

**Barton  
&Loguidice**

**Lake Waccabuc**  
*Engineering Study*

July 28, 2021

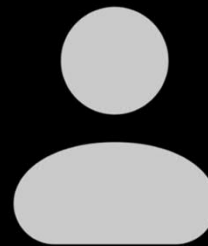


Zoom

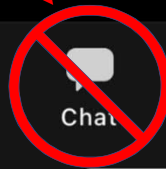
Leave

The chat function has been turned off

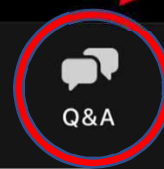
Please use the Q&A button to submit questions



Raise Hand



Chat



Q&A



More

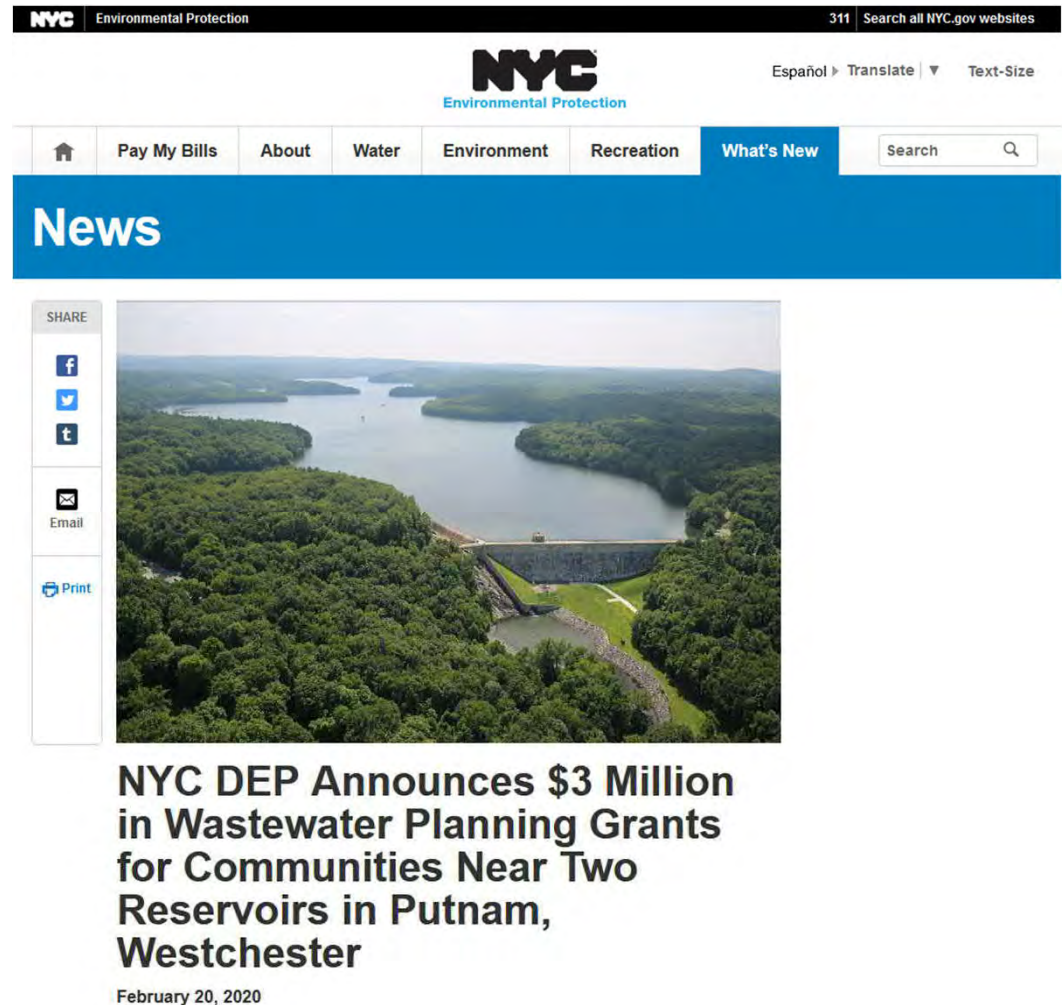
# Outline

- I. Introduction
- II. Identifying Sources of Nutrient Pollution
- III. Wastewater Management
- IV. Funding
- V. What's Next

# Introduction

# Lake Engineering Studies

- The Town of Lewisboro obtained grant money to conduct engineering studies on three lakes:
  - Lake Waccabuc
  - Lake Truesdale
  - Lake Kitchawan
- The studies are funded by the East of Hudson Community Wastewater Planning Assistance Grant Program



The screenshot shows the NYC Environmental Protection website. The header includes the NYC logo, 'Environmental Protection', and a search bar. The main navigation menu has links for 'Pay My Bills', 'About', 'Water', 'Environment', 'Recreation', and 'What's New'. Below the navigation is a blue 'News' banner. The featured article is titled 'NYC DEP Announces \$3 Million in Wastewater Planning Grants for Communities Near Two Reservoirs in Putnam, Westchester' and is dated February 20, 2020. The article is accompanied by a large photograph of a reservoir with a dam and surrounding greenery. To the left of the image are social media sharing options for Facebook, Twitter, and Tumblr, as well as an email and print button.

Article Link: <https://www1.nyc.gov/site/dep/news/20-005/nyc-dep-3-million-wastewater-planning-grants-communities-near-two-reservoirs-in#/0>

# Lake Waccabuc Study Area



The study area is made up of the Lake Waccabuc watershed, excluding Lake Rippowam and Lake Oscaleta.

# Lake Waccabuc Water Quality

- Eutrophication is the enrichment of lakes with nutrients
- Lake Waccabuc is mesotrophic based on recent trends
  - Intermediate levels of biological production
    - Increased biomass (algae and plants)
    - Decreased clarity
- **Phosphorus** is most often the ‘limiting nutrient’ in freshwater lakes
  - Phosphorus is the primary of concern for Lake Waccabuc
  - Control the limiting nutrient, minimize the growth

Classification	Definition	Water Quality
Oligotrophic	Low level of biological productivity	Good
Mesotrophic	Moderate level of biological productivity	Fair
Eutrophic	High level of biological productivity	Poor
Hypereutrophic	Highest level of biological productivity	Very Poor

# Nutrients in Lake Waccabuc

- Water quality data is collected through the Citizen Statewide Lake Assessment Program (CSLAP)
- CSLAP shows significant increase in phosphorus levels since 1986
- 2020 CSLAP data identified peak phosphorus concentrations of 0.053 mg/L
  - Over 2x greater than the NYS recommended limit (0.020 mg/L)
- 2020 CSLAP data suggests Lake Waccabuc is approaching a eutrophic condition

Lake Waccabuc – Lake Scorecard

Water Quality Indicators	Average Year	2020
Phosphorus	Mesotrophic	Eutrophic
Chlorophyll A	Mesotrophic	Eutrophic
Secchi	Mesotrophic	Eutrophic
Lake Perception	Good	Good
Harmful Algal Blooms	Poor	Poor
Open Water Algae Levels	Fair	Poor
Aquatic Invasive Species	Present	



Seasonal High (7/6/2020)



# Effects of High Nutrient Concentrations

Effects of high nutrient concentrations in Lake Waccabuc include:

- Depletion of dissolved oxygen concentrations
  - Can result in fish kills
- Harmful algal blooms (HABs)
  - HABs produce algal toxins harmful to human health and aquatic life
- Impairment of drinking water supply
- Vulnerability for invasive species
  - Increased growth of lake weed
- Limits on recreational opportunities

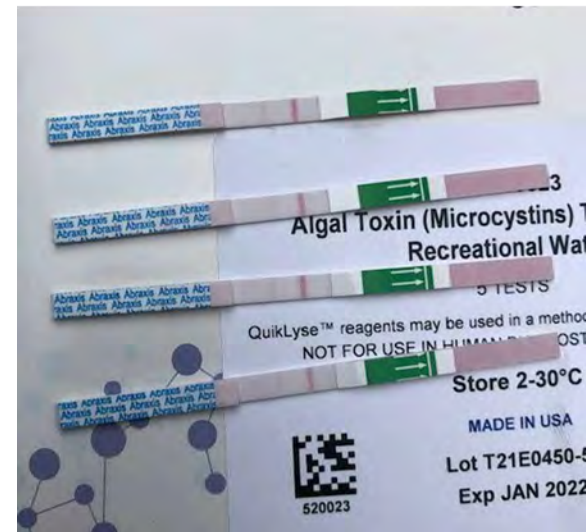




# Field Sampling & Monitoring - Parameters

Field monitoring/sampling was conducted from July 7 to July 8, 2021 for the following parameters:

Laboratory Analysis	Field Monitoring
• Chlorophyll-a	• Temperature
• Fecal Coliform	• pH
• Total Phosphorus	• Conductivity
• Soluble Phosphorus	• Dissolved Oxygen
• Total Nitrogen	• Oxidation-Reduction Potential
• Total Kjeldahl Nitrogen	• Clarity
• Total NO3/NO2	• Turbidity
• Soluble Nitrogen	• Microcystins (Algal Toxins)
• Soluble Kjeldahl Nitrogen	• Detergents (Anionic Surfactants)
• Soluble NO3/NO2	
• Total Hardness	
• Ammonia	
• Potassium	
• Boron	
• Color	

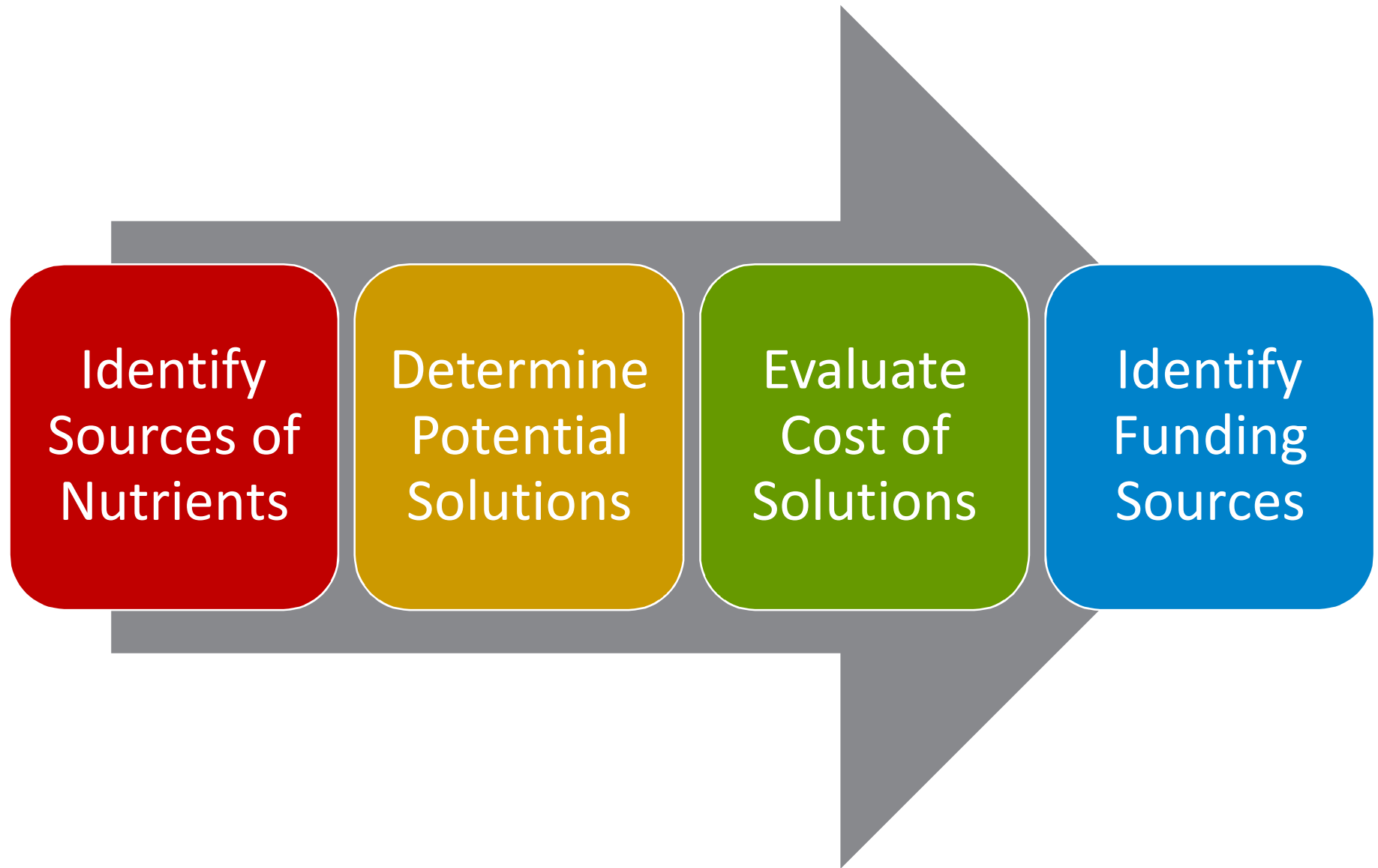


# 2021 CSLAP Update

- 4<sup>th</sup> Sampling Session Complete
  - >6.6” of rain in July 2021
    - 2.0” higher than average
  - Cyanobacteria or “blue-green algae” present lake-wide
    - Capable of producing toxins, but do not always – awaiting lab results
    - Avoid contact
  - Green non-toxic algae also present



# Engineering Study Objectives



The slide features a white background with large, solid blue geometric shapes. A large blue triangle is positioned in the top-left corner, and another large blue triangle is in the bottom-left corner. A horizontal grey bar spans across the middle of the slide, containing the title text.

# Identifying Sources of Nutrient Pollution

# Identify Sources of Nutrient Pollution

Data  
Collection



Model  
Data



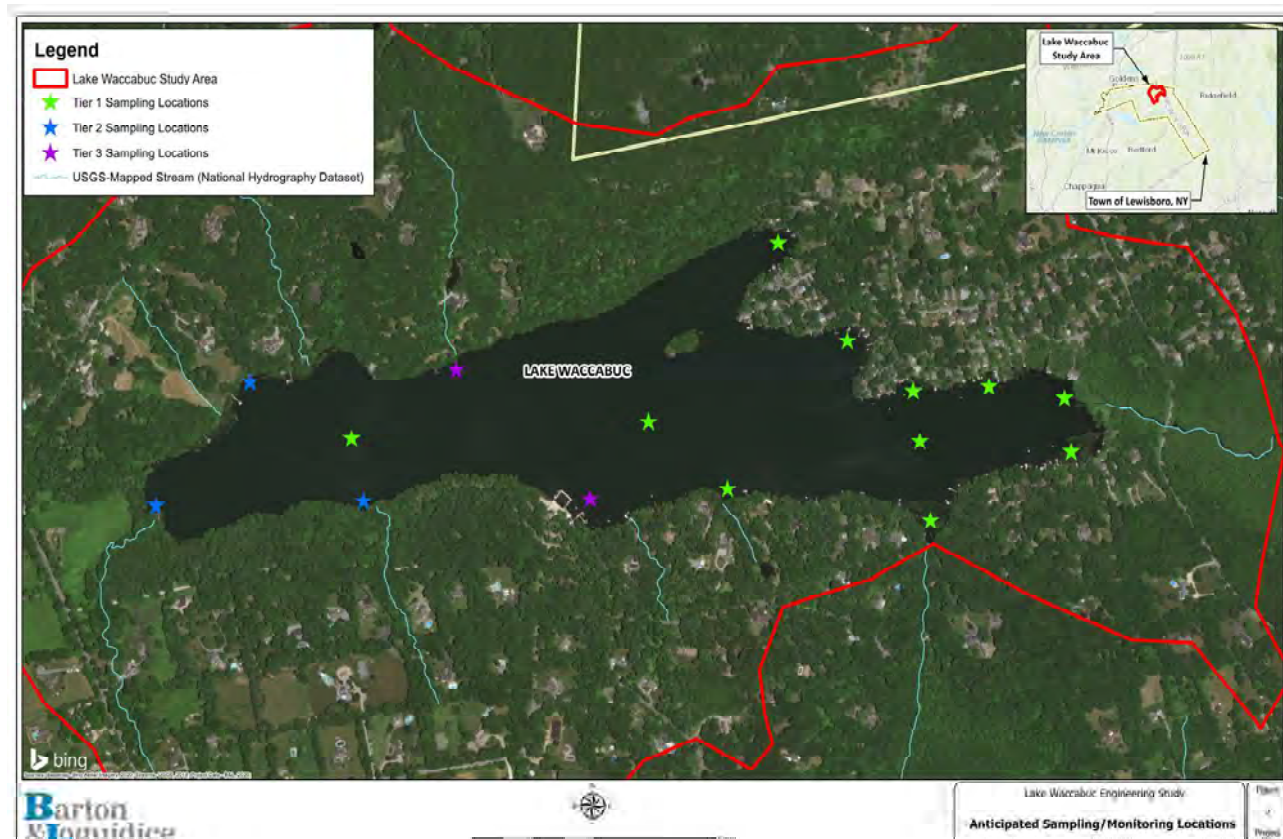
Sample  
Lake



Compare  
Results

Looking to answer the following questions:

1. To what extent are septic systems contributing nutrient pollution to Lake Waccabuc?
2. Which septic systems are likely the contributors?
3. What impact would providing sewer to these homes have on the lake?



# Nutrient Contributions from Septics

Evaluated available data for the study area to identify the following for input to the model:

- Failing Septic Systems
- Poorly Functioning Septic Systems

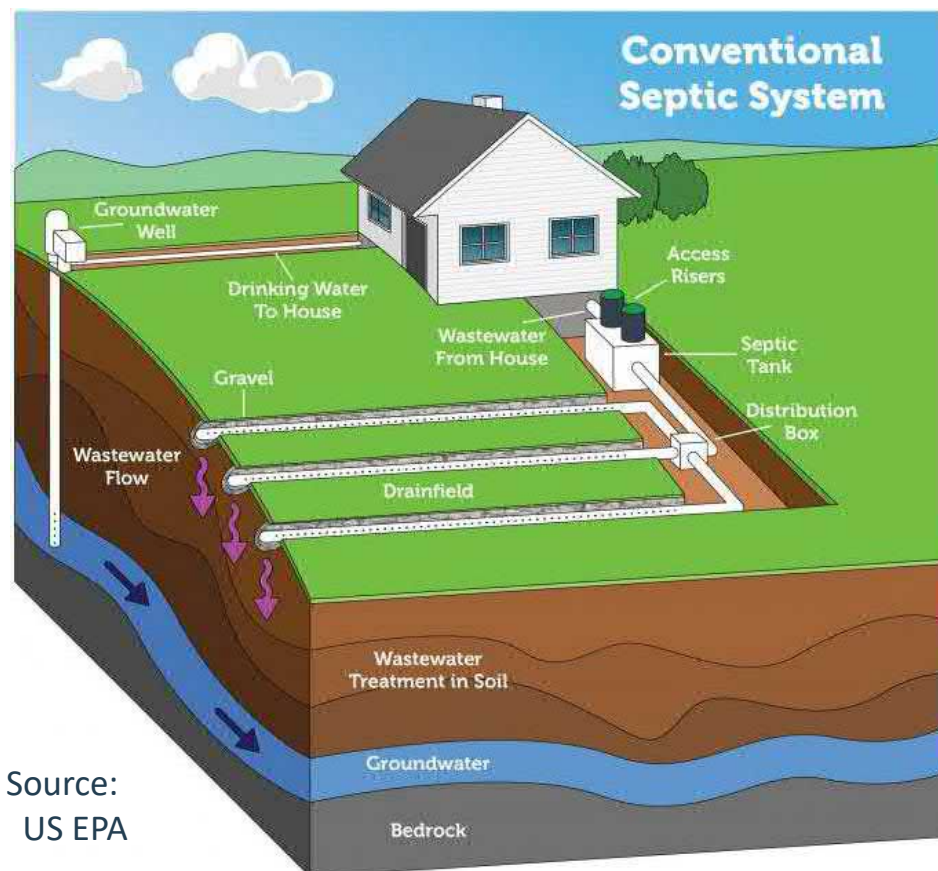




# Failing Septic Systems

A septic system is considered failing when one of two things happen:

- Wastewater reaches the surface above the septic system
- Wastewater backs into the home



Source:  
US EPA

# Failing Septic Systems

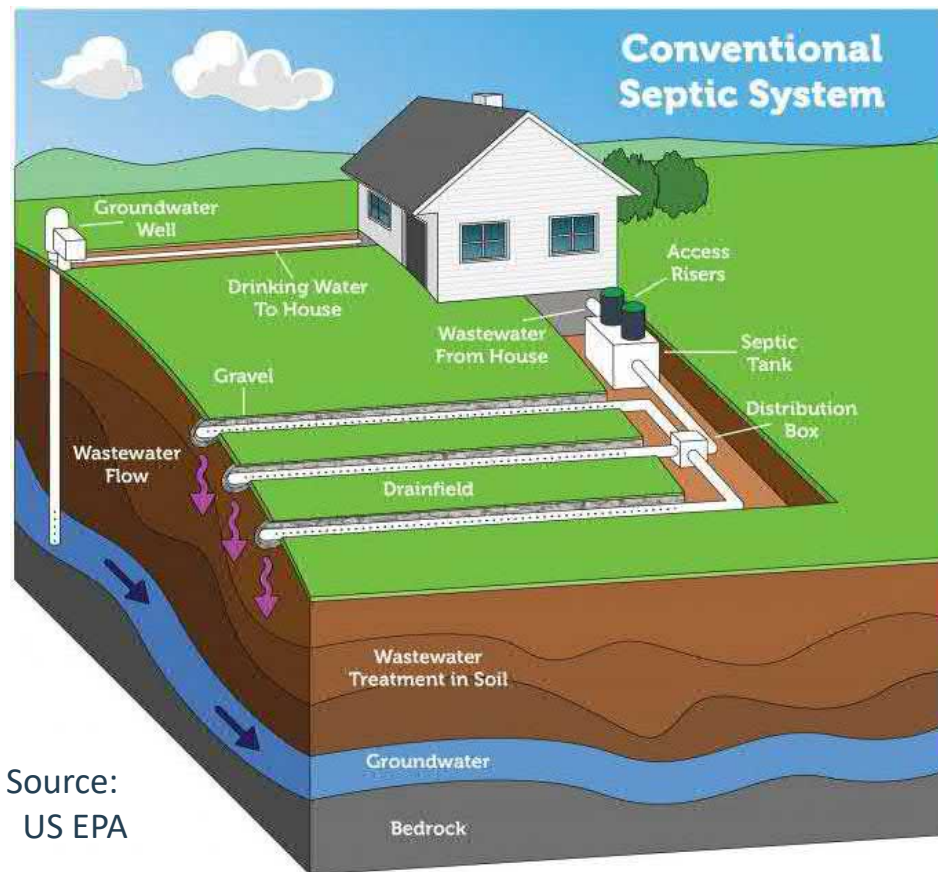
- Approx. 2 septic systems fail per year within the study area
- This value is based on data from the Westchester County Department of Health and the April public survey
- There may be additional septic system failures that have not been reported



# Poorly Functioning Septic Systems

Examples of conditions that may cause a septic system to perform poorly may include:

- Aging System Components
- Site Environmental Constraints



Source:  
US EPA

# Aging Septic Systems

- The limiting components of a septic system have a life expectancy of **50 years**.
- The USEPA states that *“the average lifespan of a septic system is **15 to 40 years**, but it can last longer if properly maintained.”*
- The Cornell Cooperative Extension states that *“[septic] systems are designed to have a useful life of **20 to 30 years** under the best conditions.”*



# Aging Septic Systems

Based on existing available data...

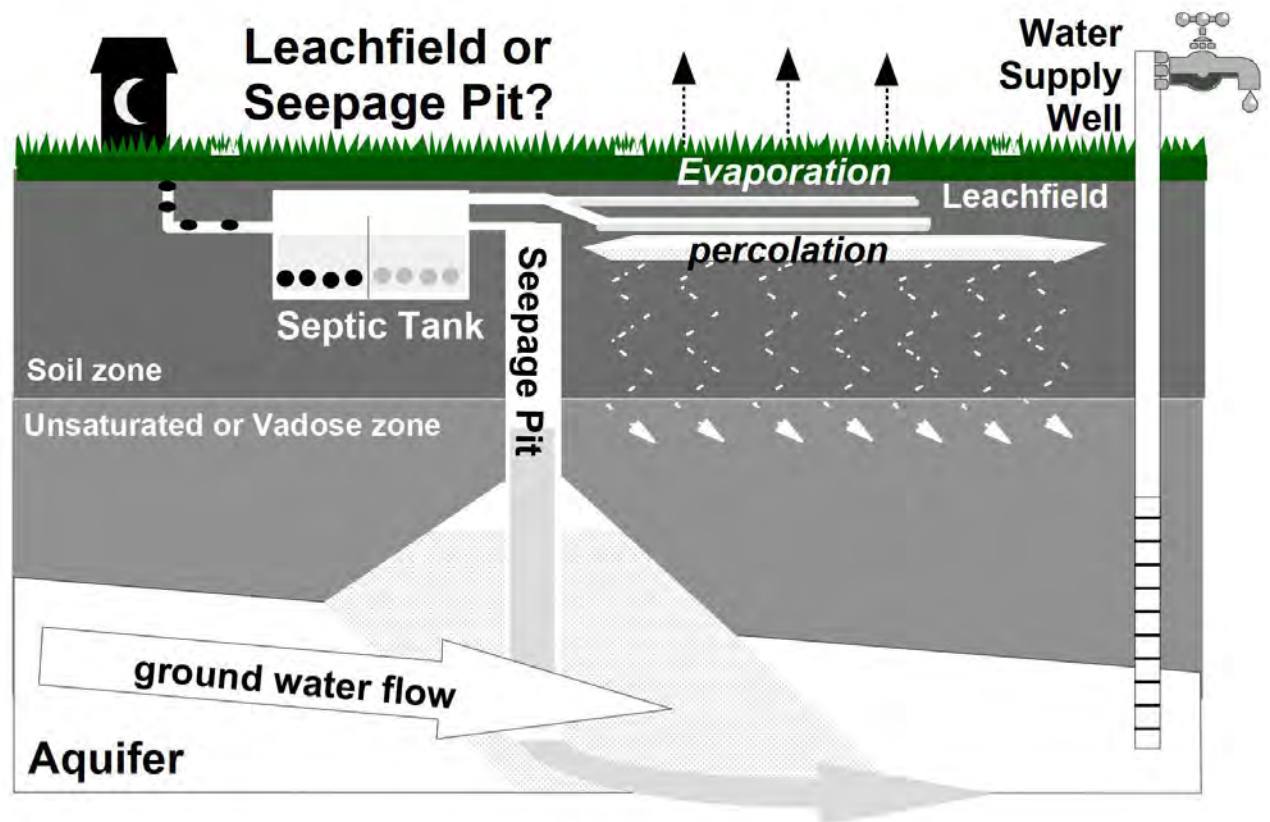
- Any septic system estimated to be **50 years or older** is assumed to be poorly functioning
- Any septic system estimated to be **30 to 49 years old, without record of regular septic pump-outs** is assumed to be poorly functioning





# Site Environmental Constraints

- Soils that drain too quickly or too slowly
- Close proximity to water bodies and wetlands
- Limited separation to groundwater and bedrock
- Steep slopes
- Cesspools and seepage pits



Source: US EPA

# Site Environmental Constraints

Based on existing available data...

Any septic system that likely does not meet the current Health Code standards is assumed to be poorly functioning.

UNOFFICIAL COMPILIATION OF CODES, RULES AND REGULATIONS OF THE STATE OF NEW YORK TITLE 10. DEPARTMENT OF HEALTH. CHAPTER II, PART 75. STANDARDS FOR INDIVIDUAL ONSITE WATER SUPPLY AND INDIVIDUAL ONSITE WASTEWATER TREATMENT SYSTEMS, APPENDIX 75-A.

## **APPENDIX 75-A**

**WASTEWATER TREATMENT STANDARDS – RESIDENTIAL ONSITE SYSTEMS**  
(Statutory Authority: Public Health Law, 201(1)(f))

---

### SECTION

- 75-A.1 Introduction
- 75-A.2 Regulation by other agencies
- 75-A.3 Sewage flows
- 75-A.4 Soil and site appraisal
- 75-A.5 House or building sewer
- 75-A.6 Septic tanks and Enhanced Treatment Units
- 75-A.7 Distribution devices
- 75-A.8 Conventional subsurface treatment systems
- 75-A.9 Alternative subsurface treatment systems
- 75-A.10 Other systems
- 75-A.11 Specific Waivers

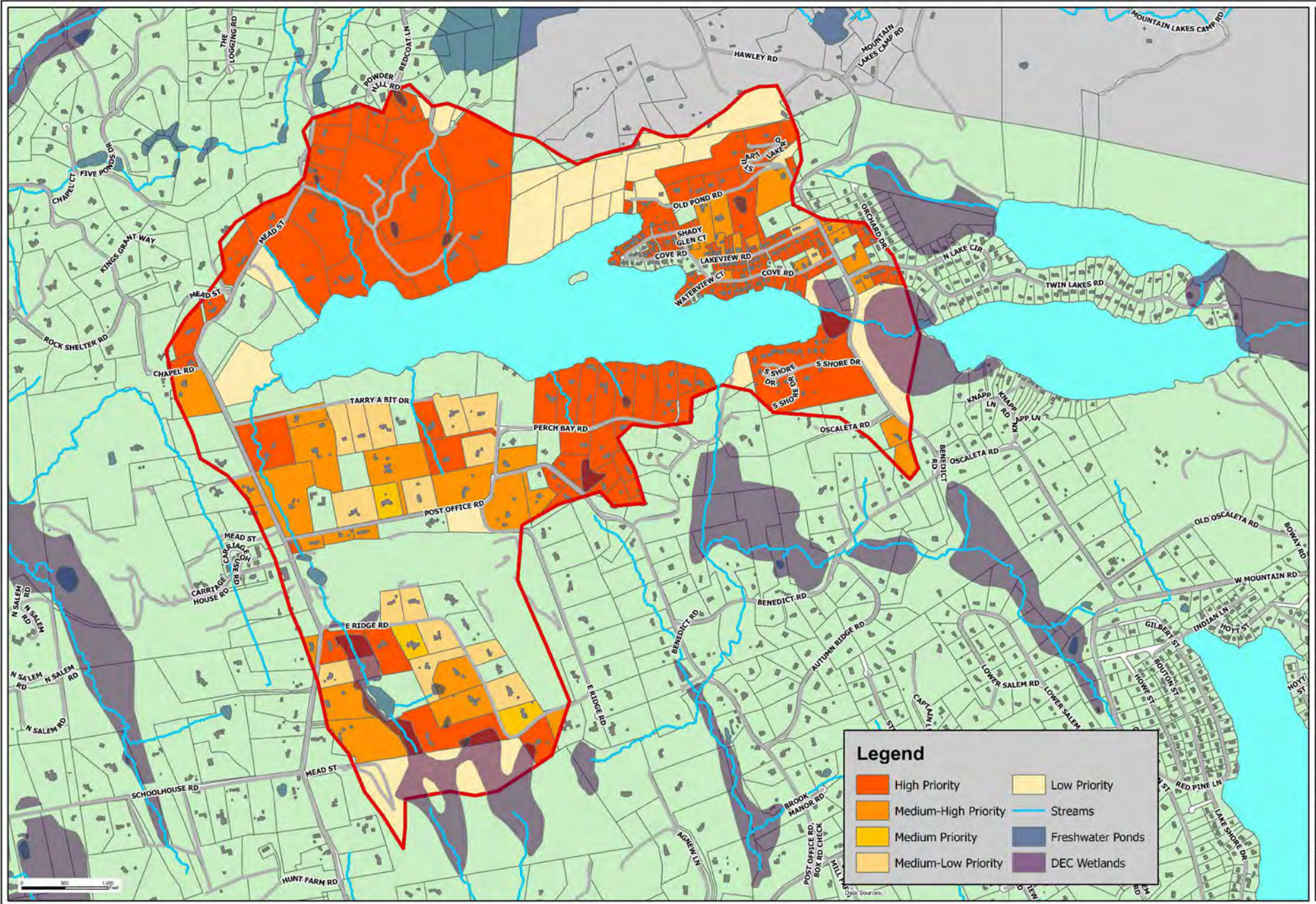
**Effective Date of March 16, 2016**

---





# Potentially Poorly Functioning Septics



**Legend**

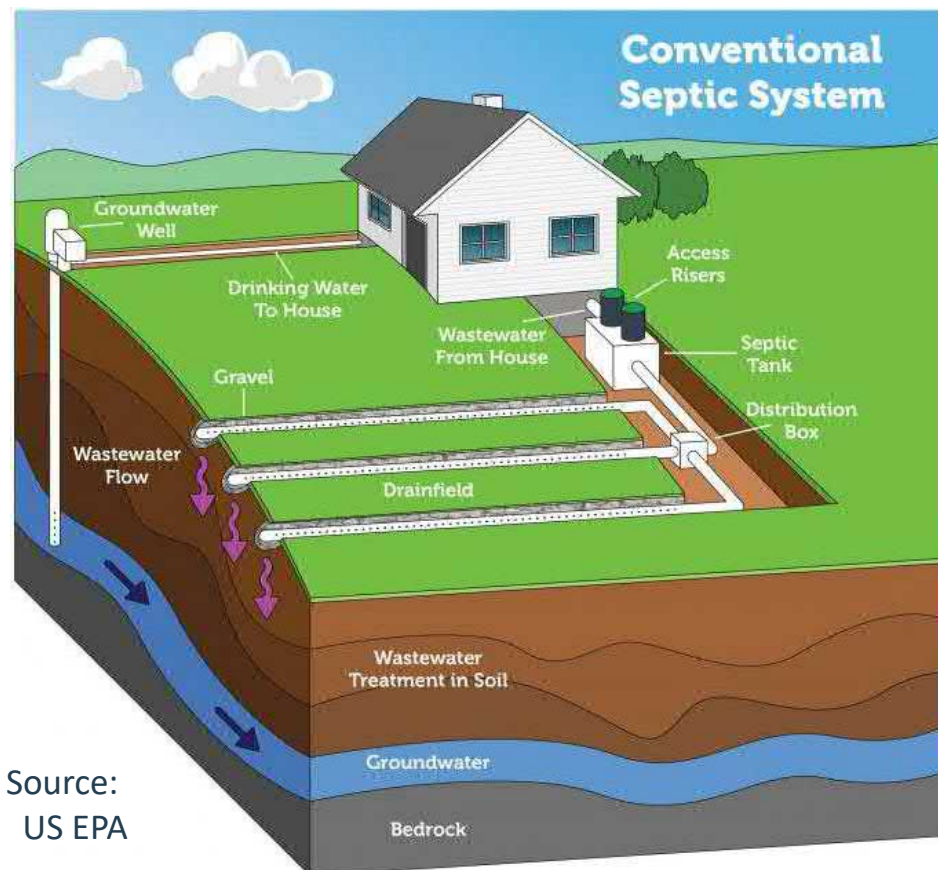
<span style="display:inline-block; width:15px; height:15px; background-color:orange; border:1px solid black;"></span> High Priority	<span style="display:inline-block; width:15px; height:15px; background-color:yellow; border:1px solid black;"></span> Low Priority
<span style="display:inline-block; width:15px; height:15px; background-color:orange; border:1px solid black;"></span> Medium-High Priority	<span style="display:inline-block; width:15px; height:15px; border-bottom:1px solid blue;"></span> Streams
<span style="display:inline-block; width:15px; height:15px; background-color:yellow; border:1px solid black;"></span> Medium Priority	<span style="display:inline-block; width:15px; height:15px; background-color:lightblue;"></span> Freshwater Ponds
<span style="display:inline-block; width:15px; height:15px; background-color:lightorange; border:1px solid black;"></span> Medium-Low Priority	<span style="display:inline-block; width:15px; height:15px; background-color:purple;"></span> DEC Wetlands

Town of Lewisboro <b>Wastewater Management Solution                  Prioritization</b> Westchester County
New York
Date July 28, 2021
Scale 1" = 1,000'
Figure Number ---
Project Number 2390.001.001

# Wastewater Management

# Determine Potential Solutions

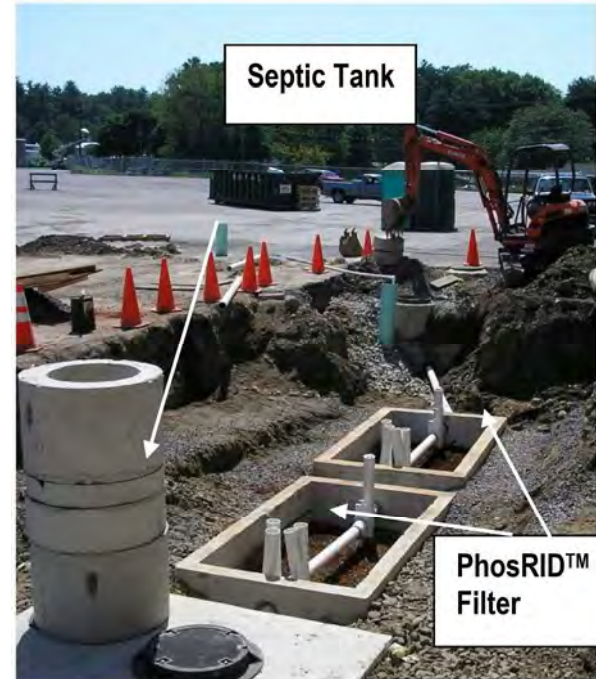
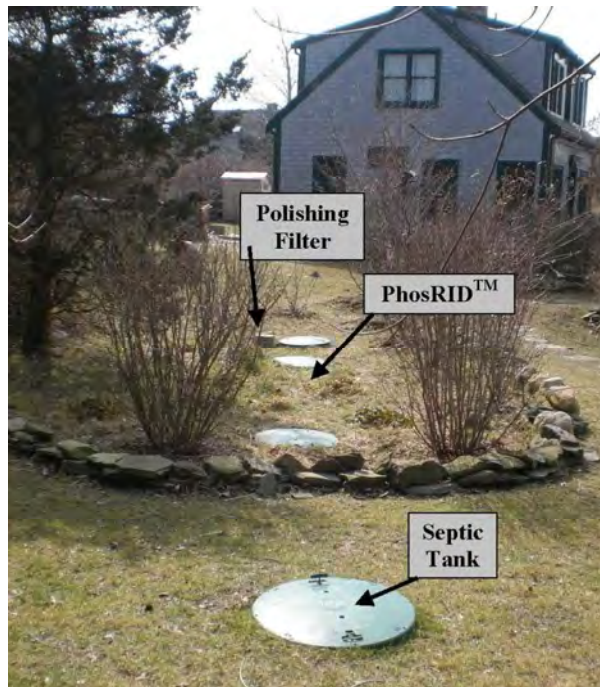
1. Upgrades/Replacements of Individual Septic Systems
2. Connection to Community / Cluster Septic Systems
3. Sewer to an Existing Wastewater Treatment Plant (WWTP)
4. Sewer to a New Wastewater Treatment Plant



Source:  
US EPA

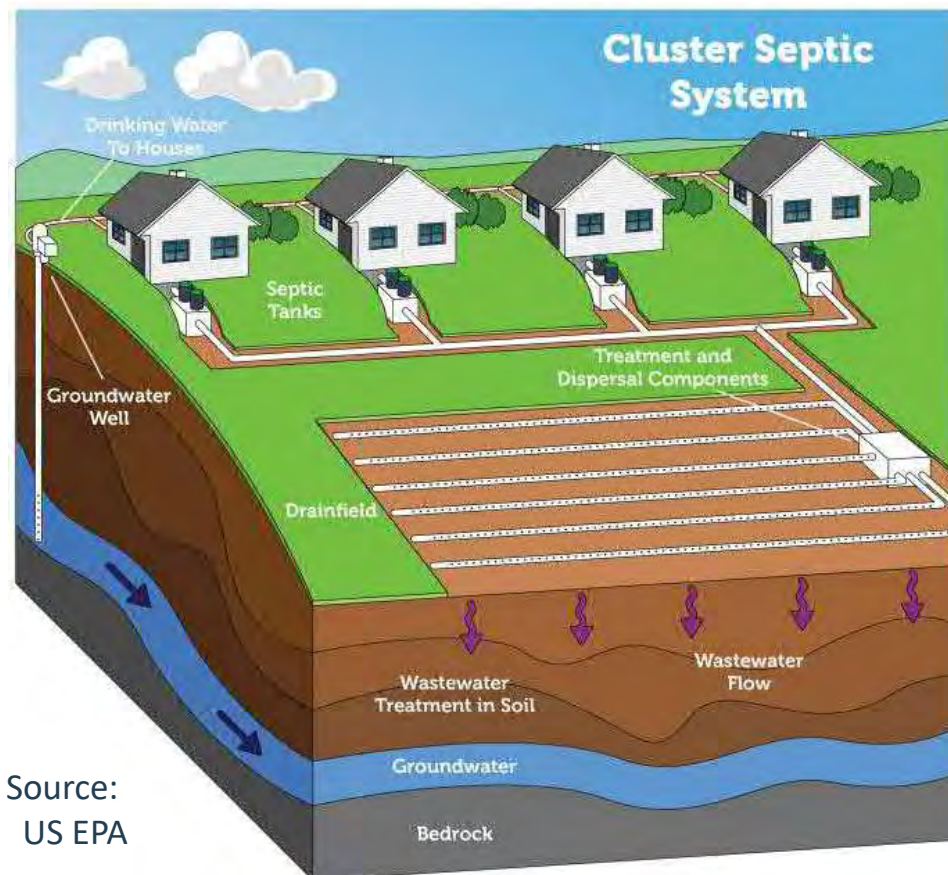
# Upgrades/Replacements of Septic Systems

- Replacing old septic systems may reduce nutrient pollution to Lake Waccabuc, IF there are no environmental constraints
- For sites with environmental constraints, we recommend the implementation of a phosphorus treatment system



# Determine Potential Solutions

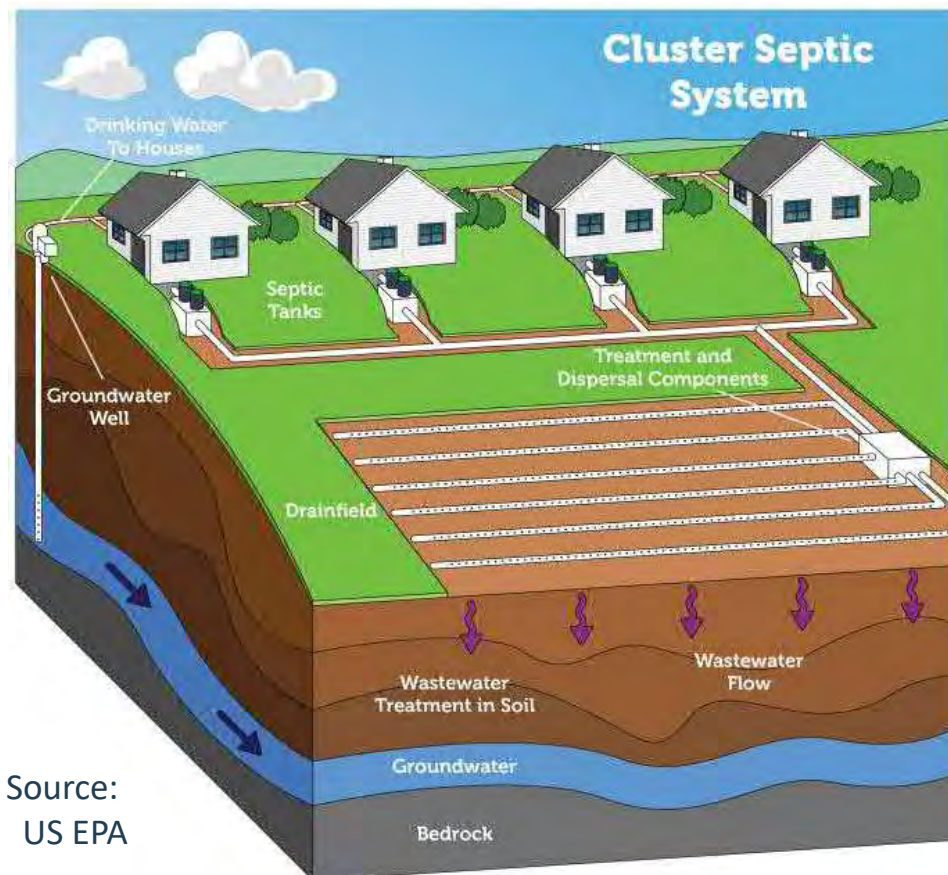
1. Upgrades/Replacements of Individual Septic Systems
2. Connection to Community / Cluster Septic Systems
3. Sewer to an Existing Wastewater Treatment Plant (WWTP)
4. Sewer to a New Wastewater Treatment Plant



Source:  
US EPA

# Connection to Community Septic Systems

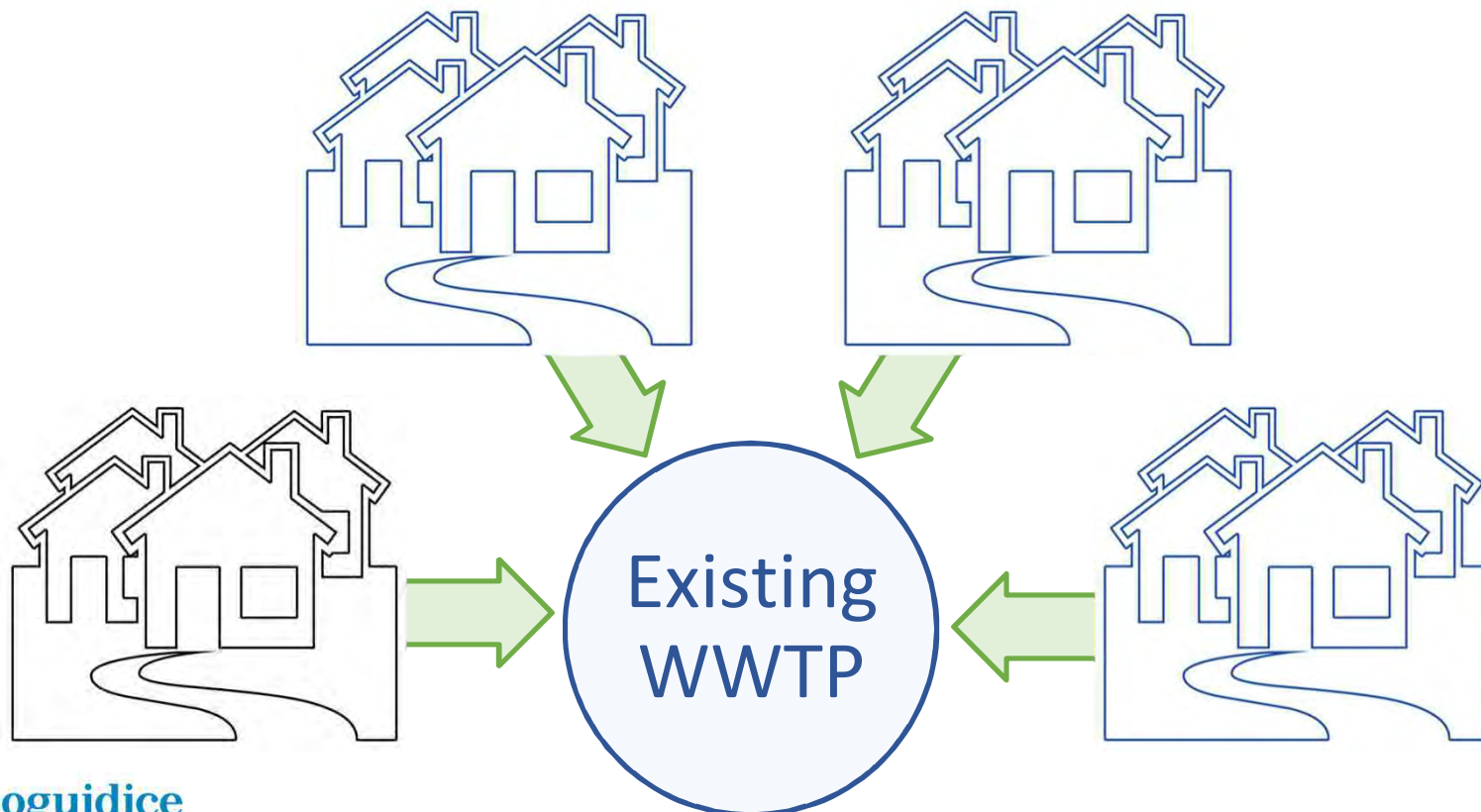
- Limited land available to build a community septic system
- The land requirement is estimated at ~8 acres to support the entire study area
- South Shore Waccabuc Association can support its residents



Source:  
US EPA

# Determine Potential Solutions

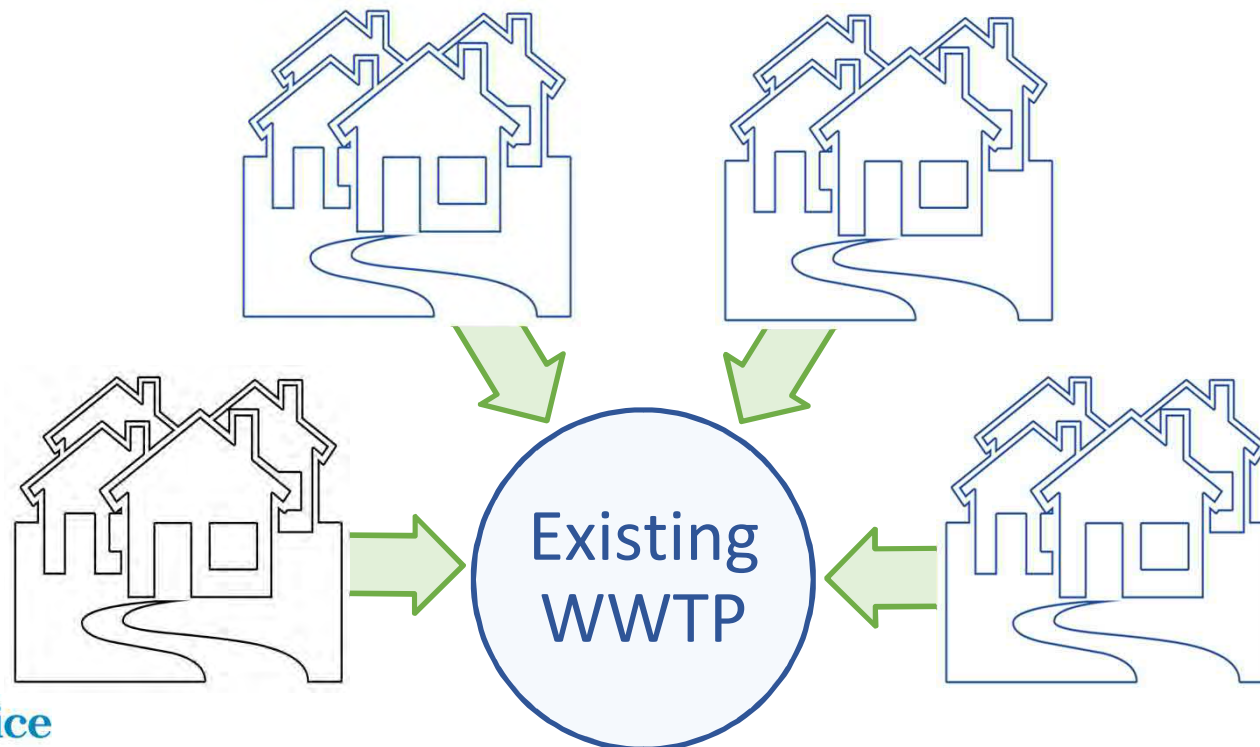
1. Upgrades/Replacements of Individual Septic Systems
2. Connection to Community / Cluster Septic Systems
3. Sewer to an Existing Wastewater Treatment Plant (WWTP)
4. Sewer to a New Wastewater Treatment Plant





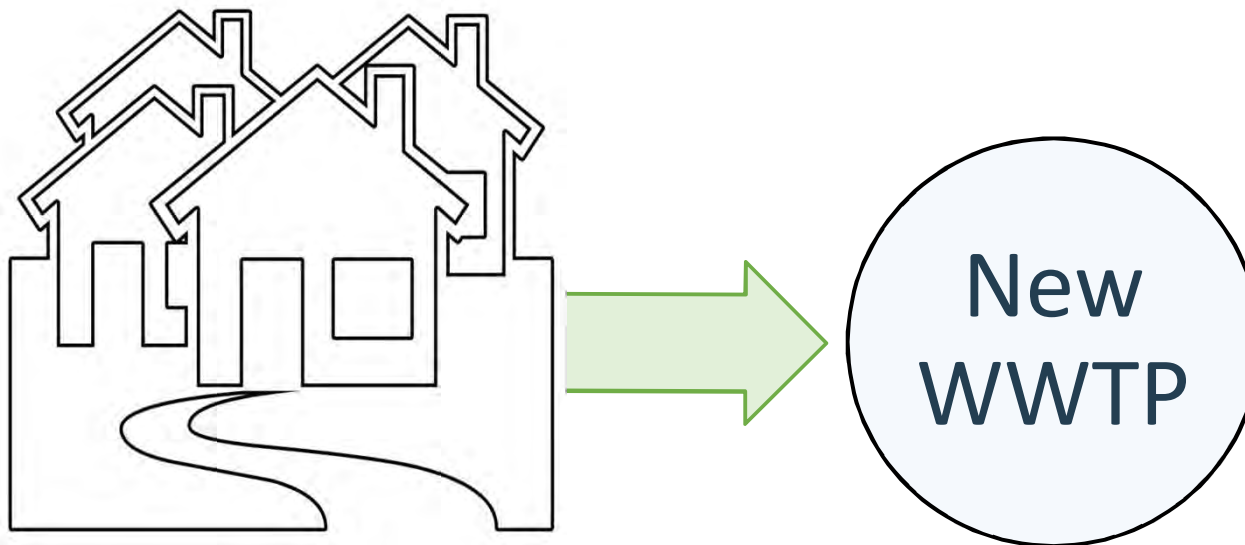
# Sewer Extension to an Existing WWTP

- Ridgefield, Connecticut has the nearest municipal WWTP
  - They recently upgraded their plant and are already at capacity
  - They do not have the space to further increase their capacity
- Evaluated other nearby municipal WWTPs within a 10-miles radius
  - There are 2 WWTPs currently under consideration



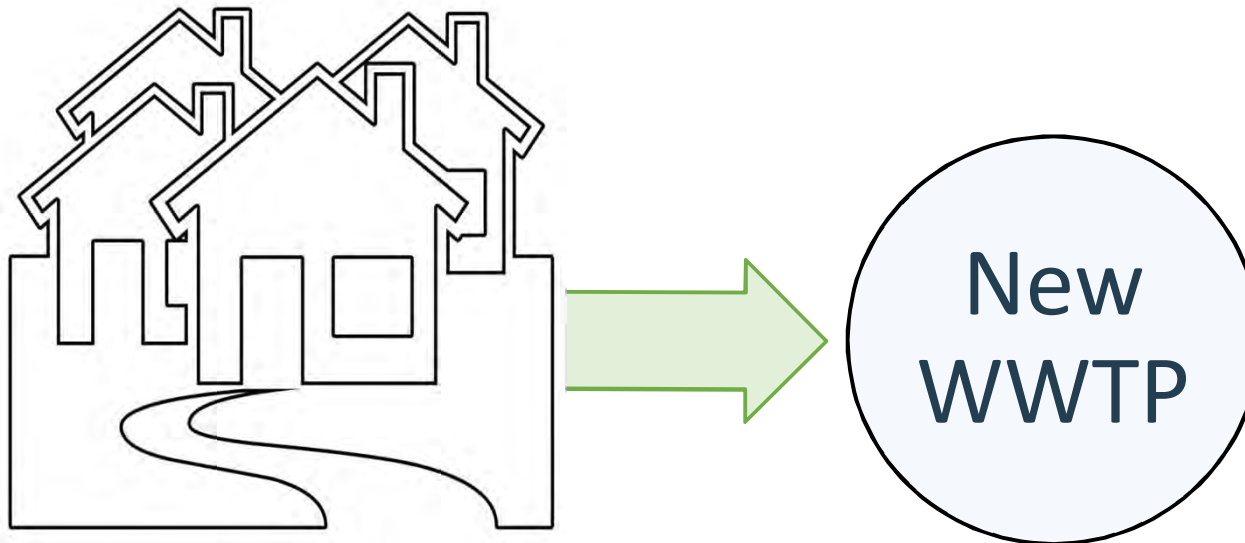
# Determine Potential Solutions

1. Upgrades/Replacements of Individual Septic Systems
2. Connection to Community / Cluster Septic Systems
3. Sewer to an Existing Wastewater Treatment Plant
4. Sewer to a New Wastewater Treatment Plant

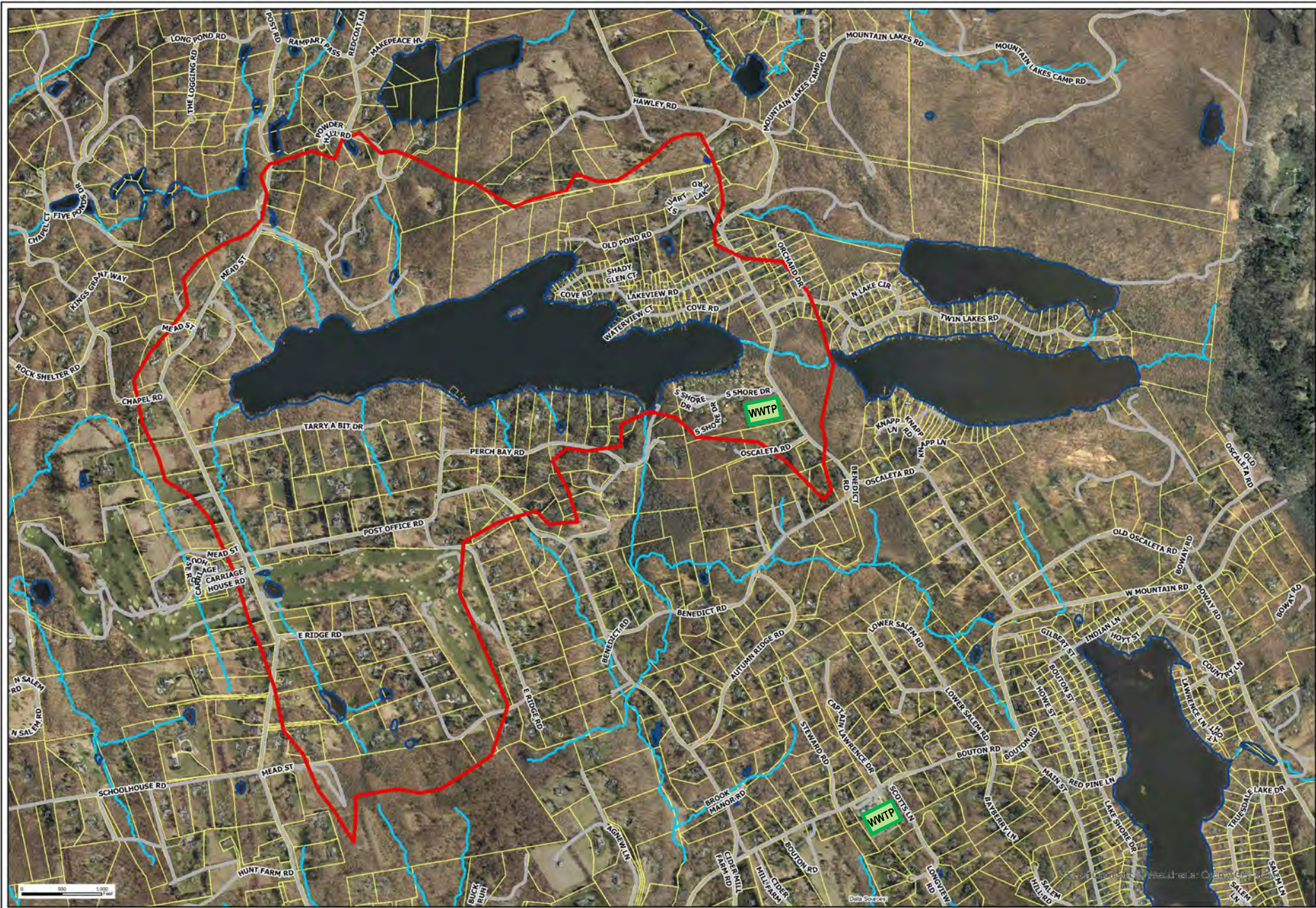


# Sewer to a New WWTP

- There is limited land available to build a WWTP
  - It would take ~ 0.5 acres to treat the entire study area
- There are 2 sites under consideration:
  - South Shore Association – Limited Capacity
  - Lewisboro Elementary School – Combined with Truesdale Lake community



# Sewer to New WWTP



Town of Lewisboro	
<b>Wastewater Treatment Plant Locations</b>	
Westchester County	
New York	
<b>Barton &amp; Loguidice</b>	
<b>Date</b>	June 28, 2021
<b>Scale</b>	1" = 1,000'
<b>Figure Number</b>	---
<b>Project Number</b>	2390.001.001

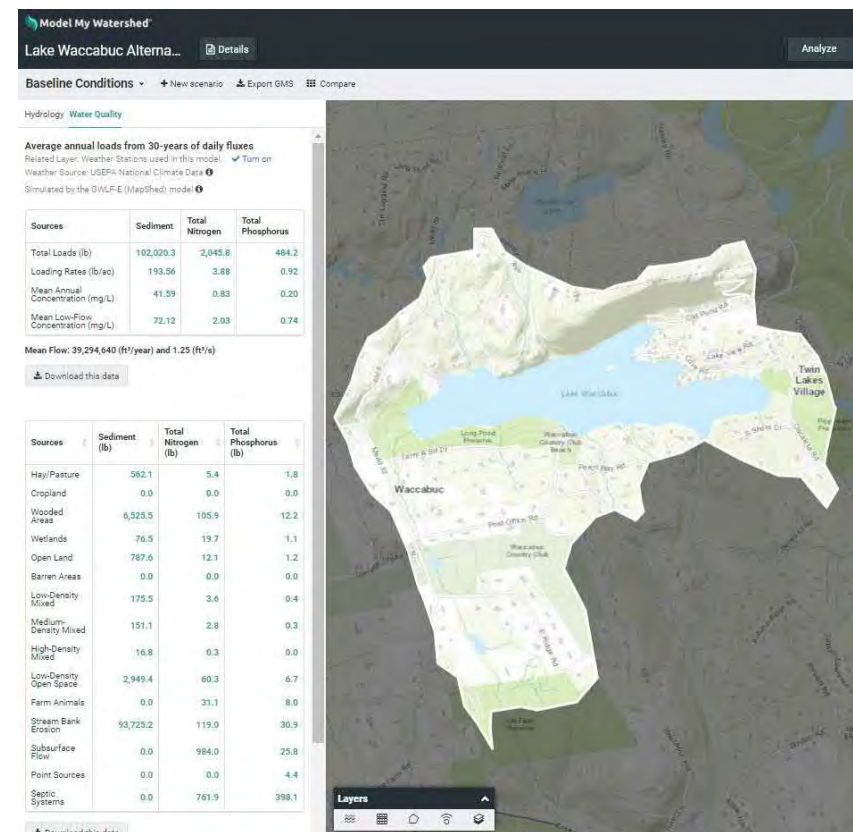
# Existing Nutrient Loads by Source

Model results indicate septic system failure contributes:  
 ~81% of existing external phosphorus (P) load  
 ~36% of existing external nitrogen (N) load

## BASELINE DATA

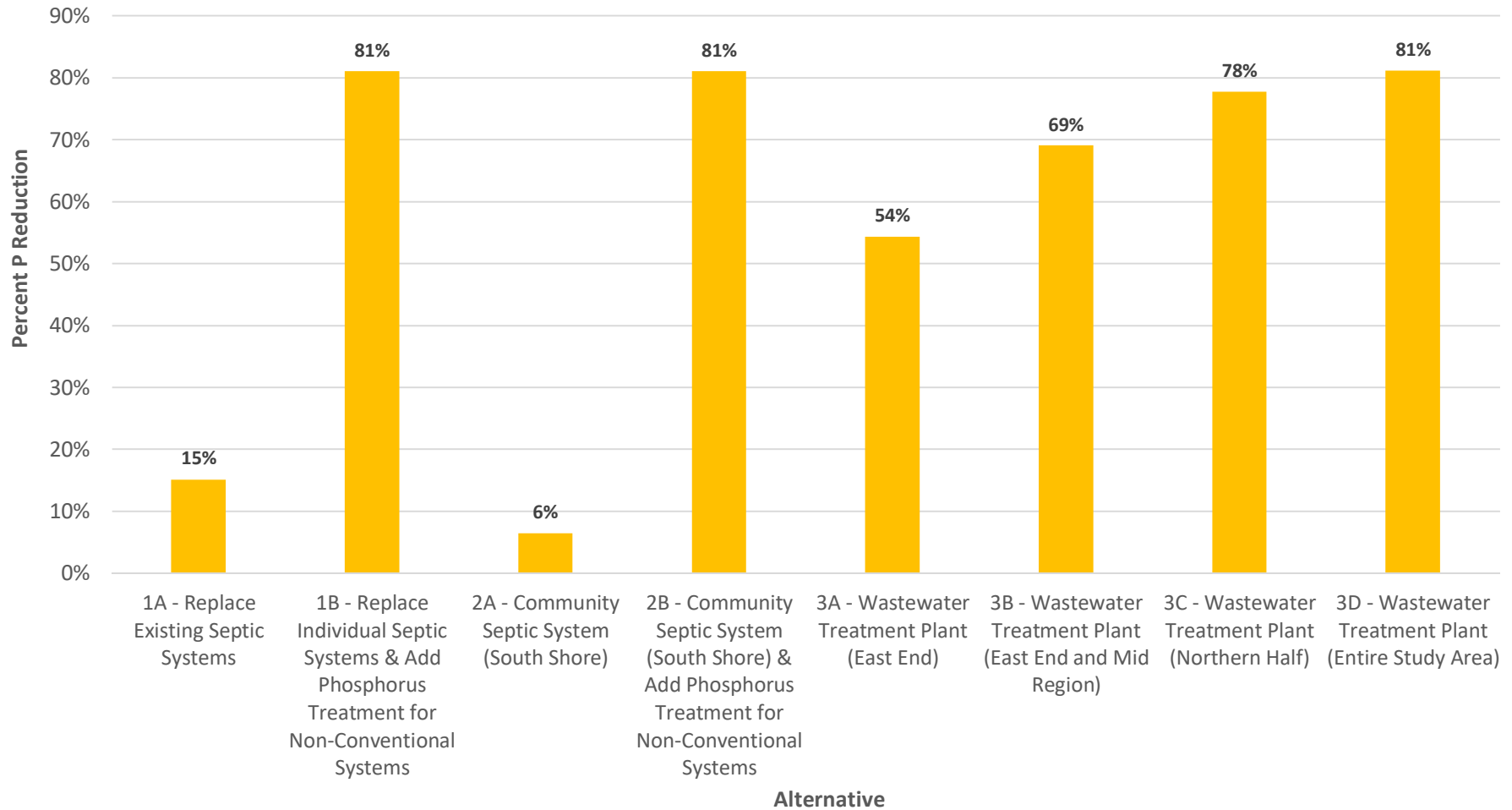
Sources	Sediment (lb)	Total Nitrogen (lb)	Total Phosphorus (lb)
Hay/Pasture	562.1	5.4	1.8
Cropland	0	0	0
Wooded Areas	6,525.5	105.9	12.2
Wetlands	76.5	19.7	1.1
Open Land	787.6	12.1	1.2
Barren Areas	0	0	0
Low-Density Mixed	175.5	3.6	0.4
Medium-Density Mixed	151.1	2.8	0.3
High-Density Mixed	16.8	0.3	0
Low-Density Open Space	2,949.4	60.3	6.7
Farm Animals	0	31.1	8
Stream Bank Erosion	93,725.2	119	30.9
Subsurface Flow	0	984	25.8
Point Sources	0	0	4.4
<b>Septic Systems</b>	<b>0</b>	<b>761.9</b>	<b>398.1</b>
<b>TOTAL</b>	<b>104,969.7</b>	<b>2,106.1</b>	<b>490.9</b>

## MODEL MY WATERSHED



# Modeling Alternatives – Phosphorus

## Model My Watershed Modeling Results - Percent Phosphorus Reduction by Alternative



# Funding

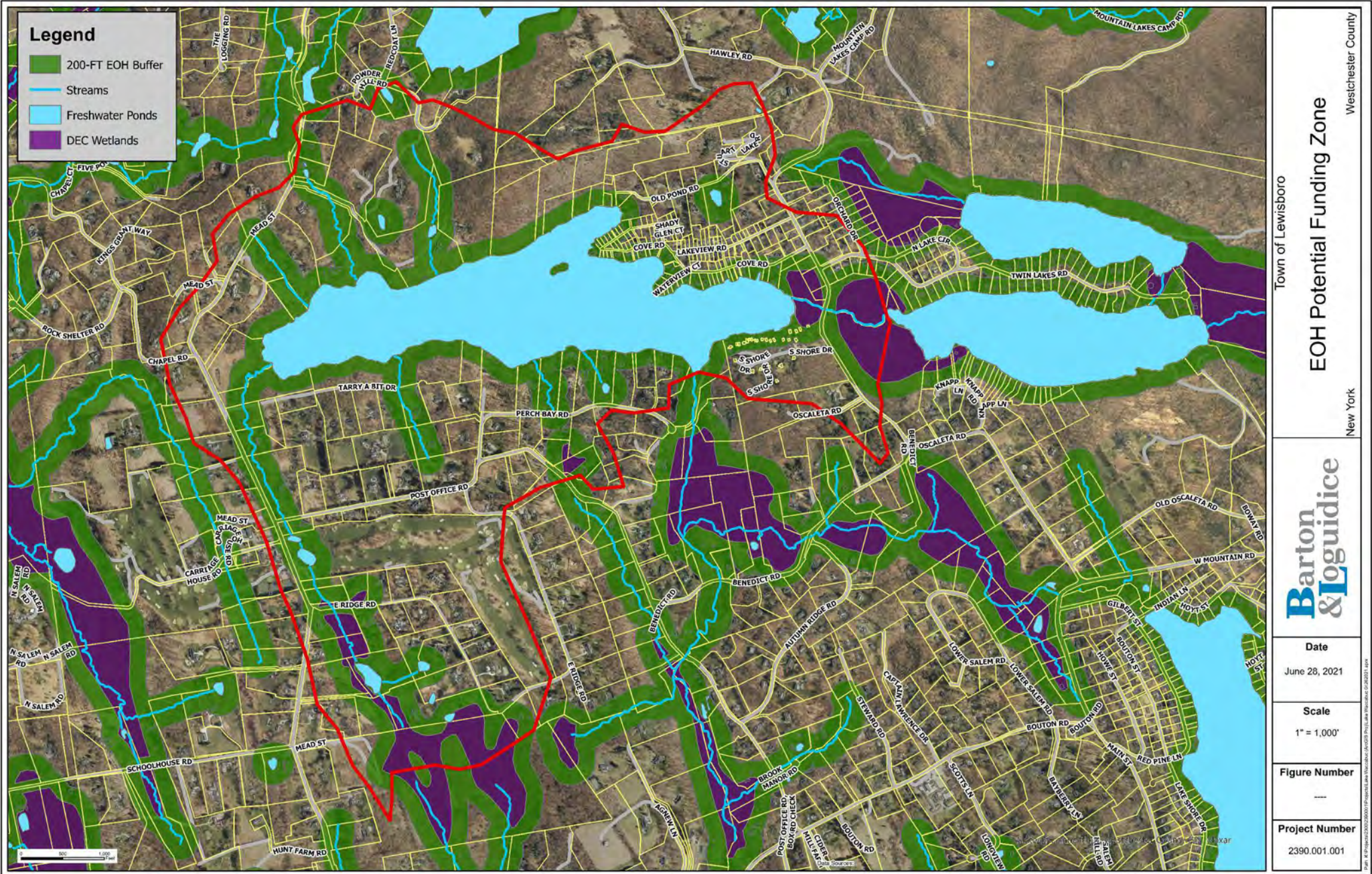
# Funding Sources

- The eligibility of each alternative solution is being evaluated for grant funding programs
  - NYS EFC
  - NYS CFA
  - US EPA





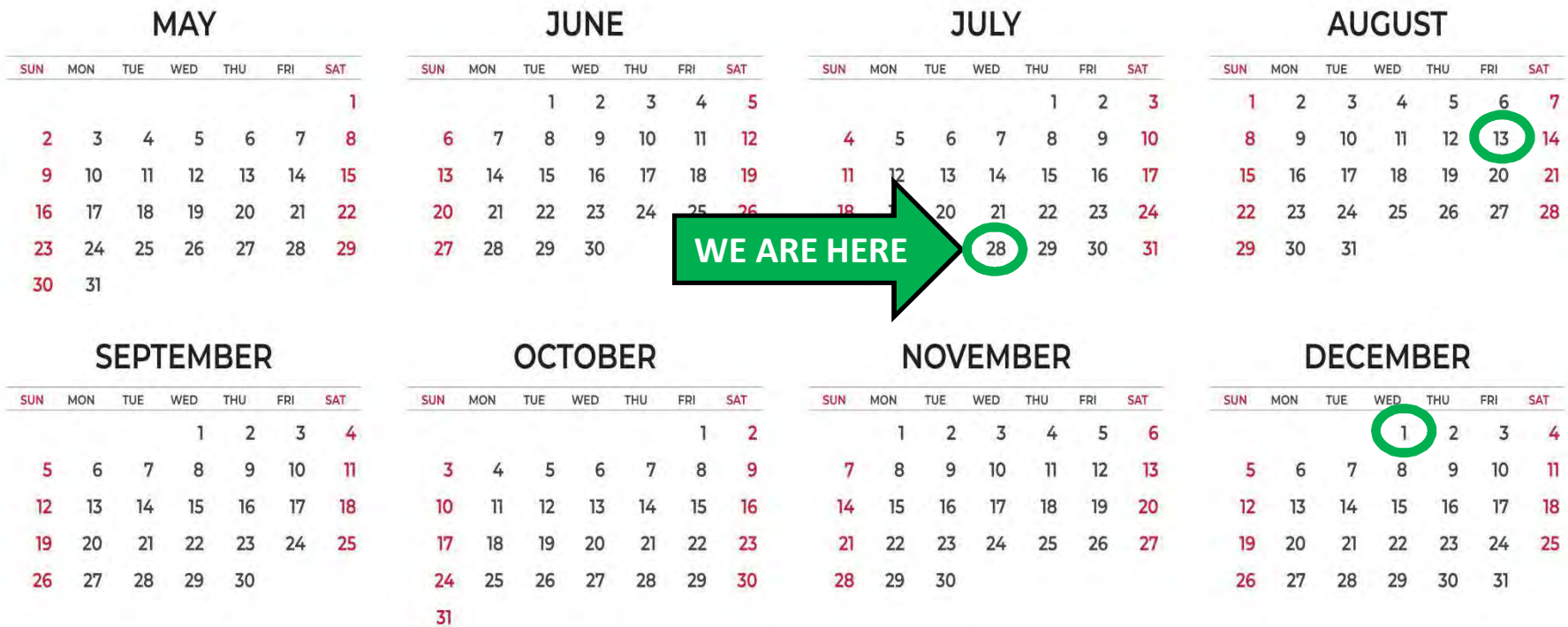
# Existing Funding for Homeowners



# What's Next

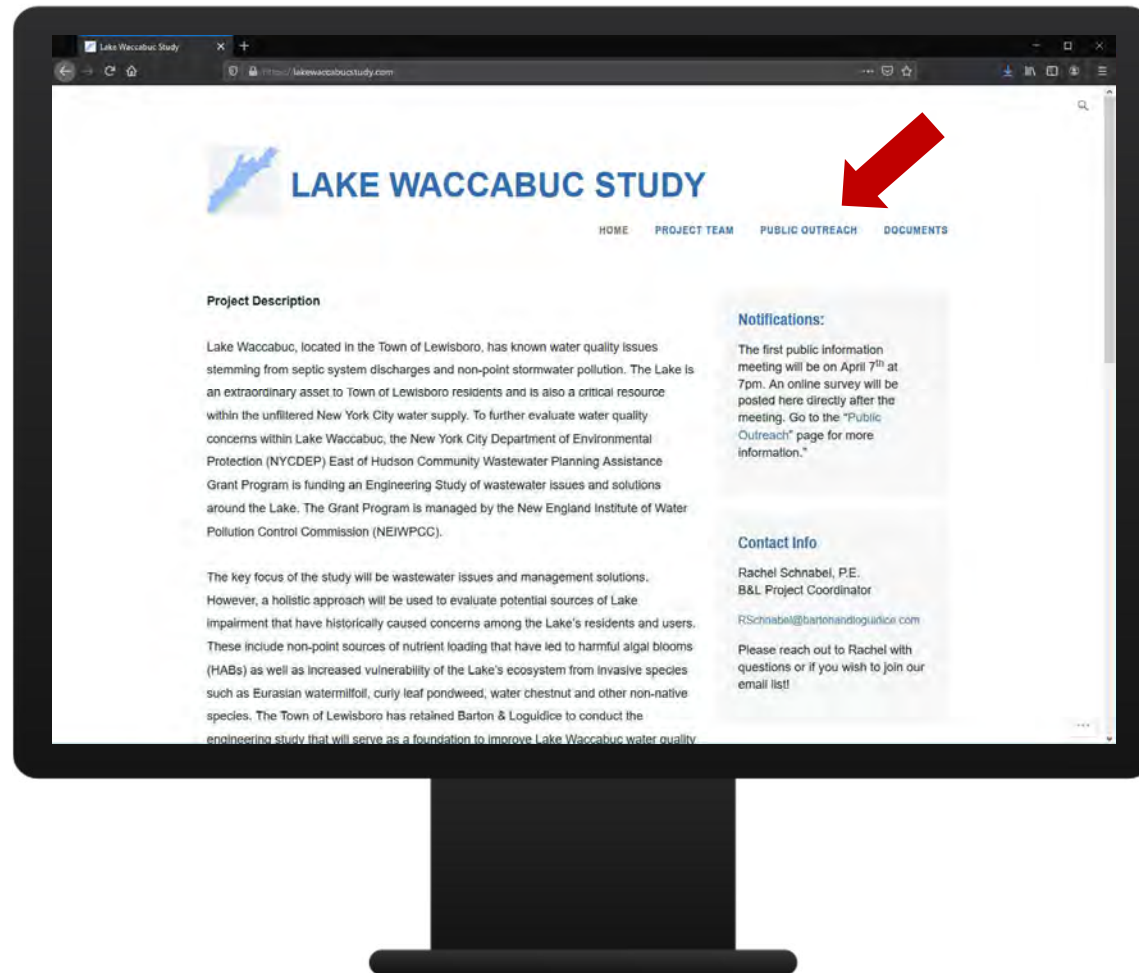
# Project Schedule

- The Draft Engineering Report is due August 13<sup>th</sup>
- The Final Engineering Report is due December 1<sup>st</sup>
- These documents will be posted to the project website



# How You Can Help

- Go to the project website:  
<https://LakeWaccabucStudy.com/>
- Click on the Public Outreach tab to access the survey link



# How You Can Help

This survey will be available on the project website starting tomorrow morning and will close at the end of the day on August 4<sup>th</sup>!

## JULY

## AUGUST

SUN	MON	TUE	WED	THU	FRI	SAT
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

SUN	MON	TUE	WED	THU	FRI	SAT
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

# Why It All Matters

Restoring the water quality of Lake Waccabuc will...

- Protect/repair the ecosystem of the lake
- Allow continued safe recreational use of the lake
- Protect/improve the value of properties in the study area
- Protect drinking water for residents in the study area



<https://LakeWaccabucStudy.com>

The experience to  
**listen**  
The power to  
**solve**<sup>SM</sup>

*BartonandLoguidice.com*

