acres and is tributary to the Croton Falls Reservoir.

There are a total of 280 parcels in the study area, of which 234 parcels are developed and 46 are undeveloped. Most parcels are residential with a small number of commercial and recreational land uses. Census data estimates 2.8 persons per household in Carmel and 2.69 persons per household in Kent for a total study area population of approximately 650 persons. Total estimated wastewater flow from developed parcels is 60,000 gpd.

Based on data obtained from the Putnam County Health Department (PCHD), a total of 52 septic systems failed or needed repair in the past 40 years, which equates to a failure rate of 1.3 systems per year, or less than 1% per year for all developed parcels.

The Town's engineering consultant evaluated several possible alternatives including no action (i.e., continue individual septic system use and repair should failures occur), a repair and replacement program using advanced treatment units, regional consolidation by constructing a low-pressure collection system and connecting to Carmel Sewer District #2, centralized treatment by constructing a low-pressure collection system and new WWTP, and decentralized treatment using various clustered scenarios. Based on the analysis of cost, need, and feasibility, the final report recommended implementation of a repair and replacement program administered by the Town of Kent and focused on 125 parcels located south of Route 52. The repair and replacement program would replace conventional septic systems with an advanced treatment unit for enhanced nutrient removal.

The projected cost of the proposed repair and replacement program is \$2,700,000. Annual O&M cost is estimated to be \$80,000.

Lake Gilead

Lake Gilead is in the Town of Carmel, Putnam County. It is approximately 116 acres in area with a maximum depth of 120 feet and a mean depth of 43 feet. The Lake Gilead drainage basin is approximately 425 acres and is tributary to the Croton Falls Reservoir.

There are a total of 188 parcels in the study area, of which 178 parcels are developed and 10 are undeveloped. Most parcels are residential with a small number of commercial and recreational land uses. There are 141 parcels served by public sewer (Carmel Sewer District #2) with 37 parcels (53 homes) served by septic systems. Census data estimates 2.8 persons per

household in Carmel for a total study area population of approximately 382 persons. Total estimated wastewater flow from unsewered parcels is estimated to be 16,324 gpd.

Based on data obtained from the PCHD, a total of 33 septic systems failed, needed repair, or requested to connect to public sewers in the past 47 years, which equates to a failure rate of 0.7 systems per year, or less than 1% per year for all developed parcels.

The Town's engineering consultant evaluated several possible alternatives including no action (i.e., continue individual septic system use and repair should failures occur), connecting homes to the existing public sewer, a community septic system, and a septic system maintenance program. Based on the analysis of cost, need and feasibility, the consultant recommends that property owners continue to maintain their septic systems and for the Town to implement a septic maintenance program.

The projected probable cost of a septic repair per home was estimated to be \$25,600 with a 30-year net present value of \$43,000. Annual O&M cost was estimated at \$60 per year per home, which assumes one pump out per home every five years. The annual cost of the proposed septic maintenance program is \$10,000.

Lake Casse

Lake Casse is in the Town of Carmel, Putnam County. It is approximately 32 acres in area with a drainage basin of approximately 255 acres. Lake Casse is tributary to the Croton Falls Reservoir.

There are a total of 252 parcels in the study area, of which 244 parcels are developed, seven are undeveloped, and one is for recreational use. Using census data, the consultant estimated 2.9 persons per household for a total study area population of approximately 777 persons. Total estimated wastewater flow from developed parcels is 86,040 gpd.

Based on data obtained from the PCHD, a total of 69 repairs or replacements were identified in the past 34 years, which equates to a failure rate of 2.0 septic systems per year, or less than 1% per year for all developed parcels.

The Town's engineering consultant evaluated several possible alternatives including no action (i.e., continue individual septic system use and repair should failures occur), septic maintenance district, community septic system, connection to the existing Mahopac WWTP, and construction of a new WWTP with groundwater discharge. Based on the analysis of cost, need, and feasibility, the consultant recommends no action and that property owners continue to maintain their septic systems and repair systems as required.

Lakeview Road

Lakeview Road is in the Town of Carmel, Putnam County. The study area consists of 62 parcels located to the east of the northeastern branch of the Croton Falls Reservoir. All 62 parcels are developed with residential homes. Census data estimates 2.8 persons per household in Carmel for a total study area population of approximately 174 persons. Total estimated wastewater flow from the study area is estimated to be 19,096 gpd.

Based on data obtained from the PCHD, a total of 46 records of septic system failures, repairs, or replacement were identified over the past 28 years, which equates to a failure rate of 1.6 systems per year, or 2.6% per year for all developed parcels.

The Town's engineering consultant evaluated several possible alternatives including no action (i.e., continue individual septic system use and repair should failures occur), connecting homes to the existing public sewer, a community septic system, and a septic system maintenance program. Based on the analysis of cost, need, and feasibility, the consultant recommends that property owners continue to maintain their septic systems and that the Town implement a septic maintenance program.

The projected probable cost of a septic repair per home was estimated to be \$25,600 with a 30-year net present value of \$43,000. Annual O&M cost was estimated at \$60 per year per home, which assumes one pump out per home every five years. The annual cost of the proposed septic maintenance program is \$10,000.

Mud Pond Brook

Mud Pond Brook is in the Town of Carmel, Putnam County. The Pond is approximately 13 acres with a drainage basin of approximately 467 acres. Mud Pond Brook is tributary to the Croton Falls Reservoir.

There are a total of 218 parcels in the study area, of which 212 parcels are developed, six are undeveloped, and one is for recreational uses. Using census data, the consultant estimated 2.9 persons per household for a total study area population of approximately 701 persons. Total estimated wastewater flow from developed parcels is 82,390 gpd.

Based on data obtained from the PCHD, a total of 55 repairs or replacements were identified in the past 34 years, which equates to a failure rate of 1.6 septic systems per year, or less than 1% per year for all developed parcels.

The Town's engineering consultant evaluated several possible alternatives including no action (i.e., continue individual septic system use and repair should failures occur), septic maintenance district, community septic system, connection to the existing Mahopac WWTP, and construction of a new WWTP with groundwater discharge. Based on the analysis of cost, need, and feasibility, the consultant recommends no action and that property owners continue to maintain their septic systems and repair systems as required.

ATTACHMENT A

**ENGINEERING REPORT OUTLINE INCLUDED
IN APPLICATION PACKAGE**

Final Engineering Report were prepared, stamped, and dated by a New York State registered Professional Engineer and developed in accordance with all applicable federal, state, and local standards as they related to wastewater treatment in the Eligible Area.

1. Title Page
2. Executive Summary – Provide a brief description of the purpose of the report, need for the project, evaluations conducted, recommended alternative, and the proposed course of action.
3. Environmental Settings
 - Project location and description of study area including municipal boundaries, and scaled maps
 - Land use and zoning
 - Number of properties and population served
 - Existing utilities and water service
 - Environmental resources including Federal, State, and locally mapped wetlands and watercourses, regulated adjacent areas, general overview of land cover, potentially impacted waterbodies or aquifers, etc.
4. Environmental Conditions
 - General description and history of existing wastewater infrastructure including:
 - Number and type of existing units
 - Age and condition
 - Flow estimates
 - Suitability for septic systems
 - Size of each parcel in proposed district
 - Area of each parcel that is suitable for septic disposal (i.e., not constrained by slope, soil, groundwater, or setback from watercourse)
 - Soil types in district
 - Slopes
 - Depth to groundwater
 - Depth to ledge rock
 - Floodplains
 - Date of last inspection and pump-out
 - Septic inspection and failure data from municipality and County records (date of last inspection)
 - Date of most recent pump-out/inspection for each parcel
 - Summary of water quality management actions to date, if any
 - Water quality measurement criteria
 - Eutrophic indicators in waterbody
 - Lake perception
 - Biological condition
 - Phosphorus load contributions by source (i.e. wastewater, stormwater, etc.)
 - Water budget for lake (if applicable)

5. Evaluation of Treatment Options

- Delineate the area to be served
- Describe existing wastewater infrastructure in the vicinity of the study area, including but not limited to, existing sewer districts in and around the study area, existing WWTPs, gravity or force mains, etc.
- Evaluation of management actions shall include, but is not necessarily limited to, the following:
 - Septic maintenance district
 - Community septic system
 - Connection to existing WWTP
 - New WWTP

6. Recommended Treatment Practice

- Identify and describe the preferred treatment alternative, including but not limited to:
 - Proposed Sewer District Boundaries
 - Discharge location
 - Estimated wastewater flows, solids and nutrient loads
 - Proposed collection system layout

7. Potential Water Quality Impacts of the Recommended Treatment Practice

- Projected nutrient load reductions and impact on TMDL
- Impacts on downstream waterbodies and wetlands

8. Project considerations

- Permits/ Approvals
 - MS4 permit, found on the NYSDEC website
 - SPDES permit, found on NYSDEC website, if applicable
 - DEP Watershed Rules and Regulations, with potential requirements for additional permits, variances, or plans
 - County-Level Permits
 - Westchester County Wastewater Disposal System application
 - Putnam County Forms, Requests, and Applications
 - Town-Level Permits, depending on the proposed project type
- Feasibility
 - Environmental constraints (ledge rock, wetlands, etc.)
 - Required improvements to existing facilities or decommissioning, as applicable
 - Land requirements and need for land acquisition, if any
 - Seasonal limitations, challenges, and requirements, if any
 - Public support or other community considerations or non-monetary considerations (e.g. aesthetics, improved habitat, etc.)
- Financial Status
 - Briefly provide information regarding potential sources of income, current and/or future rate schedules, and other capital improvement programs

9. Estimated Cost of Recommended Treatment Practice

- General
- Design Costs
- Construction Costs
- Operation and Maintenance Costs
- Estimated annual costs per connection
- Potential Federal/State Funding sources (e.g. CW State Revolving Fund)

ATTACHMENT B

STUDY AREA SUMMARY TABLE

Attachment B: EOH Wastewater Grant Program Study Area Data

	Lake Kitchawan	Truesdale Lake	Lake Waccabuc	Lake Gilead	Lake Casse	Mud Pond	Palmer Lake	Lakeview Road
Watershed Area (acres)	1,160	2,400	913	425	255	467	460	*
Total Number of Parcels	633	513	369	188	252	218	280	62
Number of Developed Parcels	474	419	289	178	244	212	234	62
Estimated Wastewater Flow (gpd)	125,000	178,100	128,000	16,324	86,040	82,390	60,000	19,096
Number of Parcels Pumped in Past 5 Years	**	330	138	16	87	79	27	20
Percentage of Parcels Pumped in Past 5 Years	**	79%	48%	30%	36%	37%	12%	32%
Septic Failure Rate (% per year)	0.5%	0.2%	0.7%	0.4%	0.8%	0.8%	0.6%	2.6%
Septic Failure rate (# per year)	2.2	0.8	2.0	0.7	2.0	1.6	1.3	1.6
Recommended Action	Repair and replace existing septic tanks with advanced treatment units for 187 parcel focus area east of Lake Kitchawan.	Low pressure sewer collection system with connection to expanded WWTP at Lewisboro Elementary School (274 existing residences within 800 ft of the Lake) and septic maintenance district (145 residences).	Low pressure sewer collection system in the eastern portion of the study area (173 parcels) and connection to new WWTP on Benedict Road and replacement of failing septic systems in remaining portions of study area.	Continue individual septic system use and repair as failures occur and for the Town to implement a septic maintenance program.	Continue individual septic system use and repair as failures occur.	Continue individual septic system use and repair as failures occur.	Repair and replace existing septic tanks with advanced treatment units for 125 parcels located south of Route 52.	Continue individual septic system use and repair as failures occur and for the Town to implement a septic maintenance program.
Cost of Recommended Action (Capital)	\$3,900,000	\$40,692,200	\$19,900,000	\$0	\$0	\$0	\$2,700,000	\$0
Cost of Recommended Action (Annual O&M)	\$119,000	\$640,460	\$263,000	\$10,000	\$274,000	\$238,000	\$80,000	\$10,000

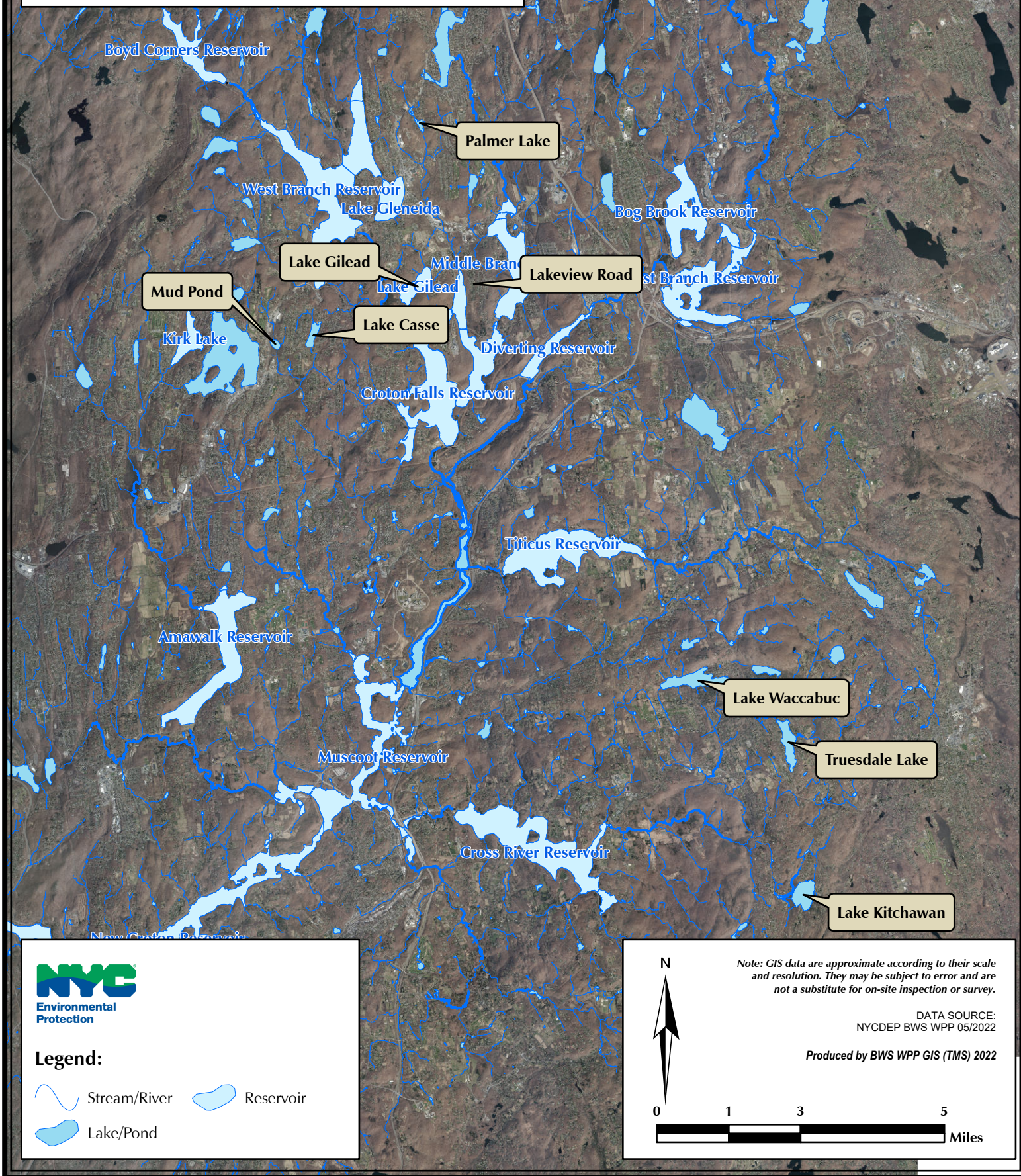
*Lakeview Road is not a singular drainage basin but is a linear road that lies within three larger subbasins of the Croton Falls Reservoir.

**Data not provided by consultant as part of final report.

ATTACHMENT C

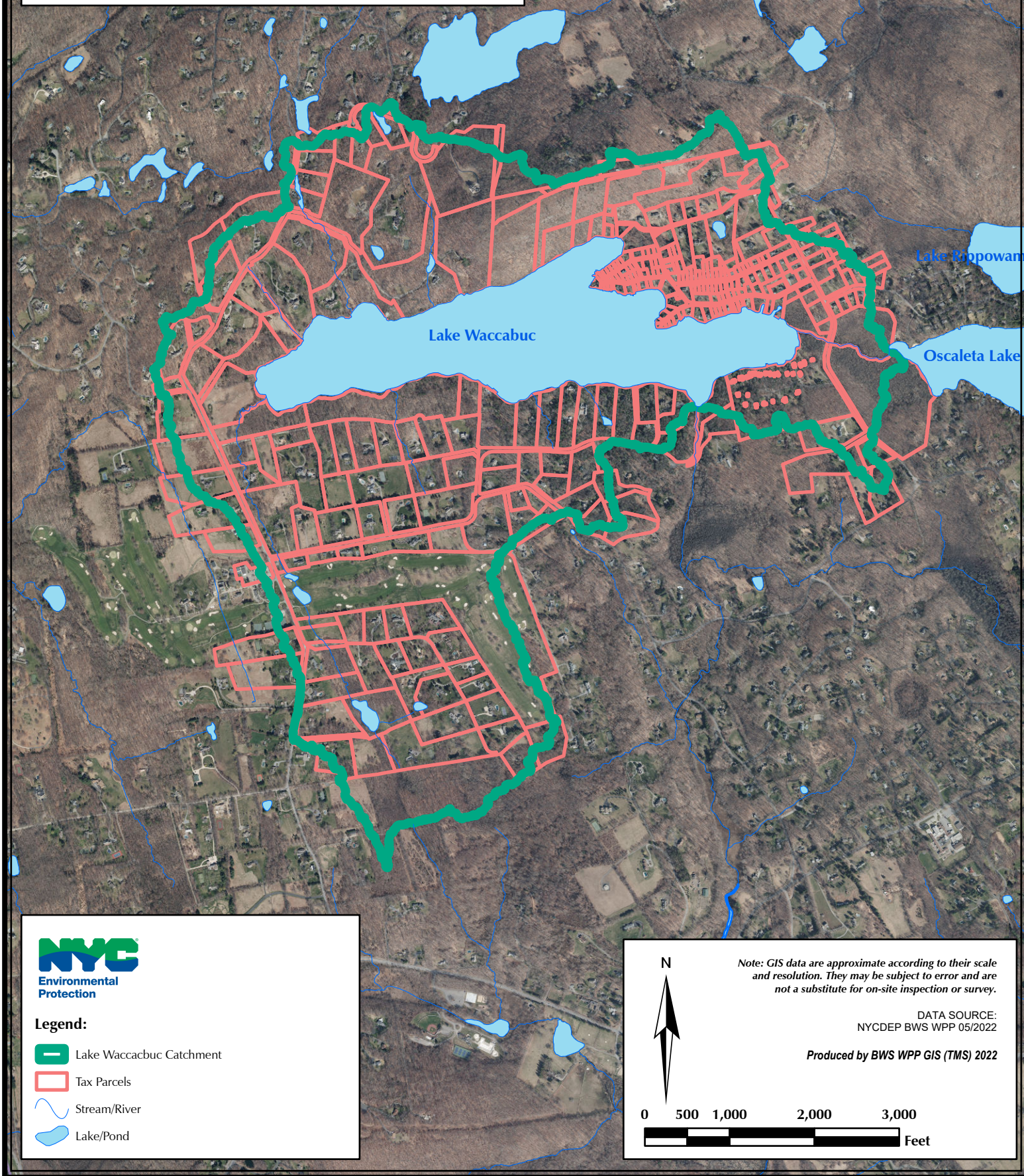
STUDY AREA MAPS

As of May 2022



EOH Wastewater Grant Program Lake Waccabuc Study Area

As of May 2022



Legend:

- Lake Waccabuc Catchment
- Tax Parcels
- Stream/River
- Lake/Pond

N



Note: GIS data are approximate according to their scale and resolution. They may be subject to error and are not a substitute for on-site inspection or survey.

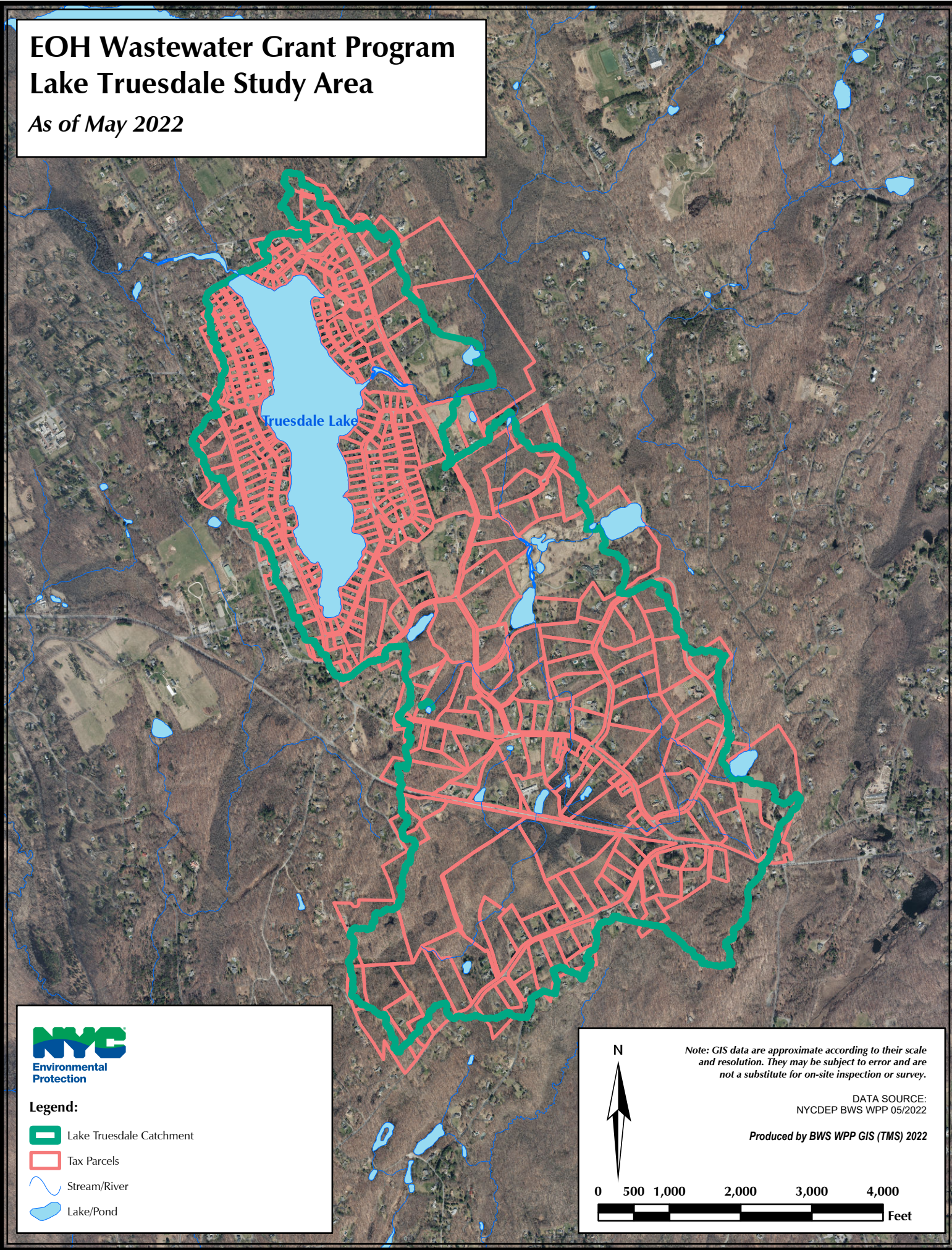
DATA SOURCE:
NYCDEP BWS WPP 05/2022

Produced by BWS WPP GIS (TMS) 2022





0 500 1,000 2,000 3,000
Feet

EOH Wastewater Grant Program Lake Truesdale Study Area

As of May 2022



Legend:

-  Lake Truesdale Catchment
-  Tax Parcels
-  Stream/River
-  Lake/Pond

N



Note: GIS data are approximate according to their scale and resolution. They may be subject to error and are not a substitute for on-site inspection or survey.

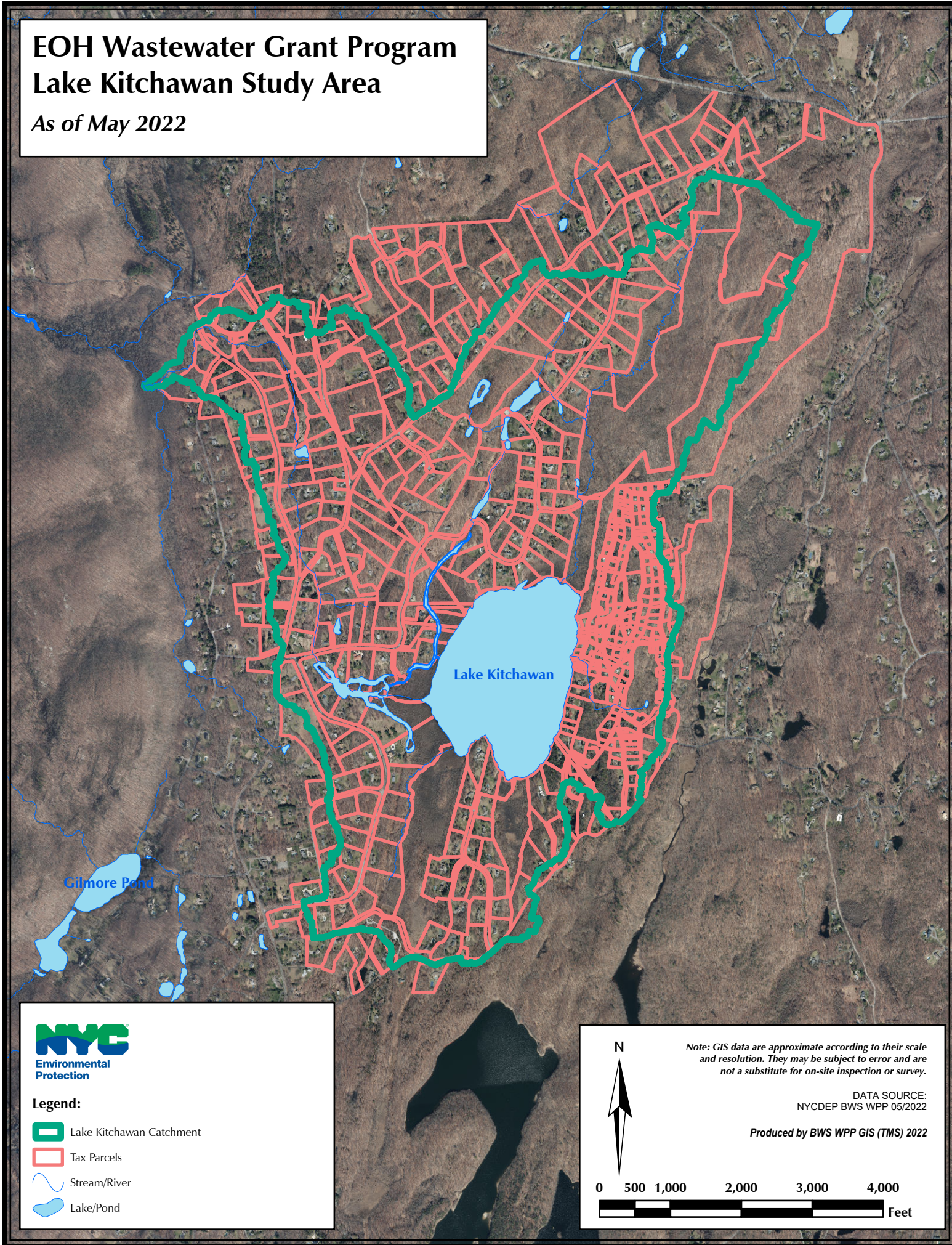
DATA SOURCE:
NYCDEP BWS WPP 05/2022

Produced by BWS WPP GIS (TMS) 2022

0 500 1,000 2,000 3,000 4,000
Feet

EOH Wastewater Grant Program Lake Kitchawan Study Area

As of May 2022



Legend:

- Lake Kitchawan Catchment
- Tax Parcels
- Stream/River
- Lake/Pond

N



Note: GIS data are approximate according to their scale and resolution. They may be subject to error and are not a substitute for on-site inspection or survey.

DATA SOURCE:
NYCDEP BWS WPP 05/2022

Produced by BWS WPP GIS (TMS) 2022

0 500 1,000 2,000 3,000 4,000
Feet

EOH Wastewater Grant Program Palmer Lake Study Area

As of May 2022

Dean Pond

Lake Carmel

Palmer Lake



Environmental
Protection

Legend:



Palmer Catchment



Tax Parcels



Stream/River



Lake/Pond



Reservoir

N



0 500 1,000 2,000 3,000
Feet

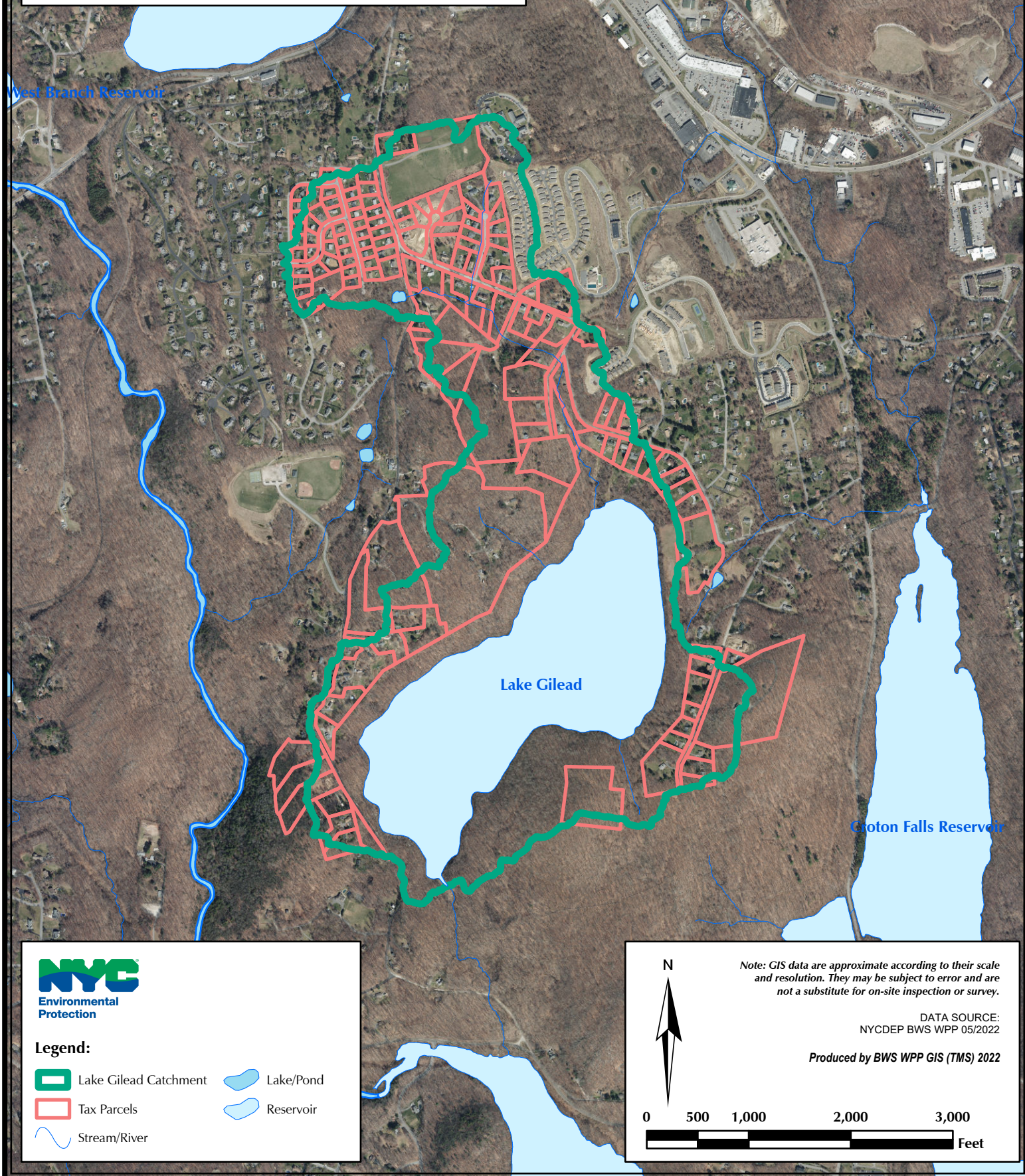
Note: GIS data are approximate according to their scale and resolution. They may be subject to error and are not a substitute for on-site inspection or survey.

DATA SOURCE:
NYCDEP BWS WPP 05/2022

Produced by BWS WPP GIS (TMS) 2022

EOH Wastewater Grant Program Lake Gilead Study Area

As of May 2022



Legend:

- Lake Gilead Catchment
- Tax Parcels
- Stream/River
- Lake/Pond
- Reservoir



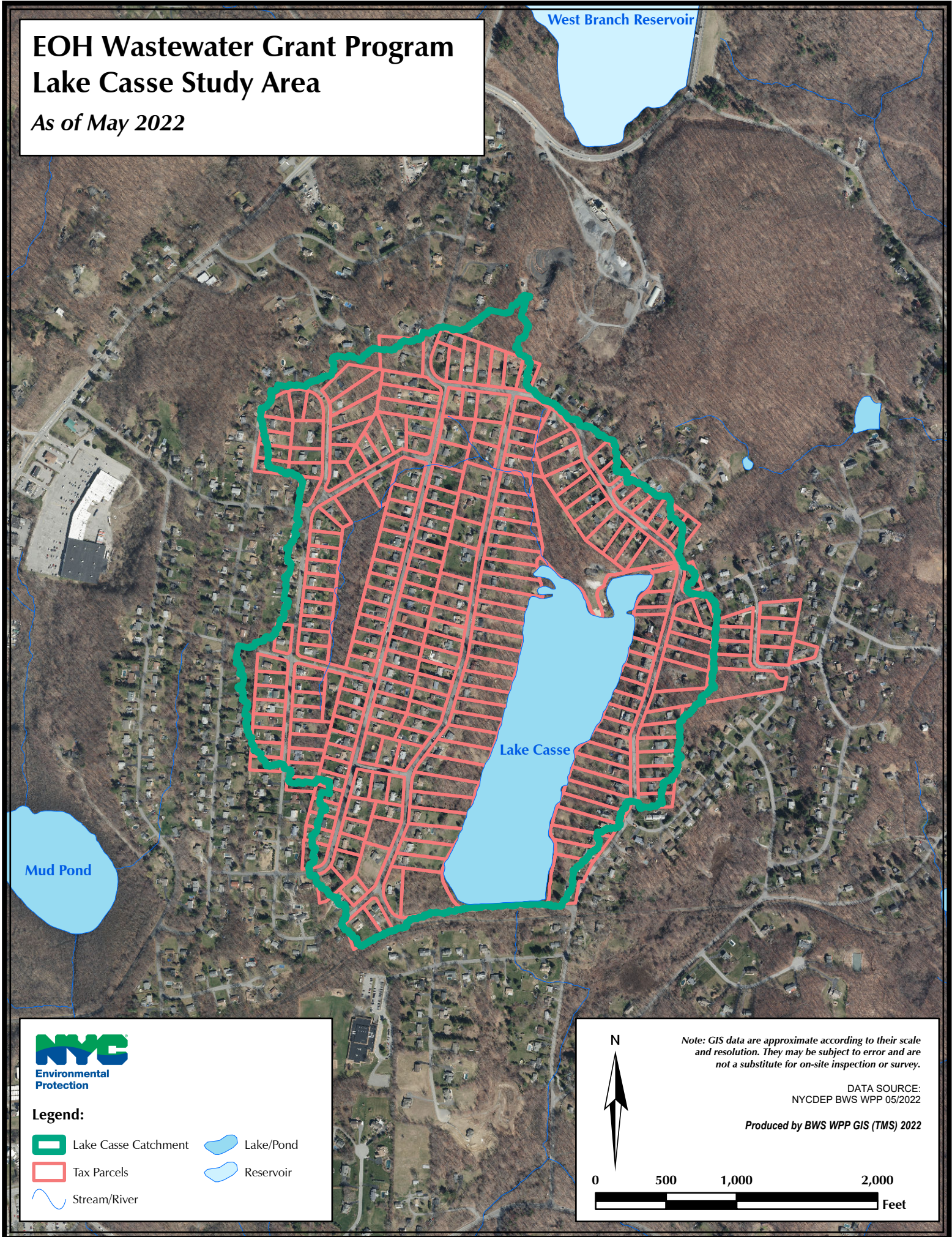
Note: GIS data are approximate according to their scale and resolution. They may be subject to error and are not a substitute for on-site inspection or survey.

DATA SOURCE:
NYCDEP BWS WPP 05/2022

Produced by BWS WPP GIS (TMS) 2022



EOH Wastewater Grant Program Lake Casse Study Area *As of May 2022*



EOH Wastewater Grant Program Lakeview Road Study Area

As of May 2022

Middle Branch Reservoir

Croton Falls Reservoir



Legend:

- | | |
|---|---|
|  Tax Parcels |  Lake/Pond |
|  Stream/River |  Reservoir |

N



0 500 1,000 2,000
Feet

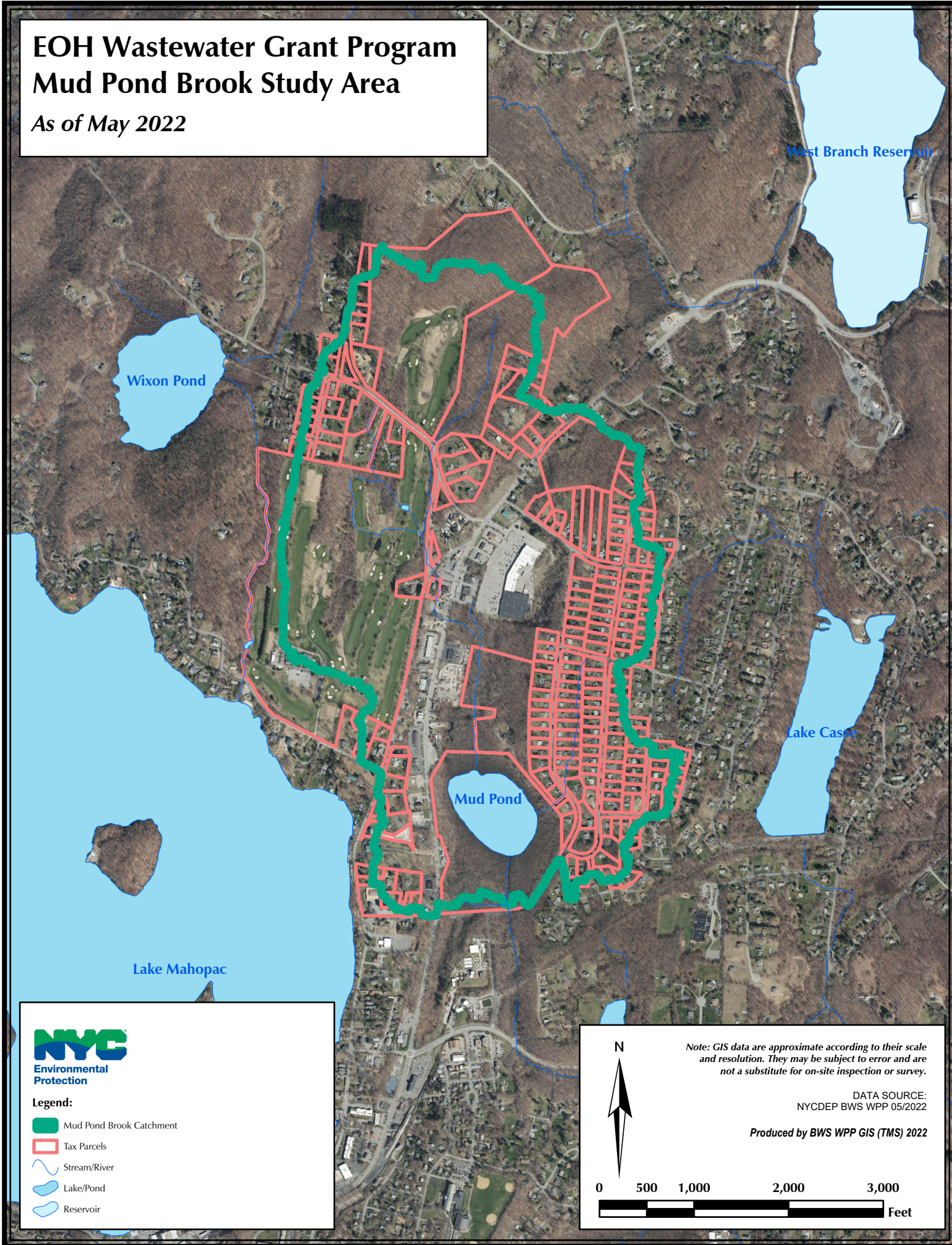
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DATA SOURCE:
NYCDEP BWS WPP 05/2022

Produced by BWS WPP GIS (TMS) 2022

EOH Wastewater Grant Program Mud Pond Brook Study Area

As of May 2022



Legend:

- Mud Pond Brook Catchment
- Tax Parcels
- Stream/River
- Lake/Pond
- Reservoir

N



Note: GIS data are approximate according to their scale and resolution. They may be subject to error and are not a substitute for on-site inspection or survey.

DATA SOURCE:
NYCDEP BWS WPP 05/2022

Produced by BWS WPP GIS (TMS) 2022

0 500 1,000 2,000 3,000
Feet