



# Wastewater Preliminary Engineering Report

Town of Copake

March 2023



Services Provided in New York by T&B Engineering and  
Landscape Architecture, PC

**Tighe&Bond**

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C5130  
March 22, 2023

Thomas Goldsworthy  
Town of Copake  
230 Mountain View Road  
Copake, NY 12516

Re: **Wastewater Preliminary Engineering Report**

Dear Mr. Goldsworthy,

Tighe & Bond, whose services are provided in New York by T&B Engineering and Landscape Architecture, PC (Tighe & Bond), is pleased to submit our final copy of the Wastewater Preliminary Engineering Report for the Town of Copake.

### **Executive Summary**

Tighe & Bond has evaluated various wastewater collection, recovery, and return options to determine a viable solution for the Town. The enclosed report summarizes our evaluation including a potential proposed sewer district boundary, a discussion of conventional and alternative water resource recovery systems, identification of alternatives, a summary of the recommended alternative, and anticipated costs.

As you are aware, the Town of Copake sent out a water condition survey in 2022. The results of the recent water condition survey revealed that although there are some failed septic systems, there is little perceived need for a community wastewater system as many respondents did not feel that a sewer system would benefit the hamlet or would be an unnecessary expense. However, to put the needs analysis in context and provide opportunity for a cost versus benefit assessment, this report explores a sewer service area delineation, flow development, and conceptual collection and treatment system recommendations and costs, so the financial impact of a potential system can be established.

### **Alternatives Analysis**

Based on the alternative development discussed in Sections 6 of the enclosed report, three alternatives were identified for consideration including:

- Alternative No. 1:
  - No Action
- Alternative No. 2:
  - Septic Tank Effluent Collection System
  - PBF Water Resource Recovery System
  - Surface Return to Bash Bish Brook
- Alternative No. 3:
  - Individual Onsite Septic System Improvements

## Recommended Alternative

A cost analysis was performed for Alternative No. 2 and is presented in Section 7 of the report. The anticipated capital costs for this system including contingency is \$8.4M. However, as mentioned above, there is a high level of divergence in perceived need and theoretical need for wastewater service in the study area. The recent water condition survey data indicates a very low level of perceived need, with only three parcels indicating problems, which appear to be related to flooding concerns, and only slightly more indicating awareness of septic problems elsewhere in the community.

In our experience, the construction of a community wastewater system needs significant support from the community to move forward as it is a large undertaking. Given the apparent lack of support based on the recent water condition survey, we are recommending that Copake does not move forward with a municipal wastewater system at this time (Alternative No. 2) but instead consider Alternative No. 3 – individual onsite septic system improvements. Alternative No. 3 recommends:

- The Town consider completing a sanitary study or other work to document drinking water or environmental quality concerns which may permit the hamlet's inclusion in the State Septic Replacement Program.
- The Town work with Columbia Economic Development Corporation and Empire State Development to develop a comprehensive Town-led approach to facilitate business expansion via septic system replacement.

## Project Costs and Funding Opportunities

The cost for replacing an existing septic system with a new conventional septic system, mound-style system, or alternative onsite septic system varies greatly depending on the system type and individual parcel conditions. Since the project scope cannot be defined until additional site investigations are performed, a definitive project cost cannot be determined at this time. While generally the cost to replace existing septic systems with new septic systems is the responsibility of individual property owners, we believe collaboration between the Town and economic development funding agencies may lead to additional support and ease of access for businesses with growth and expansion goals.

We understand that considering a wastewater system is an important endeavor for the Town of Copake and we hope that this report will meet the Town's goal of understanding the options available for implementing a sewer system. Please contact Erin Moore at 845-516-5835 if you have any questions regarding this report.

Very truly yours,

**T&B Engineering and Landscape Architecture, PC**



Erin K. Moore, PE, BCEE  
Senior Project Manager

# **Section 1**

## **Project Planning**

### **1.1 Introduction**

This report presents a wastewater feasibility study and preliminary engineering report performed for the Town of Copake, New York. This evaluation has been performed to determine if municipal wastewater service is appropriate for the hamlet of Copake and, if so, recommend a delineation of a wastewater service district and the most cost-effective means of wastewater collection, treatment, and return for the proposed district.

The need for community wastewater collection and treatment systems is constantly evolving. Historically, initial efforts were focused on collection and disposal and were driven by the need to reduce human disease. That era was followed by a focus on the elimination of water pollution effects, allowing native marine organisms to return to normal growth patterns and allowing full human recreational use. Currently, community wastewater collection and treatment systems have begun to redefine wastewater as a valuable resource. As such, when proposing alternatives for addressing wastewater needs this document uses the term “water resource recovery and return systems”. This modern terminology embraces the concept that water is the most valuable resource in the world.

The hamlet of Copake is currently served by individual (residential/commercial) subsurface wastewater disposal systems (primarily septic tanks with leach fields) and is un-sewered. The focus area for this study is the hamlet of Copake with a focus on the hamlet business area. The study area is shown in Figure A.1 (Appendix A).

The following tasks were performed as part of this evaluation and are described in the Sections that follow:

1. Sewer District Delineation
2. Wastewater Flow Estimates
3. Evaluation of Collection, Recovery, and Return Alternatives
4. Cost Estimates for the Developed Alternatives
5. Recommendations & Implementation Procedures

Tighe & Bond, whose services are provided in New York through T&B Engineering & Landscape Architecture, P.C. (Tighe & Bond), has been engaged by the Town of Copake (Town) to prepare this Preliminary Engineering Report (PER) in a format consistent with the New York State Environmental Facility Corporation (EFC) New York State Clean Water Revolving Fund Engineering Report guidelines.

### **1.2 Previous Planning Efforts**

The availability of prior planning efforts for the Town of Copake was investigated as part of this evaluation to obtain background information regarding any previous approaches or studies that were conducted. The *Town of Copake Comprehensive Plan, 2011*, and the *Town of Copake Downtown Revitalization Initiative Proposal, 2021* were reviewed as part of this effort and are summarized below as they relate to wastewater.



### **Town of Copake Comprehensive Plan (2011)**

The Comprehensive Plan discusses the goals and objectives for the Town of Copake and the hamlets and center of Copake. It is noted in the 2011 Comprehensive Plan that a goal for the Town is to evaluate the need and feasibility for a public sewer system, especially in the hamlet area.

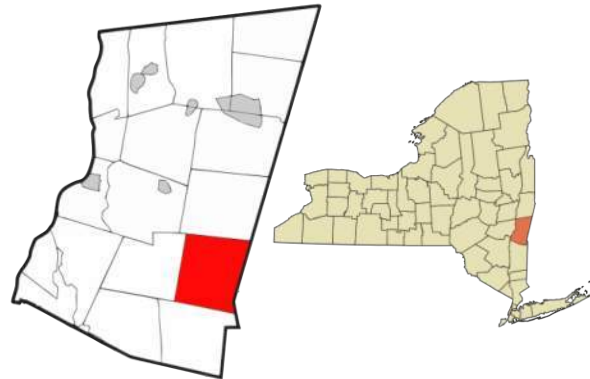
### **Town of Copake Downtown Revitalization Initiative Proposal (2021)**

The Town of Copake Downtown Revitalization Initiative proposal is a document submitted by the Town to New York State's Downtown Revitalization Initiative (DRI) which is part of the state's economic development program. This document outlines several foundation projects that would help to revitalize the downtown area in the Town of Copake. One of the foundation projects listed in the plan is the Water and Wastewater Implementation Plan which consists of conducting a feasibility study to determine the best solution for Copake and then implementing the recommended plan for wastewater infrastructure.

## **1.3 Site Information**

### **1.3.1 Location & Population Trends**

The Town of Copake is in the South-East part of Columbia County, New York. The hamlet of Copake lies approximately in the South Central part of the Town. Route 7A and Main Street pass through the center of the hamlet of Copake and form the main intersection where many of the businesses are located. Route 22 borders the East side of the hamlet. Two small waterbodies lie north of the hamlet of Copake including Robinson Pond and Shaver Pond. The hamlet is approximately 0.8 square miles according to the United States Census Bureau designated place.



**FIGURE 1.1**  
Town of Copake, New York

The Town of Copake had a total population of 3,615 at the time of the 2010 census which decreased to 3,346 according to the 2020 census. The American Community Survey (ACS) 2019 ACS 5-year estimate data shows a population of 257 for the Copake census designated place (CDP) which closely matches the hamlet delineation. Thus, using the 2020 and 2019 estimate census data, the hamlet represents approximately 8% of the Town population.

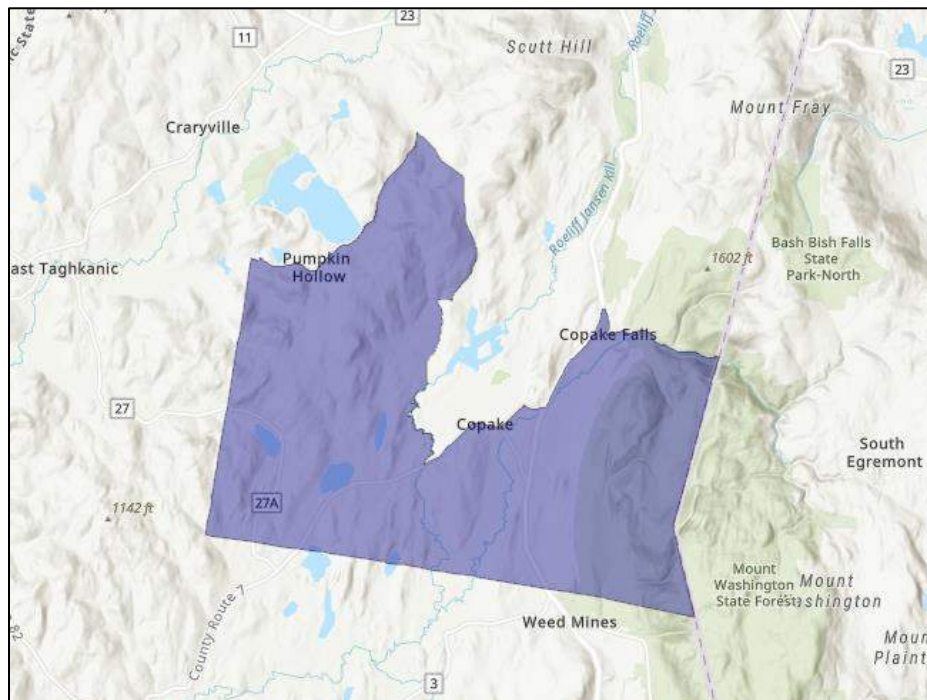
While there are no formal population projections for the hamlet of Copake, the ACS population estimates between 2017 and 2019 for the hamlet have, for the most part, remained the same. As discussed in Sections 2 and 3 of this report, the primary focus area for this project is the business area in the center of the hamlet. There is limited room for residential growth in this area and thus over the 20-year planning period the population in the hamlet is expected to remain relatively stable.

### 1.3.2 Environmental Justice Areas

The portion of the Town of Copake south of County Rd 7A is identified as a potential environmental justice area (PEJA) by the New York State Department of Environmental Conservation (NYSDEC) info locator mapping tool presented in Figure 1.2 (purple shading). This map is based on U.S. census block groups that had populations that met or exceeded at least one of the following statistical thresholds:

1. At least 52.42% of the population in an urban area reported themselves to be members of minority groups; or
2. At least 26.28% of the population in a rural area reported themselves to be members of minority groups; or
3. At least 22.82% of the population in an urban or rural area had household incomes below the federal poverty level.

According to the tool, the percentage of the census block group who reported themselves as a minority population is 9.56% and the percentage below the poverty level is 34.29%. Therefore, this portion of Copake is considered a PEJA since more than 22.82% of the population in the rural area reported having household incomes lower than the federal poverty level. The percentage of the population that are members of minority groups (9.56%) is less than the statistical threshold (26.28%).



**FIGURE 1.2**

Town of Copake Potential Environmental Justice Areas

### 1.3.3 Hardship Financing Eligibility

The Clean Water State Revolving Fund (CWSRF) loan program can provide either low-interest or interest-free loans for project financing. To qualify for interest-free loans, called hardship financing, the community must:

- Have a population less than 300,000
- Have a Medium Household Income (MHI) as defined by the U.S. Census Bureau's 2019 American Community Survey data less than 80% of the regionally adjusted MHI
- Not exceed \$20M of hardship financing
- Be in pursuit of a municipally-owned wastewater treatment works project, which is environmentally significant and scores above the Hardship Subsidy Line

The regionally adjusted MHI for Columbia County (Upstate) is \$68,486; 80% of this is \$54,789. The Copake CDP 2020 MHI is \$97,237 (2019 data is unavailable). Considering the MHI is higher than 80% of the County regionally adjusted MHI, Copake will not meet the municipal hardship financing criteria. However, projects that do not meet the municipal criteria listed above may be eligible for hardship financing when at least 50% of the project cost and/or scope serves, protects, and benefits the residents of a PEJA. Given the delineation of the proposed sewer district (discussed later in the report) and the PEJA delineation discussed in the section above, Copake may qualify for other financing opportunities.

#### **1.3.4 Geologic & Topographic Conditions**

The hamlet is composed mainly of loam soils of one main soil type identified as Blasdel channery loam. Blasdel channery loam was formed by channery loamy glaciofluvial deposits derived mainly from local acid shale bedrock and consists of very deep, well drained soils. The areas where these soils are found are level to moderately steep areas and are located on terraces, alluvial fans and valley trains with slope ranges of 0 to 35 percent. The capacity of the most limiting layer to transmit water is high and the depth to the water table is reported as more than 80 inches according to the Natural Resources Conservation Service (NRCS) soil report for the area.

The Blasdel channery loam soils are categorized in Hydrologic Soil Group (HSG) Type A. HSG Type A soils are defined as sand, loamy sand, or sandy loam type soils that have low runoff potential and high infiltration rates even when thoroughly wetted. They consist chiefly of deep, well to excessively drained sands or gravels and have a high rate of water transmission. Figure 1.3 shows the soil types around the hamlet. Figure A.2 identifies all soil types around the hamlet as well as those with reported depth to bedrock of less than 4 feet and depth to the water table of less than 4 feet as reported by the NRCS.



**FIGURE 1.3**  
Hamlet of Copake Soil Map

Copake is composed of mainly recent deposits and outwash sand and gravel. Recent deposits are generally confined to floodplains within a valley and are subject to frequent flooding. Outwash sand and gravel is coarse to fine gravel with sand that is generally finer textured away from ice border and varies in thickness, generally around 2-20 meters. Bedrock that is exposed or generally within 1 meter of the surface is found north of the hamlet. Till also surrounds Copake which is of variable texture including clay, silt-clay and boulder clay. The till is relatively impermeable and is comprised of variable clast content ranging from abundant well-rounded diverse lithologies in valley tills to relatively angular, more limited lithologies in upland tills. A brief description of each of the primary soil types found in the hamlet is below:

**BIA** – Blasdell channery loams consist of well drained soils formed in glaciofluvial deposits derived mainly from local acid shale bedrock. They are found on alluvial fans and terraces. The capacity of the most limiting layer to transmit water is high and the depth to the water table is reported as more than 80 inches. The depth to a restrictive layer is also reported as more than 80 inches.

**Om** – Occum loam consists of well drained soils formed in loamy over sandy alluvium. The soil profile consists of loam and stratified very gravelly sand. They are found in flood plains and summits. The capacity of the most limiting layer to transmit water is moderately high to high and the depth to the water table is reported as about 48 to 72 inches.



Fr – Fredon silt loam consists of poorly drained soils formed from glaciofluvial deposits. The soil profile consists of sandy loam and gravelly loamy sand. They are found in depressions. The capacity of the most limiting layer to transmit water is moderately high to high and the depth to the water table is reported as about 0 to 12 inches. The depth to restrictive feature is more than 80 inches.

Ln – Limerick silt loam consists of poorly drained soil formed in alluvium that is dominantly silt and very fine sand. They are found in flood plains. The capacity of the most limiting layer to transmit water is moderately high to high and the depth to the water table is about 0 to 18 inches. The depth to restrictive layer is more than 80 inches.

Lo – Linlithgo silt loam consists of somewhat poorly drained soil formed in loamy alluvium over sandy and gravelly water-sorted deposits. They are found in flood plains. The depth to restrictive feature is more than 80 inches and the capacity of the most limiting layer to transmit water is moderately high to high. The depth to the water table is about 6 to 18 inches.

NbE – Nassau channery silt loam, steep, very rocky consist of somewhat excessively drained soil formed from mainly local slate or shale. The soil profile consists of silt loam and unweathered bedrock. They are found on till plains, ridges and benches. The depth to restrictive feature is 10 to 20 inches to lithic bedrock. The capacity to the most limiting layer to transmit water is very low to moderately high. The depth to the water table is more than 80 inches.

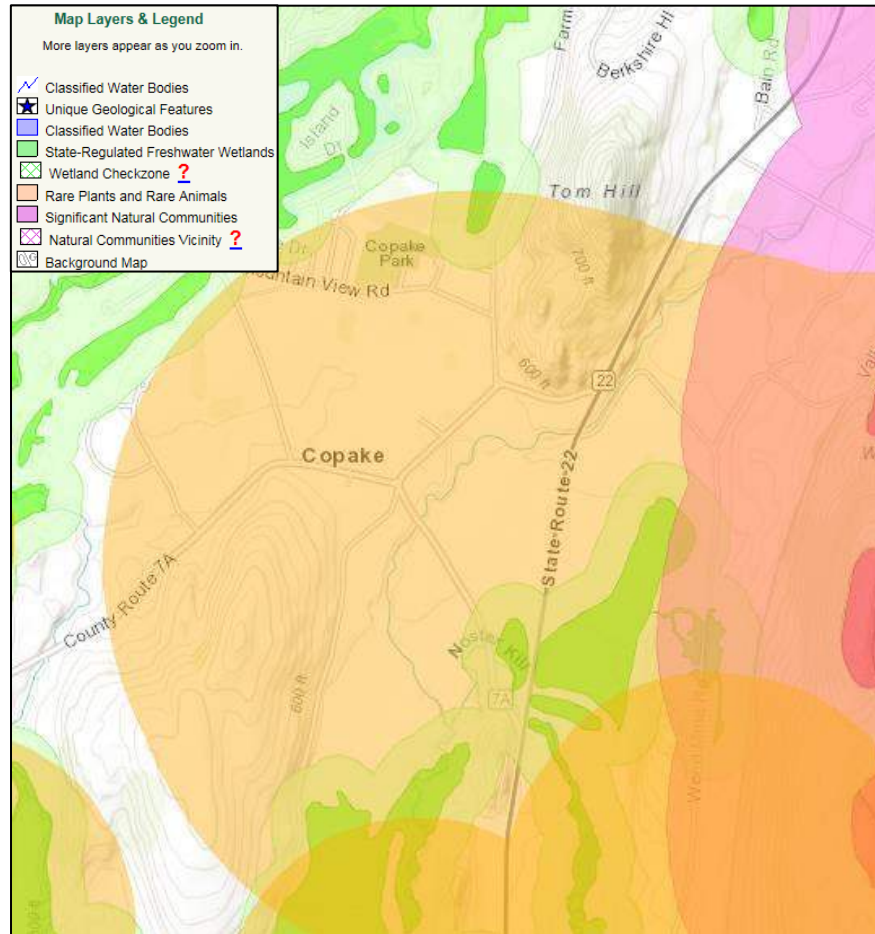
StC and StD – Stockbridge silt loam are well drained soils formed from calcareous loamy till. They are found in till pains, hills and drumlinoid ridges. The depth to restrictive feature is more than 80 inches. The capacity of the most limiting layer to transmit water is moderately low to moderately high and the depth to the water table is more than 80 inches.

NcA – Natchuag muck is very poorly drained soil formed from highly decomposed organic material. They are found in depressions. The depth to a restrictive feature is more than 80 inches. The capacity of the most limiting layer to transmit water is moderately low to high and the depth to the water table is about 0 to 6 inches.

The topography in most of the hamlet and throughout the more densely populated areas in the center of Copake is mostly level with a few rolling hills. The topography rises to the southwest of the hamlet and to the northeast of the hamlet center to an area called Tom Hill. Figure A.3 shows the topography around the hamlet.

### **1.3.5 Environmental Resources & Floodplain**

The hamlet was found to be within the New York State Department of Environmental Conservation (NYSDEC) rare plants and rare animals check zone as shown on their Environmental Resource Mapping tool, Figure 1.4, below. The locations shown in the Environmental Resource Mapper Rare Plants and Rare Animals layer are not precise locations. Rather, they show those generalized areas where New York Natural Heritage has information in its databases regarding rare animals and/or rare plants. These generalized areas show the vicinity of actual, confirmed observations and collections of rare animals and rare plants. The precise locations are not provided by this tool.



**FIGURE 1.4**  
Environmental Resources in the Vicinity of Copake

The natural communities within the vicinity of Copake are noted as an Appalachian oak-hickory forest, a Hemlock-northern hardwood forest, and a Chestnut oak forest at Alander Mountain. These natural communities are all located to the east of the hamlet.

As shown on Figure 1.4, there are NYSDEC regulated freshwater wetlands to the north and south of the hamlet center. Figure A.4 in Appendix A also identifies the U.S. Fish and Wildlife National Wetlands Inventory (NWI) wetlands around Copake; much of which overlap with the NYSDEC regulated wetlands shown on Figure 1.4.

The Bash Bish Brook and Roeliff Jansen Kill are both Class C water bodies that flow through Copake that can support trout spawning and fisheries. Robinson Pond is located north of the hamlet of Copake and can support fisheries. There are a few small, unnamed tributaries in Copake that feed each of these water bodies.

The 100-year flood zone as delineated by the Federal Emergency Management Agency (FEMA) are shown on Figure A.4. The mapped flood zones follow the Roeliff Jansen Kill and Bash Bish Brook. As shown on Figure A.4, the Bash Bish Brook flood zone is wide spread and portions of the hamlet are within the 100-year flood zone.

### 1.3.6 Land Use/Zoning

The Town of Copake has adopted zoning laws that were most recently updated in July of 2018. The Town has 8 zoning categories, two of which are hamlet districts and two others within the study area. The four zoning categories which are relevant to the study area are summarized below:

#### Hamlet (H)

- The Hamlet zoning district is meant to promote higher-density, hamlet-scale residential uses on smaller lots. A further purpose is to allow for cultural events and uses that promote a sense of place and community. The Hamlet District supports continuation of a network of interconnected streets and blocks. The minimum lot size required in the hamlet district is dependent upon whether public waste treatment (sewer) facilities are present.

#### Hamlet Business (HB)

- The Hamlet Business zoning district is meant to allow for and promote smaller-scale business, commercial, retail and service uses compatible with a main street setting. A further purpose is to allow for community, government, and cultural uses. This district is the prime retail, service and cultural area within the hamlet that is designed to support residents and visitors.

#### Agriculture and Rural Residential (RU)

- The Agriculture and Rural Residential zoning district is meant to protect the Town's rural atmosphere, open spaces, agricultural land uses and its environment. The Agriculture and Rural Residential zoning district also allows agriculture, agri-businesses, low density residential uses, home occupations, and other low intensity uses.

#### Highway Business (HWB)

- The Highway Business zoning district is meant to allow for a mix of residential and small to moderate scale business use.

The zoning districts surrounding the hamlet of Copake are shown in Appendix B.

## 1.4 Community Engagement

The Town of Copake has taken several steps to engage the community regarding the implementation and feasibility of a new sewer district. Below is a timeline which illustrates the actions already taken, as well as the planned approach to continuously involve the community and encourage civic participation throughout the next phases of the project.

- July 2011 – The Town of Copake Comprehensive Plan was updated and includes a goal to evaluate the need and feasibility for a public sewer system, especially in the hamlet area.
- August 2021 – Town of Copake selects Tighe & Bond to perform the sewer feasibility study.
- October 2021 – Town of Copake met with Tighe & Bond for a kick-off meeting to discuss approaches for the study including coordination of the wastewater survey, compiling of preliminary sewer district delineation ideas, and creation of wastewater flow estimate methodology.

- February 2022 – The Town sent out 138 wastewater surveys to businesses and homeowners in the hamlet area to collect input from community members regarding water and septic issues in the hamlet.
- June 2022 – The Town received and compiled the results of the wastewater survey. Results were shared with Tighe & Bond.
- August 2022 – Tighe & Bond met with Town of Copake to discuss the survey results, preliminary district delineation, flow estimate, potential treatment locations and next steps.
- August 2022 – Tighe & Bond engaged the New York State Department of Environmental Conservation to determine preliminary return limits.
- December 2022 – Tighe & Bond sends draft sewer feasibility report for the Town to review.
- March 2023 – Tighe & Bond incorporates the Town’s feedback on the draft report and develops the final report.
- Planned – the Town of Copake will share the results of this report with the community.

## 1.5 Need for Project

As discussed, the Town of Copake recognized the need to perform a feasibility study for a centralized sewer system for the hamlet over a decade ago. The hamlet does not currently have a public wastewater collection or treatment system although there is relatively dense development in the hamlet. Most parcels in the hamlet are served by individual subsurface septic tanks and leachfields while some may have even older disposal systems such as cesspools according to the results of the recent water condition survey. Some of these older systems are generally regarded as outdated and no longer considered best practices.

The 2011 Town of Copake comprehensive plan lists the feasibility study as an important step to determine the need for wastewater service. A central sewer system would make it easier and more attractive for businesses to expand and would allow lot sizes to be smaller in the sewer district which would allow for greater density and number of businesses. It would also allow for mixed-uses such as apartments to be built above storefronts which would otherwise be futile for certain parcels without providing a public wastewater system as the smaller lots are unable to support the larger flow demands of mixed-use buildings.

A central sewer system could provide several benefits to Copake, including:

- Replace outdated or failing septic systems
- Allow existing businesses to reach their full capacity
- Encourage additional growth and new businesses in the hamlet
- Allow for multi-use buildings
- Provide environmental protection by replacing failing or outdated septic systems
- Promote sustainable community development that benefits all town residents
- Encourage capital investments in-Town



## **Section 2**

# **Wastewater Needs Analysis**

The first task of this study is to perform a wastewater needs analysis. The objective of the wastewater needs analysis is to determine which parcels need or would benefit the most from wastewater service. This evaluation considered several items during the wastewater analysis including responses to the recent water condition survey, site conditions, zoning, and potential impacts to comprehensive plan goals.

### **2.1 Water Condition Survey**

Questionnaire surveys were mailed by the Town of Copake to 136 homeowners and business owners in the hamlet. The surveys requested information about the homeowner's property, their onsite wastewater disposal system, their well, stormwater issues, and related property information. The survey was intended to evaluate homeowners' and business owner's experiences and the perceived need for water or wastewater infrastructure in the hamlet. The survey asked if they have problems with their existing septic system, if the expansion or function of their property has been affected by water or wastewater issues, and what they think the Town should be doing to improve water or septic issues in the Hamlet. In addition, the survey inquired about groundwater conditions in basements to collect information about areas with groundwater problems, which can lead to failing wastewater systems.

A copy of the waster condition survey, cover letter, and summary table of all responses is included in Appendix C. A total of 62 surveys were returned, representing a 46% overall response rate. Of the 62 responses, 46 were residential (74%), 10 were commercial (16%), 5 were vacant lots (8%), and 1 was farmland (2%).

Only three (3) of the respondents reported issues with their existing septic systems including one homeowner who reported issues with their toilet backing up during flooding events, one who reported issues with their field becoming flooded, and one who reported odor issues. The remaining respondents did not report any problems with their wastewater disposal system (53) or did not answer the question (6). Figure A.5 shows the parcels where septic issues were reported. Of the three respondents that cited septic problems, 2 were residential use properties near Fire Pond and one was a commercial use property.

A total of 28 respondents reported having problems with water in their basements, 31 respondents did not have problems with water in their basements, and 3 respondents did not respond to the question. A total of 32 respondents reported that they have sump pumps in their basement while 25 reported not having a sump pump in their basement and 5 did not respond to the question. Of those with sump pumps, responses ranged from continuous use of sump pump to never using or very occasionally using the sump pump. Sump pumps in basements can be an indication of a high groundwater table. The location of those that reported issues with flooding are shown on Figure A.6.

As indicated by the survey results, there appears to be a high groundwater table in hamlet. Many of the survey respondents provided comments regarding flooding and stormwater issues in the Town. Several of the comments were specifically about flooding issues associated with Fire Pond. The stormwater issues surrounding Fire Pond may be causing the septic issues with the two parcels that reported issues adjacent to Fire Pond.

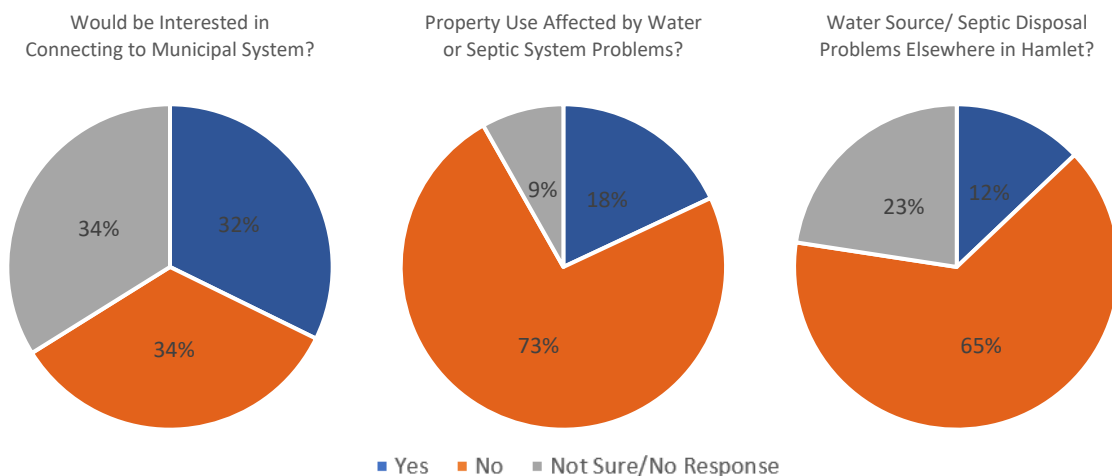
The survey asked for general comments and what they think the Town should be doing to improve water or septic issues in the Hamlet. The responses varied in opinion, and while a few comments were supportive of a municipal water or sewer system, there were more respondents who were against a central wastewater system. Below is a comment from a survey respondent not in favor of a central water or sewer system for Copake.

*"No improvements needed for septic. Drainage is needed for stormwater. Drainage in the Hamlet center is needed due to big puddles of water. Municipal water and sewer are absolutely not needed. Every tax payer already has their own system, and a municipal system would be an unfair additional tax burden."*

In general, many respondents expressed concern whether a municipal system is really needed for Copake and with the potential cost of the system. This is reflected in the statistics of the question which asked, "Are you aware of any water source problems or septic disposal problems elsewhere in the hamlet?" The results of this question were that 12% said yes, 65% said no, and 23% said they were not sure or did not respond to the question. The responses to this question suggest while some residents/business owners know of or have heard of septic issues in the Town, most respondents had no perceived concerns.

Respondents were asked if the use of their property, or the function, expansion or capability of their business has been affected by water problems or septic limitations. 18% of respondents reported their property use had been affected, 73% responded their property use had not been affected, and 9% did not respond or did not know. Once again, most respondents do not seem to be affected by water problems or septic limitations.

When asked if they would be interested in connecting to a municipal water or wastewater system, 32% said yes, 34% said no, and 34% said they were not sure or did not respond to the question. The breakdown of those interested in connecting to a municipal water system versus those interested in connecting to a municipal wastewater system is not available. The responses to the three questions mentioned above are shown graphically in Figure 2.1. Figure A.7 in Appendix A shows the respondents who would be interested in connecting to a municipal water or wastewater system.



**FIGURE 2.1**  
Responses to Water Condition Survey Questions

The overall indication that the water condition survey results provide is that:

- There are a few isolated issues with existing wastewater systems, but generally most septic systems are functioning properly according to survey respondents
- Property use has generally not been affected by the lack of municipal water or wastewater systems
- There are indications of high groundwater levels and localized flooding issues in the Town, especially surrounding Fire Pond
- Many respondents are more concerned with addressing stormwater issues than they are with drinking water or wastewater issues

## **2.2 Site Conditions**

Several site conditions can contribute to poor wastewater disposal systems, including:

- Poor Soil Conditions
- Shallow Depth to Groundwater
- Shallow Depth to Bedrock
- Parcel Size
- Parcel Density

### **Poor Soil Conditions**

When soils are 'tight' and have percolation rates greater than 60 minutes/inch, wastewater disposal fields are much more likely to fail and create surface ponding or clogging problems. As discussed in Section 1.3.4, the soils in the hamlet are mostly Blasdel channery or Occum loam soils which are expected to be well drained and thus are not likely to have excessive percolation rates.

These soils should be appropriate for wastewater disposal adsorption fields as long as percolation rates are in accordance with New York State Department of Health (NYS DOH) Standards,

The parcels in the southern portion of the study area running along Columbia County Route 7A are in Linlithgo silt loam which is characterized by somewhat poorly drained soil. Otherwise, there are no large groups of parcels that appear to be significantly affected by poor soils around the hamlet center. The soil types for the study area are shown in Appendix A, Figure A.2.

### **High Groundwater or Shallow Bedrock**

The vertical separation to seasonal high ground water is an important requirement in siting subsurface disposal systems. A minimum separation of 4 feet from the bottom of the absorption field to the seasonal high groundwater level is required by the New York State Department of Health Standards for Individual Onsite Water Supply and Individual Onsite Wastewater Treatment System (Appendix 75A). Nearly the entire hamlet center area is expected to have groundwater levels less than 4 feet below grade as reported by the NRCS.

In addition to ground water levels, the vertical separation to a restrictive layer such as bedrock is an important requirement in siting subsurface disposal systems. A minimum depth to a restrictive layer of 4 feet is required per Appendix 75A. According to the NRCS soil maps, the only area where depth to bedrock is expected to be less than 4 feet is the hill to the west of Empire Road.

Appendix A, Figure A.2 identifies all soil types around the hamlet as well as those with reported depth to bedrock of less than 4 feet and depth to the water table of less than 4 feet as reported by the NRCS.

### Parcel Size and Density

To provide adequate space for a septic tank, soil adsorption system, and reserve area, as well as sufficient room for a building and setback requirements, a minimum lot size is typically required.

In the hamlet, separation distances between the septic tanks and absorption fields from dwellings, property lines, water bodies and wells need to be considered. However, parcels less than 0.5 acres may have difficulty conforming to the Appendix 75A and Zoning Code of the Town of Copake. The Appendix 75A and Town Zoning Code requirements include:

- |   |          |
|---|----------|
| • Minimum distance from septic tank to well               | 100 feet |
| • Minimum distance from septic tank to water body         | 150 feet |
| • Minimum distance from septic tank to dwelling           | 10 feet  |
| • Minimum distance from septic tank to property line      | 10 feet  |
| • Minimum distance from absorption field to building      | 20 feet  |
| • Minimum distance from absorption field to water body    | 150 feet |
| • Minimum distance from absorption field to property line | 10 feet  |
| • Minimum distance from absorption field to well          | 100 feet |

For some parcels in the hamlet, the building takes up a significant portion of the parcel, leaving very little area for an adequate wastewater disposal system. Appendix A, Figure A.8 shows the parcels in the hamlet which are less than 0.25 acres and parcels that are between 0.25 and 0.5 acres. As shown in Figure A.8, there are some parcels in the hamlet that are less than 0.5 acres. Most of the parcels around the main intersection are less than 0.5 acres in size.

Parcel size is typically related to parcel density. Highly developed areas usually have small lot sizes spaced closely together. These areas are not well suited for onsite disposal systems simply due to limited space. The greatest parcel density in the hamlet is in the Hamlet Business area around the main intersection.

## 2.3 Zoning & Comprehensive Plan

The land use and zoning districts in the hamlet were discussed in Section 1.3.6. The Town of Copake Density Control Schedule already has minimum lot size requirements for lots with a connection to a central sewer system versus lots which are not served by a central sewer system. The Hamlet-Business district contains the businesses in the Hamlet Center and overlaps with many of the small parcels shown in Appendix A, Figure A.8.



The schedule of use regulations in the 2018 Zoning Code of the Town of Copake prohibits the use of parcels in the Hamlet Zone for public utility structures. Public utilities structures and buildings are allowed in the Agriculture and Rural Residential zoning districts through a special use permit approval by the Zoning Board of Appeals and site plan approval.

The Comprehensive Plan provides the following vision for the Town of Copake:

- A close & lively community
- Thriving farms
- Healthy natural environment
- Scenic rural landscape
- Thriving economy
- Well maintained infrastructure
- Attractive Community with Character
- Effective and efficient Town government
- Quality housing for all residents
- Skillful management of land and resources

In review of the Comprehensive Plan, wastewater disposal improvements are believed to impact the above items in the following manner, as discussed in Table 2.1:

**TABLE 2.1**

Comprehensive Plan Vision & Wastewater System Impacts

Item	Potential Wastewater System Impacts
Close & Lively Community	Municipal wastewater service may permit increased housing density and greater economic development in the Town Center which may prompt Copake to be more of a "close" and "lively" community
Thriving Farms	A wastewater system in the hamlet is not expected to directly impact agriculture or open space with proper delineation, but may provide increased opportunity for local produce sales if there are more people visiting the area
Healthy Natural Environment	Failing or flooded septic systems have negative impacts on surface and ground water quality. A well maintained municipal wastewater system could replace failing wastewater systems and therefore increase the health of the natural environment
Scenic Rural Landscape	A central wastewater system serving the hamlet should not impact the rural character. A properly delineated wastewater district will encourage commercial growth in areas served by the system and discourage commercial growth in the rural areas of the Town

**TABLE 2.1**

Comprehensive Plan Vision &amp; Wastewater System Impacts

Item	Potential Wastewater System Impacts
Thriving Economy	A municipal wastewater system would make it easier and more attractive for businesses to expand and encourage capital investment in the sewer district
Well Maintained Infrastructure	A new central wastewater system will address existing on-site wastewater systems that are beyond their service life. A central wastewater system would have dedicated and professional staff to operate and maintain the system
Attractive Community with Character	A wastewater treatment system may encourage capital investment in the Town Center which could make the community more attractive
Effective & Efficient Town Government	A wastewater treatment system in the hamlet is not expected to impact the efficiency of the Town Government
Quality Housing for All Residents	A centralized wastewater system could allow for additional housing opportunities in the sewer district
Skillful Management of Land and Resources	As stated, a wastewater treatment system is expected to have positive impacts for supporting the Hamlet Center by allowing existing businesses to expand to their full potential and encourage new businesses to come to the Hamlet Center while discouraging this growth in primarily rural areas. This is in line with the comprehensive plan goals and would be considered skillful management of resources

## 2.4 Summary

There is a high level of divergence in perceived need and theoretical need for wastewater service in the study area. While more than a decade old, the comprehensive plan sited community growth as a main driver for consideration of a municipal wastewater system but did not provide strong critique of existing individual systems with exception of those on bodies of water which were not included in this study area. In the section on infrastructure the comprehensive plan notes: Copake does not operate a public water or sewer system and, for the most part, these facilities are not available in many other rural areas in Columbia County. The comprehensive plan therefore recognizes that the area will rely upon private wells and septic systems for some time into the future.

The recent survey data indicates a very low level of perceived need, with only three parcels indicating problems, which appear to be related to flooding concerns, and only slightly more indicating awareness of septic problems elsewhere in the community.

However, the desktop analysis of site conditions provides a contrasting need, with nearly the entire hamlet center expected to have high groundwater and with many parcels too small to have a compliant on-site sewer system including insufficient set-back distances, flood prone parcels, and those with poor soils and/or high groundwater.

Although there appears to be little perceived need, a municipal wastewater system generally does support the many community goals presented in the comprehensive plan as discussed in Section 2.3.

To put the needs analysis in context and provide opportunity for a cost versus benefit assessment, this report continues to sewer service area delineation, flow development, and conceptual collection and treatment system recommendations and costs, so the financial impact of a potential system can be established.

## **Section 3**

### **Sewer District Delineation**

The second task of this evaluation is to delineate a sewer district. Parcels that have failing septic systems, small lot sizes, site constraints such as high groundwater, or fall into a specific zoning district may be well suited for inclusion in a sewer district. Intelligent district delineation is imperative to ensure that all parcels which need to be included are captured, and that parcels which do have enough space for an on-site septic system are not included and thus they do not bear any unnecessary expense. This evaluation considered all the items discussed in Section 2 to determine the correct delineation of a sewer district, including:

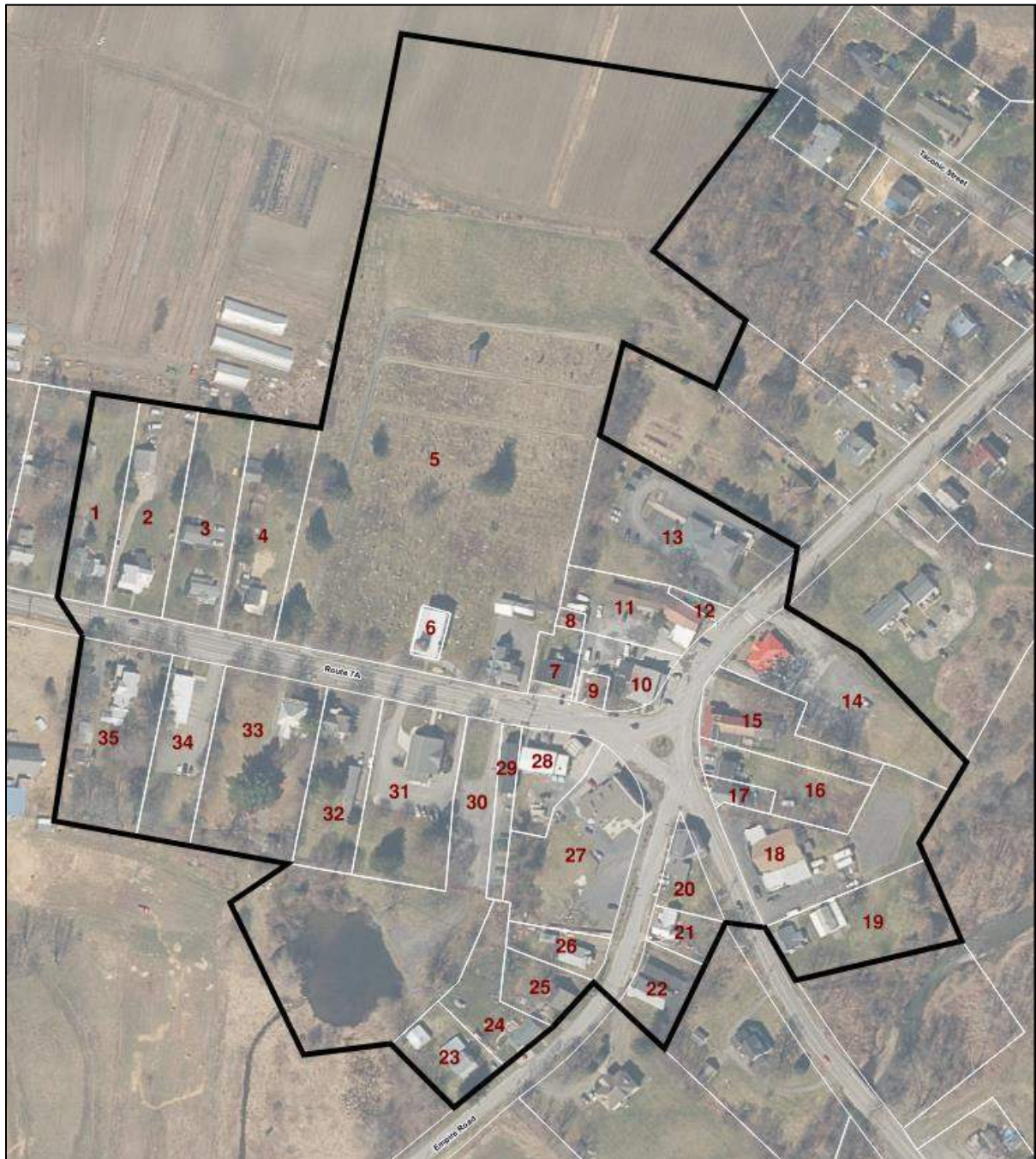
- Responses of the water condition survey
- Evaluation of site conditions that may indicate constraints to individual onsite wastewater disposal systems including soil type, shallow depth to groundwater or bedrock, parcel size, and parcel density
- Assessment of existing land use and zoning districts
- Review of comprehensive plan goals and priorities which may impact the need for wastewater treatment improvements
- Input from AWC regarding specific parcels

#### **3.1 Proposed Sewer District**

Considering the water condition survey responses, local site conditions, the zoning districts, and comprehensive plans goals; it is recommended that the proposed sewer district serve 35 parcels centered around the hamlet center. This delineation is recommended for the following reasons:

1. There are isolated issues with existing septic systems in the center of the hamlet
2. There is evidence of flooding in the center of the hamlet including the parcels surrounding Fire Pond
3. The hamlet reportedly has high groundwater levels which can negatively impact the effectiveness of conventional septic system and leachfield systems
4. The smallest parcels are in this area and small parcels present challenges for onsite wastewater disposal
5. This area is within the Hamlet Business zoning district where most businesses are located, and businesses are most likely to benefit from a wastewater system
6. A central sewer district serving the hamlet center will help achieve the goals of the Town of Copake comprehensive plan

A meeting with board members from the Town of Copake was held to discuss the sewer district delineation. The district is centered on the hamlet center and was expanded in each direction to capture parcels that were within a reasonable distance from the Hamlet Center and who reported existing septic issues or responded that they were interested in connecting to a water or sewer system. Figure 3.1 show the proposed sewer district.



**FIGURE 3.1**  
Proposed Sewer District

A summary of the sewer district delineation decisions are as follows:

- The district was extended to the west along County Route 7A to Parcel No. 1 and Parcel No. 35 whose owners indicated that they were interested in connecting to a municipal water or wastewater system and reported basement flooding issues.

- The district was extended south along Empire Road to Parcel No. 23 whose owner reported flooding issues, septic issues, and that they would be interested in connecting to a municipal water or wastewater system. Other parcel owners along Empire Road also reported similar issues or desire to connect to a municipal system.
- The district was extended north along Main Street to Parcel No. 13 whose owner responded that they would be interested in connecting to a municipal system and Parcel 14 whose owner responded that they experience issues with their septic system.
- The district was extended east to encapsulate the parcels between Main Street and County Road 7A that either responded to the survey stating they were interested in connecting or are small parcels and are in an area expected to have high groundwater
- Other parcels within the proposed district were included because of their current business usage or to form a contiguous district delineation

There are a few parcels which were included in the district delineation that did not respond to the wastewater survey or said that they were not interested in connecting to the sewer district. They were included because they must connect to the sewer system per NYS DOH requirements if sewer service is available. Sewer service would be available since sewer mains would be installed past the parcels to serve the parcels which were interested in connecting to the district.

Note that the proposed sewer district shown in Figure 3.1 does not include the parcels for the proposed recovery system and return system. Refer to Section 5 for discussion of the recovery system and return location. The treatment system parcel will be included in the final sewer district delineation.

There are a total of 35 parcels in the proposed sewer district. Of the 35 parcels, 14 are residential, 20 are commercial, and 1 is vacant.

## Section 4 Design Parameters

### 4.1 Flow Estimates

Historical water meter data for the Town of Copake was not available since there is no public drinking water supply system. Therefore, the flow for each parcel was calculated based on the 2014 New York State Design Standards for Intermediate Sized Wastewater Treatment Systems Typical Per-Unit Hydraulic Loading Rates (Table B-3) and parcel information obtained from the Columbia County Parcel Access system and provided by the Town. In Tighe & Bond's experience, the flow estimates that are calculated using this method are generally found to be conservative.

Using the flow estimate methodology discussed above, the total average day flow for the proposed sewer district was determined to be 17,600 gallons per day (gpd). A 15% factor has been applied to the base flow to account for future expansion and growth within the sewer district. Therefore, the total average day design flow for the proposed sewer district is **21,000 gpd**. Table 4.1 provides a summary of the average day design flow for the proposed sewer district.

**TABLE 4.1**

Copake Sewer District Design Flow

<b>Contribution</b>	<b>Flow (gpd)</b>
Base Design Flow	17,600
Future Expansion (15%)	2,700
<b>Average Day Design Flow</b>	<b>21,000</b>

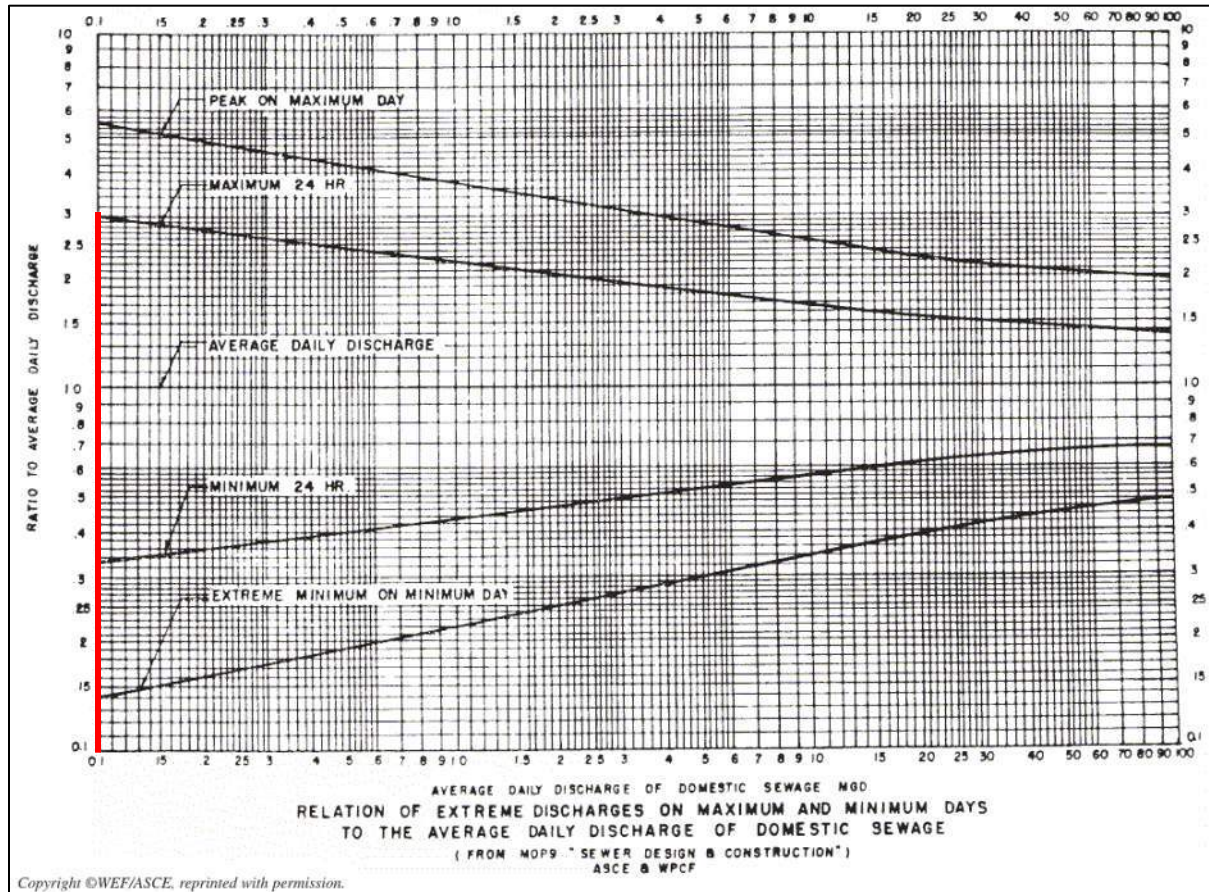
A table showing the estimated average day wastewater flows from each parcel is provided in Appendix E.

### Peak Flow Considerations

Several peak flows should also be considered when discussing the design flows of water resource recovery systems including the anticipated peak daily flow and the anticipated peak hourly flow. Since daily flow meter data is unavailable, Figure 4.1 provides the American Society of Civil Engineers (ASCE) Manual of Practice No. 9 Sewer Design and Construction (MOP 9) daily peaking factor curves taken from TR-16 Guides for the Design of Wastewater Treatment Works. Using the estimated average daily flow for the proposed sewer district of 21,000 gpd produces a maximum day peaking factor of approximately 3.0, which results in a peak daily flow of 63,000 gpd for the proposed sewer district.

It should be noted that, in accordance with TR-16, this method for estimating peak daily flows is primarily for residential areas and that commercial, institutional, and industrial flows will generally have a different, lower peaking factor, depending on locations in a system and hours of operation. Thus, since the proposed sewer district is largely commercial, this peak daily flow estimate is likely conservative.

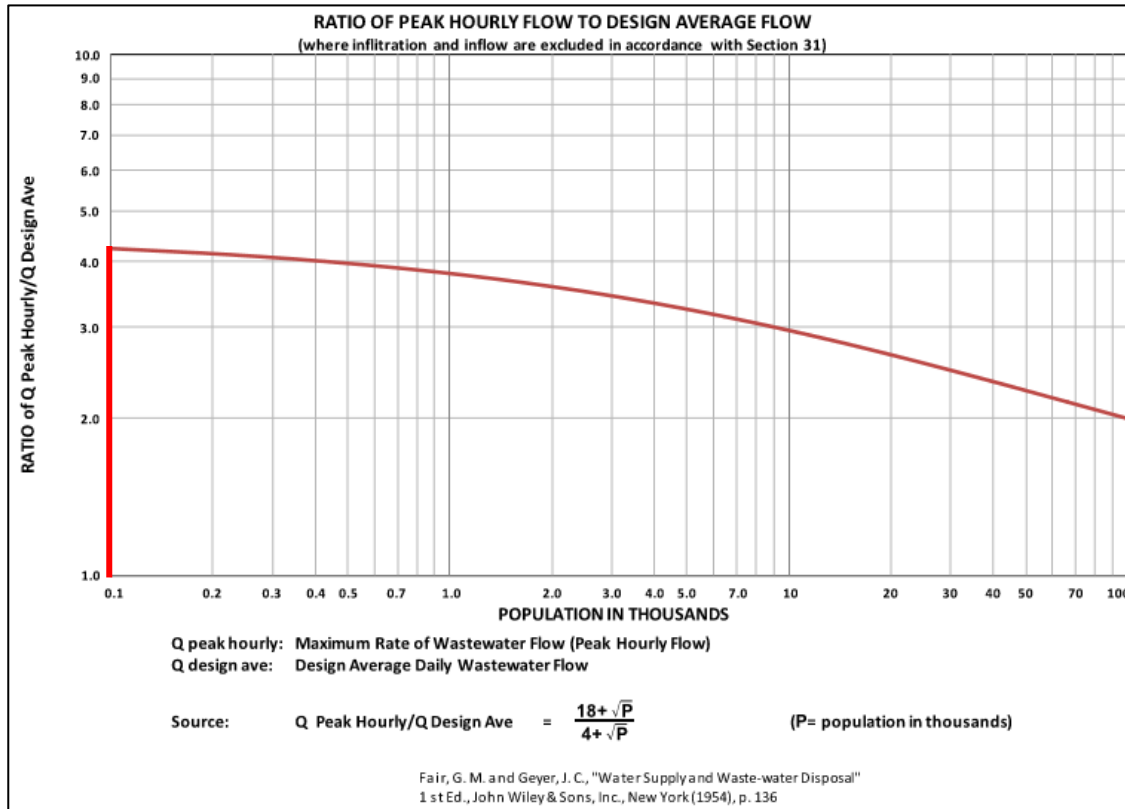




**FIGURE 4.1**  
MOP 9 Daily Peaking Factor Calculation

Figure 4.2 shows the 10 States Standards (10 SS) peak hour peaking factor computational methodology. Assuming the proposed sewer district serves 20% of the hamlet population based on the number of parcels in the proposed district compared to the number of total households in the hamlet, the peak hour peaking factor is 4.2. Applying the total estimated average daily flow for the proposed sewer district of 21,000 gpd produces a peak hourly flow of up to 88,200 gpd. Note that as the service area increases, the peaking factor is predicted to decrease. In accordance with 10 SS, the peaking factor and resulting peak hourly flow account for normal inflow and infiltration (I&I) for systems built with modern construction techniques.

It should be noted that this method is also intended for estimating flows from residential areas and that it may be conservative for estimating peak hourly flows from service areas that have many commercial users.

**FIGURE 4.2**

Ten States Standards Peak Hour Factor Calculation

A summary of the anticipated design flows for the proposed sewer district is provided in Table 4.2.

**TABLE 4.2**

Anticipated Design Flows

Average Daily Flow (gpd)	21,000
Peak Daily Flow (gpd)	63,000
Peak Hourly Flow (gpd)	88,200

**4.1.1 Future Flows**

The design wastewater constituents should be based upon the sewer district at its full potential. Additional residential and commercial development and high demand businesses such as restaurants in the sewer district may increase the daily average flows. For this application, a 15% factor has been applied to the base flow to account for future expansion and growth within the sewer district.

Additionally, and although this would be a new system, typical practice also accounts for inflow and infiltration, as well as prohibited flows into the wastewater system. However, in Tighe & Bond's experience, the flow estimates that are calculated using the DEC methodology are generally conservative and therefore, no additional factor of safety has been included.

## 4.2 Influent Loading

Treatment efficiency for small systems is generally characterized by their efficiency at removal of organic constituents and solids. The most commonly used parameter to define the organic strength of municipal wastewater is biochemical oxygen demand (BOD). BOD is the quantity of dissolved oxygen utilized by microorganisms in the aerobic oxidation of organic matter in wastewater over a period of time. The depletion of dissolved oxygen in wastewater is directly related to the amount of organic matter present in the wastewater.

The quantity of solids in wastewater is typically expressed as total suspended solids (TSS). Suspended solids are those removable by filtration or settling. Wastewater may also have quantities of dissolved solids, which require additional treatment for removal.

Another parameter used to gauge the strength of wastewater is nitrogen. Common forms of nitrogen are ammonia, nitrite, and nitrate. Large quantities of nitrogen in wastewater returned to a water body can cause growth of algae. Ammonia is considered a serious water pollutant as it is toxic to fish. Nitrate can easily pass through the soil to the groundwater, where it can accumulate to high levels over time, potentially contaminating drinking water sources.

Typically, a permit for subsurface wastewater return for flows above 1,000 gpd will have limitations set for nitrogen. Individual disposal system absorption fields remove little or no nitrogen from the septic tank effluent. Primary treatment by a traditional septic tank is effective at removing quantities of BOD and TSS and some nitrogen species. Table 4.3 provides typical influent loading concentrations for a conventional water resource recovery system and for an alternative water resource recovery system (septic tank effluent). These influent loading concentrations have been used for the preliminary design.

**TABLE 4.3**

Typical Influent Loading Concentrations

Parameter	Conventional Treatment System	Alternative Treatment System (Septic Tank Effluent)
BOD	350 mg/l	150 mg/L
TSS	400 mg/l	60 mg/L
TKN	300 mg/l	60 mg/L
NH <sub>3</sub> -N	70 mg/l	50 mg/L
FOG	150 mg/l	20 mg/L

## 4.3 Return Limits

The return limits of a new water resource recovery system depend on the type of return system selected. Generally, subsurface return systems do not have as many return limitations as conventional water resource recovery systems returning to a surface water. In New York State, a water resource recovery system returning to a surface water body or to the subsurface at flows over 1,000 gpd is subject to a NYSDEC State Pollutant Discharge Elimination Permit (SPDES).

Tighe & Bond reached out to NYS DEC Region 4 for preliminary return limits for a new system returning to Bash Bish Brook at a flow of 21,000 gpd with a multiport fully submerged cross-channel diffuser. The system would be expected to meet the permit limits summarized in Table 4.4. Note that the ammonia limits below reflect a range of dilution rates (10:1, 5:1, & 1:1).

**TABLE 4.4**

Anticipated Permit Limits for Surface Return

Parameter	Limit	Units	Type
Biological Oxygen Demand (BOD <sub>5</sub> )	30	mg/L	Daily Max
Total Suspended Solids (TSS)	30	mg/L	Daily Max
Settleable Solids	0.1	ml/L	Daily Max
Dissolved Oxygen	7.0	mg/L	As Min
pH	6.5 – 8.5	SU	Range
Ammonia (Summer, Jun 1 –Oct 31)	0.9/4.3/8.6	mg/L	Monthly Average
Total Phosphorus	1.0	mg/L	Daily Max
Temperature	70	°F	Daily Max
Fecal Coliform	200	#/100ml	30-day Geo. Mean
Fecal Coliform	400	#/100ml	7-day Geo. Mean
Total Residual Chlorine (TRC) <sup>1</sup>	0.03	mg/L	Daily Max

<sup>1</sup> If applicable

A new water resource recovery system with a subsurface return and a design flow of 21,000 gpd would be expected to meet the return limits summarized in Table 4.5. There may also be permit limits for ammonia, sodium, fecal coliform, and TRC. However, in our experience with other communities of similar size, these additional limits have not been required for subsurface disposal. NYSDEC does, however, typically require groundwater monitoring for discharges to the subsurface for flows greater than 30,000 gpd with an applicable Nitrite limit (as N) of 10 mg/L. However, since the anticipated average day and future average day flows for Copake are less than 30,000 gpd, groundwater monitoring is not anticipated for Copake.

**TABLE 4.5**

Anticipated Permit Limits for Subsurface Return

Parameter	Limit	Type
pH	6.5 – 8.5	Range
Biological Oxygen Demand (BOD <sub>5</sub> )	30	Monthly Average
Biological Oxygen Demand (BOD <sub>5</sub> )	45	7-Day Average
Settleable Solids	0.1	Daily Max
Total Suspended Solids (TSS)	30	Monthly Average
Total Suspended Solids (TSS)	45	7-Day Average

A pre-SPDES application conference with DEC Region 4 would need to be conducted during the design process to finalize the limits for a surface return or a subsurface return. However, the surface return limits presented in Table 4.4 and the subsurface return limits presented in Table 4.5 have been assumed for the alternative analysis presented herein.

## Section 5

### Resource Recovery/Return Sites

Determining the correct site for a new water resource recovery system and return location can be challenging, especially in areas where there is no vacant land available or where the municipality does not already own property. However, the use of alternative water resource recovery technologies, with their low visual, audio, and odor impact, allow for a much greater number of sites to be considered. This Section discusses the water resource recovery sites that were considered for Copake.

#### 5.1 Initial Parcel Screening

Tighe & Bond and officials from the Town of Copake met to discuss different parcels which may be suitable for a water resource recovery system. Eight parcels were identified that may be suitable. The parcels are shown in Figure A.9. Tighe & Bond completed a desktop analysis of the site conditions for each parcel and the initial notes and concerns from the desktop analysis for each parcel are summarized below in Table 5.1.

**TABLE 5.1**  
Potential Locations and Initial Parcel Screenings

Parcel	Parcel ID No.	Initial Concerns & Notes
1	103200-187.1-1-15	Historic place, size is limiting
2	103200-187.1-1-27	Size is limiting
3	103200-176.-1-60.200	Size is limiting, partially in flood zone
4	103200-187.-1-2.111	Size is limiting, water isolation distances
5	103200-176.3-4-3	Size is limiting, distance from Hamlet
6	103200-176.3-4-48.111	Distance from Hamlet
7	103200-176.-1-78	Distance, active farmland
8	103200-187.-1-3	Flood zone, potential for surface return

As shown in Table 5.1, each parcel has unique concerns or challenges. However, there appear to be a few parcels that may be suitable for a water resources recovery system. Several parcel considerations are generically discussed in the following section.

#### 5.2 Parcel Considerations

The New York State Department of Environmental Conservation outlines considerations in selecting sites for water resource recovery systems to minimize potential adverse impacts. These criteria are important to consider when selecting a water resource recovery system location.

### Separation Distances

Table 5.2 provides the recommended separation distances that should be maintained between treatment facilities and dwellings or property lines to provide some attenuation of airborne nuisances such as aerosols, pathogens, odors, and noise as provided by the NYSDEC *Design Standards for Intermediate Sized Wastewater Treatment Systems, 2014*.

Using Table 5.2 as a guideline, a minimum distance between the nearest downwind dwelling and the treatment system of 200 feet is desirable. Additionally, the treatment system should be a minimum of 150 feet from the property line.

**TABLE 5.2**

Recommended Separation Distances

Treatment Type	Radial Distance to Existing Downwind Dwellings	Distance to Property Line from Treatment Unit
Wastewater Treatment Process Open to the Atmosphere e.g. Open Sand Filter, and Oxidation Ditches	400 feet	350 feet
Wastewater Treatment Processes Enclosed in a Building, and Buried or Covered Sand Filters	200 feet	150 feet
Facultative and Aerated Lagoons	1,000 feet	800 feet
Effluent Recharge Bed	750 feet	550 feet

### Zoning and Other Land Use Restrictions

Parcels appropriate for siting a water resource recovery system are within the Agriculture and Rural Residential zoning district. A review of the Zoning Code of the Town of Copake, Density Control Schedule (updated July 2018), indicates that public utility structures and buildings are allowed in the Agriculture and Rural Residential zoning districts through a special use permit approval by the Zoning Board of Appeals and site plan approval. Our interpretation of a public utility as defined by the Zoning Code of the Town of Copake is that a water resource recovery system would be considered a public utility. Therefore, zoning restrictions for parcels within the Agriculture and Rural Residential zoning district are not expected to be a problem.

### Topography

Sites with slopes greater than 15% are not well suited for treatment systems. Most of the sites close to the hamlet center are relatively flat, and therefore, slope is not expected to be an issue.

### Area for Future Expansion

A larger parcel is preferable to allow for expansion should the sewer district be expanded in the future. Many of the parcels near the hamlet center are relatively small, and therefore, there would be minimal room for future expansion. The larger parcels are more desirable from a future expansion perspective.



**Direction of Prevailing Wind**

Prevailing winds in the Town are generally from the west. However, prevailing wind direction is a more significant consideration for larger traditional wastewater treatment plants with open tanks and sludge and septage processing. It is assumed that odors will be minimal for the proposed treatment technologies and therefore would not be an issue.

**Flood Considerations and Accessibility**

Wastewater treatment systems and disposal areas should be located above the 100-year flood plain. Additionally, the NYSDEC *Design Standards for Wastewater Treatment Works*, requires that all treatment and disposal systems be located to minimize or eliminate flood damage. Parcels within the 100-year flood zone may require additional site work or measures to protect equipment from flooding.

**Geologic Considerations**

The geology of the area is shown on Figure A.2. The soil types and groundwater conditions vary from site to site and additional onsite investigations would be required to confirm the soil conditions. Generally, shallow groundwater is a concern for most of the parcels under consideration but shallow depth to bedrock is not expected to be an issue.

**Protection of Groundwater**

As a regulatory minimum, subsurface disposal systems are required to be located 100 feet from groundwater wells. Well locations need to be considered since residents rely on well water as their source water.

The separation to seasonal high ground water is also an important requirement in siting subsurface disposal systems. A minimum vertical separation distance of 4 feet between the bottom of the disposal trench and the seasonal high groundwater level is required by New York State Department of Health. Areas with suspected high groundwater levels are shown in Figure A.2. As shown, high groundwater is a concern at several of the parcels under consideration.

**Conveyance Distance**

The cost of installing sewers from the collection system to the treatment area is directly related to the length of sewer lines required. Sites which require longer conveyance distances are less favorable than sites which are closer to the center of the sewer district as long as those sites are not in disagreement with the items discussed above.

**5.3 Surface Return Locations**

In general, for systems with smaller capacities, surface return is the less desirable option, when avoidable, as the SPDES permit limits are much more significant compared to a subsurface return system. In addition, regulatory agencies typically view subsurface return as the preferred option because it recharges the local aquifer instead of immediately leaving the watershed such as the case for a surface water return.

Tighe & Bond and officials from the Town of Copake met to discuss the potential surface water return locations and Bash Bish Brook was determined to be the most feasible and suitable location for a surface water return.

Bash Bish Brook runs southeast of the hamlet center. If a water resource recovery system were installed at a suitable parcel, the treated wastewater could return to the Bash Bish Brook at the approximate location shown on Figure 5.1. There are other potential locations for a return to Bash Bish Brook, but the location shown in Figure 5.1 has been assumed for the alternative analysis.



**FIGURE 5.1**  
Potential Surface Return Location at Bash Bish Brook

## **Section 6**

### **Alternatives Considered**

A water resource recovery system consists of three components: collection, recovery, and return. Each component has several different methods and technologies available. This section compares alternatives for each to determine which is the most appropriate for the proposed Copake sewer district.

#### **6.1 Collection Systems**

The types of collection systems that were analyzed for Copake include:

1. Conventional Gravity with Grinders or Pump Station
2. Septic Tank Effluent Systems

##### **6.1.1 Conventional Gravity and Pumped Collection Systems**

###### **General Description**

A conventional collection system consists of PVC piping installed by an open trench method. This involves removing pavement or sod on the ground surface, excavating to depths of 5 – 12 feet (typically, but can be deeper) installing crushed stone bedding, installing rigid PVC pipe, and backfilling and repairing the disturbed surface. Gravity piping must be installed carefully to maintain a constant downward slope. Access for inspection and cleaning is by pre-cast concrete manholes spaced approximately 250 feet. Generally, the smallest gravity main is no less than 8-inches with a minimum slope of 0.4%.

Gravity systems are appropriate when there is enough grade to ensure required pipe slopes. However, since maintaining slope is vital to these systems, open trench construction is necessary. Open trench construction in shallow cross-country routes with enough space and only requiring loaming and seeding for repair can be very cost effective. However, open trench construction through well trafficked paved areas can have expensive restoration costs.

Where site conditions and topography do not allow for conveyance to the treatment site, gravity piping will discharge to a pump station. Conventional pump stations typically consist of a pre-cast concrete wet well with two submersible wastewater pumps. Pump stations discharge to a smaller diameter forcemain. The minimum sanitary forcemain diameter is typically 4-inches and the pumps must maintain a flow velocity of 2 fps. Sanitary forcemains must have clean out structures every 400 – 500 feet and may require air release structures at high points.

Rather than pumping stations, grinder pumps may be used to convey untreated wastewater directly from a buildings sewer into the collection system. This option requires a grinder pump at each household but is often a good option if site conditions and topography do not allow for gravity lines or for isolated parcels which are at slightly lower elevations as compared to nearby areas.



### Conventional Collection System Layout

The topography and treatment system location dictate the layout of a conventional collection system. The topography across the proposed sewer district generally slopes from northwest to southeast towards Bash Bish Brook. Therefore, gravity flow may be possible depending on the water resource recovery location. Grinder pumps may be necessary for certain parcels depending on local topography.

Although a conventional collection system is plausible for Copake, based on the size of the proposed sewer district and Tighe & Bond's experience, we believe a septic tank effluent collection system will be more cost effective. Therefore, a conventional collection system has not been considered any further as part of this analysis.

### 6.1.2 Septic Tank Effluent Collection Systems

#### General Description

Alternative type collection systems such as septic tank effluent gravity (STEG) and septic tank effluent pumped (STEP) differ from conventional collection systems because both utilize septic tanks. Septic tanks are typically plastic or concrete tanks which detain raw wastewater discharge from a building service. The tank is baffled which allows solids to settle to the bottom of the tank, and floatable material to form a scum layer at the top of the tank. Wastes in the tank are decomposed by aerobic digestion.

Wastewater leaving the tank (septic tank effluent) is of improved quality as solids remain within the septic tank. Septic tanks must be pumped regularly (typically every 3 – 7 years) or solids will build up in the tank and discharge in the effluent. A schematic of STEG and STEP systems is shown in Figure 6.1.



**FIGURE 6.1**  
Typical STEG and STEP System Schematic

STEG systems use small diameter gravity collector lines to convey septic tank effluent to a treatment location. These gravity lines have a minimum diameter of 4-inches and no minimum slope but typically have a minimum velocity of 0.5 fps. Cleanouts are typically preferred over manholes for STEG collection systems since septic tank effluent is anaerobic and prone to odors and corrosion from turbulence in concrete manholes. Air release valves or ventilated cleanouts are required at high points in STEG systems. The STEG tanks have septic tank effluent filters to prevent solids from leaving the septic tanks.

STEG systems offer a few advantages including reduced excavation and disturbance compared to conventional systems and STEG systems have the advantage of not requiring any power to operate and will continue to provide appropriate wastewater service even in cases of electricity outages.

Low pressure STEP sewers consist of smaller diameter forcemains through which sewage is pumped. Septic tank effluent pumps force wastewater through the main regardless of pipe slope. Low pressure sewers can be installed by conventional open trench methods, but smaller diameter piping can also be installed by horizontal directional drilling.

Horizontal directional drilling utilizes exit and entry pits, and access for service connections, but does not disturb the ground surface over the entire pipe length, significantly reducing restoration costs. The minimum diameter for low pressure sewer piping is 2-inches and there are no minimum slope requirements. Individual effluent service lateral lines may be as small as 1.25" in diameter. Similar to conventional sanitary sewer forcemains, low pressure sewers must have regular clean out structures every 500 to 1,000 feet and will require air release valves at high points.

Typical STEG/STEP systems have an easement which allows the utility to maintain the septic tank and periodically pump out the tank. A control panel will be located near each tank for STEP systems. Easements will also be necessary for the sewer forcemains located in the streets and/or on individual parcels.

One of the basic concerns for STEP collection systems is that the pumps at each parcel will not work if there is a power outage. Frequently, if a home has municipal water service, the water service often remains unaffected by the power outage and therefore the homeowner can continue to use water, but the wastewater pump cannot turn on and thus the septic tank begins to fill and will eventually cause a back-up if the power outage is prolonged. This is not an issue if the facility has a back-up generator, but if it does not, water usage will need to be reduced during the power outage. Septic tanks for STEP systems are typically sized to have 24 hours of additional storage for these scenarios.

However, if a sustained power outage lasted for several days, the municipality would need to pump each septic tank into the collection system. For a conventional collection system, this would simply require providing emergency power at a central pump station, rather than requiring service at many individual systems. Both conventional and alternative systems that utilize gravity collection avoid these problems. All water resource recovery systems, conventional and alternative, require emergency power at the main recovery system location.

### STEG/STEP Collection System Layout

A benefit of effluent sewer systems is that they can be constructed within an easement instead of directly in roadways or under road surfaces, avoiding expensive surface restorations. For example, many of the buildings within the proposed sewer district are at the front of the parcel and thus the existing septic tanks are most likely located in the rear of the parcel. Since many of these parcels would have minimal room on the side or in front of the building for a new STEG or STEP tank, it would present construction challenges for installing new service laterals from the rear of the building to the street.

There are pros and cons for routing the sewers on the backside of parcels instead of in the street. Routing them behind the houses typically reduces the length of lateral service connections and reduces construction complexities with installation of sewer lines in roadways. However, it also requires easements through each parcel, the sewer mains may be harder to access in emergency situations in winter months, and residential backyards will be disturbed when future repairs to the sewer mains are needed. It should be noted that easements for each parcel will be required regardless, and that constructing useable easements is important since the utility will own tanks and equipment on private property and will require access from time to time to provide operation and maintenance (O&M).

The location of the sewer mains for the preliminary septic tank effluent collection system layout were based on the assumed location of septic tanks relative to the buildings and parcel boundaries. The location of each septic tank and other underground utilities would be surveyed as part of the final design of a septic tank effluent collection system. At that time, it may be determined that it would be more beneficial and cost effective to run the sewer mains under the roads and have the service laterals go from the septic tanks to the sewer main in the street rather than to a sewer main on the backside of the parcels.

Figure A.10 shows the preliminary collection system layout for the proposed sewer district. It should be noted that the sewer main will need to extend to the water resource recovery system once one is selected. To be conservative at this stage in the project, we have assumed that a low pressure STEP collection system would be installed for the entire sewer district. A survey would be performed during the design phase if this project were to move forward, at which time the design may find that a STEG system or combination of STEG and STEP may work based on the topography in the sewer district. For the alternative analysis, it was assumed that the collection systems would be as shown in Figures A.10.

## 6.2 Water Resource Recovery Systems

Many larger communities have "conventional" wastewater treatment systems which generally consist of the following components:

- Primary treatment for the removal of solids
- Secondary treatment which typically consists of biological treatment for the removal of additional contaminants
- Tertiary treatment for further removal of contaminants by biological, chemical, or physical means
- Disinfection by chemical treatment or by UV light
- Return to a surface water body



Since most conventional wastewater treatment systems were built for large municipalities, extensive centralized systems were justifiable due to the significant flows requiring treatment and the site constraints faced by densely developed communities. However, a conventional system may not be the best match for a smaller, rural community such as Copake.

There is strong interest in many smaller communities about alternative technologies for water resource recovery; however, considering the significant cost burden it takes a small community to implement any wastewater system, there is a tendency to utilize the 'tried and true' approach of a conventional system. Unfortunately, a conventional system has energy, economic, and environmental impacts that place additional cost burdens on small communities.

One of the most significant disadvantages of a conventional system for small communities is solids handling. Conventional systems typically consist of screening for large solids removal, comminutors, large above ground settling basins to remove the remaining solids, pumps to remove the collected solids, digesters to further break down sludge or mechanical dewatering devices and then loading facilities for trucking to conventional landfills.

Solids removal components are generally expensive to build and operate especially at a small scale. From a technical standpoint, sludge removal, collection, and disposal are one of the most significant challenges to any wastewater system. When considering the economic scale of small community systems, successfully addressing sludge management is vital.



**FIGURE 6.2**  
Conventional Water Resource Recovery System

In general, conventional treatment systems are treating higher flows and have more complex treatment components due to onsite sludge management. For proper operation, conventional facilities require a full-time licensed operator and generally at least one other trained staff member. Alternative water resource recovery systems typically treat smaller flows and have simpler treatment systems; thus, staffing is usually part time.

Due to the rural character and size of the proposed sewer district, associated costs, and staffing requirements of a conventional wastewater treatment system, it is recommended that the Town of Copake focus on analyzing an alternative water resource recovery system instead of a conventional system or consider improvements to individual on-site wastewater systems.

An alternative water resource recovery system accomplishes treatment in two locations; primary treatment occurs in the onsite septic tanks, and secondary treatment which occurs at a site where the flow has been collected. There are several differences between conventional systems and alternative systems. The significant differences include:

- Sludge Management
- Piping Costs
- Operation & Maintenance

With many alternative systems, solids removal occurs at each parcel or a combination of a few parcels. This allows typical residential septic tank pumpers and haulers to handle solids removal and disposal. Typically, the sewer district is responsible for all maintenance of septic tanks, ensuring that efficient solids removal is occurring. Piping costs are lower due to small pipe sizes and less infrastructure such as manholes and operations and maintenance is generally less due to the simplicity of the systems.

There are many suitable alternative technologies available for water resource recovery. However, there are minimum criteria that each system must meet including the ability to meet regulatory effluent limits and NYS DEC Region 4 should be familiar with the system. Water resource recovery system technologies that have not been previously approved by the NYS DEC for a community application will have a much longer review period and have a significant chance of delaying project schedule.

Table 6.1 summarizes the water resource recovery systems that were considered for Copake but were not analyzed in detail due to various reasons as summarized in Table 6.1.

**TABLE 6.1**

Water Resource Recovery Systems Not Analyzed

<b>Treatment System</b>	<b>Reason(s) Not Considered</b>
Conventional Activated Sludge Systems	<ul style="list-style-type: none"> <li>• Complexity</li> <li>• Inappropriate size</li> <li>• Construction costs</li> <li>• Staffing requirements</li> <li>• O&amp;M requirements</li> </ul>
Packaged Steel Activated Sludge Treatment Systems	<ul style="list-style-type: none"> <li>• Complexity</li> <li>• Longevity concerns</li> <li>• Staffing requirements</li> <li>• O&amp;M requirements</li> </ul>
Membrane Bioreactors (MBR)	<ul style="list-style-type: none"> <li>• Cost</li> <li>• Aesthetics</li> </ul>

There are several other proven technologies that could be applicable to Copake including Moving Bed Biofilm Reactors (MBBR), Rotating Biological Contactors (RBC), and Packed Bed Media Filters (PBF). That being said, and as discussed in Section 2.4, the community has little perceived need for a municipal wastewater system. For this reason, the alternative analysis only compares one water resource recovery system technology, the PBF system, which has been a cost effective alternative for other communities of similar size. The PBF system will be compared to improvements to individual onsite wastewater systems (see Section 6.4).

### 6.2.1 Packed Bed Media Filters (PBF)

#### General Description

The basic principle of packed bed media filters is the biodegradation of pollutants carried out by micro-organisms attached on the filter media. Bacterial masses attached onto the media (called biofilm) oxidize most of the organic matter. Packed bed media filter processes are usually aerobic, which means that microorganisms require oxygen which can be supplied to the biofilm either passively or by a forced air supply.

There are several different packed bed media filter systems available. The Orenco AdvanTex packed bed media filter has been used as the basis for this alternative analysis. The Orenco AdvanTex system is a packed bed media filter that uses lightweight synthetic textile to treat septic tank effluent. The textile media has a high porosity and large surface area for microbial attachment and high loading rates. The septic tank effluent is sprayed onto the textile media and percolates down where it is filtered and treated by microorganisms that populate the textile. There are several AdvanTex models available, which range in size and flow capacity. An image of an operational Orenco AdvanTex PBF system in Hyde Park, NY is shown in Figure 6.3.



**FIGURE 6.3**

Orenco Advantex PBF System in Hyde Park, NY

**Preliminary PBF Design**

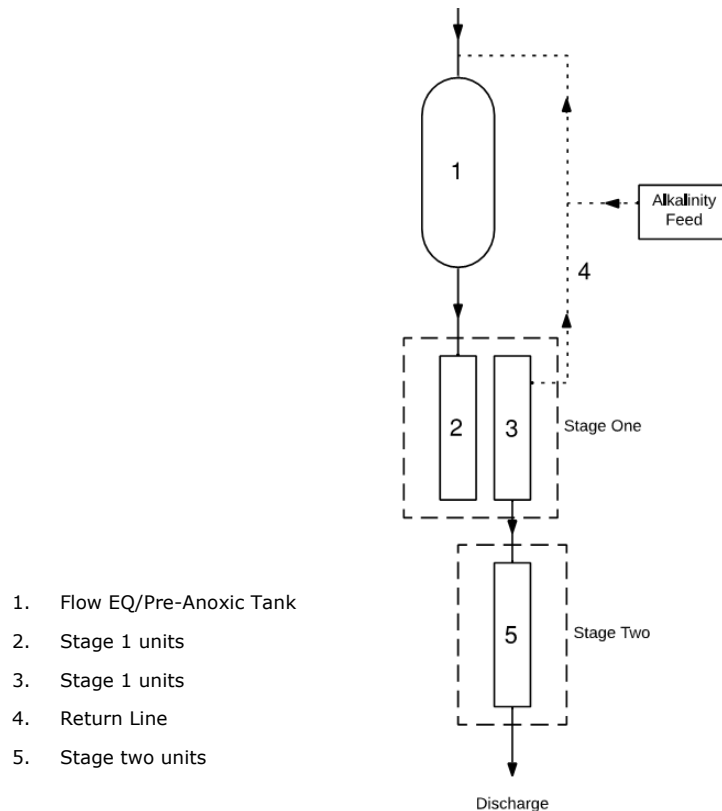
The preliminary design for the Orenco PBF system differs slightly depending on the type of return method. A system with a subsurface return will be simpler and require less components compared to a system with a surface return due to the more restrictive permit limits associated with a surface return as discussed in Section 4.3. To be conservative, the preliminary PBF design is for a system designed to achieve the surface return limits discussed in Section 4.3. The primary components included in the preliminary design of an Orenco AdvanTex PBF system for a surface return scenario include:

- 63,000-gallon Flow EQ Tank/Pre-Anoxic Tank w/ pumps
- Stage 1 – AX-MAX250-35 Treatment Units (8)
- Alkalinity feed and return line
- Stage 2 – AX-MAX300-42 Treatment Units (1)
- Stage 2 – AX-MAX225-35 Treatment Units (1) with space for recirculation and discharge pumps

The flow equalization tank is installed to provide stability by leveling out peaks in flow and allowing consistent loading of the treatment system. This tank also serves as a pre-anoxic tank which helps to balance and lower concentrations by blending primary treated effluent with filtrate while also providing an environment for denitrifying a portion of the nitrified filtrate. Time-dose-controlled pumps are installed in this tank which distribute the flow to the PBF treatment units. Eight AdvanTex treatment units will be used for stage 1 treatment. In the stage 1 tanks the flow percolates down through the media where it is filtered, cleaned, and nitrified by the naturally occurring microorganisms on the media. Aeration is provided at each of the treatment units.

A portion of the filtrate from stage 1 would be recirculated to the EQ/pre-anoxic tank and treated to control alkalinity. The remainder of the flow moves to another Advantex treatment unit for stage 2 of treatment which operates like stage 1, except that it is smaller. Because the BOD levels leaving stage 1 are low, nitrifiers populating stage 2 thrive in the low carbon environment and provide additional reduction in ammonia. Finally, treated wastewater from stage 2 leaves the last treatment unit to the surface return location.

Figure 6.4 represents a simplified process flow diagram for the Orenco AdvanTex PBF system with a surface return. These systems are NSF/ANSI Schedule 40 approved for residential wastewater treatment systems. More information on the Orenco AdvanTex PBF systems can be found in Appendix E.

**FIGURE 6.4**

Orenco PBF System Process Flow Diagram

Other components which will be installed as part of the Orenco treatment system include:

- Influent flow meter in a buried vault
- Telemetry controls
- Control building on a concrete slab (approximately 15' x 20')
- Ultraviolet (UV) disinfection system
- Post-aeration system
- Electrical service and back-up generator
- Buried process piping

The Orenco AdvanTex systems are installed in many residential applications and in several municipal locations in New York including the communities of:

- Hyde Park – 132 Service Connections – 30,000 gpd – Surface Return
- Hillsdale - 73 Service Connections – 35,000 gpd, – Subsurface Return
- Schodack Landing – 75 Service Connections – 20,000 gpd – Surface Return
- East Schodack – 23 Service Connections – 7,500 gpd – Surface Return
- Bethlehem – 23 Service Connections – 7,500 gpd – Surface Return

## 6.3 Return Systems

Two options exist for return of the treated wastewater:

- Return to a surface water body, or;
- Return to the subsurface.

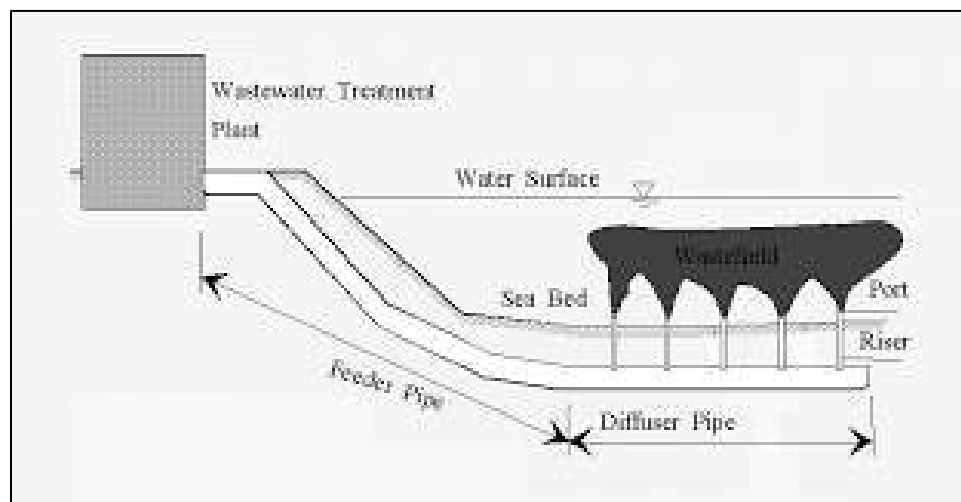
As discussed in Section 5, there may be several locations with a suitable size for siting a water resource recovery system. However, as noted in Section 2, there are concerns with the subsurface conditions around Copake including shallow depth to groundwater and poor draining soils. For these reasons, subsurface return systems have not been discussed in this Section.

### 6.3.1 Surface Water Return

The method of a conventional community water resource recovery system is to return to a surface water body, which has historically been accomplished by piping the treated wastewater to a concrete headwall, where it flows by gravity into the surface water. As discussed in Section 5.3, the surface water body where treated wastewater would be returned from the Copake water resource recovery system is Bash Bish Brook.

Return to a surface water body requires disinfection, which can be accomplished two ways, by chemical means, or by UV light. Chemical disinfection requires multiple sets of pumps for chlorination and dechlorination chemicals and onsite storage of these chemicals. UV disinfection is accomplished by exposing the treated wastewater to very high doses of ultraviolet light. It does not require the use of chemicals but is a system higher in capital costs and has significant energy usage impacts. For the preliminary design, it has been assumed that the water resource recovery system would utilize a UV system.

For Copake, a surface water return to Bash Bish Brook would consist of a multiport fully submerged cross-channel diffuser to achieve even distribution across the stream channel. This configuration is expected to achieve a greater degree of dilution and therefore lessen the permit limits. A schematic of a multiport fully submerged cross-channel diffuser is shown in Figure 6.5.



**FIGURE 6.5**

Typical Multiport Fully Submerged Cross-Channel Diffuser



## 6.4 Individual Onsite Wastewater System Improvements

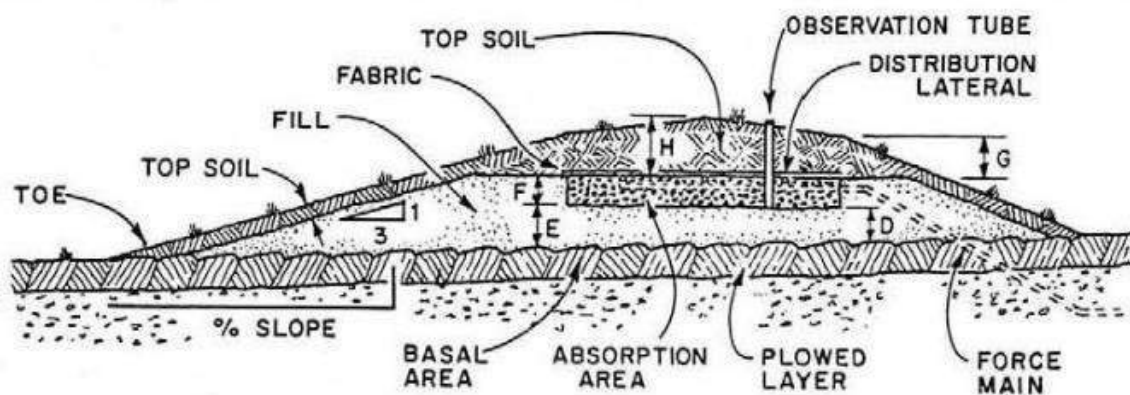
Rather than install a municipal wastewater system, homeowners in the hamlet could consider replacing their existing septic systems with new, compliant on-site wastewater systems. This would include replacing all outdated, failing, or suspected non-compliant septic systems in the district with new compliant septic systems.

In portions of the study area, primarily larger parcels at higher elevations, continued use of existing individual onsite septic systems without replacement may be appropriate. The limited number of problems in these areas coupled with sufficient sub-surface conditions can support continued use of properly maintained existing individual septic systems. However, while some homeowners may not experience issues with their septic systems such as sewer back-ups, they may not be aware that their system is ineffectively treating the wastewater. This can happen when a leachfield was installed in an area that is subject to a high water table. In this scenario, there is an insufficient amount of unsaturated soil to treat the wastewater before it re-enters the water table.

Based on the information available, the limited number of septic system problems identified in the study area can, in many cases, be attributed to flooding and high groundwater, although small areas of poor soils may also cause these problems. Where these difficult site conditions exist, continued use of conventional septic systems (septic tanks, distribution boxes, and leachfields) is not expected to provide effective, trouble-free wastewater treatment and would likely require the homeowner to replace their existing system with one of two options:

1. Replace their septic system with a mounded system
2. Replace their septic system with an alternative individual onsite septic system

Where septic system failures are the result of high groundwater alone, construction of a "mounded" leachfield, set at a sufficient elevation above the high groundwater level, may mitigate the septic system problems experienced. For example, a mounded septic system may alleviate the problems experienced at the parcels surrounding Fire Pond. Mounded systems often require pumps if the local topography does not allow for gravity flow. A typical cross-section of a mounded leachfield is shown in Figure 6.6.

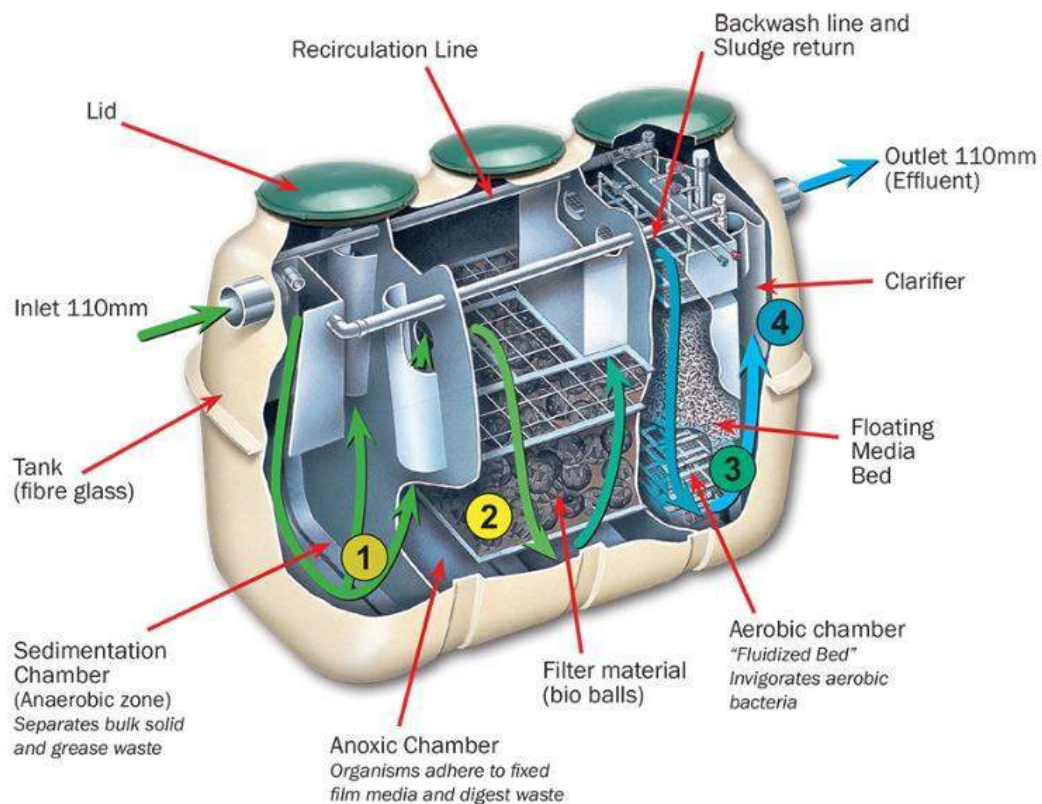


**FIGURE 6.6**  
Typical Mounded Leachfield

The construction cost to replace a conventional homeowner septic system in its entirety, (septic tank, distribution box, and leachfield) with a mound-style septic system can vary significantly depending on the size of the facility and site conditions, typically ranging from \$25,000 to \$65,000, but can be even greater. Additionally mound-style systems are large, occupying a much larger portion of the site than a conventional system. However, once failure has occurred, most conventional systems cannot be replaced in-kind.

Alternative technologies for individual onsite septic systems are often considered to upgrade failing septic systems in areas that cannot accommodate conventional systems or for small lots that have limited space for a mound-style system. Alternative onsite septic systems provide additions or modifications to one or more of the components of a conventional system, while providing at least an equivalent degree of environmental and public protection. These technologies are generally better at removing solids and other pollutants from wastewater before discharging to the leachfield, that which typically increases the life of the leachfield and may make it possible to overcome difficult site conditions. There are many different types of alternative onsite wastewater technologies.

Most of the alternative onsite treatment systems such as an aerobic treatment system, require mechanical equipment (blowers and/or pumps) to operate effectively and, as a result, require more frequent maintenance than a conventional septic tank and leachfield. Typically, a licensed operator will need to perform annual or biannual maintenance. An example of an alternative onsite treatment system is shown in Figure 6.7.



**FIGURE 6.7**  
Aerobic Alternative Onsite Treatment System

The construction cost of a typical alternative individual onsite septic system is approximately \$60,000-\$100,000. However, this cost can also vary significantly depending on family size, site conditions, and type of alternative treatment system. The annual operation and maintenance cost of an alternative onsite septic system, including sampling, testing, reporting, electricity, and facility maintenance, is estimated at approximately \$2,000 per year.

Inspections and testing would be required at each parcel in the proposed sewer district to determine which parcels need to have their septic system replaced and if so, which replacement option would be best suited for the individual parcel. Inspections of each septic system were not included in the scope of this evaluation.

## 6.5 Opinion of Probable Cost

### 6.5.1 Cost Estimate Approach

Conceptual opinions of probable costs (OPC) have been prepared for the collection system, water resource recovery system, and return system approaches discussed in the Sections above. The typical cost to replace a septic tank and leachfield system with a mounded of alternative onsite septic system have also been presented. The opinion of probable costs include the following components:

- 1. Construction Cost:** The budgetary cost estimates are based on Class 4 level construction cost estimates, as defined by the Association for the Advancement of Cost Engineering (AACE) International Recommended Practices and Standards. According to AACE International Recommended Practices and Standards, the estimate class designators are labeled Class 1, 2, 3, 4, and 5, where a Class 5 estimate is based on the lowest level of project definition and a Class 1 estimate is closest to full project definition and maturity. The end usage for a Class 4 estimate is a conceptual study. The expected accuracy range of a Class 4 estimate is between +40% and -25%. The level of project definition for a Class 4 estimate is between 1% and 15%.

The costs include overhead and profit, equipment costs, demolition/removal of existing equipment (if applicable), temporary provisions (if applicable), facilities and bypasses (if necessary, to complete the work), property acquisition (if applicable), easements, and costs regarding installation and start-up of improvements. This cost also includes a traffic control cost factor, a 5% mobilization/demobilization cost factor, and a contractor general conditions cost factor of 15% of the construction subtotal. The costs are based upon recently completed project bid forms, quotes from equipment manufacturers/vendors, and data contained in R.S. Means Construction Cost Data.

- 2. Engineering (20%):** A 20% contingency has been applied to the estimated construction costs for the engineering fees. The 20% for engineering fees can generally be broken down further as: Engineering Design (8%) and Construction Administration/Observation (12%).
- 3. Contingency (30%):** A 30% general contingency has been applied to the estimated construction costs. This contingency is in-line with the current level of project definition.

- 4. Total Project Costs:** The total project costs are the sum of the construction costs, engineering costs, and the contingency.

### 6.5.2 Construction Cost Comparison

Table 6.2 summarizes the opinion of probable construction cost for a STEP collection system as described in Section 6.1.2. The detailed opinion of probable construction cost is provided in Appendix F.

**TABLE 6.2**

Collection System Construction Costs

<b>Collection System Type</b>	<b>Cost</b>
STEP Collection System	\$1,930,000

Table 6.3 summarizes the opinion of probable construction cost for a PBF water resource recovery system as described in Section 6.2.1 and associated site work improvements. The detailed opinion of probable construction cost is provided in Appendix F. The cost shown in Table 6.3 does not include property acquisition costs.

**TABLE 6.3**

Water Resource Recovery System Construction Costs

<b>Water Resource Recovery Type</b>	<b>Cost</b>
Packed Bed Media Filter System	\$3,340,000

Table 6.4 summarizes the opinion of probable construction cost for a surface water return to Bash Bish Brook as described in Section 6.3.1.

**TABLE 6.4**

Surface Water Return Construction Costs

<b>Return System Type</b>	<b>Cost</b>
Surface Return	\$160,000

Table 6.5 summarizes the range of probable construction costs for replacing a typical residential septic tank and leachfield with a mound system and with an alternative type onsite wastewater treatment system.

**TABLE 6.5**

Individual Onsite Wastewater System Const. Costs

<b>System Type</b>	<b>Cost Range</b>
Conventional Septic Tank/Leachfield	\$10,000 - \$30,000
Mound System	\$25,000 - \$65,000
Alternative System	\$60,000 - \$100,000

## **Section 7**

### **Alternatives Analysis**

#### **7.1 Identification of Alternatives**

Two types of collection systems were discussed in Section 6.1 including conventional collection systems and septic tank effluent collection systems. As discussed in Section 6, although a conventional collection system is plausible for Copake, based on the size of the proposed sewer district and Tighe & Bond's experience we believe a septic tank effluent collection system will be more cost effective and therefore considered a STEP collection system only.

As discussed in Section 6.2, a conventional wastewater treatment system was not analyzed due to the size of the proposed district and the associated costs and staffing requirements of a conventional WWTP. In addition, several other alternative water resource recovery systems could be considered for Copake, however, as discussed in Section 2.4, the community has little perceived need for a municipal wastewater system. For this reason, the alternative analysis only compares one water resource recovery system technology, the PBF system, which has been a cost effective alternative for other communities of similar size.

A surface return option was considered in conjunction with the PBF system as discussed in Section 6.3. Subsurface return was not discussed as an alternative due to concerns with local soil conditions.

As discussed in Section 6.4, Copake could consider improvements to individual onsite septic systems instead of construction of a municipal wastewater system. This could potentially address the difference between the perceived and theoretical need for wastewater service.

Based upon the analysis and the recommendations discussed above, three alternatives should be considered regarding implementation of a wastewater collection, treatment, and return system for the Town Copake. The alternatives include:

- Alternative No. 1:
  - No Action
- Alternative No. 2:
  - Septic Tank Effluent Collection System
  - Packed Bed Media Filter System
  - Surface Return to Bash Bish Brook
- Alternative No. 3:
  - Individual Onsite Septic System Improvements

### 7.1.1 Alternative No. 1

The “no action” alternative means that no centralized wastewater collection, treatment, or return system would be installed for the hamlet. In this scenario, the existing individual wastewater treatment systems would remain in use. This option does not address the isolated wastewater disposal issues and leaves the responsibility of fixing these issues on the homeowners. In addition, the no action alternative will not address issues that residents in the hamlet center are experiencing with their existing septic systems or address systems that may be insufficiently treating their wastewater due to high groundwater conditions. Expansion of certain high demand facilities such as restaurants would continue to be limited due to wastewater capacity.

An advantage of the no-action alternative is that there is no large construction cost; all septic tank pumping costs, maintenance costs, and repair costs will remain the responsibility of the property owners. This will prevent a potential cost burden for those hamlet residents who would not be serviced by the wastewater treatment system yet may still see an increase in their contribution for funding of the construction and maintenance. Another advantage of the no-action alternative is that there will be no direct surface water discharge and no disruption of traffic which is likely to occur during construction of a new sewage collection system.

### 7.1.2 Alternative No. 2

Alternative No. 2 consists of the following:

1. Construction of a STEP collection system for the proposed sewer district.
2. Installation of the Orenco AdvanTex packed bed media filter system for secondary treatment of the septic tank effluent at a suitable parcel conforming to the constraints discussed in Section 5. The water resource recovery system will be sized to treat an average daily flow of 21,000 gpd.
3. Construction of a surface return to Bash Bish Brook.

Site work for Alternative No. 2 will depend on the selected site but would generally include construction of an access road and small parking area, a new electric service, a new well for water service, excavation for the buried piping, tanks, and treatment units, a small control building on a concrete pad, and security fencing around the treatment units. Site work would also include general fill to protect critical treatment system infrastructure above the flood elevation depending on the selected location. Construction of the surface return would include installation of 8” buried PVC pipe from the water resource recovery facility to Bash Bish Brook. There would be minimal visual impact once construction is complete for the nearby residences as almost all equipment would be below grade.

### 7.1.3 Alternative No. 3

Alternative No. 3 consists of replacing all outdated, failing, and suspected non-compliant septic systems in the district with new compliant septic systems. This may mean that many conventional septic tank and leachfield systems are replaced with a mounded or alternative type onsite septic system as discussed in Section 6.4. Inspections and testing would be required at each parcel in the proposed sewer district to determine which parcels need to have their septic system replaced and if so, which replacement option would be best suited for the individual parcel. Inspections of each septic system were not included in the scope of this evaluation.



This alternative means that no centralized wastewater collection, treatment, or disposal system would be installed for the hamlet. This alternative would address the isolated wastewater disposal issues, but it would also leave the responsibility of maintaining the septic systems on the homeowners. Additionally, this alternative may not allow for growth in the district as new septic tanks installed will be similarly sized to those existing. In some cases, the septic system and reserve area may take up a large portion of the parcel and separation distance requirements might prove difficult to maintain.

## 7.2 Life Cycle Cost Analysis

### Capital Costs

The opinion of probable cost for Alternative No. 2 is summarized in Table 7.1. The costs in this table include the construction costs for the collection system, water resource recovery system, return system, and typical site work associated with the water resource recovery system as well as engineering, contingency, and property acquisition. The property acquisition cost was assumed based on the average assessed value of the properties under consideration. Detailed tables showing the total OPC for Alternative No. 2 are provided in Appendix F.

**TABLE 7.1**

Alternative No. 2 Opinion of Probable Cost

<b>Item</b>	<b>Cost</b>
Septic Tank Effluent Collection System	\$1,930,000
PBF Water Resource Recovery System	\$3,340,000
Surface Return System	\$160,000
Subtotal Construction Costs	\$5,430,000
Engineering (20%)	\$1,086,000
Contingency (30%)	\$1,629,000
Property Acquisition	\$286,000
<b>Opinion of Probable Cost</b>	<b>\$8,431,000</b>

### Operation and Maintenance Costs

If Alternative No. 1 or 3 is selected, costs for maintenance and repairs of individual septic systems will remain the cost of the property owners including costs for repair or replacement of failing systems. Table 7.2 presents a summary of the anticipated annual operation and maintenance (O&M) costs for Alternative No. 2 since this is the only alternative that does not include individual onsite septic systems. The opinion of probable O&M cost includes the annual operation and maintenance costs for the collection, treatment, and disposal systems as well as administrative costs, short-term assets, and a 30% contingency. The detailed opinion of probable O&M costs for each alternative are provided in Appendix F.

**TABLE 7.2**

Annual O&amp;M Costs

<b>Alternative</b>	<b>Annual O&amp;M Cost</b>
Alternative No. 2	\$121,000

A life cycle cost analysis was utilized to better understand the long-term costs for Alternative No. 2. The net present value was calculated as the capital cost (which includes construction and non-construction costs such as land acquisition and easements) plus the present worth of the uniform series of annual O&M, minus the present worth of the salvage value of the system. This was calculated for a planning period of 20 years with a 2.3% inflation rate and a 0.3% discount rate taken from Appendix C of OMB Circular A-94. The net present value for Alternative No. 2 is presented in Table 7.3.

**TABLE 7.3**

Life Cycle Cost Analysis

<b>Item</b>	<b>Alternative No. 2</b>
Capital Cost	\$8,431,000
Annual O&M Cost	\$121,000
Present Day O&M	\$2,939,000
Present Day Salvage Value	\$936,000
<b>Net Present Value</b>	<b>\$10,434,000</b>
Planning Period	20 years
Inflation Rate	2.30%
Discount Rate	0.30%

## 7.3 Non-Monetary Considerations

Non-monetary factors such as environmental impacts, land requirements, constructability concerns, sustainability considerations, potential for service interruption, availability for future expansion, public perception, operation and maintenance requirements, and regulator familiarity for each alternative should also be considered. Each of these items are briefly discussed in this Section.

### Environmental Impacts

The surface return included in Alternative No. 2 has the most direct impact on the environment of all the alternatives since it will discharge directly to Bash Bish Brook. However, the treatment system would be designed to meet the SPDES effluent discharge limitations implemented by the NYSDEC. In comparison, replacement of existing septic systems as part of Alternative No. 3 would have no direct environmental impact on Bash Bish Brook. The no-action alternative (Alternative No. 1) may have environmental impacts if existing systems are to remain and are not functioning properly. There are no other anticipated environmental impacts.

**Land Requirements**

Alternative No. 2 requires procurement of land for the water resource recovery system and return system. Several potential locations were discussed earlier in the report. The Town would need to select one of the locations and negotiate with the property owner to purchase the property. This alternative is therefore dependent on the Town finding a suitable location where the property owner is also willing to sell the property.

Easements may be required for the surface return pipe for Alternative No. 2. Easements will also be required for the collection system and access easements will be required for the Town to access each parcel's STEG/STEP tank for operation and maintenance purposes for Alternative No. 2. Alternative No.1 and Alternative No. 3 do not require acquisition of new land.

**Constructability Concerns**

Each of the alternatives have their own unique constructability challenges. Alternative No. 2 may require fill to be brought in to bring up the grade to properly protect the proposed water resource recovery system from flooding. Alternative No. 3 has the challenge of siting new compliant septic systems on existing parcels. Individual parcels may have their own unique construction challenges including high groundwater and site access.

**Sustainability Considerations**

Sustainable utility management practices are important to consider when creating a new sewer district. Alternative No. 2 is utilizing a STEG/STEP collection system which is a closed system and thus there is much less chance for inflow and infiltration compared to a conventional collection system. Alternative No. 2 also requires chemical usage while Alternative No. 1 and 3 do not necessarily.

There is minimal installation of non-porous surfaces for each alternative and thus stormwater management should be easily obtained. Green infrastructure can be incorporated where practical during the final design of the selected system.

**Potential for Service Interruption**

As discussed in Section 6.1.2, STEG systems have the advantage of not requiring any power to operate and will continue to provide appropriate wastewater service even in cases of electricity outages. STEG tanks should be evaluated in the Final Design stage to determine if STEG tanks are feasible over STEP tanks. It was assumed that Alternative No. 2 will require STEP tanks for the alternative analysis which presents concerns during power outages as discussed in Section 6.1.2. Power failure events for parcels with STEP systems will mean temporary service interruptions for those parcels until electrical service is restored. Treatment system design would include an emergency back-up generator to ensure continuous operation even during a power failure.

Individual onsite septic systems have limited potential for service interruption except for systems that have dosing pumps or other components which rely on electrical components.

**Availability for Future Expansion**

Having area available for expansion of the sewer system is a very important consideration. Alternative No. 2 has a STEG/STEP collection system which can be easily expanded. Whether STEG or STEP tanks would be required depends on the direction of the system expansion and the topography.

The exact location for the water resource recovery and return system associated with Alternative No. 2 has not been determined yet. However, larger parcels are more desirable when considering future expansion. Most parcels in the proposed sewer district are relatively small and may have limited room for future expansion (Alternative No. 3).

**Public Perception**

Nuisances such as odors and noise are commonly associated with wastewater treatment systems. However, no noise or odor concerns are expected for Alternative No. 2 when properly designed and constructed.

Public perception of the surface water return to Bash Bish Brook may be seen negatively by members of the community. This can be especially true for recreational users of the brook or property owners immediately downstream of the return location.

The treatment system components for Alternative No. 2 are primarily below grade and therefore are not expected to cause any negative public perceptions regarding aesthetics. Fencing and the small control buildings can be screened with strategic placement and landscaping, if required.

Alternative No. 1 and 3 are not expected to have any negative public perception concerns.

**Operation and Maintenance Requirements**

Each of the alternatives require a different degree of operation and maintenance. For the STEG/STEP system, maintenance primarily includes pumping out the tanks every 3-5 years (same as typical septic tanks). At a minimum, a yearly check on each of the septic tanks is also good practice to make sure there are no obvious issues. Effluent filters should be cleaned/replaced on a regular basis and STEP tank pumps will need to be replaced after approximately 20 years. It is anticipated that emergency maintenance for STEG/STEP tanks will periodically be required.

There is regular operation and maintenance required for the Alternative No. 2 water resource recovery system. This involves daily checks and sampling requirements for the surface return system.

Operation and Maintenance requirements for individual onsite septic systems are minimal and typically require pumping out the septic tank every 3-5 years. More complex onsite systems may require maintenance of dosing pumps and other treatment system components if an alternative onsite system is installed.

**Regulator Familiarity**

Regulator familiarity with the treatment system will help expedite regulatory review of the project. Treatment system technologies that have not been previously approved by the NYSDEC Region 4 for a community application will have a much longer review period and have a significant chance of delaying project schedule. The Orenco treatment systems have been installed for several community applications including a 30,000 gpd system in Hyde Park and a 35,000 gpd system in Hillsdale (Alternative No. 2).

A summary of the non-monetary considerations is provided in Table 7.4.

**TABLE 7.4**

Non-Monetary Considerations

Item	Alt No. 1	Alt. No. 2	Alt. No. 3
Environmental Impacts	- Potential impacts if failing systems continue use	- Direct discharge to Bash Bish Brook	- Minimal
Land Requirements	- None	- Requires private property acquisition	- Parcels may not have enough room
Constructability Concerns	- None	- Fill required - Easement	- Parcel sizes
Sustainability Considerations	- Not a concern	- STEG for sustainable then STEP	- Not a concern
Potential for Service Interruption	- Minimal service interruptions	- Service interruptions for STEP tanks	- Potential service interruptions for systems with pumps
Availability for Future Expansion	- Limited for some parcels	- Has room for future expansion	- Limited for some parcels
Public Perception	- Generally good	- Surface return may be seen negatively	- Generally good
Operation and Maintenance Requirements	- Less O&M	- More O&M	- Less O&M
Regulator Familiarity	- Familiar	- Familiar	- Familiar

## **Section 8**

### **Proposed Project**

#### **8.1 Basis of Selection**

As discussed in Section 2.4, there is a high level of divergence in perceived need and theoretical need for wastewater service in the study area. The recent water condition survey data indicates a very low level of perceived need, with only three parcels indicating problems, which appear to be related to flooding concerns, and only slightly more indicating awareness of septic problems elsewhere in the community.

In our experience, the construction of a community wastewater system needs significant support from the community to move forward as it is a large undertaking. Given the apparent lack of perceived need based on the recent water condition survey, we are recommending that Copake does not move forward with a municipal wastewater system at this time (Alternative No. 2) but instead consider Alternative No. 3 – individual onsite septic system improvements. The basis for selection of Alternative No. 3 is as follows:

- There is limited support for a community wastewater system currently
- Alternative No. 3 would address the failing septic systems in the proposed sewer district
- Alternative No. 3 would address some of the septic systems that may appear to be operating appropriately but may be insufficiently treating their wastewater due to high groundwater levels

While wastewater improvements received limited support from the community, there was a high priority among residents for addressing flooding in the Hamlet. It is our understanding that the Columbia County Department of Public Works (DPW) is embarking on a major reconstruction project of the primary roads under a program funded by the US Department of Transportation and New York State Department of Transportation. The project includes improvements to County Route 7A (Main Street and Church Street) in Copake's hamlet center. The reconstruction is expected to be completed in 2024-2025 and will include stormwater drainage improvements along these roads, and the creation of green space around the clock intersection to aid in groundwater absorption. Tighe & Bond recommends that the Town of Copake considers a drainage study for the Hamlet center. The drainage study would determine problem areas and potential improvements for stormwater infrastructure in the hamlet. Drainage improvements can help to protect onsite septic systems especially for some of the problem areas noted in the water condition survey such as the Fire Pond area. The drainage study could include a review of the planned road/stormwater improvements and it may find that the planned improvements will help to mitigate the stormwater issues identified by residents in the recent water condition survey.

Alternative No. 3 will require innovation and collaboration between the Town and individual parcel owners in the hamlet center to replace failing or insufficient septic systems. The project will also require additional engineering to determine and prioritize parcels for septic system replacement. The following section discusses the potential approach and funding opportunities for septic system replacement.



## 8.2 Septic System Replacement Approach

Throughout New York State there are many communities who participate in the State Septic System Replacement Program, which supports residences and small business owners with grants to assist in the replacement of aging and substandard septic systems. This program provides grants to reimburse property owners up to 50% of replacement costs (a maximum of \$10,000). However, this program is only available for priority areas determined by the NYS Department of Environmental Protection and the NYS Department of Health. The Copake Hamlet is not currently one of these priority areas, while nearby Robinson Pond and Copake Lake are both qualified by the program.

It is recommended that the Town consider steps to include the hamlet area in this program. This would require documentation of either water quality impacts to Bash Bish Brook, or potential water quality impacts to drinking water. At this time, it appears that potential drinking water impacts may be a more appropriate approach.

In order to document potential drinking water impacts, the Town should work with Columbia County Department of Health to develop an acceptable scope for completion of a Sanitary Survey. While typically associated with identification of potential sources of pollution, including non-point sources, to public drinking water systems, a sanitary survey could be used to document insufficient separation distances between on-site drinking water wells, and existing septic system components. The survey should also note any past system failures and any indicators of septic system impacts on drinking water quality. Sanitary surveys are discussed in Part 5, Subpart 5-1 of the NYCRR Title 10. While not a source of funding alone, documentation of drinking water quality concerns is important component of qualifying for potential inclusion in the State Septic System Replacement Program.

However, even if the Hamlet area can be qualified for inclusion in the program, it is anticipated businesses would need additional sources of funding for septic system improvements. We have contacted both Columbia Economic Development Corporation and Empire State Development and believe both of these resources could be utilized to develop a funding program specific to the Town.

Columbia Economic Development Corporation has already worked with businesses in Copake and believe several programs exist which could be utilized for loan funding to assist with septic system expansion or upgrades if they will support increased business utilization.

Empire State Economic Development additionally has several programs, which may provide both grant and loan funding to commercial properties and their Empire State Economic Development Fund Program is specifically oriented toward site and infrastructure needs.

While these resources always exist for individual businesses, what may provide additional leverage and opportunity is the Town, if willing, to serve as an applicant and administrator. By the Town directly working with these agencies to develop a set of criteria for improvements funding, and then administering the funding, a new innovative methodology could be created that helps serves communities caught in the middle of the funding gap, where analysis points to the existence of problems, but due to the small quantity of known environmental impacts, a comprehensive municipal solution is not economically feasible.

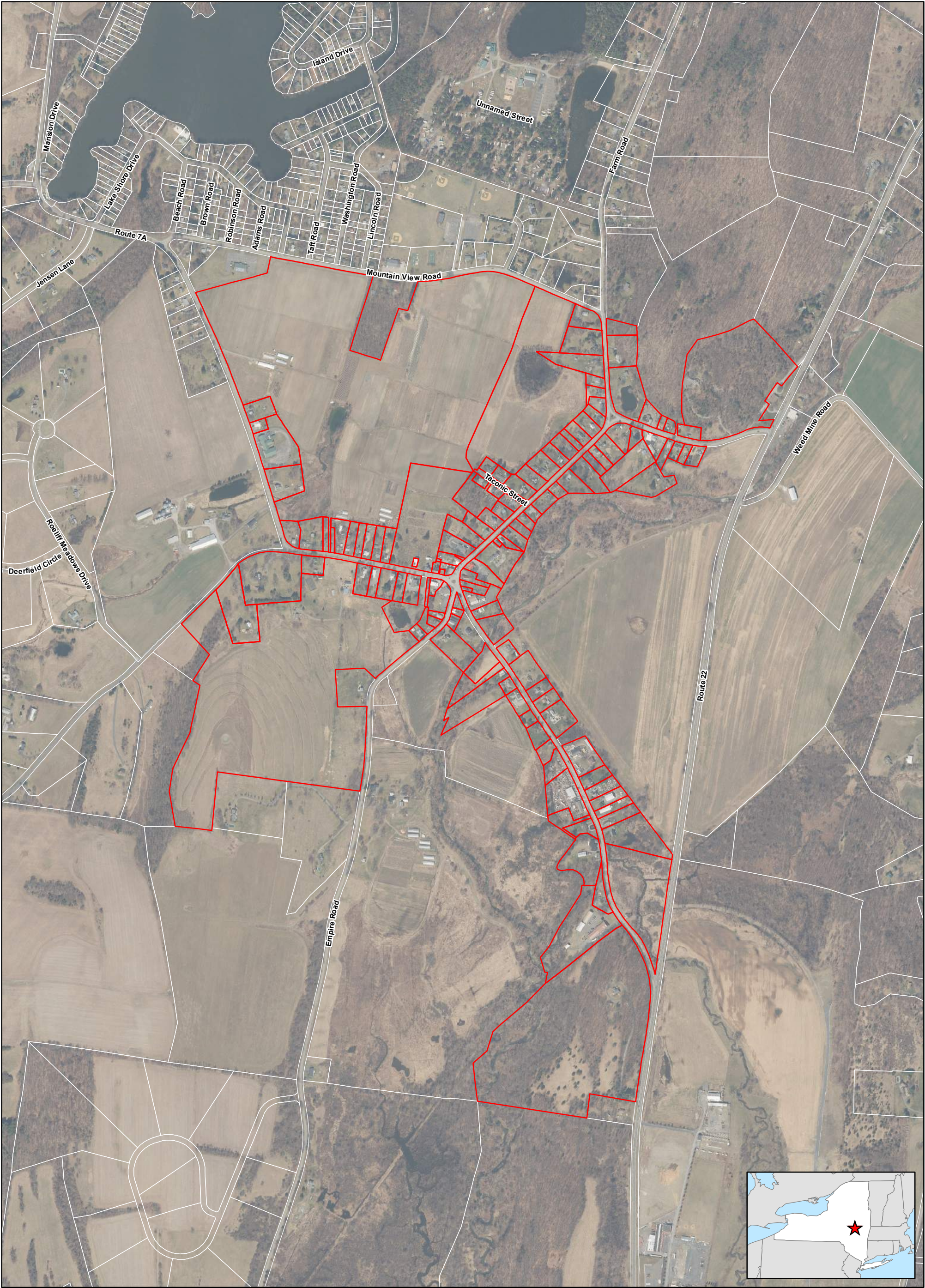
### 8.3 Project Implementation Plan

The following are the next steps for project implementation of the recommended alternative:

1. The Town of Copake will distribute the final version of this wastewater preliminary engineering report to the community.
2. The Town of Copake will initiate correspondence with Columbia County Department of Health and NYS Department of Environmental Protection to understand steps required to document need for inclusion in the Septic System Replacement Program and determine if a sanitary survey will assist in qualifying the hamlet area for this program.
3. The Town of Copake will initiate correspondence with Empire State Development and Columbia Economic Development Corporation with the goal of establishing a septic system upgrade or replacement fund focused on commercial properties in the hamlet center. This recommendation is based upon the Town's willingness to serve as a primary contact, organizer, and administrator of an assistance program.
4. The Town of Copake will consider initiation of a drainage study for the Hamlet Center to identify necessary stormwater related improvements and compare these to the planned improvements by the DPW to identify if additional measures are needed to address flooding concerns.

**APPENDIX A**



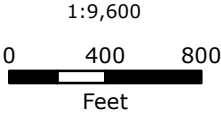


**LEGEND**

Approximate Study Area



Ortho provided by dhses.ny.gov (2021).  
Columbia County Parcels provided by Columbia County  
Real Property Tax Service & Columbia County  
Planning Department.

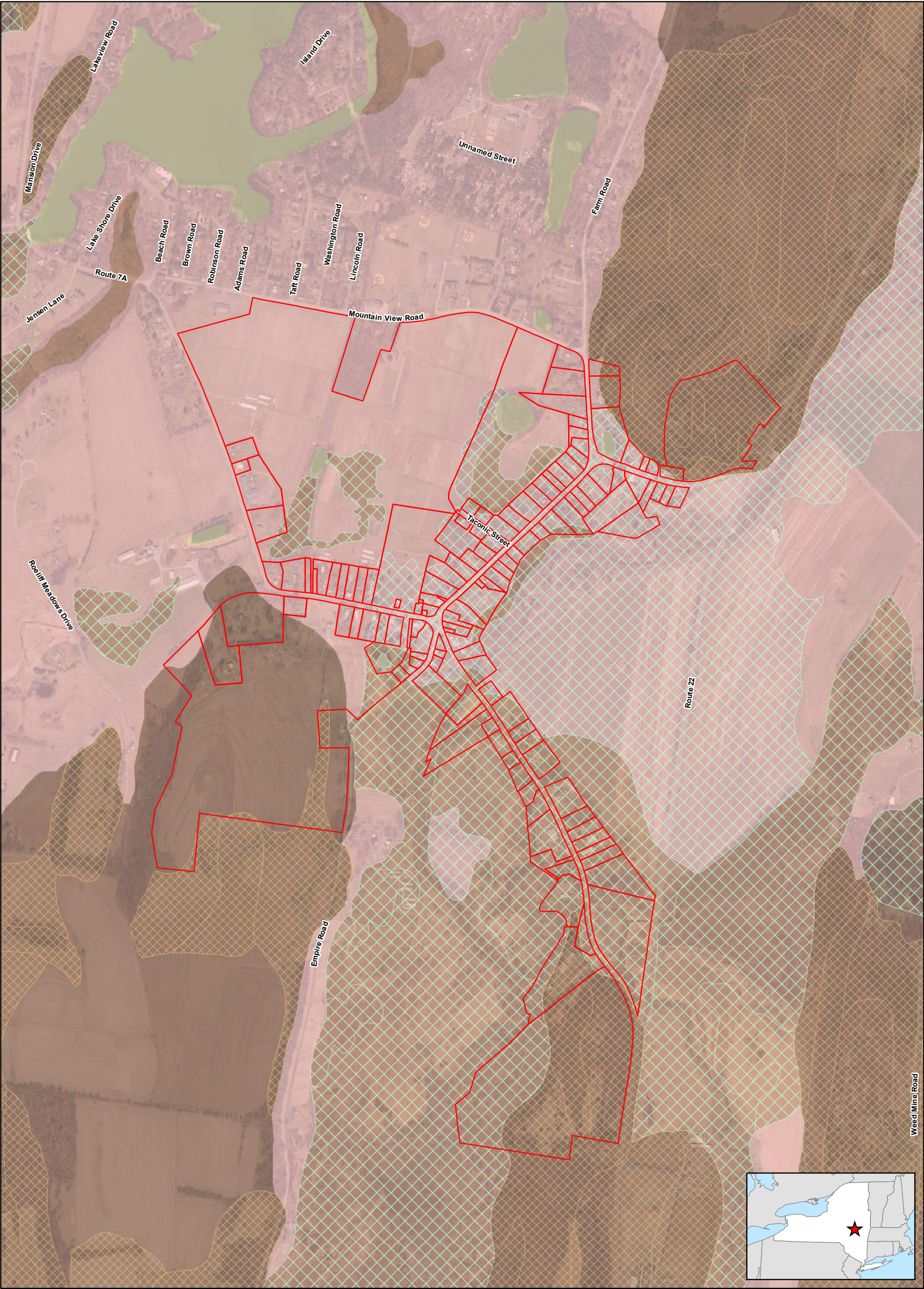


**FIGURE A.1**  
**Town of Copake Study Area**









Town of Copake  
Wastewater Feasibility Study

June 2022



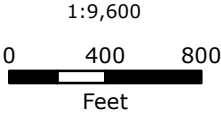


**LEGEND**

- |  |                           |   |                  |   |                  |
|--|---------------------------|---|------------------|---|------------------|
|  | Approximate Study Area    |  | Soil Type A or B |  | Soil Type C or D |
|  | Shallow Groundwater (<4') |  | Soil Type A/D    |  | Unknown          |
|  | Shallow Bedrock (<4')     |  | Soil Type B/D    |   |                  |

**Tighe&Bond**

Ortho provided by dhses.ny.gov (2021).  
Resource data provided by Columbia County Planning  
Department, from Columbia County Geo-Data website.

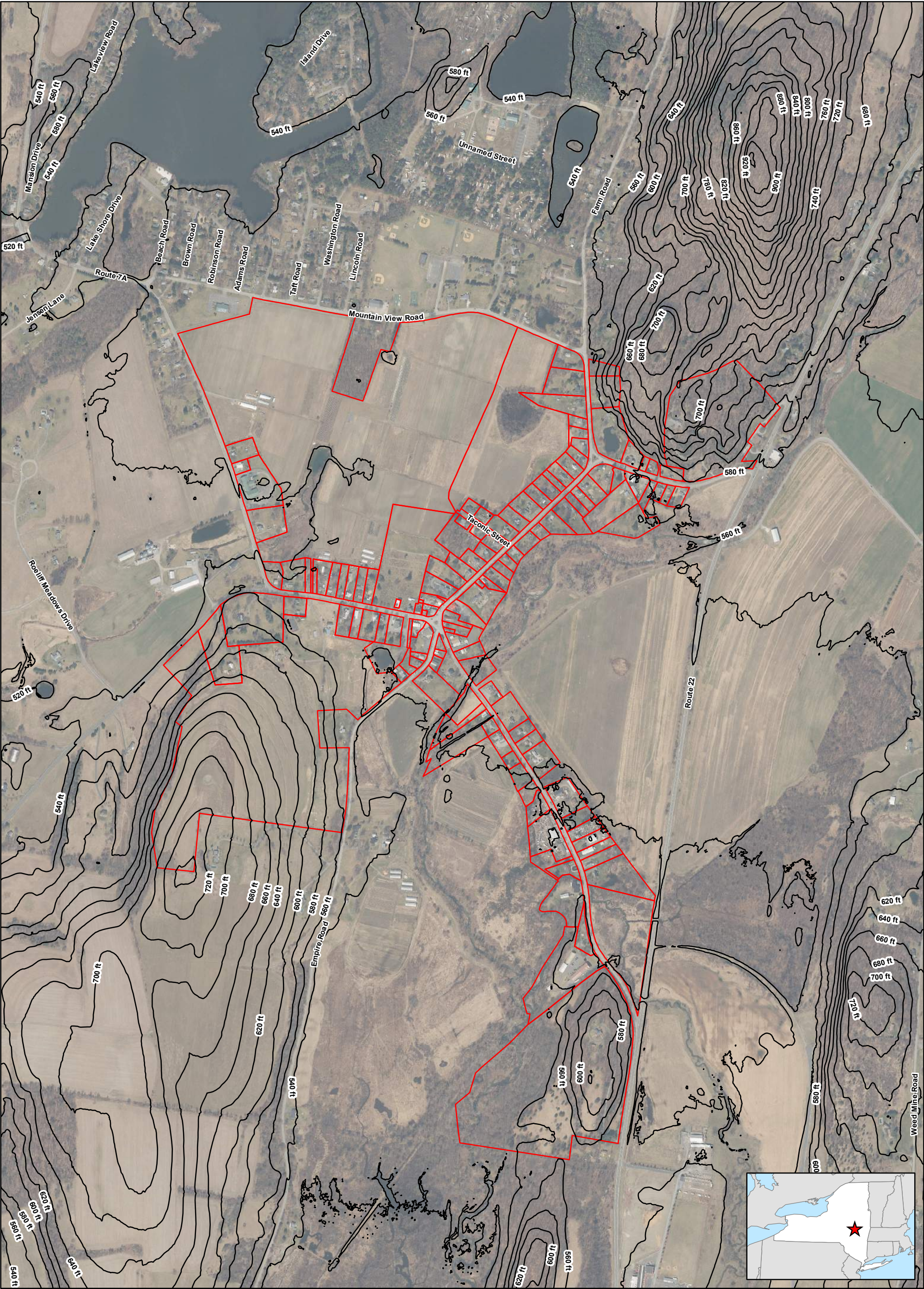


**FIGURE A.2**  
**Soil Types and Restrictive Layers**

Town of Copake  
Wastewater Feasibility Study

June 2022





**LEGEND**

- 20-foot Contour
- Approximate Study Area

**Tighe&Bond**

Ortho provided by dhses.ny.gov (2021).  
Contours and DEM downloaded from Columbia  
County Geo-Data website.

1:9,600  
0 400 800  
Feet

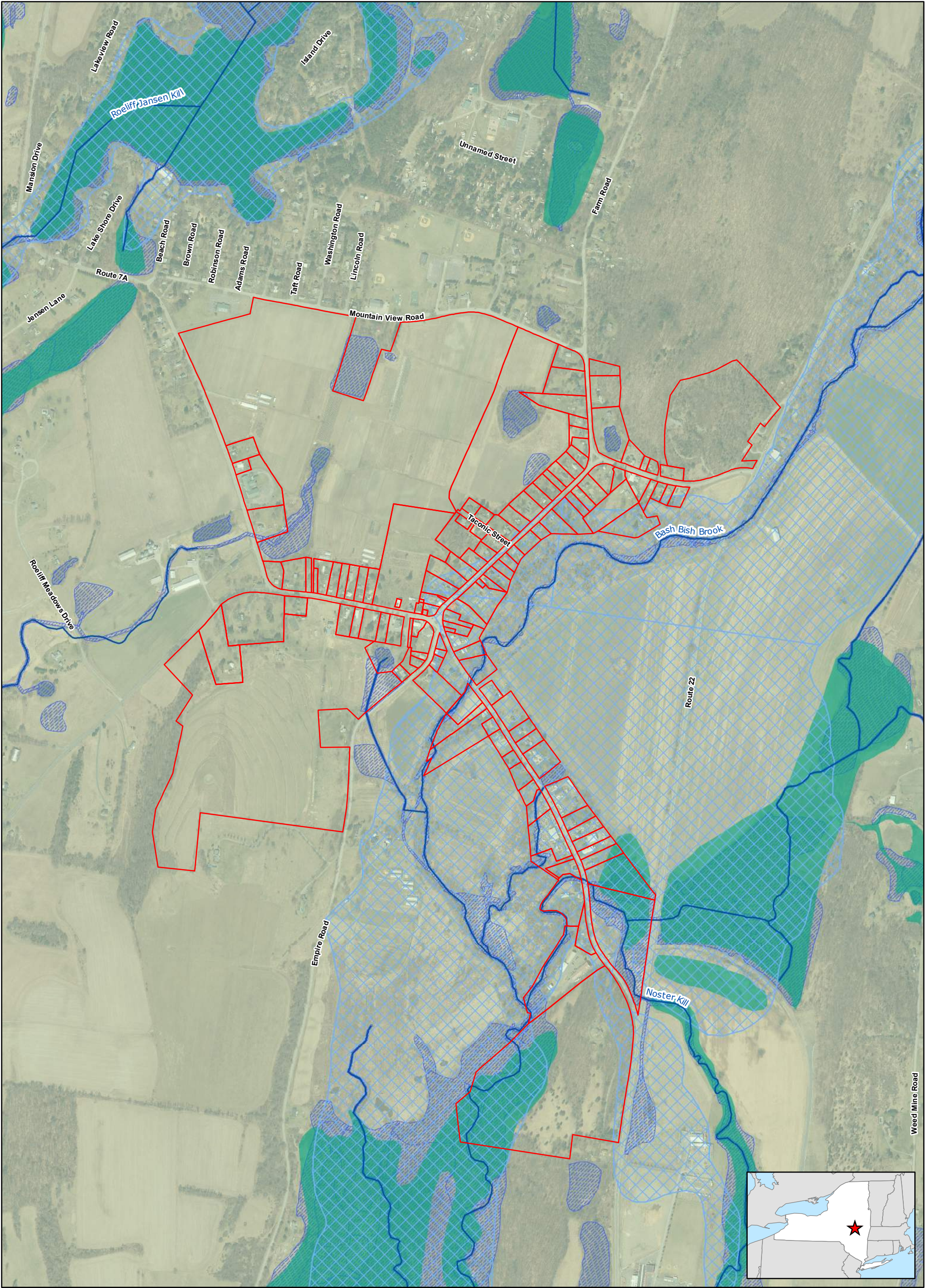


**FIGURE A.3  
Topography**

Town of Copake  
Wastewater Feasibility Study

June 2022



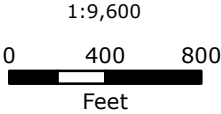


**LEGEND**

- Stream
- 100 Year Flood Zone
- NWI Wetland
- NYS DEC Wetland
- Mid Atlantic Watershed Region
- Approximate Study Area

**Tighe&Bond**

Ortho provided by dhses.ny.gov (2021).  
Columbia County resource data provided  
by Columbia County Planning Department,  
from Columbia County Geo-Data website.

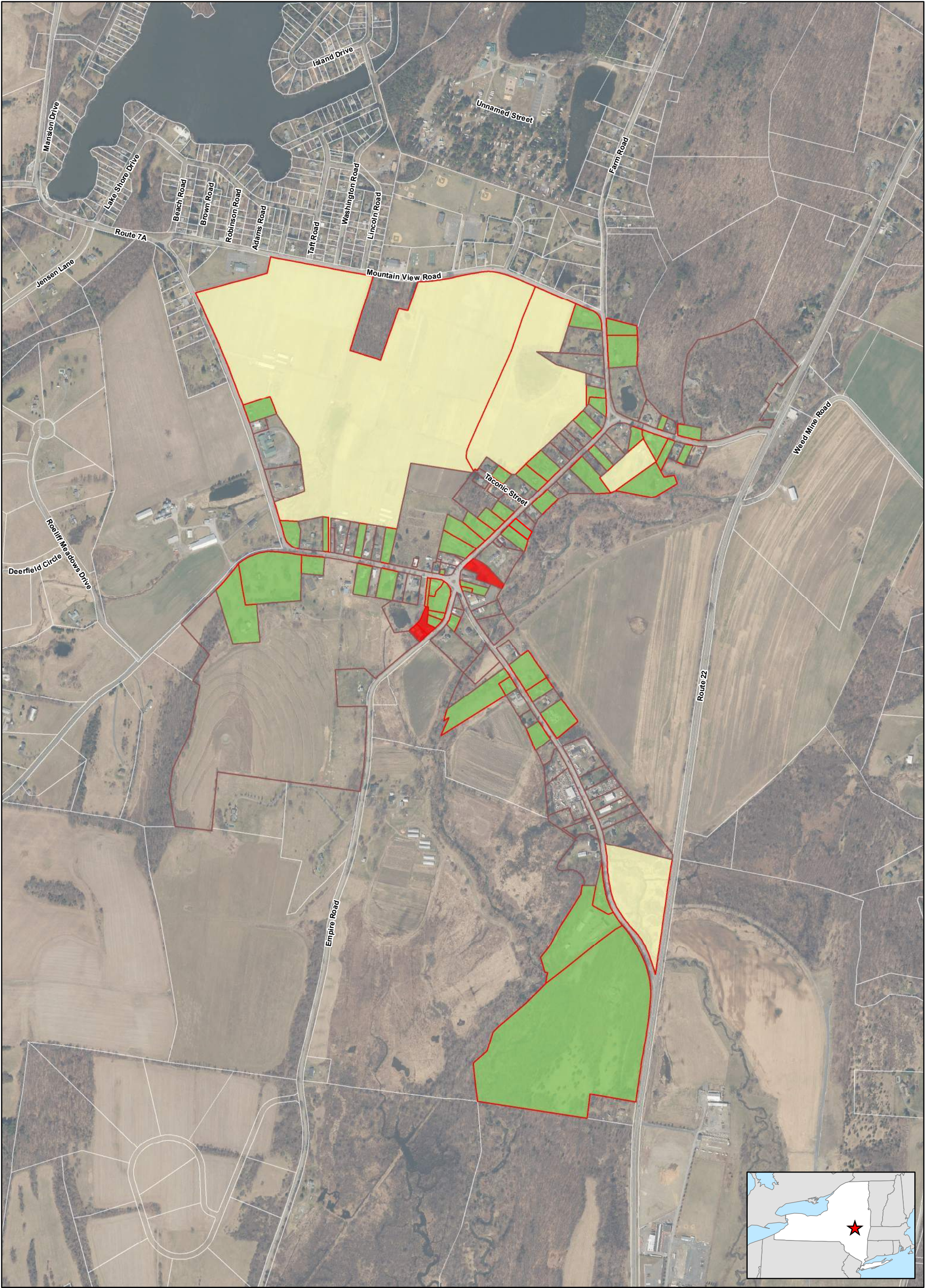


**FIGURE A.4  
Hydrography**

Town of Copake  
Wastewater Feasibility Study

June 2022





LEGEND

- Reported Septic Issues
- No Reported Septic Issues
- Not Sure/Did Not Respond to Question
- Did Not Submit Survey
- Approximate Study Area

Tighe&Bond

Ortho provided by dhses.ny.gov (2021).  
Columbia County Parcels provided by Columbia County  
Real Property Tax Service & Columbia County  
Planning Department.

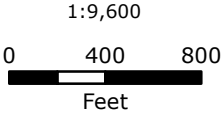
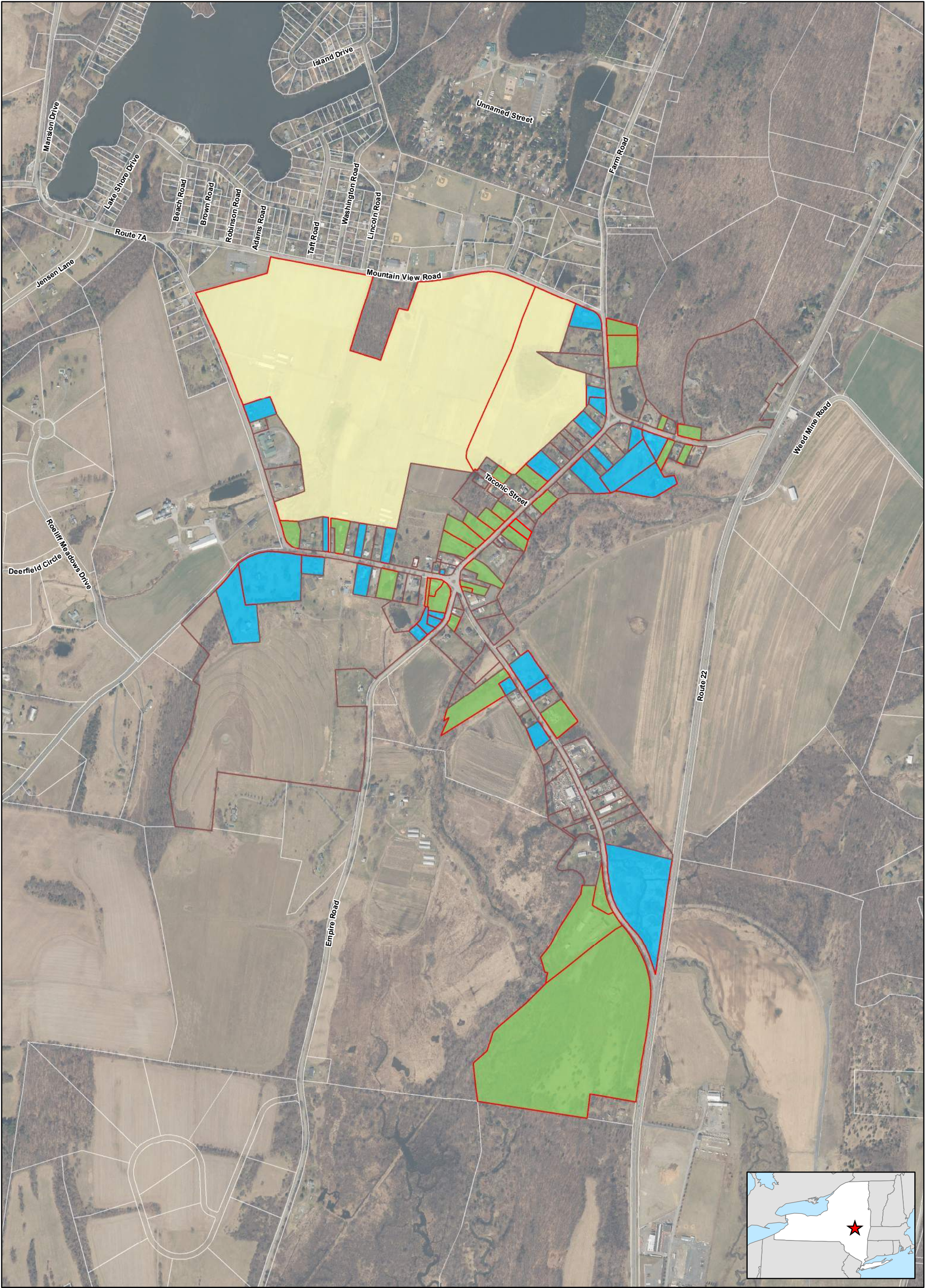


FIGURE A.5  
Reported Septic Problems

Town of Copake  
Wastewater Feasibility Study

June 2022



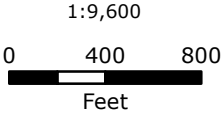


**LEGEND**

- Reported Flooding Issues
- No Reported Flooding Issues
- Not Sure/Did Not Respond to Question
- Did Not Submit Survey
- Approximate Study Area

**Tighe&Bond**

Ortho provided by dhes.ny.gov (2021).  
Columbia County Parcels provided by Columbia County  
Real Property Tax Service & Columbia County  
Planning Department.

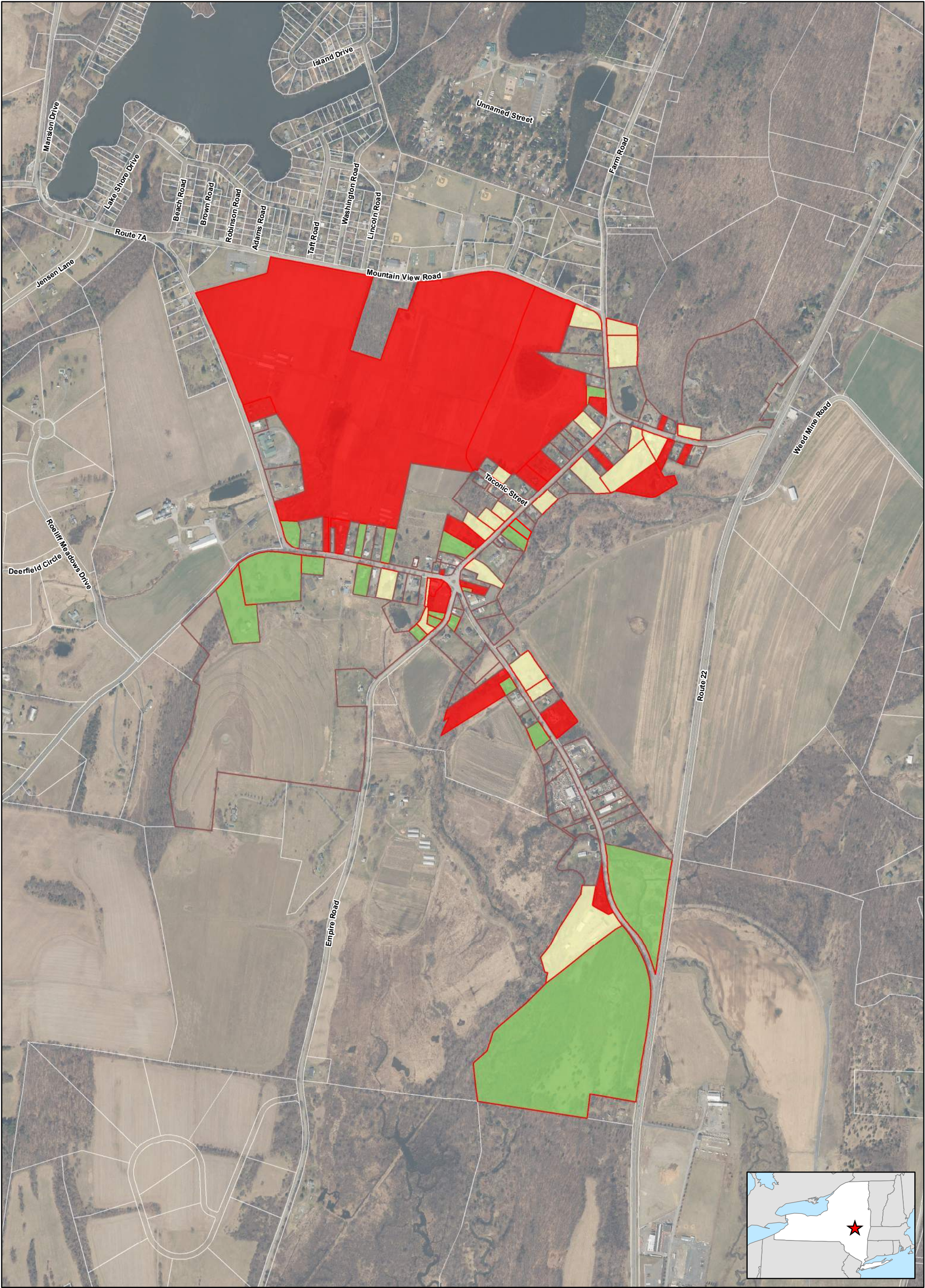


**FIGURE A.6**  
**Reported Flooding Problems**

Town of Copake  
Wastewater Feasibility Study

June 2022





LEGEND

- Interested in Connecting
- Not Interested in Connecting
- Not Sure/Did Not Respond to Question
- Did Not Submit Survey
- Approximate Study Area

Tighe&Bond

Ortho provided by dhses.ny.gov (2021).  
Columbia County Parcels provided by Columbia County  
Real Property Tax Service & Columbia County  
Planning Department.

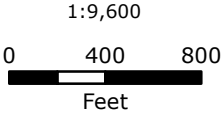
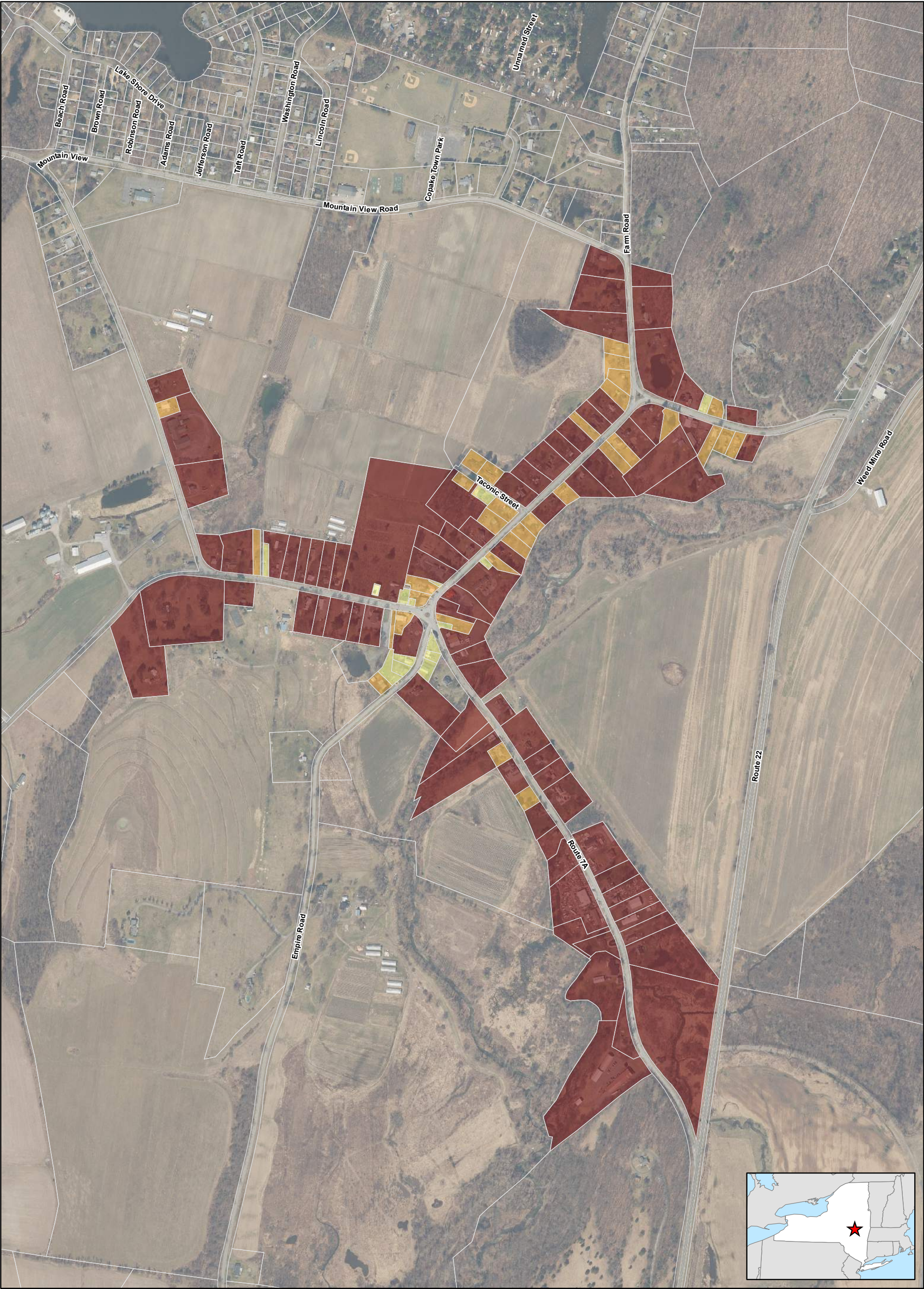


FIGURE A.7  
Parcels Interested in Connecting  
to Municipal System

Town of Copake  
Wastewater Feasibility Study

June 2022



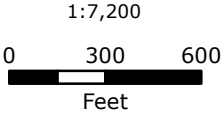


**LEGEND**

- Acres**
- < 0.25 AC
  - 0.25 AC - 0.5 AC
  - > 0.50 AC
  - Approximate Parcel Boundary



Ortho provided by dhes.ny.gov (2021).  
Columbia County Parcels provided by Columbia County  
Real Property Tax Service & Columbia County  
Planning Department.

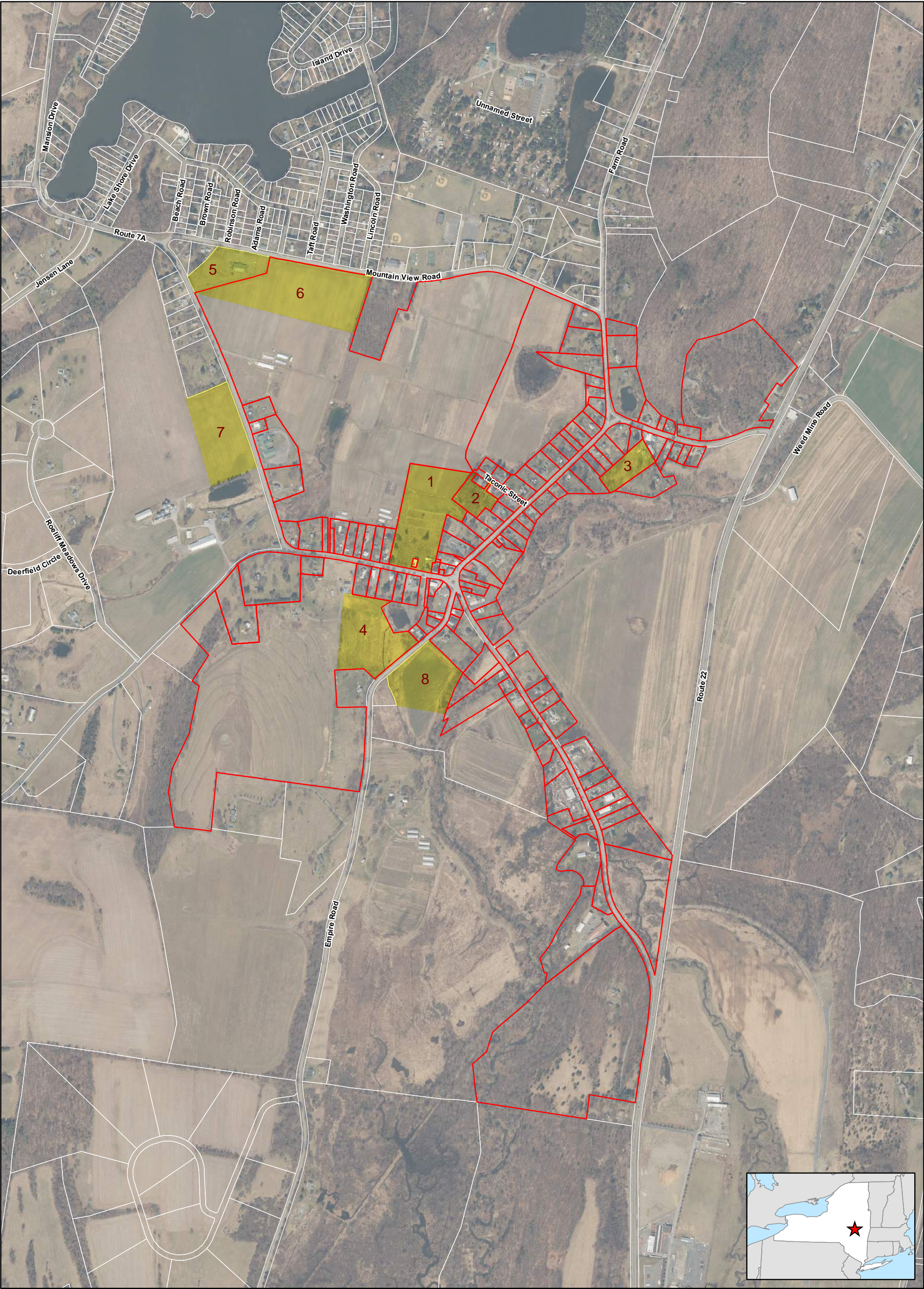


**FIGURE A.8**  
**Small Parcels**

Town of Copake  
Wastewater Feasibility Study

June 2022





LEGEND

- Approximate Study Area
- Potential Location

Tighe&Bond

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Columbia County Parcels provided by Columbia County  
Real Property Tax Service & Columbia County  
Planning Department.

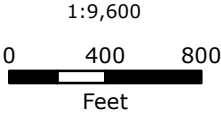
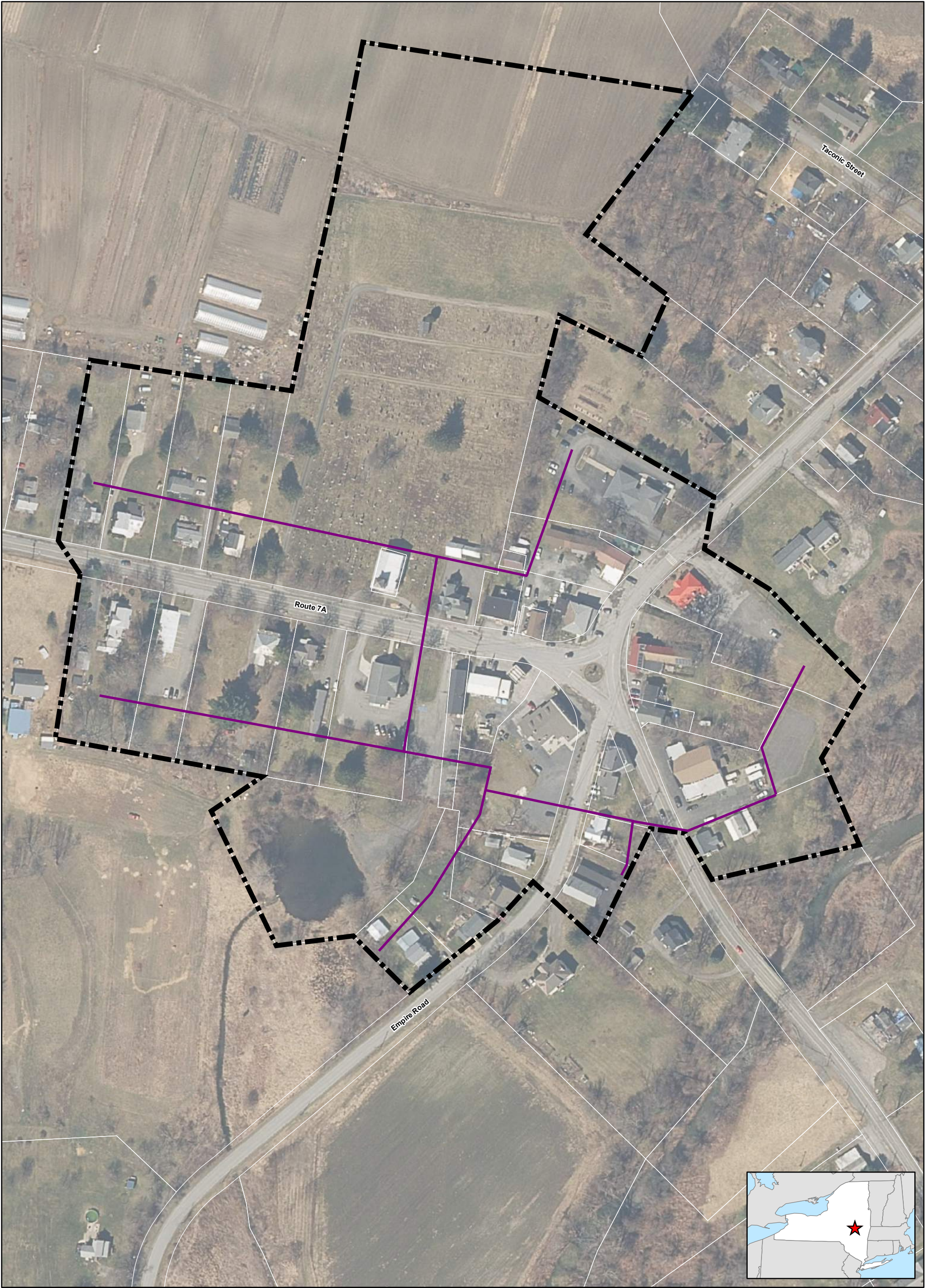


FIGURE A.9  
Potential Locations




Town of Copake  
Wastewater Feasibility Study

June 2022



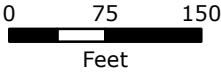


**LEGEND**

-  Approximate Parcel Boundary
-  Sewer District
-  Sewer Main



Ortho provided by dhses.ny.gov (2021).  
Columbia County Parcels provided by Columbia County  
Real Property Tax Service & Columbia County  
Planning Department.



**FIGURE A.10**  
**Preliminary Collection System Layout**

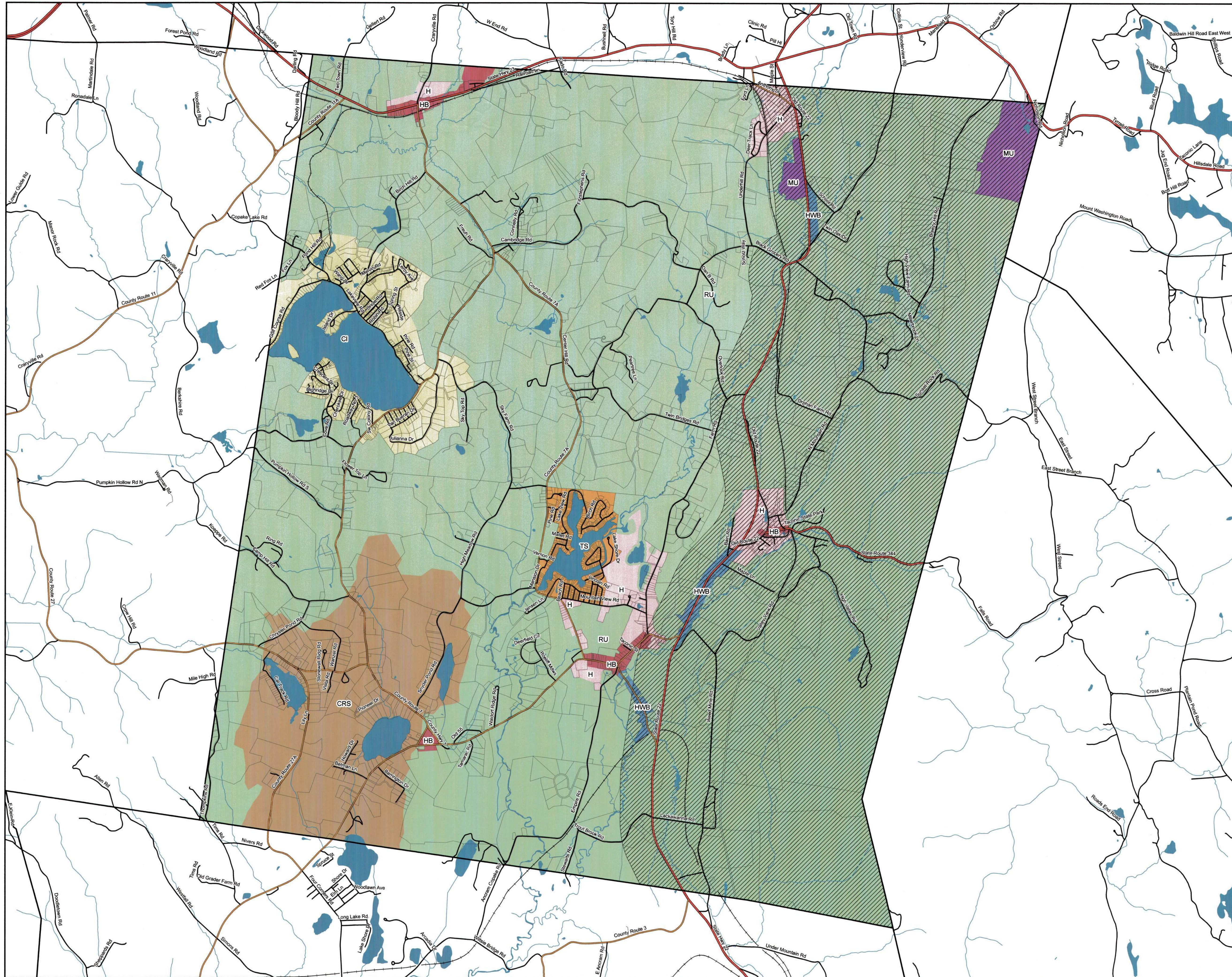
Town of Copake  
Wastewater Feasibility Study

June 2022









# Town of Copake

## Columbia County, NY

### Conceptual Zoning Districts

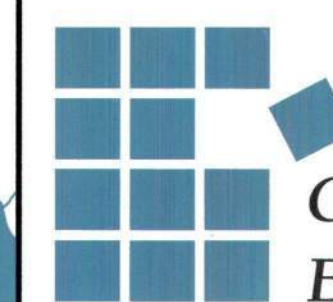
#### Version 8

7-4-2017

- Property Boundaries
- Railroads (abandoned)
- Water
- Streams
- Zoning Draft District Changes - v8
  - RU - Agriculture and Rural Residential
  - H - Hamlet
  - HB - Hamlet Business
  - CL - Copake Lake
  - TS - Taconnic Shores
  - CRS - Chrysler Rhoda Snyder Pond
  - HWB - Highway Business
  - MU - Mixed Use
- SCOZ - Scenic Overlay Zone

Map Date:  
7-4-2017

0 0.25 0.5 1 1.5 Miles



Community Planning &  
Environmental Associates

Nan Stolzenburg, AICP - [www.planningbetterplaces.com](http://www.planningbetterplaces.com)  
152 Stolzenburg Road, Berne, NY 12023  
Don Meltz, Planning and GIS - [www.donmeltz.com](http://www.donmeltz.com)





## Town of Copake Hamlet Water Condition Survey

Name of Property Owner: \_\_\_\_\_

Tax Parcel ID #: (Appears on your address label) \_\_\_\_\_

Property Location in Copake Hamlet: \_\_\_\_\_  
>PLEASE COMPLETE A SEPARATE SURVEY FOR EACH PROPERTY YOU OWN IN THE HAMLET.<

Your Property Type of Use:

\_\_\_\_ Single Family Residential    \_\_\_\_ Multi-Family/Apartment    \_\_\_\_ Commercial/Institutional  
\_\_\_\_ Vacant Land    \_\_\_\_ Other, please describe: \_\_\_\_\_

If Single Family Residential: How many bedrooms do you have? \_\_\_\_\_

If Multi-Family/Apartment: How many units are in the building(s)? \_\_\_\_\_

How many bedrooms in each unit?

Unit # 1 \_\_\_\_ Unit #2 \_\_\_\_ Unit #3 \_\_\_\_ Unit #4 \_\_\_\_ Unit #5 \_\_\_\_ Unit #6 \_\_\_\_ Unit #7 \_\_\_\_ Unit #8 \_\_\_\_

Additional Units: \_\_\_\_\_

If Commercial/Institutional:

____ Church	# of seats _____
____ Office, Bank, Store or Retail Business	# of employees _____
____ Motel, Hotel, Inn	# of rooms _____
____ Service station, Garage or Convenience Store	# of toilets _____
____ Restaurant or Bar	# of seats _____

How many wells do you have? \_\_\_\_\_

How deep is the well? \_\_\_\_\_ feet (\_\_\_\_ I don't know). Drilled? \_\_\_\_ Or Driven Point? \_\_\_\_

Do you have any problems with water quality? Please describe: \_\_\_\_\_

What type of wastewater system do you have (check all that apply)?

What is the maximum capacity, if you know:

Septic tank	Capacity _____	Don't know ____
Leach Field/ Drain Field	Capacity _____	Don't know ____
Seepage Pit	Capacity _____	Don't know ____
Cesspool	Capacity _____	Don't know ____
Holding tank	Capacity _____	Don't know ____

How old is your system? \_\_\_\_ years. How often do you pump it out? Every \_\_\_\_ years.

*Survey continues next page —>*

What is your septic tank made of? Concrete\_\_ Plastic \_\_ Metal \_\_ Fiberglass \_\_ Unknown \_\_

Do you have any problems with your system? Yes \_\_\_\_ No \_\_\_\_

If yes, check all that apply:

Odor \_\_ Sewage in basement \_\_ System drains slowly \_\_ Sewage surfaces on lawn \_\_

Backs up into house \_\_ Other \_\_\_\_\_

Do you experience any issues with flooding? Yes \_\_\_\_ No \_\_\_\_

Explain: \_\_\_\_\_

Do you have a sump pump in your basement? Yes \_\_\_\_ No \_\_\_\_

If yes, how often does it run? \_\_\_\_\_

Has your use of your property, or the function, expansion or capability of your business been affected by water problems or septic system limitations? Yes \_\_\_\_ No \_\_\_\_ Not sure \_\_\_\_

Are you aware of any water source problems or septic disposal problems elsewhere in the hamlet?

Yes \_\_\_\_ No \_\_\_\_ Not sure \_\_\_\_

If you answered yes, where? \_\_\_\_\_

What do you think the Town should be doing to improve water or septic issues in the Hamlet?

\_\_\_\_\_

Would you be interested in connecting to a municipal water or sewer system if it was available in the hamlet? Yes \_\_\_\_ No \_\_\_\_ Not sure \_\_\_\_

Additional thoughts or comments?

**THANK YOU!**

*End of Survey*

*Return Survey to Town Clerk, Town of Copake, 230 Mountain View Rd, Copake, NY 12516*

Summary of Water Condition Survey Responses

Res pon se #	Tax Map No.	Location	Property Owner	Property Type of Use	How many wells?	Depth of Well	Type of Well?	Problems with water quality?	Problems with water quality?	Type of Waste System	Capacity	How old is system	How often do you pump	Septic Tank is made of...?	Septic problems?	What kind of problem?	Any Flooding issues?	Explain Flooding	Sump Pump?	Sump Pump?	How Often Pump Runs?	Property Use affected?	Water/Septic problems elsewhere?	Water/Septic problems elsewhere?	Interested in connecting to Municipal system?	Building Type
				SFR, MFA, CI, VL, Other	#	# Feet/DK	Drilled, Point	Y/N	Comments	ST, LF, SP, C, HT	# Gallons	# Years	Every # Years	C, P, M, F, DK	Y/N	Comment	Y/N	Comment	Y/N	Additional Comments	Comment	Y/N/DK		Comment	Y/N/DK	
1	176.3-4-49.200	358 Mountain View Rd	Erasme Mercado & Betsabe Sontos	SFR	1	DK		N		DK				DK	N		Y	Basement floods	Y			DK	N		DK	Residential
2	176.3-4-49.100	29 Farm Rd	Peter N Fritsch																							Residential
3	176.3-4-50	25 Farm Rd	Glenn & Kellie Hamm																							Residential
4	176.3-4-52	17 Farm Rd	Ruth C Wittlinger																							Residential
5	176.3-4-53	13 Farm Rd	Gesue Corretti & Shawn McClain	SFR	1	20'	Point	Y	sulfur	ST, LF	1000	DK	6 yrs	C	N		Y	2 x in 10 yrs	Y		only major storms	N	N		Y	Residential
6	176.3-4-54	7 Farm Rd	Susan Yung-Kettler	SFR	1	40'	Drilled	N		ST, LF	1000	1 yr	5 yrs	C	N		Y	Basement floods	Y		Intermittent	N	N		N	Residential
7	176.3-4-55	3 Farm Rd	Kenneth Covino																							Residential
8	176.3-4-56	243 County Route 7A	Grant & Melissa Hermans	SFR	1	DK	Drilled	N		ST	DK	DK		DK	N		Y	Basement flood under severe	Y		During severe weather	N	N		DK	Residential
9	176.3-4-57	237 County Route 7A	Steven Rose 237 LLC																							Residential
10	176.3-4-58	235 County Route 7A	Killian & Melissa																							Residential
11	176.3-4-59	231 County Route 7A	Steven & Patrick																							Residential
12	176.3-4-60	219 County Route 7A	Mary, Gregory & Bruce Allen																							Residential
13	176.3-4-61	217 County Route 7A	Jason Oehl & Rebekah Sackett-Oehl	SFR	1	DK		N		ST LF			5 Yrs	DK	N		Y	When sump pump stopped working	Y		When a lot of rain	N	DK		N	Residential
14	176.3-4-62	213 County Route 7A	Letha Oulton	SFR	1	50'	Drilled	N		ST, LF		10 yrs		M	N		N		Y		Hourly	N	N		N	Residential
15	176.3-4-65	209 County Route 7A	William & Bernice O'Connell																							Residential
16	176.3-4-64	2 Taconic St	Nancy Benansky	SFR	1	57'?	Drilled	Y	Iron	ST LF	DK	16 Yrs	2 Yrs	C	N		N		Y		N	DK		DK		Residential
17	176.3-4-63	19 Taconic St	Donald Colgan, Jr																							Residential
18	187.1-1-27	Taconic St	Lindy & Jane Miller																							Vacant Land
19	187.1-1-31	17 Taconic St	Kenneth & Dianne Roberts																							Residential
20	187.1-1-30	13 Taconic St	Gary Mastropolo																							Residential
21	187.1-1-29	203 County Route 7A	AMH Enterprise, LLC																							Residential
22	187.1-1-28	199 County Route 7A	Patrick Austin & Saadia Khalid	SFR	1	43'	Drilled	Y	sediment	ST				C	N		N		N			N	N		DK	Residential
23	187.1-1-26	193 County Route 7A	Barbara Ross	SFR	1	110 ft	Drilled	Y	sulfur	ST LF	1000	1 year	New system	C	N		N		N			N	N		DK	Residential
24	187.1-1-25	189 County Route 7A	Justin Kernan	SFR	1	DK		Y	sulfur	ST LF	1K CC	1		C	N		N		N				N		DK	Residential
25	187.1-1-24	185 County Route 7A	Matthew Cain	SFR	1	125 ft	Drilled	N		ST, LF	DK	5 yrs	2 yrs	C	N		N		N			N	N		N	Residential
26	187.1-1-23	179 County Route 7A	Black Point Associates LLC	CI	1	DK	Drilled	Y	brown color	ST	1000	10 yrs	2 yrs	C	N		N		N			N	N		Y	Commercial
27	187.1-1-22	County Route 7A	Linda's																							Commercial
28	187.1-1-21	69 Main St	Hudson Phoenix Mgmt. Corp																							Commercial
29	187.1-1-19	179 County Route 7A	Copake Country General Storee																							Commercial
30	187.1-1-18	1679 County Route 7A	George & Kendra Gelsler	Other	1	DK	DK	N		DK		20 yrs	3 yrs	C	N		Y	Basement floods 2 x ea yr	N			N	N		N	Commercial
31	187.1-1-17	County Route 7A	Church Street Deli & Ellen Valden																							Commercial
32	187.1-1-20	County Route 7A	DH Valden Holdings																							Commercial
33	187.1-1-15	County Route 7A	Copake Cemetery Association																							Commercial
34	187.1-1-14	County Route 7A	Methodist Church																							Commercial
35	187.1-1-13	1657 County Route 7A	Margaret Haas	SFR	1	DK	Point	Y	Nitrates	ST, LF	1000	1 yr	5 yrs	C	N		Y	Basement flood 1x ea year	Y		3-4 weeks in summer	N	Y	many basements flood	Y	Residential
36	187.1-1-12	1655 County Route	Robert & Mary																							Residential
37	187.1-1-11	1649 County Route	Farmland Renewal LLC																							Residential
38	187.1-1-8	1647 County Route 7A	Daniel Schorr & Ellen Barker	SFR	1	DK	DK	Y	sulfur	DK		1 yr		DK	N		Y	Basement flood	Y		Constantly	DK	N		Y	Residential
39	187.1-1-7	1643 County Route 7A	James & Charlene Bocchino																							Residential
40	187.1-1-5	1639 County Route	Farmland Renewal LLC	Farmland	2	150 feet	Drilled	N		None							N		N			N	N		N	Residential
41	187.1-1-4	1637 County Route	Methodist Parsonage																							Residential
42	187.1-1-3	1635 County Route 7A	Joseph Ary	SFR	1	40'	Drilled	N		ST, LF	1000	40 yrs	5 yrs	C	N		Y	Basement water	Y		Last year, first time	N	N		N	Residential
43	187.1-1-2	1629 County Route	Erica Brown																							Residential
44	187.1-1-1	1623 County Route	John Mark Schmearer	SFR	1	DK	Drilled	N		ST, LF	250?	DK	1 yr	C	N		N		Y		Never	N	N		Y	Residential
45	176.3-4-13	372 Center Hill Rd	Otto Maier																							Residential
46	176.3-4-12	390 Center Hill Rd	Copake Fire District																							Commercial
47	176.3-4-11	398 Center Hill Rd	Charlene Grant LaPorta & Amanda																							Residential
48	176.3-4-48.112	402 Center Hill Rd	Ernesto & Delfine Iturralde	SFR	1	DK	Drilled	Y	Hard water, iron stains	ST	DK	DK	1 year	C	N		Y	Poor drainage	Y		Continuous during rains	Y	Y	street flooding	N	Residential
49	187.-1-2.200	1600 County Route 7A	Andrew Scecina	SFR	1	DK		N		ST, LF	DK	35 yrs	5 yrs	C	N		Y	Water leaks into basement	N			N	N		Y	Residential
50	187.1-1-62	1626 County Route 7A	Marc & Karen Agnifilo	SFR	1	DK		Y	bacteria infection	ST, LF	DK	DK	5 yrs	DK	N		Y	Occasional water in basement	N			Y	N		Y	Residential
51	187.-1-2.112	1628 County Route 7A	Margaret Anderson	SFR		1 DK	DK	Y	won't drink water	LF		DK			N		Y	Basement flooded several yrs ago	Y		Always in Spring	N	DK		Y	Residential
52	187.-1-2.111	1630 County Route 7A	Farm Preservation New York																							Commercial
53	187.1-1-61	1652 County Route 7A	Paul Crayton	SFR		1 DK	DK			ST	DK	DK	4 yrs	C	N		Y	Basement floods occasionally	Y		Occasionally	N	N		Y	Residential



54	187.1-1-60	1656 County Route	Harry H Hill Jr. Est.																							Commercial			
55	187.1-1-59	1662 County Route 7A	Paul & Margaret Saccoccio	MFA	1		DK	Point			ST (2 of them)		5 yrs			DK	N		N		Y				DK	N		DK	Residential
56	187.1-1-57	1668 County Route	Donna Peck																										Commercial
57	187.1-1-56	1674 County Route 7A	CoreLogic Commercial Tax Serv																										Commercial
58	187.1-1-53	1678 County Route	Fat Nell, LLC	CI	1		150'	Drilled	N		ST LF	1000	40	2 yrs		C	N		N		N				N	N		DK	Commercial
59	187.1-1-52	1680 County Route	Dev Quick Stops Inc.	CI	1		30'	Drilled	N		ST	1000	20 yrs	2 yrs		C	N		N		N				N	N		N	Commercial
60	187.1-1-51	1682 County Route	Rubin Quick Stops Inc.	CI	1		35'	Drilled	N		ST, LF	4000 (4x1000)	5 yrs	As needed		C	N		N		N				N	N		N	Commercial
61	187.1-1-63	627 Empire Rd	Rosa & Fidel Lazcano	SFR	1		DK		Y	Sulfur smell, brown color	ST HT		DK	5 Yrs		C	N		Y	Last year	Y			only when flooding	Y	N		Y	Residential
62	187.1-1-64	625 Empire Rd	Carl Gallagher	SFR	1		15 ft	Point	N		ST, LF	500	DK	2 Yrs		C	N		Y	Big rain, melt, basement floods	Y			2x per day in fall, not now	Y	N		Y	Residential
63	187.1-1-65	623 Empire Rd	Michael Weaver & Heather Thyberg	SFR	1		DK	Point	N		ST, LF	300	DK	1 year		DK	Y	When floods, toilet backs up	Y	Fire pond overflows into yard	Y			90 percent of time	N	Y	Neighbors also have flooding	DK	Residential
64	187.1-1-66	617 Empire Rd	Wayne & Francene Miller	SFR	1		DK	Point	Y	yellow color, iron	ST, LF	1000	7 years	3 years		C	Y	Field gets flooded	Y	Street drainage flooding into yard	Y	2 Pumps	When road flooded	Y	Y	Frequent flooding Empire Rd, hamlet center	Y		Residential
65	187.1-1-68	624 Empire Rd	624 Empire LLC																										Residential
66	187.1-1-48	628 Empire Rd	Copake Grange 935	CI	1		DK	Point	Y	chemical quality, oil	ST, LF	DK	DK	DK		DK	N		N		N			Y			Y		Commercial
67	187.1-1-49	630 Empire Rd	Rosa & Fidel Lazcano																										Residential
68	187.1-1-50	County Route 7A	CHAP Managemarket, Inc.																										Commercial
69	187.1-1-40.200	151 County Route 7A	Copake Creek Apartments																										Residential
70	187.1-1-70	County Route 7A	Copake VFW Post 7955																										Vacant Land
71	187.1-1-69	County Route 7A	Copake VFW Post 7955																										Vacant Land
72	187.1-2-1	County Route 7A	The Copake Laundromat, LLC	CI	1		DK	DK			ST LF	DK	DK	2 yrs		C	N		N		N				N	N		N	Commercial
73	187.1-2-2	125 County Route 7A	Linda & Eugene Funk	SFR	1		65 ft		Y	lime & iron	ST	1000	70 yrs	5 yrs		C	N		Y	Basement floods when rains 2 days	Y			When it rains	Y	Y	Neighboring property floods yard	Y	Residential
74	187.1-2-3	115 County Route 7A	New York Consolidated																										Commercial
75	187.1-2-4	109 County Route 7A	Cupcake Falls, LLC																										Residential
76	187.1-2-5	107 County Route 7A	Gregory & Mioara Larson	SFR	1		DK	DK	N		ST	DK	DK	3 yrs		C	N		Y	Basement floods	Y			Constantly	N	N		Y	Residential
77	187.1-2-23	99 County Route 7A	Margaret & John Lampman																										Residential
78	187.1-2-6	County Route 7A	James Walton																										Vacant Land
79	187.1-2-7.200	81 County Route 7A	James Walton																										Commercial
80	187.1-2-7.100	67 County Route 7A	James Walton																										Vacant Land
81	187.1-2-8	67 County Route 7A	James Walton																										Residential
82	187.1-2-9	55 County Route 7A	Scott Terwilliger																										Residential
83	187.1-2-10.220	37 County Route 7A	Carrie Stallman	SFR	1		60'	Drilled	N		DK	DK	25 yrs	2 yrs		C	N		N		N				N	N		N	Residential
84	187.1-2-10.210	31 County Route 7A	High Voltage Inc.	CI	2		DK		N		ST, LF (bio chamber)	1000	16 yrs	8 yrs		C	N		N		N				N	N		DK	Commercial
85	187.-1-12	7651 State Route 22	George & Tiziana Pieraccini	SFR	1		400'	Drilled	N		ST, LF	DK	15 yrs			C	N		N		N				N	N		Y	Residential
86	187.1-2-10.100	County Route 7A	Stephanie Sharp	VL	0						None								Y	wetland beaver dams					DK			Y	Commercial
87	187.1-2-11	62 County Route 7A	Jenna Limoges																										Residential
88	187.1-2-12	66 County Route 7A	James Walton																										Residential
89	187.1-2-13	70 County Route 7A	Lawrence & Linda Eckler																										Commercial
90	187.1-2-14	County Route 7A	Lawrence & Linda Eckler																										Commercial
91	187.1-2-15	78 County Route 7A	Michael Lindig																										Commercial
92	187.1-2-16	82 County Route 7A	James Walton																										Residential
93	187.1-2-17	County Route 7A	James Walton																										Commercial
94	187.1-2-19	110 County Route 7A	Alan & Kathy Friedman	SFR		3	3-5 ft	2 Drilled, 1 Point	N		ST LF	1000	11 yrs	4 yrs		C	N		N		Y			Not often	N	Y	failed septic at 114 C.R. 7A	N	Residential
95	187.1-2-20	114 County Route 7A	US Bank National Association																										Residential
96	187.1-2-21	120 County Route 7A	Darren & Drew Blanchard	SFR	1		DK	Point	N		ST		70 yrs	8 yrs		DK	N		Y	Basement floods with heavy rain	Y			Depends on rain	Y	N		DK	Residential
97	187.1-2-22	124 County Route 7A	Lorraine Gray	SFR	1		DK	DK	Y	iron	ST	DK	7 yrs	2 yrs		DK	N		Y	Basement floods with heavy rain	Y			When rains heavily	N	N		DK	Residential
98	187.1-1-71	138 County Route 7A	Jamie Lee Walton																										Commercial
99	187.1-1-46	County Route 7A	K&S Associates, Sullivan Annette																										Vacant Land
100	187.1-1-45	156 County Route 7A	Michael Palinkas																										Residential
101	187.1-1-44	160 County Route 7A	Albert Picarello																										Commercial
102	187.1-1-43	168 County Route 7A	Brandon Lentine & Matthew Bevilacqua	MFA	1		DK	Drilled	Y	sediment	DK	DK	DK	2 yrs		DK	N		N		N				DK	DK		Y	Residential
103	187.1-1-42	168 County Route 7A	EB5 LLC	MFA	1		DK		N		DK	DK	DK	DK		DK	N		N		N				N	N		N	Residential
104	187.1-1-41	170 County Route 7A	Copake Inn																										Commercial

105	187.1-1-40.100	178 County Route 7A	Brian Peacock	CI	1		DK	Drilled						ST, LF	3000	7 yrs			C	Y		Oder	N			N				N	DK		DK	Commercial
106	187.1-1-40.200	186 County Route 7A	Copake Creek Apartments																														Residential	
107	187.1-1-39	190 County Route 7A	Howard Wisell																														Residential	
108	187.1-1-38	192 County Route 7A	Paul & Tina Nelson Dellea																														Residential	
109	187.1-1-37	194 County Route 7A	Carl German & Fred Nachbaur	SFR	1			Point	N			12 yrs	DK	DK	N			N			Y				Infrequently	N		DK	Not sure	Y		Residential		
110	187.1-1-36	200 County Route 7A	Peter Kelly																														Vacant Land	
111	187.1-1-35	200 County Route 7A	Amanda Pickering & Erin Shaw																														Residential	
112	187.1-1-34	206 County Route 7A	Joshua Miller & Lauren Avenia																														Residential	
113	187.1-1-33	214 County Route 7A	Keith & Charlotte Smith Irrevocable	SFR	1		DK	Point	N		ST CS	50 yrs	2 yrs	DK	N			N			Y				DK	N		N					Residential	
114	187.1-1-32	218 County Route 7A	Richard & Elizabeth Williams																														Residential	
115	176.3-4-66	224 County Route 7A	Alan Murray & Marcelo Jara																														Residential	
116	176.3-4-67	232 County Route 7A	Fallon Family Trust	SFR	1		200 ft?	Drilled	N		ST LF	30 yrs	3 yrs	C	N			Y		Creek floods	N					N					DK		Residential	
117	176.3-4-68	236 County Route 7A	Daniel & Claudia Garcia																														Residential	
118	176.3-4-69	238 County Route 7A	Patricia Stickle & Amy Banks	SFR	1			Point	N		ST LF	10 yrs	2 yrs	C	N			Y		Basement floods sometimes	Y					N		N			N		Residential	
119	176.3-4-70	242 County Route 7A	Melissa Klay																														Residential	
120	176.3-4-71	254 County Route 7A	Philip Gellert																														Residential	
121	176.-1-60.100	260 County Route 7A	Raymond Doherty	SFR	1		75 ft	Drilled	Y	iron	ST LF	DK	DK	2 yrs	DK	N			Y		Storm water runoff into yard	Y		Use portable pump		Y		Y		neighbors have storm water poor road drainage creek	DK		Residential	
122	176.-1-62	266 County Route 7A	Fallon Family Trust	SFR & CI	1		180'	Drilled	N		ST LF	DK	35 yrs	2 yrs	C	N			Y		Creek floods	Y			During storms	Y		Y				DK	Commercial	
123	176.-1-60.200	County Route 7A (off)	Fallon Family Trust	VL	1		DK	Point	N		None								y		Creek floods	N					Y					DK	Commercial	
124	176.-1-65	272 County Route 7A	Leonard, Donald & Rene Fournier	SFR	1		DK	Drilled	N		ST LF	1000	30 Yrs	6 Yrs	C	N			N			Y				N		DK			N		Residential	
125	176.-1-61	264 County Route 7A	Michael & Marilyn Wiener	SFR	1		60'	Drilled			DK	DK	DK	DK	DK	N			Y		during Hurricane Irene	Y			Never	N		DK			N		Residential	
126	176.-1-66	276 County Route 7A	Scott Chwalek																														Residential	
127	176.-1-67	280 County Route 7A	Robert & Jacquelyn Dextraze	SFR	1		120'	Drilled	N		ST, LF	1000	18 yrs	3 yrs	C	N			N			N				N		N			N		Residential	
128	176.-1-69	284 County Route 7A	May Paddock																														Residential	
129	176.-1-70	297 County Route 7A	Frank & Marcia Peteroy																														Residential	
130	176.-1-68	277 County Route 7A	Ellen Liebowitz	SFR	1		DK	Drilled	N		ST, LF	DK	5 yrs	5 yrs	C	N			N			Y			Once in 20 yrs	N		N			DK		Residential	
131	176.-1-64	269 County Route 7A	Geoffrey Liebowitz																														Residential	
132	176.-1-63	267 County Route 7A	John & Clarissa Moro	SFR	1		DK				ST, LF	DK						N			N					N		N			N		Residential	
133	176.-1-59	263 County Route 7A	Robert Haldane Inc.																														Commercial	
134	176.-1-58.100	261 Farm Rd	Steven & Susan Breyette																														Residential	
135	176.-1-57	26 Farm Road	Jeffrey Baker	SFR	1		DK	Drilled	N		ST	DK			DK	N			N							N		N				DK	Residential	
136	176.-1-56	Farm Road	Thomas Cinque	SFR	1		350'	Drilled	N		ST, LF	DK	52 yrs	3 yrs	C	N			N			Y			Once 40 yrs ago	N		DK			DK		Vacant Land	
137	176.3-4-48.111	Center Hill Road	Farmland Renewal LLC	VL	3		150 ft	Drilled	N		None															N		N			N		Vacant Land	
138	176.3-4-48.120	Mountain View Road	Farmland Renewal LLC	VL	3		150 ft	Drilled	N		None															N		N			N		Vacant Land	
139	187.1-1-36	200 County Route 7A	Peter T Kelly	VL	0				N		None								N			N				N		DK			Y		Residential	

## **COPAKE WASTEWATER SURVEY**

Comments Received as of June 7, 2022

### **Respondent #5**

[The Town should] Install Sewer and Water system! More important than a sewer system would be a water system.

### **Respondent #6**

The neighbors with shallow spike (Point?) wells may benefit from assistance to drill a well. Since my system is new would like to realize the value from that expenditure. Municipal system would be a large up front expense. Would like to hear about benefits. Would all be able to afford the operating expense?

### **Respondent #13**

Water and septic issues should be left to the homeowners, unless the town and or county has polluted the ground water in some way. Is the town aware of an issue that us homeowners should be aware of? [Would you be interested in connecting to...?] Absolutely NOT!!!

### **Respondent #22**

[Would you be interested in connecting to...?] depending on the cost / quality.

### **Respondent # 25**

Survey is good. Assuming there are issues, what are they? Lived 25 yrs in Copake. Not only does my system work great, I have not noticed any sewer odors in the hamlet (as opposed to Hillsdale in years past!) Homeowners and business owners have been operating for decades and are (and should be) responsibly maintaining their own systems already. We do not need municipal water/sewer and associated expenses!!! We do not want or need an expensive water or sewer system in Copake!!

### **Respondent # 26**

I would be happy to see a central water system. I am very concerned with agricultural chemical contamination in the hamlet due to the gravel aquifer and obvious high water table. All my employees drink bottled water from a cooler for personal consumption.

### **Respondent # 30**

No improvement need to septic. Drainage needed for rain water. Drainage in the hamlet center is needed due to big puddles of water. Municipal water and sewer absolutely not needed. Every tax payer already has their own system and a municipal system would be an unfair additional tax burden.

Respondent # 37, 40, 137, 138 (same property owner)

Water flow and quality excellent for 4 farm operations to irrigate and wash produce for sale, public consumption.

Respondent # 38

it seems that the water table is suddenly rising very quickly. If there is anything that can be done to ameliorate that would be good. We also experience a very strong smell with our water that is very metallic and sulfuric. We had the water tested and the contaminant level was not high but it's still unsettling. Not sure if other Copake residents experience the same. What can we do to take of it that doesn't cost a fortune?

Respondent # 48

Should have culverts install on side of streets

Respondent # 49

[Would you be interested in connecting to...?] Sewer system only. We will keep the well. Will you test our well water for bacteria? If so, can we get the results?

Respondent # 50

Earlier this year we were all hospitalized campilobacteria (?). I had the water tested and it was from the well. I have the report to show you.

Respondent # 51

I get drinking / cooking water from elsewhere. Haven't been trusting to use well water as the farm fields are fertilizing for years and many people have been diagnosed with cancer problems. Thank you for doing this survey.

Respondent #58

[Would you be interested in connecting to...?] Depends on the initial cost, tax assessment and monthly cost of metered consumption and waste meter. Who is paying for this? I already pay for lights in town for the rest of the public to use. The taxes are high.

Respondent #62

i believe the ponding in my yard is partially due to the pond behind my property, fire pond, I believe it is called, isn't draining efficiently. The spillway goes under Empire Road and the culvert under the road may be clogged.

Respondent # 63

When my back yard floods near the leech field because of the fire pond flooding into my yard, then my toilet backs up... the fire pond is flooding into my back yard this pass summer I had a pond in the back yard most the summer where the grass still won't grow back. The pond that the fire fighters use, my back yard is right there and one time

the sprayed the water right into my yard! That pond needs to be emptied a lot and water taken somewhere else is to full, and spraying it does not help. Put in better sidewalks with a drainage under the side walks to help control the water where it needs to go. Come up with culvert systems and drainage fix the roads so the water goes towards the drainage.

Respondent # 64

[The Town needs] sewer system and proper drainage all town roads. Determine how to remedy the issue on Empire Road as Highway Superintendent feels not his problem. Also maintain sluice from Fire Pond as when it was maintenance [sic] it alleviated much of the issue surrounding flooding.

There are many issues existing within the hamlet due to flooding. In the case of Empire Road the town should do two things ASAP. A quick fix would be to dig trenches from the main street to the last house and install crushed stone to move the water down to the outlet to the Bash Bish Creek. The other issue is the outlet from the fire pond to the outlet sluiceway before and after it crosses Empire Road. That outlet area is overgrown and due to that the water is not running via the sluiceway to the creek. Clearing the sluiceway from the fire pond to the creek would help move the water downstream, That was done some years ago and it helped greatly. When the water raises the water table the area next to our home is a wetland and it remains that way until we have sunshine and wind. That high water table has a potential impact on the septic systems as well as the wells and driven points. It is fixable, however nothing has happened to remediate the issue. The pond is question is a dug pond, not a natural pond and it was dug to remediate the water issues on Church Street in the early 1940's. I believe it would be beneficial for the group responsible for this to have a conversation with those impacted, which would provide firsthand information. Or perhaps a town meeting so more people would get involved.

Respondent # 76

Put in sewers, clear and expand natural water flows.

Respondent # 85

Due to my property location, I doubt it would be feasible to connect to a muni water supply. (Steep grade & long distance to road).

Respondent # 94

Please check septic systems[s] & enforce the laws. [Would you be interested in connecting to...?] Not confident the town would maintain it as well as we would or do.

Respondent # 96

Keep stream next to The Hub dredged.

Respondent # 97

No sewage or contaminated water should be flowing into the water table, creeks, or wetlands. [Would you be interested in connecting to...?] Definitely sewer. This is a good use of taxpayer money. Thank you.

Respondent # 116, 122, 123 (same property owner)

Clean out Roe Jan Kill.

Respondent # 121

Have storm water systems installed. Drains, culverts, swales, catch basins, etc. Near my residence County Route 7A seems to be part of the problem.

Respondent # 131

Homes across the road (7A) from mine flood regularly. Some alteration to the Bash Bish stream that runs by the town might help to address the flooding issues. Incidences of flooding seem to have increased in the 20 years I have lived here.

Respondent # 136

[Would you be interested in connecting to...?] Would need a lot more information before determining





Town of Copake  
Parcel Summary Table

ID	Tax Parcel ID No.	Parcel Address	Primary Owner Name	Lot Size (Ac)	Property Description	Category	Base Design Flow (gpd)	No. Residential EDUs	No. of Commercial EDUs
1	187.1-1-8	1647 County Route 7A	Daniel Schorr & Ellen Barker	0.72	1 Family Res	Residential	450	2	0
2	187.1-1-11	1649 County Route 7A	Farmland Renewal LLC	0.63	1 Family Res	Residential	600	2	0
3	187.1-1-12	1655 County Route 7A	Robert & Mary Bradway	0.48	1 Family Res	Residential	450	2	0
4	187.1-1-13	1657 County Route 7A	Margaret Haas	0.81	1 Family Res	Residential	450	2	0
5	187.1-1-15	County Route 7A	Copake Cemetary Association	9.50	Cemetary	Commercial	300	0	0
6	187.1-1-14	Church House	Methodist Church House	0.07	Religious	Commercial	180	0	1
7	187.1-1-17	County Route 7A	Church Street Deli & Ellen Valden	0.16	Det row bldg	Commercial	1,050	0	3
8	187.1-1-20	County Route 7A (Off)	DH Valden Holdings LLC	0.03	Com vac w/imp	Commercial	0	0	0
9	187.1-1-18	1679 County Route 7A	George & Kendra Geisler	0.05	Det row bldg	Commercial	660	0	2
10	187.1-1-19	179 County Route 7A	Copake Country General Storee	0.28	Supermarket	Commercial	750	0	2
11	187.1-1-21	69 Main St	Hudson Phoenix Mgmt. Corp	0.41	Det row bldg	Commercial	318	0	1
12	187.1-1-22	County Route 7A	Linda's	0.04	1 use sm bld	Commercial	430	0	2
13	187.1-1-23	179 County Route 7A	Black Point Associates LLC	0.96	Bank	Commercial	150	0	1
14	187.1-1-40.100	178 Main St	Brian Peacock	0.92	Diner/lunch	Commercial	1,750	0	5
15	187.1-1-41	170 County Route 7A	Copake Inn	0.75	Inn/lodge	Commercial	900	0	3
16	187.1-1-42	168 County Route 7A	EB5 LLC	0.37	2 Family Res	Residential	600	2	0
17	187.1-1-43	1682 County Route 7A	Wonderdale Construction & Dev	0.15	2 Family Res	Residential	600	2	0
18	187.1-1-44	160 County Route 7A	Albert Picarello	1.10	Auto body	Commercial	60	0	1
19	187.1-1-45	156 County Route 7A	Michael Palinkas	0.62	1 Family Res	Residential	300	1	0
20	187.1-1-50	County Route 7A	CHAP Managemarket, Inc.	0.16	Det row bldg	Commercial	528	0	2
21	187.1-1-49	630 Empire Rd	Fidel Lazcano & Rosa Lazcano	0.19	1 Family Res	Residential	450	2	0
22	187.1-1-48	Empire Rd	Grange Hall	0.11	Social org.	Commercial	630	0	2
23	187.1-1-66	617 Empire Rd	Miller Irrev. Family Trust & Wayne & Francene Miller	0.30	1 Family Res	Residential	450	2	0
24	187.1-1-65	623 Empire Rd	Michael Weaver & Heather Thyberg	0.23	1 Family Res	Residential	450	2	0
25	187.1-1-64	625 Empire Rd	Carl Gallagher	0.23	1 Family Res	Residential	300	1	0
26	187.1-1-63	627 Empire Rd	Rosa & Fidel Lazcano	0.17	1 Family Res	Residential	300	1	0
27	187.1-1-51	1682 County Route 7A	Rubin Quick Stops Inc.	1.14	Bar	Commercial	1,225	0	3
28	187.1-1-52	County Route 7A	Dev Quick Stops Inc.	0.28	Gas station	Commercial	800	0	2
29	187.1-1-53	1678 County Route 7A	Fat Nell, LLC	0.26	Det row bldg	Commercial	360	0	1
30	187.1-1-55	County Route 7A	Town of Copake	2.05	Municpl park	Commercial Vacant	0	0	0
31	187.1-1-56	1674 County Route 7A	CoreLogic Commercial Tax Serv	0.81	Branch Bank	Commercial	150	0	1
32	187.1-1-57	1668 County Route 7A	Donna Peck	0.55	Converted Res	Commercial	645	0	2
33	187.1-1-59	1662 County Route 7A	Paul & Margaret Saccoccio	0.51	Apartment	Residential	750	2	0
34	187.1-1-60	1656 County Route 7A	Harry Est. H Hill, Jr	0.51	Office Bldg	Commercial	75	0	1
35	187.1-1-61	1652 County Route 7A	Paul Crayton	0.80	1 Family Res	Residential	450	2	0

**APPENDIX E**

**AdvanTex**® Treatment Systems

# AX-Max<sup>TM</sup>

Manufactured by **Orenco Systems, Inc.**



*This full-sized AdvanTex® AX-Max™ wastewater system was installed at a 50-site campground in the LaPine State Park, LaPine, Oregon, to handle design flows of 7,500 gpd (28.4 m³/day).*

## Decentralized Wastewater Treatment for Commercial Properties and Communities



814 Airway Avenue, Sutherlin, Oregon, USA 97479  
Toll-Free: 800-348-9843 • +1-541-459-4449 • [www.orenco.com](http://www.orenco.com)

### Applications:

- Municipal systems
- Subdivisions, apartments
- Golf course developments, resorts
- Manufactured home parks
- Parks, RV parks, campgrounds
- Schools, churches, businesses
- Rest areas, truck stops



# AdvanTex® AX-Max™ Treatment System

## Reliable, Energy-Efficient Wastewater Treatment

## Everywhere!

For more than 15 years, Orenco's AdvanTex® Treatment Systems have been providing reliable, energy-efficient wastewater treatment inside and outside the urban core. AdvanTex textile filter technology has been winning awards and coming out on top in field trials and demo projects, all over the world.

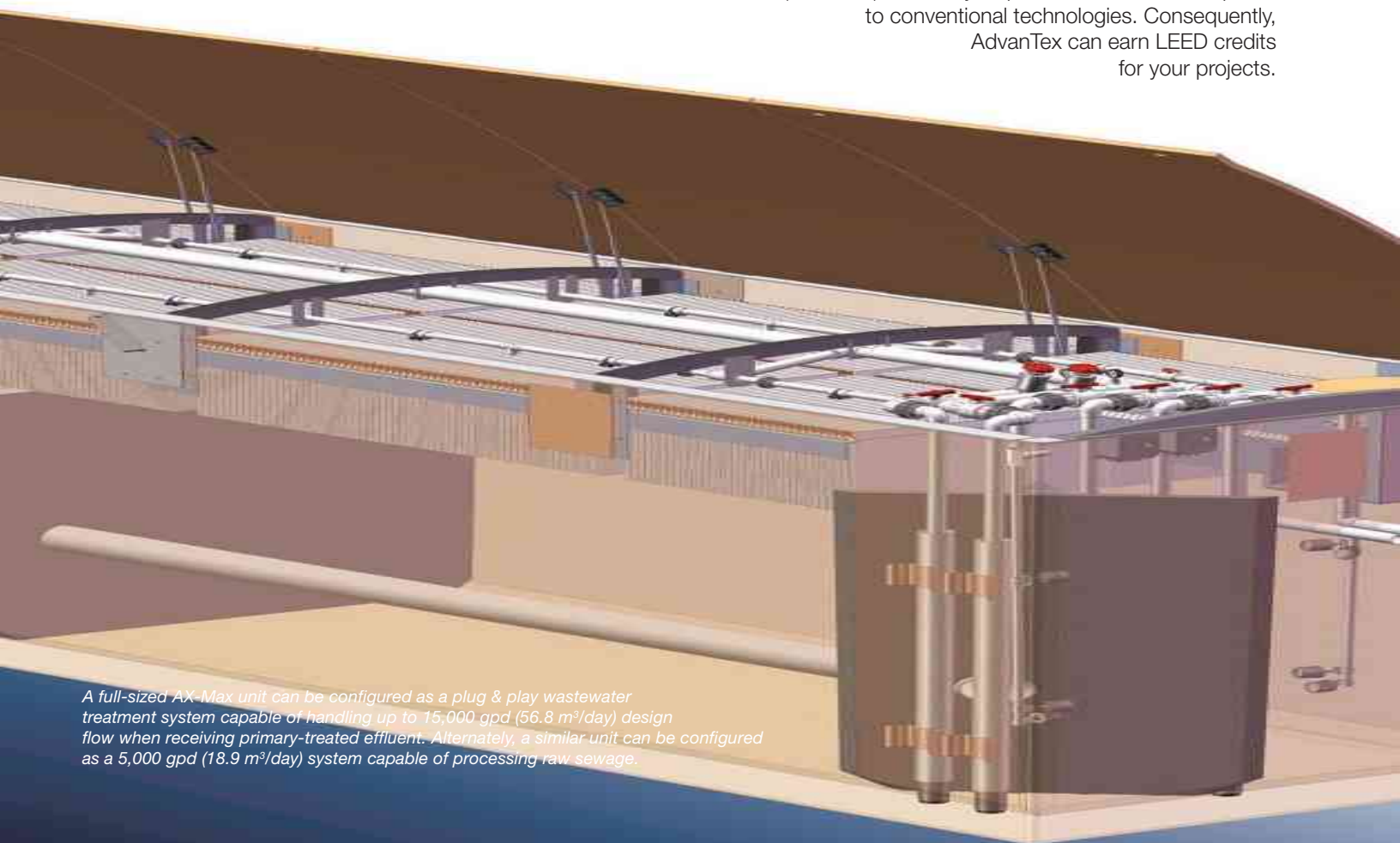
Orenco's newest product in the AdvanTex line is the AX-Max™: a completely-integrated, fully-plumbed, and compact wastewater treatment plant that's ideal for commercial properties and communities. It's also ideal for projects with strict discharge limits, limited budgets, and part-time operators.



*The Yakama Nations Housing Authority in Washington state added five AdvanTex® AX-Max units (background) to its ten AdvanTex AX-100 units, increasing the capacity of its wastewater system by 50%. Photo courtesy of Fextex Systems, Inc.*

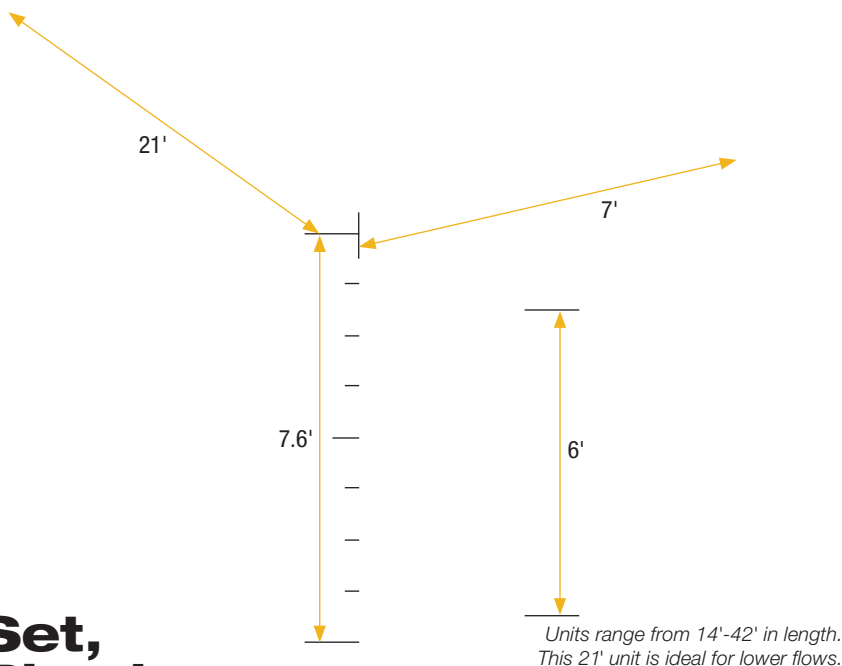
## A Sustainable Solution for Wastewater Treatment

Like all AdvanTex Treatment Systems, the AX-Max is a recirculating media filter that produces outstanding effluent quality suitable for reuse, with significant nutrient-removal. AX-Max systems are highly energy-efficient, using less than 2 kWh per 1000 treated gallons (3.785 m<sup>3</sup>). And they require minimal O&M compared to conventional technologies. Consequently, AdvanTex can earn LEED credits for your projects.



*A full-sized AX-Max unit can be configured as a plug & play wastewater treatment system capable of handling up to 15,000 gpd (56.8 m<sup>3</sup>/day) design flow when receiving primary-treated effluent. Alternately, a similar unit can be configured as a 5,000 gpd (18.9 m<sup>3</sup>/day) system capable of processing raw sewage.*

# AdvanTex® AX-Max™ Treatment System



## Set, Plumb, Wire, and Go

The AX-Max is pre-plumbed and easy to install, so AX-Max projects can meet the tightest deadlines. The entire system — including treatment, recirculation, and discharge — is built inside an insulated fiberglass tank that ranges from 14-42 feet (4.3-12.8 m) in length. AX-Max units can be installed above-ground — for maximum versatility in temporary or variable-flow situations — or in-ground. They can also be installed individually or in multi-tank arrays, treating up to 1 MGD (3,800 m<sup>3</sup>/day).

## For Every Climate and Condition

AX-Max systems provide excellent treatment anywhere, and they have been installed all over the world. For example, AX-Max systems have been installed at Malibu's famous beach parks and New Zealand's Glendhu Bay campground. Several more were installed in Soyo, Africa, to serve a new hospital and school. Other AX-Max systems have been installed on top of Alaska's frozen tundra and St. Lucia's volcanic rock. Still more have been installed in mining camps from Alberta to Texas and, in the Midwest, at a U.S. Department of Defense demo site.



## Benefits

- Containerized, fully-plumbed
- Capable of meeting stringent permit limits
  - ~ Reuse-quality effluent
  - ~ Significant reductions in ammonia, total nitrogen
- Compact and versatile
- Above-ground or in-ground installation
- Easy to set
- Simple to operate
- Low energy usage: <2 kWh per 1000 treated gal. (<2 kWh per 3.785 m<sup>3</sup>)\*

\* When treating domestic waste



### Textile Treatment Media

The treatment medium is a uniform, engineered textile. AdvanTex textile is easy to clean and allows loading rates as high as 50 gpd/ft<sup>2</sup> (2000 L/day/m<sup>2</sup>) with primary-treated influent.



### Effluent Distribution

High-quality, low-horsepower pumps micro-dose the treatment media at regular intervals, and proprietary spin nozzles efficiently distribute the effluent, optimizing treatment.



### Telemetry Controls

Orenco's telemetry-enabled control panels use a dedicated phone line or ethernet connection, ensuring 24/7 monitoring and real-time remote control.



# AdvanTex® AX-Max™ Treatment System

## Carefully Engineered by Orenco

Orenco Systems has been re-searching, designing, manufacturing, and selling leading-edge products for small-scale wastewater treatment systems since 1981. The company has grown to become an industry leader, with about 300 employees and 300 points of distribution in North America, Australasia, Europe, Africa, and Southwest Asia. Our systems have been installed in more than 70 countries around the world.

Orenco maintains an environmental lab and employs dozens of civil, electrical, mechanical, and manufacturing engineers, as well as wastewater treatment system operators. Orenco's technologies are based on sound scientific principles of chemistry, biology, mechanical structure, and hydraulics. As a result, our research appears in numerous publications and our engineers are regularly asked to give workshops and trainings.



Powered by

**Franklin Electric**



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[www.orenco.com](http://www.orenco.com)

ABR-ATX-MAX-1  
Rev. 1.5, © 03/17  
Orenco Systems®, Inc.

## Project Summary



Installation photos courtesy of BioSolutions, Inc.

### Point Dume State Beach and Preserve, Southern California

In spring, 2011, Los Angeles County needed to quickly upgrade restrooms at Malibu's Point Dume State Beach in time for the long — and busy — Memorial Day weekend. The county's engineer specified three AX-Max units, one for each restroom, and all three were installed in a matter of days. The small footprint of this configuration saved the county valuable space for visitor parking. After disinfection, the treated effluent is dispersed right into the sand. Point Dume is part of a large-scale upgrade of L.A. County beach parks, virtually all of which include AdvanTex Treatment Systems of various sizes and configurations.



### Fully Supported by Orenco

AdvanTex Treatment Systems are part of a comprehensive program that includes ...

- Designer, installer, and operator training
- Design assistance, technical specifications, and plan reviews
- Installation and operation manuals
- Lifetime technical support

Distributed by:





## ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

### STEP Collection System

Town of Copake, NY

Sewer Feasibility Study

Item Description	Unit Cost	Units	Quantity	Cost
Pump out Existing Septic Tanks and Abandon in Place	\$750	EA	34	\$25,500
1,000 Gallon STEP Tank Inc. Installation	\$13,500	EA	12	\$162,000
1,500 Gallon STEP Tank Inc. Installation	\$15,400	EA	1	\$15,400
2,000 Gallon STEP Tank Inc. Installation	\$18,300	EA	2	\$36,600
2,750 Gallon STEP Tank Inc. Installation	\$20,700	EA	1	\$20,700
3,750 Gallon STEP Tank Inc. Installation	\$24,800	EA	6	\$148,800
4,000 Gallon STEP Tank Inc. Installation	\$26,000	EA	5	\$130,000
4,250 Gallon STEP Tank Inc. Installation	\$27,300	EA	6	\$163,800
4,500 Gallon STEP Tank Inc. Installation	\$28,500	EA	1	\$28,500
STEP Service Lateral Installation (1-1/2" HDPE) Inc. Restoration	\$7,400	EA	34	\$251,600
Clearing and Grubbing in Easements	\$13,600	Acre	1	\$13,600
HDPE Forcemain Material and Installation (Directional Drilling)	\$60	LF	3705	\$222,300
Excavation and Connection at Drill Sites and at Junctions	\$5,700	EA	58	\$330,600
Directional Drill Restoration	\$50	SY	3222	\$161,200
Air Releases	\$6,000	EA	5	\$30,000
Cleanouts	\$3,500	EA	8	\$28,000
Permits	\$10,000	LS	1	\$10,000
Traffic Control	3%	%	1	\$53,400
Mobilization/Demobilization	5%	%	1	\$89,000
<b>Opinion of Probable Construction Cost</b>				<b>\$ 1,930,000</b>

**NOTES:** This is an engineer's Opinion of Probable Construction Cost (OPCC). Tighe & Bond has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's method of pricing, and that the estimates of probable construction costs are made on the basis of Tighe & Bond's professional judgment and experience. Tighe & Bond makes no guarantee nor warranty, expressed or implied, that the bids or the negotiated cost of the Work will not vary from this estimate of the Probable Construction Cost.



**ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST**  
**PBF Water Resource Recovery System**

Town of Copake, NY  
Sewer Feasibility Study

Item Description	Unit Cost	Units	Quantity	Cost
Concrete Slab on Grade for Building	\$19	SF	300	\$5,700
Control Building	\$85,000	LS	1	\$85,000
Building Plumbing	20%	%	1	\$17,000
Building HVAC	30%	%	1	\$25,500
Backup Generator	\$50,000	EA	1	\$50,000
Building Electrical	40%	%	1	\$54,000
Orenco Packaged PBF System	\$1,757,200	LS	1	\$1,757,200
PBF System Installation	40%	LS	1	\$702,900
Below Grade PVC Process Piping	\$135	LF	200	\$27,000
UV System Including Installation	\$80,500	LS	1	\$80,500
Post-Aeration System	\$70,000	LS	1	\$70,000
Influent Flow Meter in Vault	\$15,000	LS	1	\$15,000
Instrumentation/Control	5%	%	1	\$87,900
Galvanized Fencing	\$65	LF	250	\$16,300
Landscape Screening	\$35,000	LS	1	\$35,000
Lab Equipment and Misc Interior Building Supplies	\$15,000	LS	1	\$15,000
Rough Grading for Parking Area	\$1,500	EA	1	\$1,500
Prepare and Roll Subbase for Parking Area	\$3	SY	222	\$700
Stabilization Fabric for Parking Area	\$2	SY	222	\$500
Gravel and Compaction for Parking Area	\$10	SY	222	\$2,300
Driveway Culvert for Parking Area	\$1,000	EA	1	\$1,000
Trenching for Underground Electrical Utilities	\$5	LF	100	\$500
Bedding for Underground Electrical Conduits	\$7	LF	100	\$700
Direct Burial of PVC Conduits	\$7	LF	100	\$700
Utility Fee/Service Entrance	\$5,000	LS	1	\$5,000
Well & Well Pump	\$20,000	LS	1	\$20,000
Trenching for Water Service	\$6	LF	100	\$600
Bedding for Water Service	\$3	LF	100	\$300
1" Polyethylene Water Service	\$3	LF	100	\$300
General Fill to Protect Equipment Above Flood Zone	\$37	CY	2222	\$82,300
Rough Site Grading for PBF System and Control Building	\$9,000	EA	1	\$9,000
Final Grading, Mulch & Seed	\$5	SY	2222	\$11,200
Mobilization/Demobilization	5%	%	1	\$159,100
<b>Opinion of Probable Construction Cost</b>				<b>\$ 3,340,000</b>

**NOTES:** This is an engineer's Opinion of Probable Construction Cost (OPCC). Tighe & Bond has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's method of pricing, and that the estimates of probable construction costs are made on the basis of Tighe & Bond's professional judgment and experience. Tighe & Bond makes no guarantee nor warranty, expressed or implied, that the bids or the negotiated cost of the Work will not vary from this estimate of the Probable Construction Cost.



## ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

### Surface Return System

Town of Copake, NY

Sewer Feasibility Study

Item Description	Unit Cost	Units	Quantity	Cost
8" PVC Gravity Sewer Main Installation (In Road)	\$300	LF	350	\$105,000
Multiport Fully Submerged Cross Channel Diffuser	\$25,000	EA	1	\$25,000
Dewatering/Erosion Protection	\$7,500	EA	1	\$7,500
Permits	\$10,000	LS	1	\$10,000
Temporary Controls	3%	%	1	\$4,500
Mobilization/Demobilization	5%	%	1	\$7,400
<b>Opinion of Probable Construction Cost</b>				<b>\$160,000</b>

**NOTES:** This is an engineer's Opinion of Probable Construction Cost (OPCC). Tighe & Bond has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's method of pricing, and that the estimates of probable construction costs are made on the basis of Tighe & Bond's professional judgment and experience. Tighe & Bond makes no guarantee nor warranty, expressed or implied, that the bids or the negotiated cost of the Work will not vary from this estimate of the Probable Construction Cost.





## ENGINEER'S OPINION OF PROBABLE ANNUAL O&M COST

### Alternative No. 2

Town of Copake, NY

Sewer Feasibility Study

Item Description	Unit Cost	Units	Quantity	Cost
<b>Septic Tank Effluent Collection System</b>				
Proactive System Maintenance	\$75	Hour	104	\$7,800
Reactive System Maintenance	\$75	Hour	24	\$1,800
Septic Tank Pumping (1,000 gal)	\$600	EA	3	\$1,800
Septic Tank Pumping (1,500 gal)	\$750	EA	1	\$800
Septic Tank Pumping (> 1,500 gal)	\$2,000	EA	5	\$10,000
Equipment Repair and Replacement	\$1,360	Year	1	\$1,400
<b>PBF System</b>				
Proactive System Maintenance	\$75	Hour	364	\$27,300
Reactive System Maintenance	\$75	Hour	26	\$2,000
Energy Consumption	\$0.10	kWh	149621	\$15,000
Cellular Service for Communication	\$50	Month	12	\$600
Tank Pumping	\$1,200	Year	1	\$1,200
Media Replacement	\$600	Year	1	\$600
Pump Maintenance	\$500	Year	1	\$500
Blower Maintenance	\$500	Year	1	\$500
UV System Maintenance	\$2,000	Year	1	\$2,000
Post-Aeration Blower Maintenance	\$250	Year	1	\$300
Flow Meter Calibration	\$300	Year	1	\$300
Sampling Supplies	\$1,000	Year	1	\$1,000
Laboratory Fees	\$200	Month	12	\$2,400
Misc. Maintenance Supplies	\$500	Year	1	\$500
Mowing around PBF System	\$75	Hour	12	\$900
Misc. Site/Access Road Maintenance	\$500	Year	1	\$500
<b>Surface Return</b>				
Cleaning/Maintenance of Surface Return	\$1,000	Year	1	\$1,000
Subtotal Annual O&M Costs				\$81,000
Contingency (30%)				\$25,000
Administrative, Billing, & Accounting				\$15,000
<b>Opinion of Probable Annual O&amp;M Cost</b>				<b>\$121,000</b>

**NOTES:** This is an engineer's Opinion of Probable Annual O&M Cost. Tighe & Bond has no control over the cost or availability of labor, equipment or materials, or over market conditions and that the estimates of probable annual O&M costs are made on the basis of Tighe & Bond's professional judgment and experience. Tighe & Bond makes no guarantee nor warranty, expressed or implied, that the actual annual O&M costs will not vary from this estimate of the Probable Annual O&M Cost.



## Engineering Report Certification

During the preparation of this Engineering Report, I have studied and evaluated the cost and effectiveness of the processes, materials, techniques, and technologies for carrying out the proposed project or activity for which assistance is being sought from the New York State Clean Water State Revolving Fund. In my professional opinion, I have recommended for selection, to the maximum extent practicable, a project or activity that maximizes the potential for efficient water use, reuse, recapture, and conservation, and energy conservation, taking into account the cost of constructing the project or activity, the cost of operating and maintaining the project or activity over the life of the project or activity, and the cost of replacing the project and activity.

Title of Engineering Report: Copake Wastewater Preliminary Engineering Report

Date of Report: March 2023

Professional Engineer's Name: Erin K. Moore, PE, BCEE

Signature:



Date: March 22, 2023







## Smart Growth Assessment Form

This form should be completed by an authorized representative of the applicant, preferably the project engineer or other design professional.<sup>1</sup>

### Section 1 – General Applicant and Project Information

Applicant:

Project No.:

Project Name:

Is project construction complete? ☐ Yes, date:

☐ No

Please provide a brief project summary in plain language including the location of the area the project serves:

### Section 2 – Screening Questions

#### A. Prior Approvals

1. Has the project been previously approved for Environmental Facilities Corporation (EFC) financial assistance? ☐ Yes ☐ No
2. If yes to A(1), what is the project number(s) for the prior approval(s)? Project No.:
3. If yes to A(1), is the scope of the previously-approved project substantially the same as the current project? ☐ Yes ☐ No

**If your responses to A(1) and A(3) are both yes, please proceed to Section 5, Signature.**

#### B. New or Expanded Infrastructure

1. Does the project involve the construction or reconstruction of new or expanded infrastructure? ☐ Yes ☐ No

Examples of new or expanded infrastructure include, but are not limited to:

- (i) The addition of new wastewater collection/new water mains or a new wastewater treatment system/water treatment plant where none existed previously;
- (ii) An increase of the State Pollutant Discharge Elimination System (SPDES) permitted flow capacity for an existing wastewater treatment system; and OR

<sup>1</sup> If project construction is complete and the project was not previously financed through EFC, an authorized municipal representative may complete and sign this assessment.

- (iii) An increase of the permitted water withdrawal or the permitted flow capacity for the water treatment system such that a Department of Environmental Conservation (DEC) water withdrawal permit will need to be obtained or modified, or result in the Department of Health (DOH) approving an increase in the capacity of the water treatment plant.

**If your response to B(1) is no, please proceed to Section 5, Signature.**

### **Section 3 –Smart Growth Criteria**

Your project must be consistent with all relevant Smart Growth criteria. For each question below please provide a response and explanation.

1. Does the project use, maintain, or improve existing infrastructure?

☐ Yes   ☐ No

Explain your response:

2. Is the project located in a (1) municipal center, (2) area adjacent to a municipal center, or (3) area designated as a future municipal center, as such terms are defined herein (please select one response)?

☐ Yes, my project is located in a municipal center, which is an area of concentrated and mixed land uses that serves as a center for various activities, including but not limited to: central business districts, main streets, downtown areas, brownfield opportunity areas (see [www.dos.ny.gov](http://www.dos.ny.gov) for more information), downtown areas of local waterfront revitalization program areas (see [www.dos.ny.gov](http://www.dos.ny.gov) for more information), areas of transit-oriented development, environmental justice areas (see [www.dec.ny.gov/public/899.html](http://www.dec.ny.gov/public/899.html) for more information), and hardship areas (projects that primarily serve census tracts or block numbering areas with a poverty rate of at least twenty percent according to the latest census data).

☐ Yes, my project is located in an area adjacent to a municipal center which has clearly defined borders, is designated for concentrated development in the future in a municipal or regional comprehensive plan, and exhibits strong land use, transportation, infrastructure, and economic connections to an existing municipal center.

☐ Yes, my project is located in an area designated as a future municipal center in a municipal or comprehensive plan and is appropriately zoned in a municipal zoning ordinance

☐ No, my project is not located in a (1) municipal center, (2) area adjacent to a municipal center, or (3) area designated as a future municipal center.

Explain your response and reference any applicable plans:



3. Is the project located in a developed area or an area designated for concentrated infill development in a municipally-approved comprehensive land use plan, local waterfront revitalization plan, and/or brownfield opportunity area plan?

☐Yes ☐No

Explain your response and reference any applicable plans:

4. Does the project protect, preserve, and enhance the State's resources, including surface and groundwater, agricultural land, forests, air quality, recreation and open space, scenic areas, and significant historic and archaeological resources?

☐Yes ☐No

Explain your response:

5. Does the project foster mixed land uses and compact development, downtown revitalization, brownfield redevelopment, the enhancement of beauty in public spaces, the diversity and affordability of housing in proximity to places of employment, recreation and commercial development, and the integration of all income and age groups?

☐Yes ☐No

Explain your response:

6. Does the project provide mobility through transportation choices including improved public transportation and reduced automobile dependency?

☐Yes ☐No ☐N/A

Explain your response:

7. Does the project involve coordination between State and local government, intermunicipal planning, or regional planning?

☐Yes ☐No

Explain your response and reference any applicable plans:

8. Does the project involve community-based planning and collaboration?

☐Yes ☐No

Explain your response and reference any applicable plans:

9. Does the project support predictability in building and land use codes?

☐Yes ☐No ☐N/A

Explain your response:

10. Does the project promote sustainability by adopting measures such as green infrastructure techniques, decentralized infrastructure techniques, or energy efficiency measures?

☐Yes ☐No

Explain your response and reference any applicable plans:

11. Does the project mitigate future physical climate risk due to sea-level rise, storm surges, and/or flooding, based on available data predicting the likelihood of future extreme weather events, including hazard risk analysis data, if applicable?

☐Yes ☐No

Explain your response and reference any applicable plans:

#### Section 4 – Miscellaneous

1. Is the project expressly required by a court or administrative consent order? ☐ Yes ☐ No

If yes, and you have not previously provided the applicable order to EFC/DOH, please submit it with this form.

#### Section 5 – Signature

By signing below, you agree that you are authorized to act on behalf of the applicant and that the information contained in this Smart Growth Assessment is true, correct and complete to the best of your knowledge and belief.

Applicant:	Phone Number:
Name and Title of Signatory:	
Signature: 	Date: