TOWN OF
AMENIA
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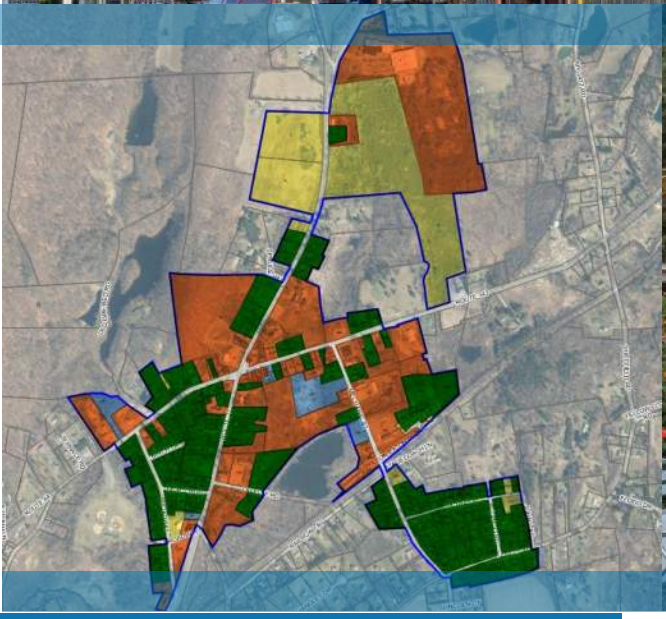

Sewer Feasibility Study

Town of Amenia

June 2022

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

Tighe&Bond

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Table of Contents

Section 7 Alternatives Analysis

Section 8 Proposed Project

Appendices

List of Tables

List of Figures

A5010-04
June 10, 2022

James Wright, Chairman
Town of Amenia Wastewater Committee
4988 Route 22
Amenia, NY 12501

Re: **Final Sewer Feasibility Study Report**

Dear Chairman Wright,

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 Sewer Feasibility Study Report for the Town of Amenia.

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 proposed sewer district, a discussion of conventional and alternative water resource recovery systems, identification of alternatives, a summary of the recommended alternative, and anticipated costs for implementing and maintaining these improvements.

As you are aware, the Town of Amenia has a long history of issues with septic systems and has been attempting to provide sewer service for nearly three decades. The results of the recent wastewater survey revealed that many respondents feel that a sewer system would benefit the hamlet and that issues with septic systems remain an issue.

Alternatives Analysis

Based on the recent discussions with the wastewater committee, results of the wastewater survey, and a desktop analysis, it was determined that the proposed sewer district should serve the main street core area and certain residential areas in the hamlet. The proposed sewer district is shown in Figure A.9 of the report.

The alternatives and cost comparisons presented in the enclosed report are based on the proposed sewer district and the estimated average day design flow of 75,000 gpd as discussed in Section 4.1 of the report. Based on the alternative development discussed in Sections 6 of the enclosed report, three action alternatives were identified for consideration including:

- Alternative No. 1:
  - Septic Tank Effluent Collection System
  - MBBR Water Resource Recovery System at the Silo Ridge Property
  - GGSF Return System
- Alternative No. 2:
  - Septic Tank Effluent Collection System
  - MBBR Water Resource Recovery System at the Mechanic Street Property
  - Surface Return to Amenia Stream
- Alternative No. 3:
  - Septic Tank Effluent Collection System
  - MBBR Water Resource Recovery System at the Leonard Property
  - Surface Return to Amenia Stream

Recommended Alternative

A no-action alternative was also considered (Alternative No. 4) but was not recommended because it would not address issues with existing septic systems and it would fail to promote growth of business development in the proposed district. Therefore, a life cycle cost analysis was performed for Alternative No. 1, Alternative No. 2, and Alternative No. 3. The results of the life cycle cost analysis are summarized in Table E.1, below.

Table E.1 - Alternative Life Cycle Cost Analysis

Item	Alt. No. 1	Alt. No. 2	Alt. No. 3
Capital Cost	$16,364,000	$17,063,000	$17,715,000
Annual O&M Cost	$143,000	$181,000	$181,000
Present Day O&M	$3,473,000	$4,396,000	$4,396,000
Present Day Salvage Value	$1,357,000	$1,553,000	$1,666,000
Net Present Value	**$18,480,000**	**$19,906,000**	**$20,445,000**
		Planning Period	20 years
		Inflation Rate	2.30%
		Discount Rate	0.30%

Several non-monetary considerations such as constructability concerns, public perception, availability for future expansion, and operation and maintenance requirements are discussed in Section 7.3 of the enclosed report. Considering the non-monetary factors discussed in Section 7.3 and the fact that the cost of each alternative are within the same order of magnitude, Alternative No. 3 is the recommended alternative.

The basis for selection of Alternative No. 3 is as follows:

- Provides room for future expansion
- Is not dependent on needing the 33% reduction in application rate
- Few constructability concerns
- Lower level of treatment required compared to Alternative No. 2
- Site is isolated – better public perception, can meet recommended setbacks
- Regulator familiarity with the system
- Will allow growth of businesses within the hamlet center

Providing a system with room for future expansion is an extremely important consideration and Alternative No. 3 is the only alternative that provides this benefit. In addition, when compared to Alternative No. 1, Alternative No. 3 does not have the risk associated with failing to fit the system on the site because the reduction in application rate was not acceptable to regulatory agencies or because of mounding analysis results which may necessitate more area, both of which are unknown at this time.

Opinion of Probable Costs

There are several financial grant or low-interest loan programs available which may assist the Town with funding this project such as the Clean Water State Revolving Fund. The enclosed engineering report has been prepared in anticipation of pursuit of a low-interest loan or grant. Table E.2 provides the conceptual opinion of probable cost including financing costs for implementation of Alternative No. 3 in a format that is consistent with funding agency requirements.

Table E.2 - Recommended Project Costs

Item	Cost
1. Construction Costs[1]	$12,687,000
2. Engineering Costs	
a. Design[2]	$986,000
b. Construction[1]	$1,523,000
3. Other Expenses	
a. Local Counsel	$95,000
b. Bond Counsel	$159,000
c. Work Force	$0
d. Financial Services	$0
e. Miscellaneous	$0
4. Equipment	$0
5. Land Acquisition	$0
6. Project Contingency (30%)[1]	$3,806,000
7. Total Project Costs	$19,256,000
8. Less Other Sources of Financing	$0
9. Project Costs to be Financed	$19,256,000
10. Financing Insurance Costs	
a. Direct Expense (1%)	$193,000
b. State Bond Issuance Charge (0.84%)	$162,000
c. Administrative Fee (1.1%)	$212,000
Total Project Cost Including Financing	**$19,823,000**

[1]Includes an escalation of 3%/year for 3 years

[2]Includes an escalation of 3%/year for 2 years

In accordance with US Environmental Protection Agency (EPA) guidance, sewer use rates are considered affordable if the annual cost for a single-family user (1 EDU) is less than 2% of the MHI. For Amenia, this equates to a single-family user fee of $1,085. The enclosed report presents an approach which can be utilized to achieve this single-family user rate.

Next Steps

It is recommended that the Town use the enclosed engineering report to apply for financial assistance for funding the design and construction of the recommended alternative. In addition, we also recommended the following:

- Develop a Map, Plan & Report and complete the State Environmental Quality Review Act review.
- Apply for financial assistance for funding the design and construction of the recommended alternative.
- Complete necessary engineering and design tasks for the recommended alternative including a site survey and parcel investigations.
- Obtain easements for sewer mains not passing through a parcel being served and permanent easements necessary for system maintenance.
- Obtain necessary permits including a SPDES permit and construction permits.
- Construction will be awarded and commence following receipt of reasonable bids.
- Testing and start-up will begin as construction nears completion and service connections are made.

We understand that installation of a new collection, water resource recovery, and return system is a complex and costly undertaking, but 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 draft 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 sewer feasibility study performed for the Town of Amenia, New York. This evaluation has been performed to determine the appropriate delineation of a wastewater service district and the most appropriate and cost-effective means of wastewater collection, treatment, and disposal 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 Amenia is currently served by individual (residential/commercial) subsurface wastewater disposal systems and is un-sewered. Most of the Hamlet is, however, served by a central water supply system. The focus area for this study is the hamlet of Amenia. The hamlet of Amenia is shown in Figure A.1 (Appendix A). The hamlet boundary shown in Figure A.1 is based on the US Census Bureau census designated place.

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 Amenia (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 Amenia was investigated as part of this evaluation to obtain background information regarding any previous approaches or studies that were conducted. The following reports and plans were reviewed and are summarized below.

Central Wastewater Facilities Feasibility Study, Hamlet of Amenia (1995)

The 1995 feasibility study reported issues with failing on-site septic systems and other challenges such as small parcel sizes and poor soil conditions, especially for parcels located in the center of the hamlet. The 1995 feasibility study identified four alternatives to address wastewater in Amenia, including:

1. Alternative No. 1 – Continued use of individual on-site disposal
2. Alternative No. 2 – Connection to a region-wide treatment facility at the Wassaic Development Center
3. Alternative No. 3 – Construction of a hamlet-wide central wastewater collection and treatment facility at Beekman Park with an estimated design flow rate of 100,000 gallons per day (gpd)
4. Alternative No. 4a – Construction of a "core area" central wastewater collection and treatment facility at Beekman Park with an estimated design flow rate of 30,000 gpd with a subsurface treatment and disposal system
5. Alternative No. 4b – Construction of a "core area" central wastewater collection and treatment facility at Beekman Park with an estimated design flow rate of 30,000 gpd with a treatment system and surface disposal

The feasibility study recommended that the Town pursue funding for one of the central wastewater service alternatives (Alternative 2, 3, 4a, or 4b) instead of continued use of individual on-site disposal. The report did not conclusively recommend which of the alternatives should be pursued.

Alternative Methods and Technologies for the Proposed Central Wastewater Treatment Facilities, Hamlet of Amenia (2003)

The August 2003 report by Morris Associates mentions that a Map, Plan, and Report had progressed since the 1995 report, however, at that time, the Town did not have a suitable location for a conventional wastewater treatment system. The report mentions that the Town had made a preliminary agreement with the Silo Ridge Golf Course to use their land as a location for an alternative wetland treatment system. This 2003 report was developed to explain alternative type collection and treatment systems that could be used instead of conventional collection and treatment systems. The report discusses small diameter gravity sewers and artificial wetland treatment systems.

Map, Plan, and Report for the Establishment of the Hamlet of Amenia Sewer District (2009)

The May 2009 Map, Plan, and Report (MPR) proposed a sewer district serving 255 parcels in the Hamlet of Amenia. The estimated existing flows for the proposed district were 106,000 gpd and the estimated future flows for the proposed district were 187,000 gpd. A 400,000 gpd wastewater treatment facility was proposed to be sited at the Silo Ridge development site located off of Route 44, at the southwest corner of the proposed district (approximately 219,000 gpd contribution from Silo Ridge and approximately 187,000 gpd contribution from the proposed Amenia sewer district).

As stated in the 2009 MPR, Silo Ridge proposed to make improvements to the Silo Ridge Resort near the hamlet of Amenia. As a condition of their approval, Silo Ridge agreed to construct the wastewater treatment facility that would service both the Silo Ridge development and the Hamlet at no cost to the Hamlet area.

The proposed hamlet sewer district was a conventional collection system with two pump stations. All flow would be delivered to the wastewater treatment plant (WWTP) at the Silo Ridge property.

The total project cost was estimated to be approximately $10,435,000. The estimated annual cost per benefit unit $1,239.

Engineer's Report for Wastewater Collection System, Hamlet of Amenia (2009)

The 2009 report was prepared by the Dutchess County Water & Wastewater Authority (DCWWA) after the 2009 MPR. As stated in the report, in 2007, Millbrook Ventures, LLC proposed to make improvements to the Silo Ridge Resort near the hamlet of Amenia. As a condition of the approval, Millbrook Ventures agreed to construct a wastewater treatment facility that would service both the Silo Ridge development and the Hamlet at no cost to the Hamlet area.

Multiple reports and iterations of the sewer district were performed during 2008 and 2009 based on input from Silo Ridge, the Town of Amenia Wastewater Committee (AWC), and DCWWA. Ultimately, the 2009 report by DCWWA recommended a hamlet collection system with a design flow of 176,500 gpd which would serve 244 parcels. DCWWA recommended removing 11 of the parcels included in the 2009 MPR because they were "land locked" parcels.

Wastewater Collection & Treatment Feasibility Study, Town of Amenia (2012)

The July 2012 feasibility study was prepared by Clark Engineering & Surveying, P.C. and unlike previous studies, the 2012 feasibility study included an analysis with alternative collection system and treatment technologies. The report states that the AWC and the DCWWA expended significant effort on developing the proposed wastewater service area but does not discuss the details of how it was delineated.

The proposed service area in the 2012 report focused on the center of the hamlet and included 126 parcels. The design average day flow for the proposed sewer district was 24,00 gpd which was based on water meter data and included a 20% factor for future flows. The 2012 feasibility study explored alternative wastewater collection and treatment systems including septic tank effluent collection systems and the Orenco Advantex and Aquapoint Bioclere Wastewater Treatment Systems.

Ten sites were explored as potential wastewater treatment sites. Site investigations were performed at two of the sites including the Town Hall site and Beekman Park. It was determined that the Town Hall parcel is not suitable for subsurface water disposal due to the high groundwater and poor soil conditions. The Beekman Park parcel, while suitable for subsurface water disposal, would most likely require an Act of State Legislature to proceed with construction and only had a capacity of 20,000 gpd compared to the 24,000 gpd proposed service area design flow. The Beekman Park site was identified as the best alternative for a subsurface system.

Four surface disposal locations were explored including the Town Hall site, the Beekman Park site, the County Highway site, and the Mechanic Street Bridge site. Ultimately, the 2012 feasibility study identified the Amenia Town Hall site with an outfall at the Mechanic Street bridge as the best surface disposal alternative.

Wastewater Feasibility Study Final, Town of Amenia (2012)

In November 2012, Clark Engineering & Surveying, P.C completed an updated version of the July 2012 feasibility study. The Kornicki Property (now referred to as the Silo Ridge Property) was identified as a potentially good location for a subsurface system in the July 2012 report but at that time the Owners of the parcel were unresponsive. Since that time, access to the site became available and this report update describes site investigations that were completed at the Kornicki parcel in 2012 (now the Silo Ridge Property).

Site investigations were completed in October 2012. The report states that in general, soils were found to be silty loam with under layers of sandy gravel and the percolation rate was found to be less than 6 minutes per inch in all but one location. In one area a rate of 9 minutes per inch was noted.

The report presents a layout of an Orenco Advantex Treatment system with subsurface disposal field at the Kornicki site along with updated construction costs and projected user costs per benefit unit.

Comprehensive Plan Update, Town of Amenia (2007)

The 2007 Comprehensive Plan update to the 1991 Amenia Master Plan discusses the Town goals and objectives which are described in greater detail in Section 3.3 of this report as they relate to sewer service in the Town. The 2007 Comprehensive Plan update listed sewers in the Hamlets of Amenia and Wassaic as an unfulfilled opportunity for change and a priority action to add sewers in the Amenia Hamlet.

The 2007 Comprehensive Plan update states that *"The most logical place to put new businesses is in the existing hamlet, but the lack of sewers makes this virtually impossible. Thus, Route 22 zoning has been and continues to be the major source of conflict within the Town. Resolution of this conflict depends upon finding a solution to the sewer issue. The success of this Plan therefore turns more on installing sewers in the hamlet than on any other single action. With sewers in the central hamlet, it could become a vibrant place capable of attracting business and having a level of activity, services, jobs, and entertainment that would enable the Town to attract people from surrounding towns and to retain its young people."*

1.3 Site Information

1.3.1 Location & Population Trends

The Town of Amenia is in the East-central part of Dutchess County, New York. The hamlet of Amenia is located within the Town of Amenia on US Route 44 at the junction of Routes 22 and 343. The closest neighboring hamlet is the hamlet of Wassaic, to the south. The hamlet of Amenia is approximately 1.5 square miles.

The Town of Amenia had a total population of 4,436 at the time of the 2010 census which decreased to 3,769 according to the 2020 census. The population of the hamlet of Amenia was 955 according to the 2010 census which decreased to 725 according to the 2020 census. Thus, using the 2020 census data, the hamlet represents approximately 19% of the Town population.

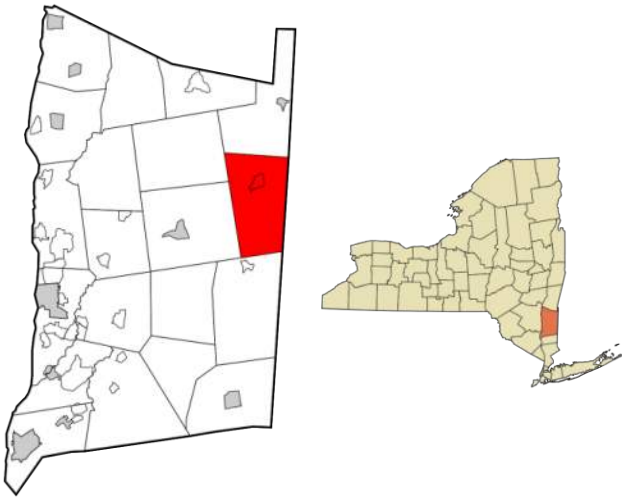

Figure 1.1
Town of Amenia, New York

1.3.2 Environmental Justice Areas

The portion of the Town of Amenia north of Route 343 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 28.73% and the percentage below the poverty level is 14.93%. Therefore, this portion of Amenia is considered a PEJA since more than 26.82% of the population in the rural area reported themselves to be members of minority groups. The percentage of the population below the federal poverty level (14.93%) is less than the statistical thresehold (22.82%).

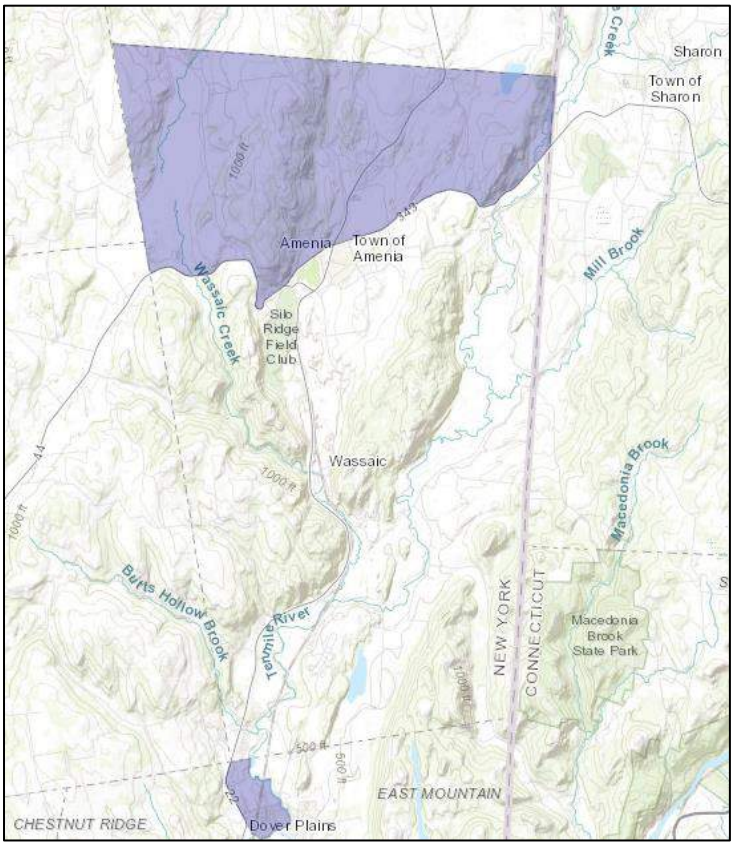

Figure 1.2
Town of Amenia Potential Environmental Justice Areas

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 Dutchess County is $86,977; 80% of this is $69,582. The Town of Amenia 2019 MHI is $54,243. Given the scope of the proposed project (discussed later in the report), it is likely that the Town would meet hardship financing criteria and could assume interest free financing. In addition to meeting the criteria above, approximately 50% of the proposed project will positively serve, protect, or benefit the PEJA described above in Section 1.3.2.

1.3.4 Geologic & Topographic Conditions

The center of the hamlet is composed largely of Copake, Nassau, Wayland, and Fredon soil types. Copake 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. Nassau soils are categorized in Hydrologic Soil Group (HSG) Type D and are defined as shallow silt loam type soils that are somewhat excessively drained. Wayland soils are categorized in HSG Type C/D and are defined as a silt loam consisting of very deep, poorly drained and very poorly drained, nearly level soils in low areas or slack water areas on flood plains. Fredon soils are categorized in HSG Type B/D and are defined as a silt loam consisting of very deep, poorly and somewhat poorly drained soils formed in glaciofluvial materials.

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 5 feet and depth to the water table of less than 4 feet as reported by the NRCS.

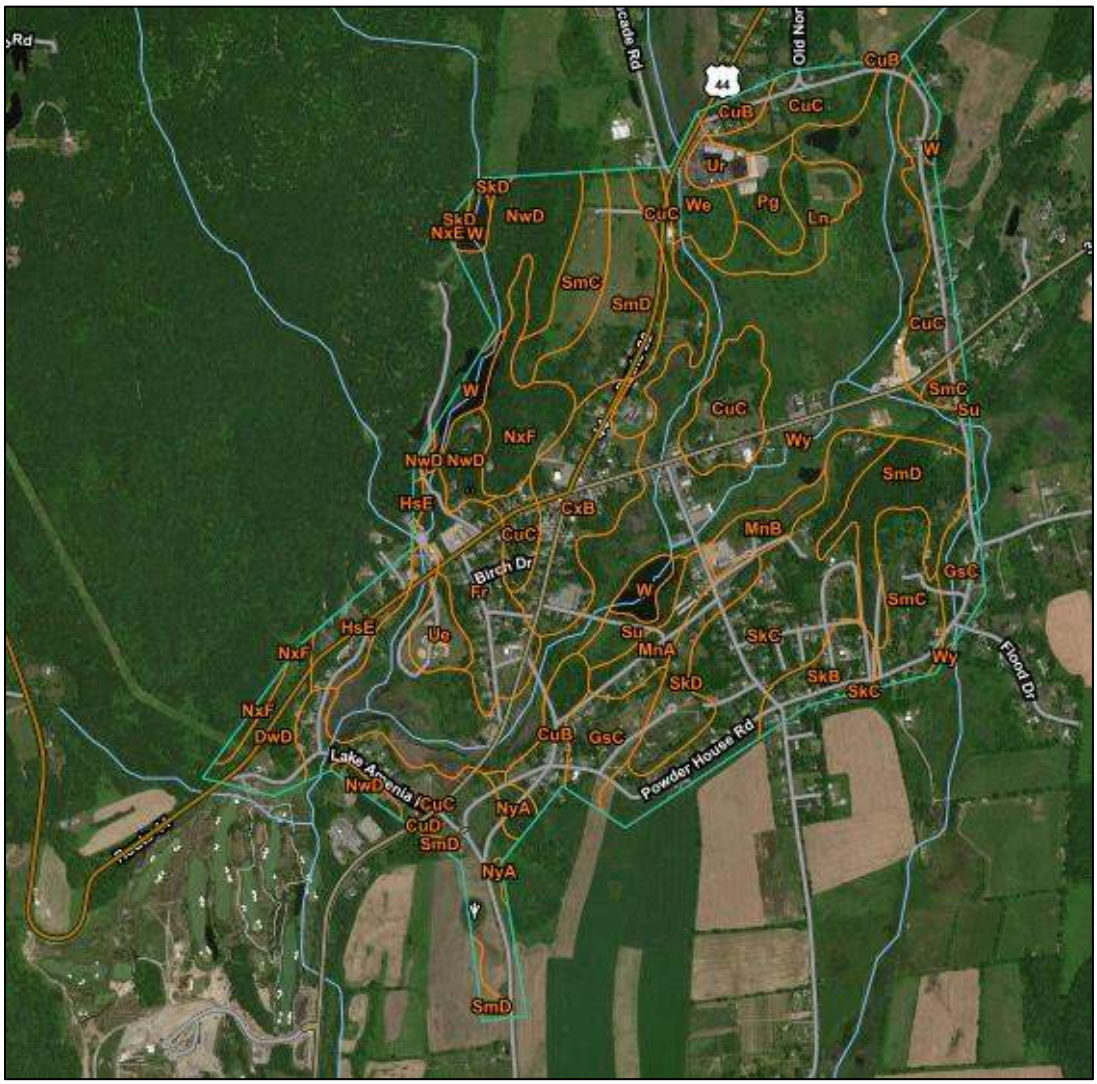

Figure 1.3
Amenia Soil Map

The National Resource Conservation Service (NRCS) soils report for the hamlet of Amenia is attached in Appendix B and a brief description of each of the primary soil types found in the hamlet is below:

Cu, Cx – Copake gravelly silt loam consist of well drained soils formed in loamy mantled stratified drift and glacial outwash. The soils are moderately deep to stratified sand and gravel and are very deep to bedrock. They are nearly level to very steep soils on outwash plains, terraces, kames, eskers, and moraines. Permeability is moderate or moderately rapid in the surface layer and subsoil, and rapid or very rapid in the substratum. The capacity to the most limiting layer to transmit water is moderately high to high and the depth to the water table is more than 80 inches. The depth to a restrictive feature is more than 80 inches.

Dw – Dutchess- Cardigan complex consists of moderately deep, well drained soils formed in till or colluvium. They are underlain by folded interbedded phyllite, slate, shale, and schist. They are on bedrock controlled landforms on hills and mountains. Slope ranges from 0 to 80 percent. The capacity of the most limiting layer is to transmit water is moderately high to high and the depth to the water table is more than 80 inches. The depth to a restrictive feature is also more than 80 inches.

Fr – Fredon silt loam consists of very deep, poorly and somewhat poorly drained soils formed in glaciofluvial materials. Fredon soils are on outwash terraces and outwash plains. Saturated hydraulic conductivity is moderately high or high in the solum and high or very high in the substratum. Slope ranges from 0 to 8 percent. The capacity of the most limiting layer to transmit water is moderately high to high and the depth to the water table is about 6 to 18 inches. The depth to a restrictive feature is more than 80 inches.

Gs – Georgia silt loam consists of very deep, moderately well drained soils on glaciated uplands. They formed in loamy till. Permeability is moderate in the solum and slow in the substratum. Saturated hydraulic conductivity is moderately high or high in the solum and moderately low or moderately high in the substratum. Slope ranges from 0 to 60 percent. The capacity of the most limiting layer to transmit water is moderately low to moderately high and the depth to the water table is about 18 to 36 inches. The depth to a restrictive feature is more than 80 inches.

Hs – Hoosic gravelly loams consist of somewhat excessively drained soils formed in gravelly glaciofluvial deposits. The soils are a mix of gravel and sand and are deep to bedrock. They are level to rolling soils on deltas, outwash plains, and terraces. The capacity of the most limiting layer to transmit water is high to very 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.

Mn – Massena silt loam consists of very deep, somewhat poorly drained or poorly drained soils on uplands. They are nearly level to strongly sloping soils that formed in till dominated by siliceous rock with some limestone. Slope ranges from 0 to 15 percent. The capacity of the most limiting layer to transmit water is moderately low to moderately high and the depth to the water table is reported as about 12 to 18 inches. The depth to a restrictive layer is also reported as more than 80 inches.

Nw, Nx – Nassau-rock outcrop and Nassau-cardigan complex consists of shallow, somewhat excessively drained soils formed in channery till derived from acid shale and slate. They are nearly level to very steep soils that overlie shale bedrock at depths of 25 to 50 cm. They are found on summits, shoulders, and backslopes of ridges and hills on glaciated uplands. Slope ranges from 0 to 70 percent. The capacity of the most limiting layer to transmit water is low to moderately low and the depth to the water table is reported as more than 80 inches. The depth to a restrictive layer is reported as being 10 to 20 inches to lithic bedrock.

Ny – Natchaug muck consists of very deep, very poorly drained soils formed in woody and herbaceous organic materials overlying loamy deposits in depressions on lake plains, outwash plains, till plains, moraines, and flood plains. Saturated hydraulic conductivity is moderately high or high in the organic layers and moderately low to high in the loamy material. Slope ranges from 0 to 2 percent. The capacity of the most limiting layer to transmit water is moderately low to high and the depth to the water table is reported as about 0 to 6 inches. The depth to a restrictive layer is reported as being more than 80 inches.

Pg – Pawling silt loam consists of moderately well drained soils formed in loamy over sandy and gravelly alluvium. The soil profile consists of silt loam over very gravelly sand. They are nearly level soils 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 reported as about 18 to 24 inches. The depth to a restrictive layer is reported as more than 80 inches.

Sk, Sm – Stockbridge silt loam consists of very deep, well drained soils formed in loamy calcareous till. They are nearly level to very steep soils on till plains, smooth hills, low ridges and drumloidal landforms. Slope ranges from 0 to 60 percent. Permeability is moderate in the surface layer and subsoil and moderately slow or slow in the substratum. The capacity of the most limiting layer to transmit water is moderately low to moderately high and the depth to the water table is reported as more than 80 inches. The depth to a restrictive feature is also reported as more than 80 inches.

Su – Sun silt loam consists of very deep, poorly drained soils formed in till derived primarily from limestone and sandstone with smaller amounts of schist, shale and granite in some areas. These soils are in low areas or depressions on till plains. Saturated hydraulic conductivity is moderately high to high in the mineral surface and subsoil, and moderately low and moderately high in the substratum. Slope ranges from 0 to 3 percent. The capacity of the most limiting layer to transmit water is moderately low to moderately high and the depth to the water table is reported as about 0 inches. The depth to a restrictive feature is reported as more than 80 inches.

Wy – Wayland silt loam consists of very deep, poorly drained and very poorly drained, nearly level soils formed in recent alluvium. These soils are in low areas or slack water areas on flood plains. Saturated hydraulic conductivity is moderately high or high in the mineral soil. Slope ranges from 0 through 3 percent. The capacity of the most limiting layer to transmit water is moderately low to moderately high and the depth to the water table is reported as about 0 inches. The depth to a restrictive feature is reported as more than 80 inches.

Bedrock in the hamlet consists mainly of Stockbridge Marble which falls in the Wappinger and Stockbridge bedrock groups. The Stockbridge Marble generally runs north-south along Route 22. To the west of the Hamlet the bedrock transitions to the Walloomsac formation which consists of phyllite, schist, and metagraywacke.

The topography in most of the hamlet and throughout the more densely populated areas in the center of Amenia is mostly a level, low-lying area with a few rolling hills. There are wetlands throughout the hamlet. The topography rises just north west of the hamlet center to a ridge that runs parallel to Route 22 and rises to the west along Route 44. The topography immediately southeast of the hamlet rises to an area called Depot Hill. Route 22 follows the Wassaic Creek valley south of the hamlet towards the hamlet of Wassaic. Topography around the hamlet of Amenia is shown in Figure A.3.

1.3.5 Environmental Resources & Floodplain

The hamlet of Amenia 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.

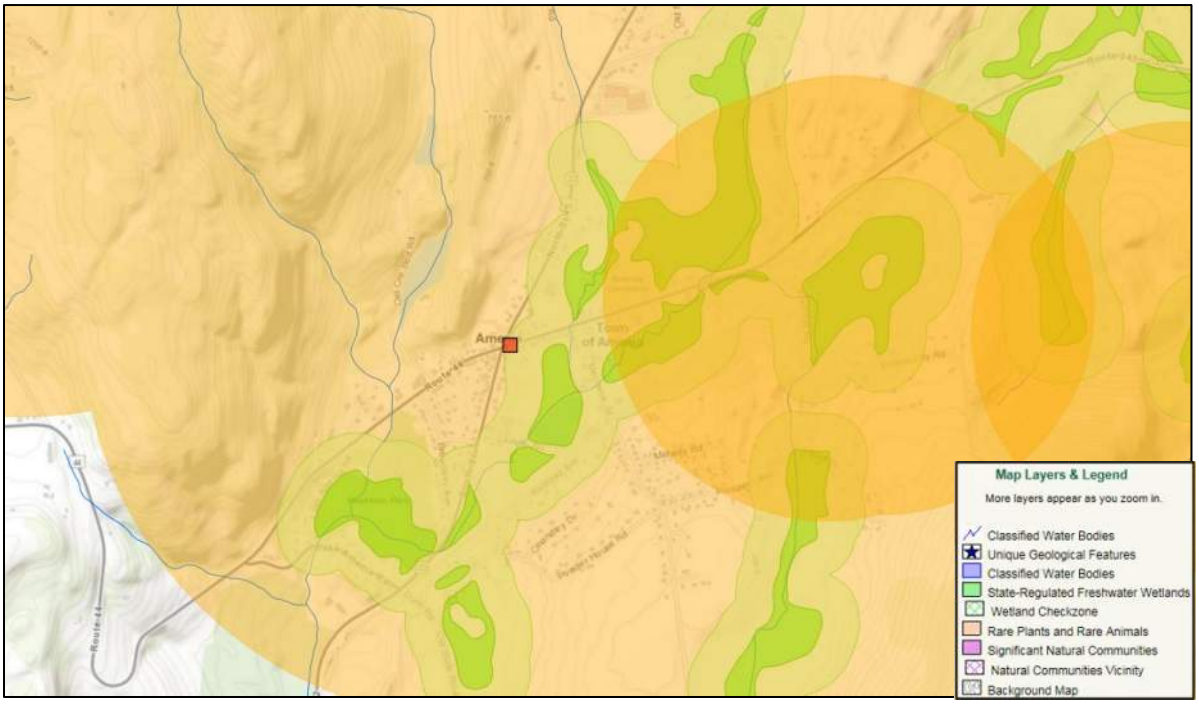

Figure 1.4
Environmental Resources in the Vicinity of Amenia

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. The specific species of rare plants and/or rare animals that are in this vicinity of the hamlet are not provided by the Environmental Resource Mapper Tool. No significant natural communities were noted within the vicinity of the hamlet of Amenia.

As shown on Figure 1.4, there are NYSDEC regulated freshwater wetlands on the eastern and southern side of the hamlet adjacent to the NYS DEC Class C streams that join at Beekman Park and continue south along Route 22 and eventually join with the Wassaic Creek. Figure A.4 in Appendix A also identifies the U.S. Fish and Wildlife National Wetlands Inventory (NWI) wetlands around Amenia; much of which overlap with the NYSDEC regulated wetlands shown on Figure 1.3.

Unnamed tributaries generally flow south through the hamlet of Amenia and combine with what is identified as the Amenia Stream on the Federal Emergency Management Agency (FEMA) flood insurance rate maps (FIRMs). Amenia Stream flows south along Route 22 and eventually joins the Wassaic Creek. These waterbodies are Class C, Class C(T) or Class C(TS) waterbodies as defined by NYSDEC. Class C waterbodies are suitable for supporting fisheries and non-contact activities. The waterbodies classified as Class C (T) support a trout population and the Class C(TS) waterbodies support trout spawning.

The 100-year flood zones in the Amenia hamlet area as delineated by FEMA are shown on Figure A.4. The mapped flood zones are adjacent to Amenia Stream and the tributaries to Amenia Stream. As shown on Figure A.4, a significant portion of the hamlet is within or adjacent to the 100-year flood zones.

1.3.6 Zoning

The Town of Amenia has adopted zoning laws that were most recently amended in August of 2016. The Town has 8 zoning districts, two of which are hamlet districts. The eight zoning categories are summarized below:

Hamlet – Mixed Use (HM)

- The purpose of this district is to maintain the traditional scale, density, architectural style, and mixed-use character of the existing Amenia and Wassaic hamlet core areas, to allow them to be restored, revitalized and expanded to become more economically viable, and to allow for the creation of new hamlet centers where access to commuter rail stations makes such centers viable for transit-oriented development.

Hamlet - Residential (HR)

- The purpose of this district is to maintain the traditional scale, density, and character of small hamlets and the residential neighborhoods surrounding the hamlet cores and to allow expansion into surrounding land areas that are generally within walking distance from the hamlet centers or the train stations.

Suburban Residential (SR)

- The purpose of this district is to maintain the character of existing suburban density residential developments and to allow a limited extension of suburban growth patterns.

Highway Commercial (HC)

- The purpose of this district is to allow commercial uses that rely heavily on automobile and truck access and that would not be compatible with a hamlet mixed-use area.

Office Commercial/Industrial (OC)

- The purpose of this district is to allow areas for light industrial, service commercial, office, and research facilities. Such districts may also include, where compatible, housing and limited retail commercial development intended to support the primary uses or to provide adaptive reuses for existing commercial or industrial buildings.

Rural Agricultural (RA)

- The purpose of this district is to maintain the Town's working landscape by promoting agriculture, forestry, recreation, land conservation, and low-density residential uses, as well as compatible open space and rural uses, by encouraging such activities and discouraging large-scale residential development.

Rural Residential (RR)

- The purpose of this district is to allow residential uses in a rural setting, at a lower density than is allowed in the hamlets.

Industrial/Manufacturing (M)

- The purpose of this district is to allow industrial and related uses and adult entertainment, uses that are not compatible with most commercial, office, or residential uses, in isolated and well-buffered locations.

There are several overlay districts and protection corridors which are not discussed in this report. The zoning districts, overlay districts, and protection corridors are shown on the Town of Amenia Zoning Map attached to this report in Appendix C.

1.4 Community Engagement

The Town of Amenia has been looking for a solution to provide a centralized sewer system for the hamlet for nearly three decades. The first study was completed in 1995 but a sewer district was never formed. In 2000, the Town developed the AWC to look at the possibility of constructing a wastewater collection and treatment system and the AWC is still active to this day. A separate engineering report and an MPR were developed in 2008 and 2009 which recommended a sewer district for the Hamlet that would be funded by the Silo Ridge development; however, this did not come to fruition.

Most recently, an engineering report was developed in 2012 which recommended a smaller sewer district focused on the core area in the Hamlet center with a treatment system at Beekman Park or at the Town Hall. The 2012 effort did not proceed to the MPR phase. Despite incomplete attempts in the past, a central sewer system for the Hamlet of Amenia is still a top priority for the Town.

The Town 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.

- 1995 – A sewer feasibility study was completed.
- 2000 – The wastewater committed was formed.

- 2008/2009 – A new engineering report and MPR were developed in conjunction with the Dutchess County Water and Wastewater Authority, the Town of Amenia, and the Silo Ridge Development. As recommended by the engineering report and the MPR, this new district would serve most of the Hamlet of Amenia and construction of the system would be funded by Silo Ridge. However, the sewer district was never formed.
- 2012 – A new engineering report was developed which recommended a smaller sewer district focused on the core area in the Hamlet center with an alternative collection system and a treatment system at the Beekman Park or at the Town Hall. This effort never advanced to the MPR phase.
- 2021 – Town of Amenia selects Tighe & Bond to perform the sewer feasibility study.
- Spring 2022 – Town sends out wastewater surveys to homeowners and businesses in the Town of Amenia to collect input from community members regarding the potential for a central sewer system. Town of Amenia actively encouraged property owners within the hamlet to complete the survey.
- Spring 2022 – The AWC met with Tighe & Bond several times to discuss progress, determine the district delineation, and discuss potential treatment system locations and technologies.
- Spring 2022 – Tighe & Bond met with the Town of Amenia to review the draft report and prepare for the public meeting and presentation.
- Summer 2022 - A joint presentation by Tighe & Bond and the AWC will be held at the Amenia Town Hall to present the results, recommendations, financial impacts, and next steps. This meeting is intended for the stakeholders in the proposed sewer district.
- Planned – the Town of Amenia intends to move forward with development of the Map, Plan, and Report for the proposed sewer district presented in this report.
- Planned – the Town of Amenia will submit this Preliminary Engineering Report to the New York State Environmental Facilities Corporation for funding assistance.

Section 2
Need for Project

As discussed, the Town of Amenia recognized the need for a centralized sewer system for the hamlet nearly three decades 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 have even older disposal systems such as seepage pits or cesspools according to the results of the recent wastewater survey. Some of these older systems are generally regarded as outdated and no longer considered best practices.

Amenia has a long history of issues with septic systems in the hamlet which have been documented and expressed in prior feasibility studies. For example, the 1995 feasibility study noted that the parcel size, location, and soil conditions of many of the parcels in the hamlet precludes the ability to reconstruct adequate on-site systems and the persistence of the problem creates not only economic hardship on the property owners and the hamlet, but a serious environmental and public health concern as well.

The 2009 engineering report indicated that several individual on-site septic systems in the hamlet have failed due to the soils, water table levels, and lot sizes and that many of the parcels are not large enough to construct new systems that meet current design standards. The continued failure of septic systems in the hamlet presented concerns that the groundwater aquifer would be threatened. The Dutchess County Department of Health issued a letter to the Town of Amenia in 2009 citing their concern relative to the failing residential and commercial septic systems within the hamlet area and stated that they support the Town in pursuit of a centralized sewer system. A copy of this letter is attached as Appendix D.

The 2007 Town of Amenia comprehensive plan update listed sewers in the Hamlets of Amenia and Wassaic as an unfulfilled opportunity for change and a priority action to add sewers in the Amenia Hamlet. The comprehensive plan states that without a central sewer system, most of the other planning goals in the comprehensive plan will be frustrated and thus the addition of a central sewer system is the most important priority.

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 without providing a public wastewater system as the small existing lots in the hamlet are not able to support the larger flow demands of mixed use buildings.

A central sewer system would provide several benefits to Amenia, including:

- Replace outdated 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 3
Sewer District Delineation

The first task of this study is to delineate the sewer district. Parcels that have failing septic systems, small lot sizes, site constraints such as high groundwater, or fall into a specific zoning area are 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 bare any unnecessary expense. This evaluation utilized several steps to determine the correct delineation of a sewer district, including:

- Review responses of the wastewater 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, and;
- Input from the AWC regarding specific parcels.

3.1 Wastewater Survey

Questionnaire surveys were mailed by the AWC to all homeowners and business owners in the Town of Amenia (approximately 1,000 surveys). The surveys requested information about each property owner's on-site wastewater disposal system and related property information. The survey was intended to evaluate homeowners' and business owner's experiences and the perceived need for a wastewater system in the hamlet. The survey asked if they have problems with their existing system, if they would like to connect to a central system, and if they think there are septic system issues elsewhere in Town. In addition, the survey inquired about groundwater conditions in basements to collect information about neighborhoods with groundwater problems, which can lead to failing wastewater systems.

A copy of the wastewater survey and summary table of all responses is included in Appendix E. A total of 231 surveys were returned, representing an approximately 25% overall response rate. Of the 231 responses, 181 were residential single family and multi-family parcels (78%), 45 were commercial (19%), 1 vacant parcel (1%), and 4 were anonymous (2%).

Of the 181 residential responses, 9 said yes, they have issues with their existing septic, 114 said no they do not have issues with their existing septic, 4 said maybe, and 54 said unknown or did not respond to the question. Of the 45 commercial responses, 2 said yes, they have issues with their existing septic, 14 said no they do not have issues with their existing septic, 1 said maybe, and 28 said unknown or did not respond to the question.

Common issues for those who reported septic system problems were odors, slow draining systems, and sewage backups into the basement. It should be noted that several survey responses listed a problem such as a slow draining system but did not respond yes to the question that their system has problems.

Figure A.5 shows the parcels where septic issues were reported.

Fifty three (53) respondents reported that they have sump pumps in their basement, 148 said no they do not have sump pumps in their basement, and 30 did not answer the question. Of the responses, some said their sump pump runs every time it rains while others stated their sump pumps only run on isolated occasions. 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.

The survey also asked for general comments which varied in opinion, from strongly supporting a central sewer system to strongly against a central wastewater system. Several respondents in favor of a central sewer system mentioned issues with neighboring septic systems that are failing, and several others mentioned high groundwater table issues. Below is a comment from a survey respondent in favor of a central sewer system for Amenia.

"I'm accompanying this letter to your survey to emphasize that if you were to gauge our interest in a community wastewater system for the town on a scale of 1-10, we're at an 11. My wife and I moved to this area last year, and we agree with the consensus that a municipal sewage treatment system is a prerequisite to meaningful growth and economic sustainability. It would benefit us personally as well as collectively. Looking forward to seeing this develop."

Those not in favor of a central sewer system generally voiced their concerns with the cost for implementing such a system and whether it would be affordable for the average family. Below is a comment from a survey respondent not in favor of a central sewer system for Amenia.

"For the amount of businesses and residential properties that would benefit I'm not sure it would be worth the cost."

While only 11 survey respondents said they experience septic issues with their own system, when asked if they think there are septic disposal problems somewhere in Town, 42% said yes, only 2% said no, and 56% said they were not sure or did not respond to the question. The responses to this question suggest that residents/business owners know of or have heard of septic issues in the Town. A common response for where respondents thought issues are occuring was the center of Amenia and Wassaic and generally along the streams in low-lying areas. Several respondents mentioned odor issues along Route 343 and Mechanic Street.

When asked if they thought the hamlet would benefit, 66% of respondents said yes, 4% said no, and 30% were not sure or did not respond to the question. When asked if they would be interested in connecting to a municipal wastewater system if their property/business is located in the hamlet, 38% said yes, 19% said no, and 43% said they were not sure or did not respond to the question.

The responses to the three questions mentioned above are shown graphically in Figure 3.1. Figure A.7 in Appendix A shows the respondents who would be interested in connecting to a municipal sewer system.

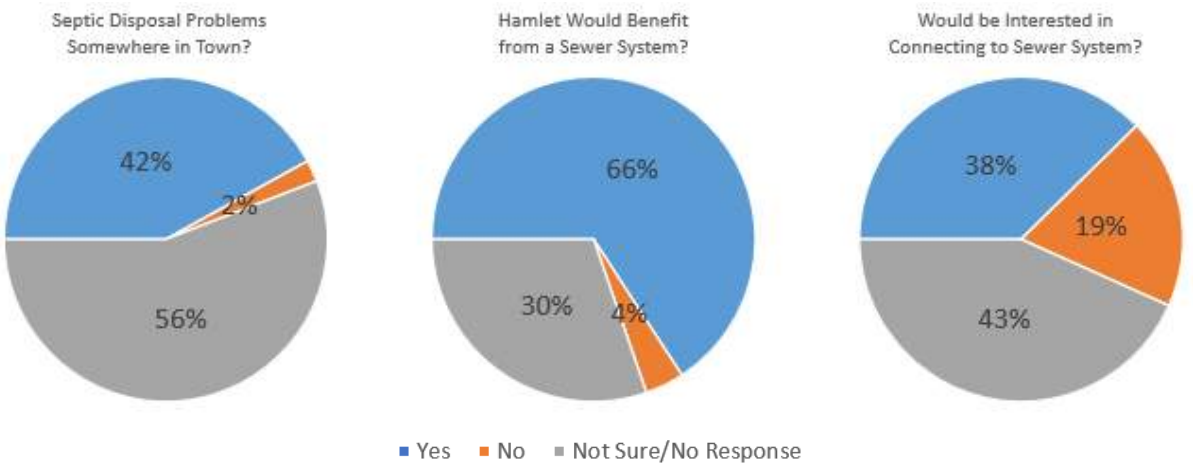

Figure 3.1
Responses to Wastewater Survey Questions

The overall indication that the wastewater survey results provide is that:

- There are isolated issues with existing wastewater systems and groundwater levels in the Town
- Wastewater survey respondents felt that a wastewater system would benefit the hamlet and many respondents believe there are issues with existing sewer systems in the center of the hamlet
- Some survey respondents are concerned with the price of the system, who would be responsible for paying, and whether the cost would be worth the benefit

3.2 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 and 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 1.3.3, the soils in the hamlet vary, but generally consist of different silt loams, some of which are not well drained. Some areas outside the hamlet may have better soils based on the NRCS soil map.

Depending on the percolation rates and whether they are in accordance with New York State Department of Health (NYS DOH) Standards, and considering there is a public water supply, some of the soils in the hamlet may not be appropriate for on-site adsorption fields. Or, if percolation rates are slow, it will require the on-site absorption fields to have a large footprint, and that, coupled with the requirement of a 100% reserve area, may not be feasible for some of the smaller parcels in the hamlet.

The Copake gravelly silt loam (CuC) and Copake urban land complex (CxB) soils in the center of the hamlet and extending north-south along Route 22 are reported as well drained HSG Type A soils (see Figure 1.3 for the soil map). These areas may have better soils than the silt loam (Fr) area which generally extend along Broadway and the Wayland silt loam soils which generally follow the floodplain and include sections along Route 343. The soil types in and around the hamlet are shown on 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 Dutchess County Department of Behavioral and Community Health (DCDBCH). There are portions of the hamlet where the depth to groundwater is expected to be less than 4 feet as reported by the NRCS. These areas are mainly around Beekman Park, along Broadway, along the Amenia Stream, the low-lying areas along Route 343, an area along Railroad Avenue, and an area near Horse Shoe Bend Road.

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 5 feet is required per DCDBCH regulations. There are isolated portions of the hamlet where bedrock is expected to be less than 5 feet according to the NRCS. These areas are mostly on the ridge to the northwest of the hamlet that runs parallel to Route 22.

Figure A.2 identifies all soil types around the hamlet as well as those with reported depth to bedrock of less than 5 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 wells and septic systems are not an issue as there is a public water system. However, parcels less than 0.5 acres may have difficulty conforming to the DCDBCH setback requirements. The DCDBCH requirements include:

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

For many parcels in the hamlet, the building takes up a significant portion of the parcel, leaving very little area for an adequate wastewater disposal system. 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 is a concentration of 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 and some are less than 0.25 acres. There is also a concentration of small parcels along Broadway, along Midway Avenue, and the area between W Lake Amenia Road, Lake Amenia Road, and Route 44.

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 the area surrounding the main intersection and a dense cluster of parcels between W Lake Amenia Road, Lake Amenia Road, and Route 44.

3.3 Zoning & Comprehensive Plan

The zoning districts in the Town of Amenia are discussed in Section 1.3.5 and the districts are shown in Appendix C. The Town of Amenia zoning regulations already have 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 for the Hamlet – Mixed Use (HM) and the Hamlet – Residential (HR) districts. The HM district contains a large portion of the businesses in the hamlet and overlaps with many of the small parcels shown in Figure A.8.

The schedule of use regulations in the Town of Amenia zoning Law does not specifically address sewage treatment systems. However, for the purpose of this study, it was assumed that a sewage treatment system would fall under the "public utility facility" category which would require a special permit issued by the Planning Board if it were in any of the eight zoning districts.

The 2007 Comprehensive Plan update listed sewers in the Hamlets of Amenia and Wassaic as an unfulfilled opportunity for change and a priority action to add sewers in the Amenia Hamlet. In addition, the 2007 comprehensive plan update provides the following over-arching goals for the Town of Amenia:

1. Achieve broad-based balance between the rural, historic, and agricultural beauty of the town as it is and the need for appropriate and smart economic growth and development.
2. To establish a business-friendly attitude and commitment will attract and support the development of retail, small business, service businesses, and even light industry, will create employment opportunities (especially for young people), and will increase tax revenue.
3. To develop and encourage the growth of agriculture as a profitable business within the context of preserving open space.
4. To encourage more housing – low, affordable, moderate-income, high-end, and rental – to create a genuinely multigenerational community:
    - A vital place with good schools for growing families, and
    - A safe place for young people to grow up and to which they will want to return because of the employment opportunities they have here;
    - An attractive, safe place for elderly people.

In review of the 2007 comprehensive plan update, sewer system improvements are believed to impact the above items in the following manner, as discussed in Table 3.1.

Table 3.1 – Comprehensive Plan Goals & Sewer System Impacts

Item	Potential Sewer System Impacts
Broad-Based Balance Between Rural, Historic, and Agriculture	A central wastewater system serving the hamlet should not impact the rural character. A properly delineated sewer district will encourage commercial growth in areas served by the system and discourage commercial growth in the rural areas of the Town.
Business-Friendly Attitude and Commitment	A sewer system in the hamlet will help to attract the development of retail and small business to the hamlet since they will not be limited by on-site septic constraints, and thus this will in turn create more employment opportunities and will increase tax revenue.
Develop and Encourage the Growth of Agriculture	A sewer system serving the hamlet is not expected to directly encourage the growth of agriculture in the Town.
Encourage More Housing	A sewer system could allow for additional housing opportunities in the hamlet.

3.4 Proposed Sewer District

Considering the wastewater survey responses, the local site conditions, the zoning districts, comprehensive plans goals, and input from the AWC; it is recommended that the proposed sewer district should serve the business center of the hamlet of Amenia and certain residential areas around the center of the hamlet for the following reasons:

1. There are isolated issues with existing septic systems and groundwater levels in the center of hamlet of Amenia and the surrounding residential areas
2. Wastewater survey respondents felt that a wastewater system would benefit the hamlet and many respondents believe there are issues with existing sewer systems in the hamlet
3. The parcels in the hamlet are mostly small parcels which present challenges for onsite wastewater disposal and limit the expansion of businesses in these areas
4. Some businesses in the hamlet have restrictions on expanding their business due to limitations of their existing septic systems
5. A central sewer district serving the hamlet will help achieve the goals of the Town of Amenia Comprehensive Plan

A meeting with the AWC was held to discuss the preliminary sewer district delineation in April 2022. The district was modified based on the discussion with the AWC and based on the AWC member's knowledge of the area and locations which experience existing issues. Figure 3.2 shows the proposed sewer district (in blue). The proposed sewer district is also shown on Figure A.9 in Appendix A.

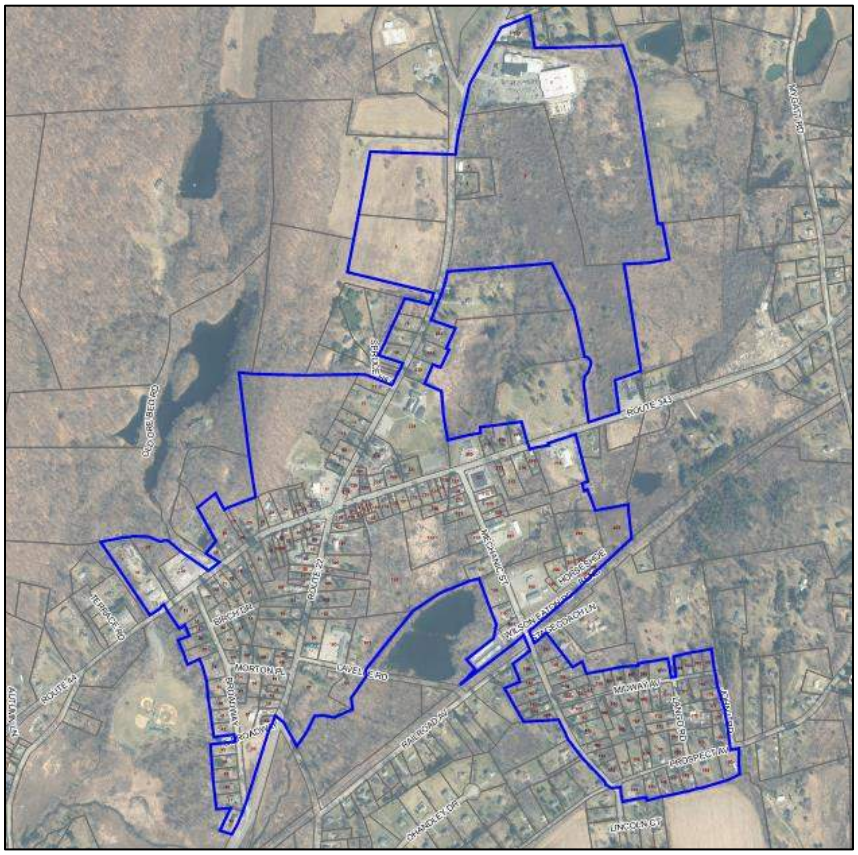

Figure 3.2
Proposed Sewer District

A summary of the district delineation is follows:

- The district is centered around the intersection of Route 22, Route 343, and Route 44, which is commonly referred to as the center of Amenia
- The district extends north along Route 22 to the Cascade Country Corner parcel
- The district extends east along Route 343 to the Sun River Health office parcel
- The district extends south from Route 343 along Mechanic Street and Depot Hill Road and includes the residential neighborhood around Midway Avenues, Lango Road, John L Lane, and Prospect Avenue
- The district extends south from the main intersection along Route 343 and Broadway down to the Fudgy's Ice Cream parcel
- The district extends west along Route 44 to the Welsh Sanitation parcel

There are several parcels which were included in the district that did not respond to the wastewater survey or said that they were not interested in connecting to the sewer district (see Figure A.7). They were included because the sewer district must be contiguous and generally parcels must connect to a 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. Exceptions to this rule can be made with reason such as large parcels or flag lot parcels.

Note that the proposed sewer district shown in Figure 3.2 and Figure A.9 do not include all the parcels under consideration for the proposed water resource recovery system and/or return fields. Refer to Section 5 for discussion of the treatment system and disposal field locations under consideration. The water resource recovery system parcel will be included in the final sewer district delineation, once selected.

There are 233 total parcels in the proposed sewer district. Table 3.2 summarizes the number of parcels in each land use category. Figure A.10 shows which parcels in the district are residential (210 – 322) and which parcels are commercial (330 – 831).

Table 3.2 - No. of Parcels by Land Use Category

Land Use Code	Land Use Type	Res. or Com.	No. of Parcels
210	1 Family Res	Residential	121
220	2 Family Res	Residential	21
230	3 Family Res	Residential	4
270	Mfg housing	Residential	3
281	Multiple res	Residential	6
311	Res vac land	Residential	9
312	Vac w/imprv	Residential	1
314	Rural vac<10	Residential	2
322	Rural vac>10	Residential	1
330	Vacant comm	Commercial	6
411	Apartment	Commercial	6
421	Restaurant	Commercial	1
431	Auto dealer	Commercial	2
432	Gas station	Commercial	1
433	Auto body	Commercial	2
444	Lumber yd/mi	Commercial	1
447	Truck terminal	Commercial	1
449	Other Storage	Commercial	2
452	Nbh shop ctr	Commercial	1
457	Small Retail	Commercial	1
461	Bank	Commercial	1
464	Office bldg.	Commercial	1
465	Prof. bldg	Commercial	1
470	Misc service	Commercial	1
480	Mult-use bld	Commercial	1
482	Det row bldg	Commercial	11
483	Converted Res	Commercial	5
484	1 use sm bld	Commercial	7
485	>1 use sm bld	Commercial	2
611	Library	Commercial	1
620	Religious	Commercial	4
642	Health bldg	Commercial	1
652	Govt bldgs	Commercial	2
662	Police/fire	Commercial	1
822	Water supply	Commercial	1
831	Tele Comm	Commercial	1
		TOTAL	**233**

Section 4
Design Parameters

4.1 Flow Estimates

Historical water meter data was provided by the Town of Amenia Water Department. The data included quarterly water usage data for Q1, Q2, and Q3 of 2021. Water usage data before 2021 was not available due to flow meter software changes implemented at the end of 2020 and the flow meter data for Q4 2021 and Q1 2022 was not accurate due to data base issues for the Q4 2021 meter readings.

The flow for each parcel was calculated based on the quarterly water usage divided by the number of days per quarter. The maximum quarter water usage for each parcel was used as a conservative measure to determine the average daily flow from each parcel. Parcels with multiple flow meters were added together to determine the total flow contribution from the parcel. Forty five (45) parcels in the proposed sewer district do not have flow meters because they are not in the water district or are vacant. Of the 45 parcels that do not have water meter data, 12 are single family residential, 4 are two family residential, 19 are vacant, and 10 are commercial.

An average day flow of 200 gpd was assigned for each single family residential parcel without a flow meter, 400 gpd for each two family residential parcel without a flow meter, and 0 gpd for each vacant parcel. The flow for each commercial parcel that did not have a flow meter was calculated using Table B-3 from the NYS DEC 2014 Design Standards for Intermediate Sized Wastewater Treatment Systems and publicly available information through the Dutchess County Real Property Tax Service Agency online parcel access website.

Twelve (12) parcels have flow meters but reported zero water usage for each quarter and 1 parcel has a flow meter but reported a negative water usage. The flow rate for each of these 13 parcels was calculated using the same methods as those with no flow meter as discussed in the paragraph above. Two parcels had an abnormally high maximum quarterly water usage and therefore the average quarter water meter readings were used for these two parcels.

Using the water meter data and methodology discussed above, the total average day flow for the proposed sewer district was determined to be 54,900 gpd. A 10% factor of safety has been applied to the base flow to account for potential errors in meter readings and potential illicit or unmetered flows. Additionally, a 25% 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 **75,000 gpd**. Table 4.1 provides a summary of the average day design flow for the proposed sewer district.

Table 4.1 - Amenia Sewer District Design Flow

Contribution	**Flow (gpd)**
Base Design Flow	54,900
Factor of Safety (10%)	5,500
Future Expansion (25%)	13,800
Average Day Design Flow	74,200
SAY	**75,000**

Sewer districts commonly use the term Equivalent Dwelling Units (EDUs) for comparing the flow from individual parcels. A single EDU represents the flow from a typical single family household in the district. There are 101 single family residential units in the proposed amenia sewer district which have reliable flow meter data (excluding those with zero reported water usage). The average day water usage for the 101 single family residential parcels in the district is 198 gpd. Therefore, one EDU was equated to a flow rate of 200 gpd for the proposed amenia sewer district.

The number of EDUs associated with each parcel in the proposed sewer district was calculated based on the design flow rate of each parcel. A minimum of 1 EDU was assigned for each single family residential parcel, 2 EDUs for each two family residential parcel, etc. even if the flow rate was below 200 gpd. The same was done for commercial parcels with a minimum of 1 EDU. EDU assignments for each parcel were rounded up to the nearest whole number. Table 4.2 below summarizes the number of EDUs in the proposed sewer district. A table summarizing the flow from each parcel and the associated number of EDUs is provided in Appendix F.

Table 4.2 - Amenia Sewer District EDU Summary

Type	**No.**
Residential EDUs	217
Commercial EDUs	176
Total No. of EDUs	**393**

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 the TR-16 Guides for the Design of Wastewater Treatment Works. Using the estimated average daily flow for the proposed sewer district of 75,000 gpd produces a maximum day peaking factor of approximately 3.0, which results in a peak daily flow of 225,000 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. In addition, this method is for conventional wastewater collection systems, and not septic tank effluent system which have some attenuation of peak flows at each septic tank.

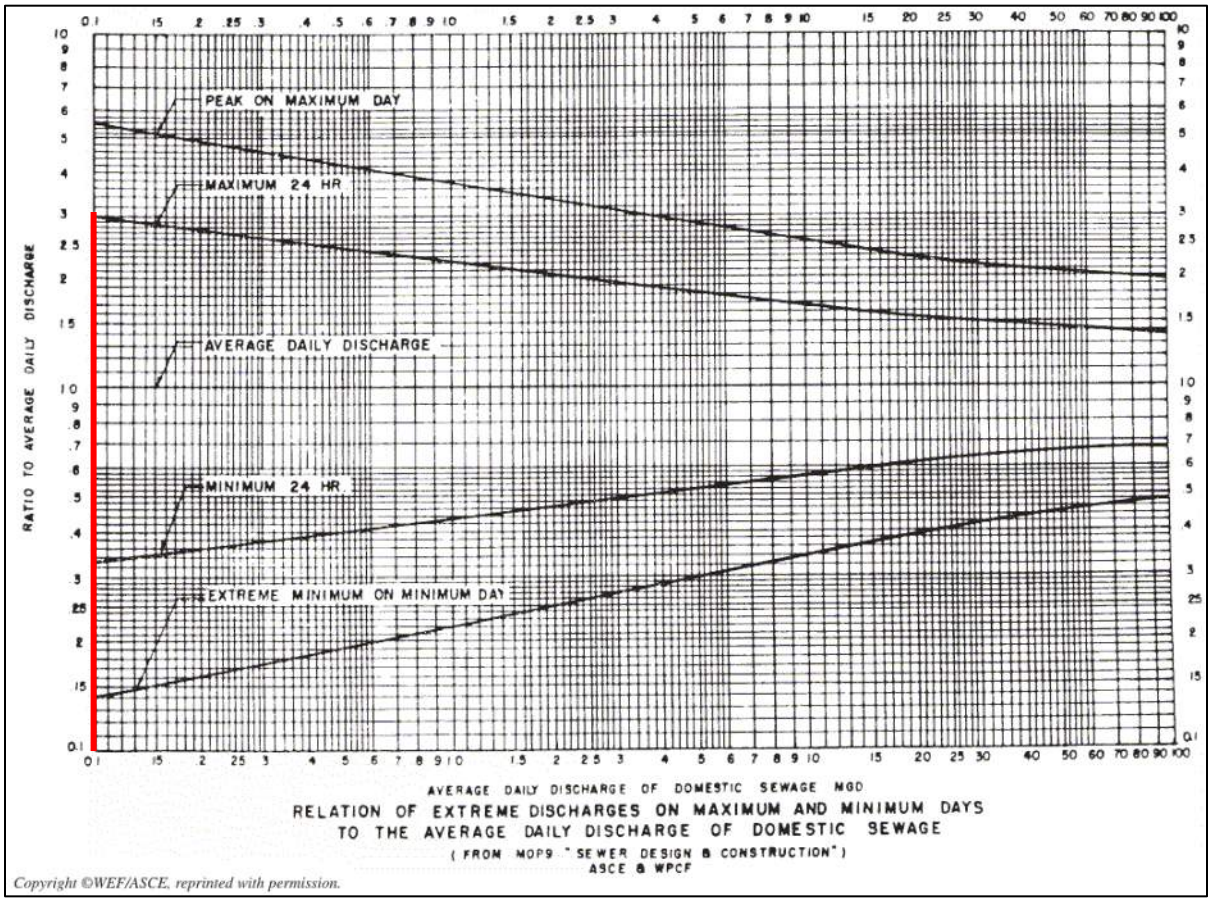

Figure 4.1
MOP 9 Daily Peaking Factor Calculation

Figure 4.2 shows the 10 States Standards (10 SS) peak hour peaking factor computational methodology. Assuming the proposed sewer district serves 60% of the hamlet population (435 people) 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 4.0. Applying the total estimated average daily flow for the proposed sewer district of 75,000 gpd produces a peak hourly flow of up to 300,000 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 conventional collection system and therefore it may be conservative for estimating peak hourly flows from service areas that have many commercial users, for alternative septic tank effluent systems, and for new "tight" collection systems.

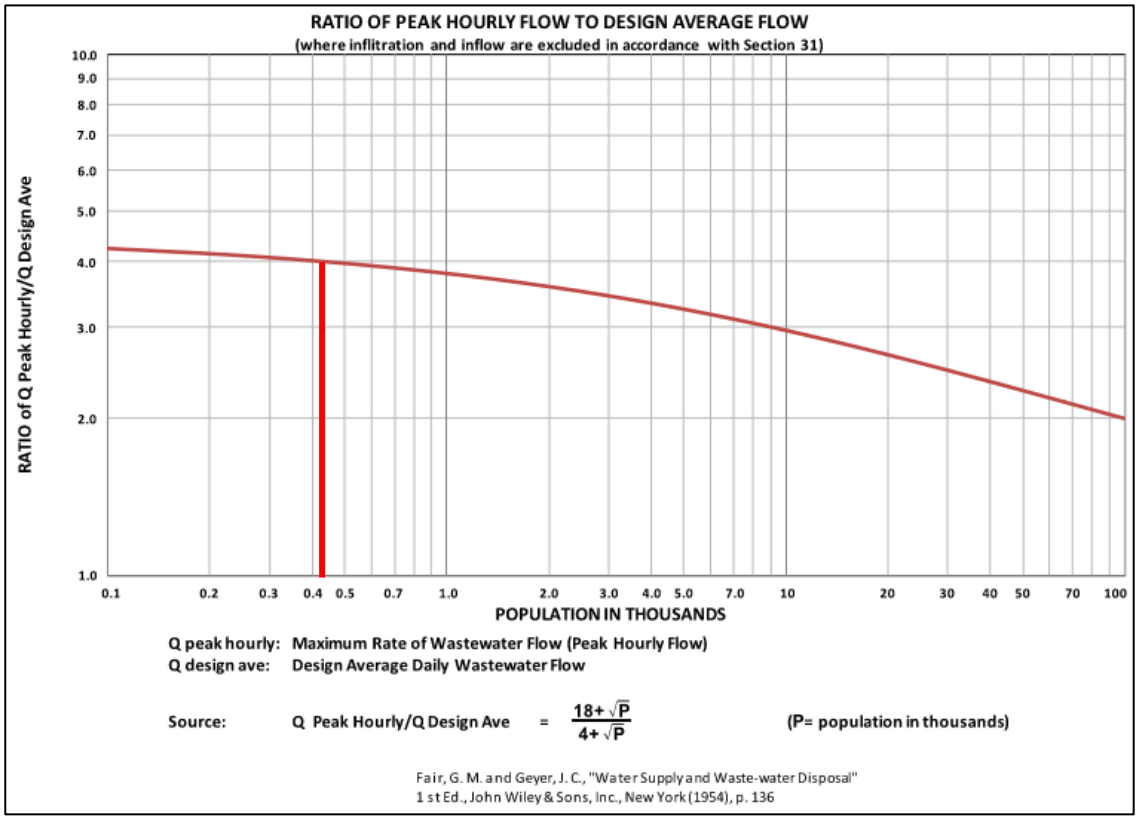

Figure 4.2
Ten States Standards Peak Hour Factor Calculation

A summary of the anticipated design flows for the proposed sewer district is provided in Table 4.3.

Table 4.3 – Anticipated Design Flows

Average Daily Flow (gpd)	75,000
Peak Daily Flow (gpd)	225,000
Peak Hourly Flow (gpd)	300,000

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 25% 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. For this application, a 10% factor of safety has been applied to the base flow to account for potential errors in meter readings and potential illicit or unmetered flows.

It is noted that there are several large vacant lots within the proposed sewer district which could be developed, and that there are ongoing plans to develop some of these parcels. To avoid unnecessary expense for the existing users in the proposed district, the anticipated average day design flow of 75,000 gpd has been used for the alternative analysis presented in this report. This includes the 25% factor for expansion of existing businesses. However, the 25% factor may not be sufficient to support significant new development. The system could be expanded in the future to meet higher average day demands due to new development, businesses, etc. It is anticipated that developers would be responsible for paying for the treatment system expansion in the future, if needed.

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 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 4.4 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 4.4 – 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_3-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 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).

The return limits associated with a new water resource recovery system returning to Amenia Stream at a flow of 75,000 gpd depend on the location along the stream and configuration of the outfall. The two potential surface return locations identified are near the Mechanic Street bridge and near the Leonard Property. Both locations are discussed in further detail in Section 5.4.

Table 4.5 shows the anticipated permit limits for a surface return to Amenia Stream near the Mechanic Street Bridge and Table 4.6 shows the anticipated permit limits for a surface return to Amenia Stream near the Leonard Property.

Table 4.5 – Anticipated Permit Limits for Surface Return – Mechanic Street Bridge

Parameter	Limit	Units	Type
Biological Oxygen Demand (BOD_5)	5	mg/L	Daily Max
Total Suspended Solids (TSS)	10	mg/L	Daily Max
Settleable Solids	0.1	ml/L	Daily Max
Dissolved Oxygen	7	mg/L	As Min
pH	6.5 – 8.5	SU	Range
Ammonia (Summer, Jun 1 – Oct 31)	0.2	mg/L	Monthly Average
Ammonia (Winter, Nov 1 – May 31)	0.4	mg/L	Monthly Average
Fecal Coliform	200	#/100ml	30-day Geo. Mean
Fecal Coliform	400	#/100ml	7-day Geo. Mean
Total Residual Chlorine (TRC)	0.03	mg/L	Daily Max

Table 4.6 – Anticipated Permit Limits for Surface Return – Leonard Property

Parameter	Limit – No Dilution	Limit – Max (4:1) Dilution	Units	Type
Biological Oxygen Demand (BOD_5)	5	15	mg/L	Mon. Avg.
	7.5	22.5	mg/L	7-D Avg.
Total Suspended Solids (TSS)	5	15	mg/L	Mon. Avg.
	7.5	22.5	mg/L	7-D Avg.
Settleable Solids	0.1	0.1	ml/L	Daily Max
Dissolved Oxygen	7	7	mg/L	As Min
pH	6.5 – 8.5	6.5 – 8.5	SU	Range
Ammonia (Summer, Jun 1 – Oct 31)	0.2	0.8	mg/L	Mon. Avg.
Ammonia (Winter, Nov 1 – May 31)	0.4	1.6	mg/L	Mon. Avg.
Fecal Coliform	200	200	#/100ml	30-D Geo. M
Fecal Coliform	400	400	#/100ml	7-D Geo. M
Total Residual Chlorine (TRC)	0.03	0.12	mg/L	Daily Max

As shown in Tables 4.5 and 4.6, the return limits further upstream near the Mechanic Street Bridge are generally more restrictive than the limits downstream near the Leonard Property. However, they are nearly the same for the no dilution scenario and therefore the limits shown in Table 4.5 have been assumed for the alternative analysis presenter herein. The return limits are slightly less when a greater dilution ratio is achieved near the Leonard Property. Greater dilution could potentially be achieved by utilizing an enhanced outfall configuration such as a multiport fully submerged cross-channel diffuser.

Preliminary conversations with NYS DEC Region 3 indicated that there may 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 return. NYSDEC does, however, typically require groundwater monitoring for returns to the subsurface for flows greater than 30,000 gpd with an applicable Nitrite limit (as N) of 10 mg/L. A pre-SPDES application conference with DEC Region 3 will need to be conducted during the design process to finalize limits for a subsurface return. For the alternative analysis presented herein, we have assumed that a new water resource recovery system with a subsurface return and a design flow of 75,000 gpd would be expected to meet the return limits summarized in Table 4.7.

Table 4.7 – Anticipated Permit Limits for Subsurface Return

Parameter	Limit	Type
pH	6.5 – 8.5	Range
Biological Oxygen Demand (BOD_5)	30	Monthly Average
Biological Oxygen Demand (BOD_5)	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

The surface return limits presented in Table 4.5 and the subsurface return limits presented in Table 4.7 have been assumed for the alternative analysis presented herein. As discussed above, the limits provided are preliminary. The final permit limits for surface return are dependent on location and the proposed outfall configuration and the final permit limits for surface return will be determined during the design phase following a pre-SPDES application conference with DEC Region 3.

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 the Town of Amenia.

5.1 Initial Parcel Screening

Tighe & Bond and the AWC met to discuss different parcels which could potentially be used for a water resource recovery system. Fifteen parcels were identified that could potentially be utilized. The parcels are shown on Figure A.11. Twelve of the parcels were eliminated based on initial review of site conditions or conversations with the property owners as indicated below in Table 5.1.

Table 5.1 – Potential Locations and Initial Parcel Screenings

Parcel	Name	Status - Reason	Tax Parcel ID No.
1	Mondrian Property	Eliminated – not authorized, distance	7167-00-001874
2	Gregory Property	Eliminated – not authorized	7167-00-191723
3	Silo Ridge Property	Considered	7167-00-186672
4	Town Hall	Eliminated – flooding, size	7167-00-196542
5	JLN Property	Eliminated – topography	7067-00-840297
6	Beekman Park	Eliminated – park, wetlands	7067-00-974260
7	Leonard Property	Considered	7067-20-917181
8	NYS Property	Eliminated – size, better options	7167-17-113214
9	Church Property	Eliminated – wetlands	7167-13-154303
10	Midway Holdings Property	Eliminated – bedrock, topography	7167-14-391384
11	Syms Property	Eliminated – cost, distance	7167-00-430145 & 315135
12	Clare Michael Property	Eliminated – planned development	7167-00-212034
13	County Organic Recycling Property	Eliminated – cost, distance	7166-00-051601
14	Amenia Landfill	Eliminated – landfill, distance	7066-00-882575
15	Mechanic Street Property	Considered	7167-14-297367

As shown in Table 5.1, there are three parcels which should be considered for a water resource recovery system. They are referred to as the "Silo Ridge Property" (formerly known as the Kornicki property in previous reports), the "Leonard Property", and the "Mechanic Street Property" for the remainder of this report and are discussed in greater detail below.

Silo Ridge Property

The Silo Ridge Property is 8.47 acres located on the west side of Route 22 and north of the main intersection. The property is currently vacant and was previously used as a hay field. The parcel is within the Hamlet Residential zoning district. The lot is cleared and slopes consistently from west to east. There are no structures on the parcel.

The neighboring parcels immediately to the north and west are vacant. There are residential parcels to the south and across Route 22 there is a large vacant parcel and a multi-family residence.

The AWC has discussed the possibility of acquiring the property from the current owner and the owner has indicated that they would be open to selling the parcel.

Leonard Property

The Leonard Property is 3.90 acres located off Lake Amenia Road. The property is a single family residential property with one residential house that is reportedly in poor condition and has not been occupied in many years. The property has a relatively flat area that is already cleared. The property slopes down to Amenia Creek to the west and there is a small, wooded ridge that separates the east side of the property and the neighboring residential properties.

The parcel is within the Hamlet Residential zoning district and the western edge of the property is within the stream corridor buffer. The neighboring parcels to the north and east are residential. The western edge of the property borders the Silo Ridge golf course and the properties to the south are both commercial including a Dutchess County highway garage, a Dutchess County Sheriff Sub-Station, and an electrical substation.

The AWC has discussed the possibility of acquiring the property from the current owner and the owner has indicated that they would be open to selling the parcel.

Mechanic Street Property

The Mechanic Street Property is 0.70 acres located at the corner of Mechanic Street and Stagecoach Lane. The property is currently vacant and it is owned by the Town of Amenia. The AWC noted that there are piles of old trash on the property from prior owners and that the property needs to be cleaned-up. The parcel is in the Hamlet Residential zoning district.

The parcel is mostly wooded and it reportedly has varying topography including a steep ridge that may have shallow depth to bedrock. There are no structures on the parcel. The neighboring parcels to the west, south, and east are all residential and the parcel to the north contains a parking area for the rail trail.

5.2 Parcel Considerations

The New York State Department of Environmental Conservation outlines considerations in selecting sites for water resource recovery systems in order to minimize potential adverse impacts. These criteria are important to consider when selecting a 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. Maintaining both distances at the Silo Ridge Property is attainable. Maintaining the 200 foot distance to the nearest dwelling should be attainable at the Leonard Property, however, maintaining the 150 foot property line setback may not be attainable, but will be close, depending on the size of the system. Maintaining either of the separation distances at the Mechanic Street Property will not be feasible since the property is so small.

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

As mentioned, the three properties under consideration are all within the Hamlet Residential zoning district. A review of the Town of Amenia Zoning Law Use Table (amended on November 20, 2019) indicates that Public Utility Facilities are allowed in the hamlet residential zoning district through a special use permit approval by the Planning Board and Municipal uses are a use permitted by right, subject to site plan review by the planning board. Therefore, zoning restrictions at each potential location are not expected to be a problem.

Topography

Sites with slopes greater than 15% are not well suited for water resource recovery systems. The steepest part of the Silo Ridge Property has a slope of approximately 12.5% and therefore topography should not be a major issue at the Silo Ridge Property. Portions of the Leonard Property are steeper than 15%, especially near the edge of Amenia Creek. However, there are flatter areas of the property which could be well suited for a water

resource recovery system. The steepest part of the Mechanic Street Property is approximately 28% according to topographic maps available online. Therefore, the Mechanic Street Property would require significant grading to make it suitable for a water resource recovery system.

Area for Future Expansion

A larger parcel is preferable to allow for expansion should the sewer district be expanded in the future. The Silo Ridge Property is approximately 8.5 acres which makes it a potential candidate for a subsurface return location while the Leonard Property and Mechanic Street properties are too small to be considered for a subsurface return. However, as discussed later in the report (Section 6.3.2) the Silo Ridge Property is only large enough for a Gravelless Geotextile Sand Filter system with a 33% increase in application rate. The Silo Ridge Property is not large enough for a subsurface return system if the 33% increase in application rate is not allowed.

The Leonard Property is not large enough for a subsurface return system but is large enough for a water resource recovery system with a surface return including room for future expansion. The Mechanic Street Property is only 0.7 acres and has no room for future expansion. The area for future expansion at each site is discussed in greater detail later in the report.

Direction of Prevailing Wind

Prevailing winds in the Town are generally from the west. The Mechanic Street property has residential neighbors that are very close including one residential household immediately to the east. 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 water resource recovery technologies and therefore will not be an issue at any of the three locations under consideration.

Flood Considerations and Accessibility

Water resource recovery systems and return fields should be located three feet above the 100-year flood plain in accordance with updated design standards. Additionally, the NYSDEC *Design Standards for Wastewater Treatment Works*, requires that all water resource recovery systems and return systems be located to minimize or eliminate flood damage. Each of the three properties under consideration are more than three feet above the 100-year flood zone and therefore flooding is not expected to be an issue at any of the locations.

Geologic Considerations

The geology of the area is shown on Figure A.2. The soil at the Silo Ridge Property and the Mechanic Street Property is a Stockbridge-Farmington complex which is a HSG Type C soil with a reported depth to the water table and depth to a restrictive layer of more than 80 inches. Further discussion of subsurface conditions at the Silo Ridge Property are provided in Section 5.3.

The soil at the Leonard Property is a combination of Copake gravelly silt loam and Nassau-Cardigan complex. Copake gravelly silt loam is a HSG Type A soil that has a reported depth to the water table and depth to a restrictive layer of more than 80 inches. Nassau-Cardigan complex is a HSG Type D soil with a reported depth to the water table of more than 80 inches and a depth to a restrictive layer of only 10-20 inches to lithic bedrock. It is suspected that the shallow depth to bedrock is mostly along the ridge which generally runs parallel to the eastern side of the Leonard Property, however, no on site investigations have been conducted at the Leonard Property at the time of this report.

Protection of Groundwater

As a regulatory minimum, subsurface disposal systems are required to be located 100 feet from groundwater wells. This is not expected to be a problem for the Leonard Property or the Mechanic Street Property since the neighboring parcels served by the Amenia Water District and therefore, they presumably do not have private wells.

The parcels along Spruce Hill Road, which are just south of the Silo Ridge Property, are not served by the Amenia Water District and thus they have private wells according to the Dutchess County Parcel Access online tool. The house at 21 Spruce Hill Road is closest neighbor to the Silo Ridge Property. Although the exact location of their well is unknown, the house is approximately 150 feet from the edge of the Silo Ridge Property and therefore maintaining the 100 foot buffer is not expected to be an issue.

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 the Dutchess County Department of Behavioral and Community Health (DCDBCH). Areas with suspected high groundwater levels are shown in Figure A.2. As shown, high groundwater is not expected to affect any of the sites and no basement flooding problems were reported near the sites.

Conveyance Distance

The cost of installing sewers from the collection system to the water resource recovery system 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. The Silo Ridge Property and the Mechanic Street Property are both within the proposed sewer district and therefore no additional length of piping will be required to convey the sewage to these sites. However, the Leonard Property is south of the proposed sewer district and will require approximately 2,000 feet of additional piping to get to convey the sewage to the property.

5.3 Site Investigations

Soils suitable for subsurface return systems must be sufficiently permeable to allow effluent to be returned to groundwater. The commonly used empirical measure is the percolation test that measures the rate of water drop in minutes per inch (mpi) in a small percolation test hole.

For subsurface return, soils must have a percolation rate of less than 120 minutes/inch and preferably less than 60 minutes per inch; especially for larger systems. NYSDEC standards tabulate the allowable application rate for subsurface return in gallons per day per square foot for a range of percolation rates. The required system size and cost is therefore proportional to the percolation rate.

Soils with a percolation rate of over 60 minutes per inch need to be 6 times larger than systems with a soil percolation rate of 1 minute per inch. Very coarse sands and gravels may have percolation rates of less than 1 minute per inch. In this case, NYSDEC standards require additional treatment (beyond septic tanks) because the effluent moves too rapidly through the soil to be treated.

A subsurface return system must also meet separation requirements to the seasonal high groundwater level and the depth to the nearest restrictive layer. In each case, the separation requirements differ between regulatory agencies. The requirements are summarized in Table 5.3. In this case, the DCDBCH has the more restrictive separation requirements and thus DCDBCH's requirements have been assumed for the preliminary design.

Table 5.3 – Trench Separation Requirements

Regulator	Minimum Separation Distance from Bottom of Trench to Seasonal High Groundwater Level	Minimum Separation Distance from Bottom of Trench to Restrictive Layer (bedrock, clay, etc.)
New York State DEC	2 feet	4 feet
Dutchess County (DCDBCH)	4 feet	5 feet

No on-site soil investigations have been completed as part of this study at the Leonard Property or the Mechanic Street Property since the parcels are too small for a large subsurface return system. On-site soil investigations at the Silo Ridge Property were performed by Clark Engineering & Surveying, P.C. on October 11, 2012. The results of the on-site soil investigations are documented in the November 2012 *Wastewater Feasibility Study Final* by Clark Engineering & Surveying, P.C. Testing performed in 2012 included percolation tests and deep hole tests. The 2012 on-site soil investigations are discussed in the subsections below and a copy of the 2012 report is included in Appendix G.

5.3.1 Percolation Tests

Six percolation tests were performed at the Silo Ridge Property in 2012. According to the 2012 report, the soils were generally found to be silty loam with under layers of sandy gravel and the percolation rate was found to be less than 6 minutes per inch in all but one location. In one area, a rate of 9 minutes per inch was noted, but given the percolation rates at other areas of the property, the 2012 report recommended that soil amendment in this area could be used to increase the percolation rate. A map of the percolation test hole locations and table summarizing the results of each percolation test are included in the 2012 report (attached as Appendix G).

Based upon the observed percolation rates and NYSDEC Design Standards Table E-1, an application rate of 1.0 gallons/day/square foot is appropriate for the Silo Ridge Property (6-7 mpi). However, the New York State Department of Health (NYSDOH) may allow a 33% increase in application rate for treatment systems that are owned by a responsible management entity provided that secondary treatment is supplied prior to subsurface disposal. Therefore, an application rate of 1.33 gallons/day/square foot may be used. This is discussed in greater detail in Section 6.3.2.

5.3.2 Deep Hole Tests

Nine deep hole tests were performed at the Silo Ridge Property in 2012. According to the 2012 report, the soils at each deep hole test were similar and generally consisted of a topsoil layer, a silty loam layer, a sandy gravel layer, and finally fractured shale towards the bottom of the deep hole test pits.

The topsoil layer ranged from 12” to 24” deep and the silty loam layer ranged from 24” to 66” deep measured from the top of the test pit down to the bottom of the layer. The silty loam layer reportedly had some gravel, cobbles, and was reported as silty clay loam in three of the deep hole test pits. The sandy gravel layer extended to a depth of approximately 72” below the top of the hole and generally transitioned to fractured shale below a depth of 72”. No groundwater or mottling was encountered in the test pits.

5.4 Surface Return Locations

In general, for systems with smaller capacities, surface return is the less desirable option, when avoidable, as the SPDES permit return levels 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 return.

There are a few unnamed tributaries in the hamlet of Amenia that converge with Amenia stream which generally runs from the northeast to the southwest through the hamlet. Amenia stream crosses beneath Mechanic Street, Route 22, and Lake Amenia Road.

If a water resource recovery system was constructed at the Mechanic Street Property, the most logical place for a surface return would be to Amenia Stream near the Mechanic Street Bridge. This location is shown in Figure 5.1, below. This section of Amenia Stream is classified as a class C trout stream (C(T)) according to the NYSDEC Resource Mapper tool. An advantage of using the Mechanic Street bridge location for the surface return is that it is within the Town ROW along Mechanic Street. Also, after leaving the bridge, the stream only passes by one residential property before travelling through a lightly populated area of the hamlet.

The disadvantages of using the Mechanic Street Bridge location for the surface return are the long conveyance distance from the Mechanic Street Property (approximately 700 feet) and the stream is relatively small in this location.

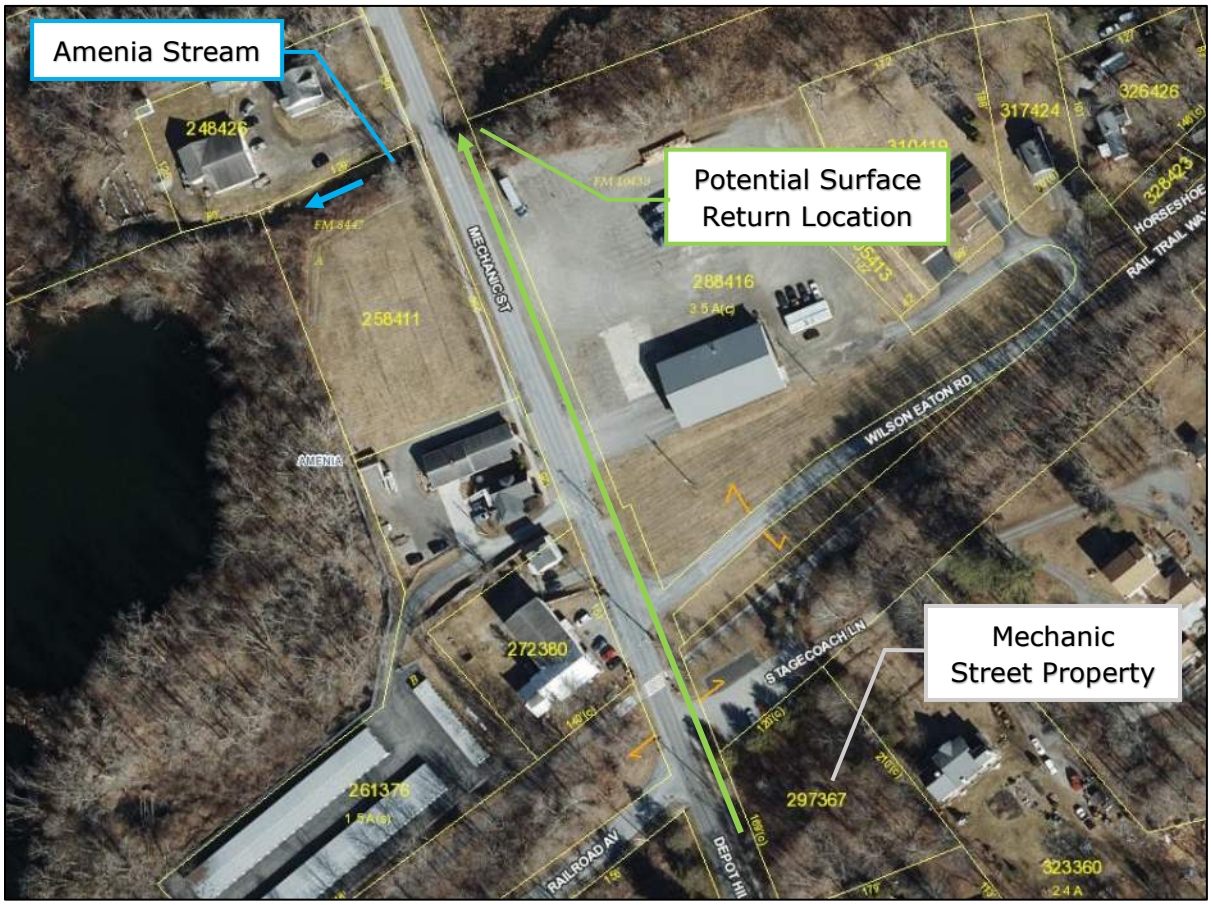

Figure 5.1
Mechanic Street Property Potential Surface Return Location

If a water resource recovery system was constructed at the Leonard Property, the most logical place for a surface return would be to Amenia Stream on the west side of the property. This location is shown in Figure 5.2, below. This section of Amenia Stream is classified as a class C trout spawning stream (C(TS)) according to the NYSDEC Resource Mapper tool. The advantages of using this location for the surface return are that it would be close to the water resource recovery system, the stream is larger in this location, and the stream travels a long distance before reaching a populated area. The disadvantages of this location for a surface return are that the stream splits into two channels along the west side of the Leonard Property (which could present challenges for the outfall design) and the stream is on the Silo Ridge golf course property. Since the stream is on the Silo Ridge golf course property it has been assumed that an easement would be required for this surface return location.

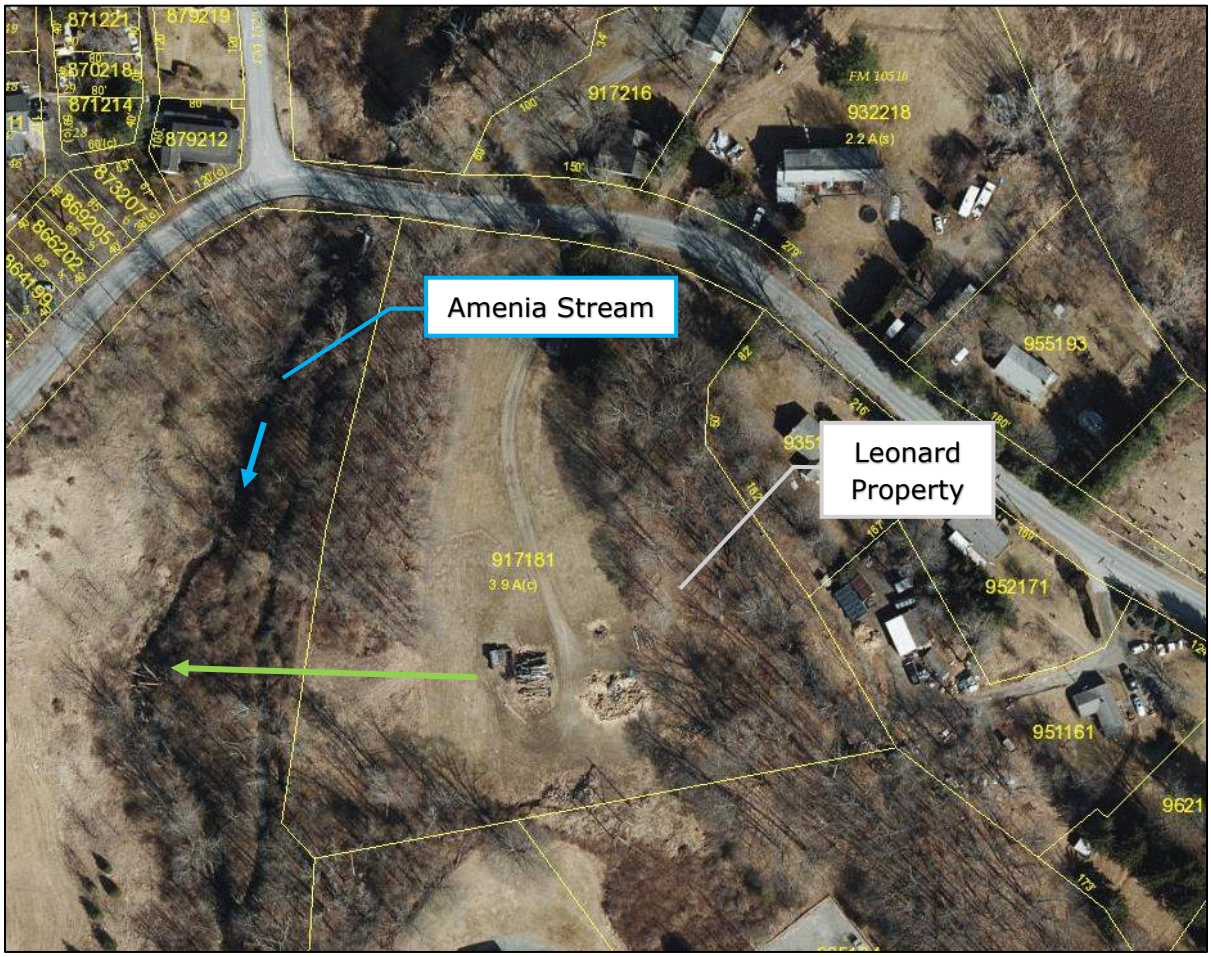

Figure 5.2
Leonard Property Potential Surface Return Location

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 Amenia sewer district.

6.1 Collection Systems

The types of collection systems that were analyzed for Amenia 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 don't 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 across the proposed sewer district generally slopes downhill from the northwest and southeast towards Amenia Stream and the grade decreases to the southwest as Amenia Stream flows out of the hamlet. The topography and treatment system location will dictate the layout of a conventional collection system.

Due to the topography, several pump stations and long forcemains would be required if the treatment system were located at the Silo Ridge Property. The pump stations and long forcemains will add significant costs to the project and for these reasons, a conventional collection system has not been considered in conjunction with a water resource recovery system located at the Silo Ridge Property.

If a water resource recovery system were located at the Leonard Property, a combination of conventional gravity sewer mains and pump stations could be used. For this layout, there are anticipated to be two pump stations and forcemains including one at the end of Lavelle Road and one near the intersection of Route 22 and Lake Amenia Road. It should be noted that the preliminary layout assumes that gravity flow can be achieved between Mechanic Street and the pump station at the end of Lavelle Road based on limited topographic data. However, if detailed design determines that gravity flow cannot be achieved, then a third pump station may need to be added on Mechanic Street. It should also be noted that certain parcels may need grinder pumps based on local topography such as the parcels at the end of Horseshoe Bend.

If a water resource recovery system were located at the Mechanic Street Property, a combination of conventional gravity sewer mains and pump stations could also be used. For this layout, there are anticipated to be three pump stations and forcemains including one at Mechanic Street, one at the end of Lavelle Road, and one near the intersection of Route 22 and Broadway. It should be noted that certain parcels may need grinder pumps based on local topography such as the parcels at the end of Horseshoe Bend.

Figure A.12a and Figure A.12b show the preliminary collection system layouts of a conventional collection system with the water resource recovery system located at the Leonard Property and the Mechanic Street Property, respectively.

If a conventional collection system were used in conjunction with an alternative water resource recovery system, a large influent tank would be required to capture the solids prior to the recovery system. This tank would essentially serve as a large septic tank in place of the individual septic tanks and provide primary treatment before the sewage entered the alternative water resource recovery system. The tank would be located at the water resource recovery system site.

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 state roadways such as Route 22, Route 44, and Route 343. 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 layouts shown in Figure A.12c, Figure A.12d, and Figure A.12e 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.

As shown in Figures A.12c, A.12d, and A.12e, the collection system layout varies changes slightly based on the location of the water resource recovery system. If the water resource recovery system were located at the Silo Ridge Property (Figure A.12c) or the Leonard Property (Figure A.12d) a pressurized STEP collection system would likely be required for the entire system. If the water resource recovery system were located at the Mechanic Street Property (Figure A.12e) a pressurized STEP collection system would likely be required for the portion of the sewer district on the north side of Railroad Avenue. A gravity STEG collection system could be used for the Depot Hill area with a separate gravity line feeding the water resource recovery system since this area is all at a higher elevation compared to the Mechanic Street Property.

For the alternative analysis, it was assumed that the collection systems would be as shown in Figures A.12c, A.12d, and A.12e.

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 contaminates
- 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 Amenia.

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 Amenia sewer district, associated costs, and staffing requirements of a conventional wastewater treatment system, it is recommended that the Town of Amenia focus on an alternative water resource recovery system instead of a conventional system.

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 3 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 Amenia but were not analyzed.

Table 6.1 – Water Resource Recovery Systems Not Analyzed

Treatment System	Reason(s) Not Considered
Conventional Activated Sludge Systems	• Complexity • Inappropriate size • Construction costs • Staffing requirements • O&M requirements
Packaged Steel Activated Sludge Treatment Systems	• Complexity • Longevity concerns • Staffing requirements • O&M requirements
Alternative Individual Onsite Treatment Systems	• O&M requirements and costs • Does not address concerns with reserve area

The types of treatment systems that were analyzed for Amenia include:

1. Membrane Bioreactors (MBR)
2. Moving Bed Biofilm Reactors (MBBR)
3. Packed Bed Media Filters (PBF)
4. KleanTU NitROE System

6.2.1 Membrane Bioreactors (MBR)

General Description

Membrane bioreactors (MBR) combine biological oxidation of the activated sludge process with membrane separation. MBR systems treat wastewater through aerobic digestion and membrane filtration. This allows both to occur in a single unit operation and eliminates the need for large settling tanks required in conventional water resource recovery systems. Air is introduced into the tank housing the membranes which provides oxygen for the biological process, mixes the tank, and scours the membranes to reduce fouling.

There are several manufacturers of packaged MBR systems, however, the Ovivo MBR has been used as the basis for the Amenia preliminary design. The Ovivo MBR is a packaged system designed to be simple to operate and with options ranging from initial solids removal through disinfection.

The Ovivo packaged MBR systems are available in two configurations including an inground concrete tank configuration where the components are supplied loose, and the contractor builds the tank and installs the components or an above ground packaged system which includes the tanks and all components pre-assembled. The pre-assembled tank configuration has been used for the alternative analysis presented in this report. The MBR system has only been considered in conjunction with a surface return system since MBR systems are not as cost effective compared to other technologies when used in conjunction with a subsurface return system.

The packaged MBR system contains the tanks, fine and coarse screens, membranes, transfer pumps, permeate pumps, dosing pumps, blowers, transformers, breakers, UV disinfection system, instrumentation, and controls. An equalization tank, sludge tank, and post aeration will need to be provided separately. A typical Ovivo packaged MBR system in the pre-assembled tank configuration is shown in Figure 6.3.

Figure 6.3
Ovivo Packaged MBR System

Preliminary MBR Design

Assuming treatment of septic tank effluent, an average day design flow of 75,000 gpd, and the anticipated surface return limits discussed in Section 4.3; a dual-zone MBR system would be required. To treat the estimated average day design flow, eight membrane units would be required for the surface return system. The membrane units will be split into two parallel trains with four membranes in each train. A pre-anoxic zone and an aerobic zone will be located upstream of the membrane zones. A flow equalization tank, influent flow meter, sludge holding tank, and post aeration are not included in the packaged MBR system. A building will also be required for the MBR system. The approximate building size for the MBR system is 50’ x 70’.

Figure 6.4 shows the preliminary layout of the MBR system for Amenia. Supplemental information regarding the Ovivo MBR system can be found in Appendix H.

The Ovivo packaged MBR systems have been installed in well over 200 applications across the country including several in New York. A similar system was approved and installed within NYS DEC Region 3 at the Storm King School in Cornwall.

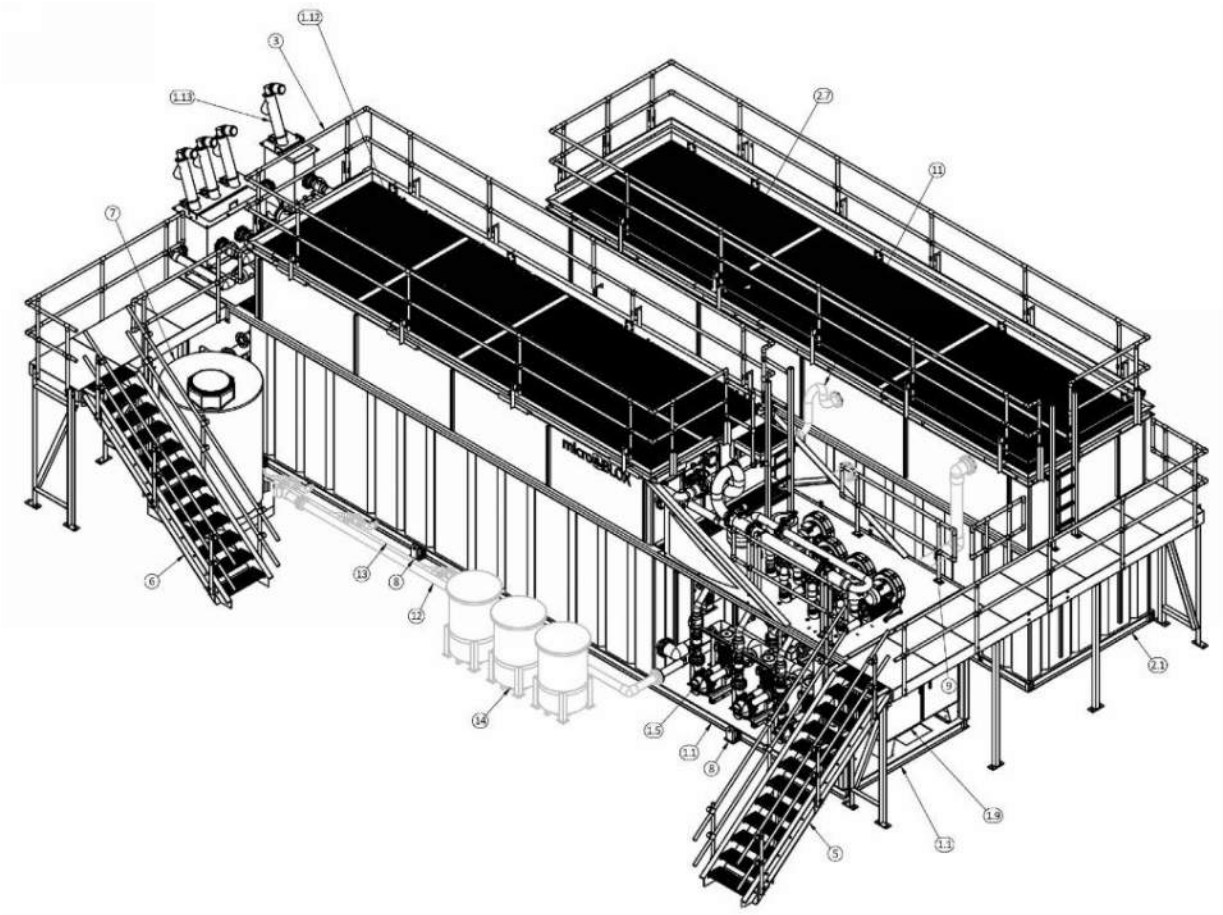

Figure 6.4
Preliminary Layout of Ovivo Packaged MBR (Surface Return)

Other components which are not part of the MBR packaged system but will be required if this type of water resource recovery system is selected include:

- Influent flow meter
- 25,000 gallon FRP flow equalization tank with submersible duplex pumps and a submersible mixer/aerator
- 3,500 sq ft building (50'x70') on a concrete slab
- 20,000 gallon sludge holding tank with decant pumps
- Electrical service
- Building plumbing, heating, and ventilation
- Buried and exposed process piping
- Chemical totes
- Post aeration system
- Back-up generator
- Site upgrades

6.2.2 Moving Bed Biofilm Reactors (MBBR)

General Description

Moving Bed Biofilm Reactor systems consist of an aeration tank with media that is suspended within the tank (typically high-density polyethylene). The plastic media provides a surface for biofilm to grow. The media is mixed within the tank by the aeration system thus allowing good contact between wastewater and the biofilm on the media. As the media moves throughout the water column, oxygen and organic/inorganic material are available to the biofilm which absorbs, oxidizes, and reduces these pollutants thus providing treatment. MBBR systems are considered a fixed film technology and have no return activated sludge, and therefore they have a reduced footprint and simpler operation and maintenance compared to conventional activated sludge systems.

There are several manufacturers of packaged MBBR systems, however, the AquaPoint AquaCELL MBBR system has been used as the basis for the Amenia preliminary design. The AquaPoint MBBR is a packaged system designed to be installed within buried fiberglass tanks which are readily available and lower in cost compared to cast-in-place concrete tanks.

The packaged system generally consists of three parts: 1) an influent EQ tank, 2) an MBBR train, and 3) clarifiers. The MBBR system can be configured for a subsurface return or surface return system. An MBBR designed to meet surface return limits will be larger than a system designed for subsurface return, and it will also require additional media, tertiary filtration, UV disinfection, and post aeration. A representative picture of AquaPoint MBBR system is shown in Figure 6.5. Figure 6.5 shows a system with AquaPoint Bioclere units instead of clarifiers. Clarifiers, with covers will look very similar to the Bioclere units shown in the upper right portion of Figure 6.5.

Figure 6.5
Representative Image of AquaPoint MBBR System

Preliminary MBBR Design

Assuming treatment of septic tank effluent, an average day design flow of 75,000 gpd, and the anticipated permit return limits discussed in Section 4.3; the MBBR system would consist of the following components:

- 25,000 gallon FRP flow equalization tank with submersible duplex pumps and a submersible mixer/aerator
- Two 7,500 gallon dual stage FRP MBBR tanks in parallel with media, CPVC aeration grids, and dual blowers in FRP enclosures for a subsurface return system or two 12,500 gallon dual stage FRP MBBR tanks in parallel with media, CPVC aeration grids, and dual blowers in FRP enclosures for a surface return system
- Flow splitter box
- Two 12' diameter FRP hopper bottom clarifiers (can be provided with a cover or with railings & a catwalk)
- 20,000 gallon FRP sludge holding tank
- 10,000 gallon FRP filter feed/Backwash/Re-Aeration Tank with fine bubble re-aeration grid (for surface return only)
- Two disc filters in parallel in stainless steel tanks with feed pumps, backwash pumps, and controls (for surface return only)
- Open channel UV disinfection system (for surface return only)
- Chemical feed package for alkalinity and coagulant with storage tanks, pumps, and controls (for surface return only)

As represented in the list above, the preliminary design for the MBBR system differs slightly depending on the type of return method. An MBBR system for a subsurface return will be smaller and generally has less components which results in a system that is simpler to operate and requires less maintenance compared to a system for a surface return.

As indicated above, a flow equalization tank is installed for each scenario to provide stability by leveling out peaks in flow and allowing consistent loading of the MBBR system. Flow is pumped from the equalization tank to the MBBR treatment system. For the preliminary design, we have assumed that two parallel dual stage MBBR trains, each sized to treat half the flow will be used to allow one train to be taken offline for maintenance while the other remains in operation. The first stage is primarily for BOD removal and the second stage is primarily for nitrification. Aeration is provided in each MBBR tank through CPVC aeration grids that are supplied by blowers with VFD controls.

Effluent flow from the MBBR tanks will flow by gravity to a flow splitter box where the flow is split between two FRP hopper bottom clarifiers. For the subsurface return system, the effluent from the clarifiers will flow by gravity to leachfield field or to a dosing chamber. For a surface return system, coagulant can be added at the splitter box to help settle out any colloidal organic nitrogen that could mineralize into ammonia in the effluent. The coagulant will also help floc particles allowing the disc filters to perform better. For the surface return system, the flow from the clarifiers will go to the filter feed tank. A fine bubble re-aeration grid will be located within the filter feed tank to meet the dissolved oxygen limit.

For a subsurface return system, a control building that is approximately 15' x 20' is recommended for the blowers and controls. For a surface return system, the building will house two parallel disc filter trains and backwash pump assemblies along with the chemical feed systems, blowers, and controls. The anticipated building size for the surface return system is 20' x 40'. The building could be masonry, metal, stick-built, or pre-fabricated FRP depending on the aesthetics of the area.

Sludge from the clarifiers and filter backwash (for surface return only) is collected within the buried sludge holding tank. Decant water from the sludge holding tank will flow by gravity to the head of the system and sludge will need to be periodically removed off site.

Figure 6.6 shows a simplified process flow diagram of the AquaCELL MBBR system. Note that the flow equalization, sludge storage tank, filter feed tank, and disc filters are not shown in Figure 6.6. Supplemental information regarding the AquaCELL MBBR system can be found in Appendix H.

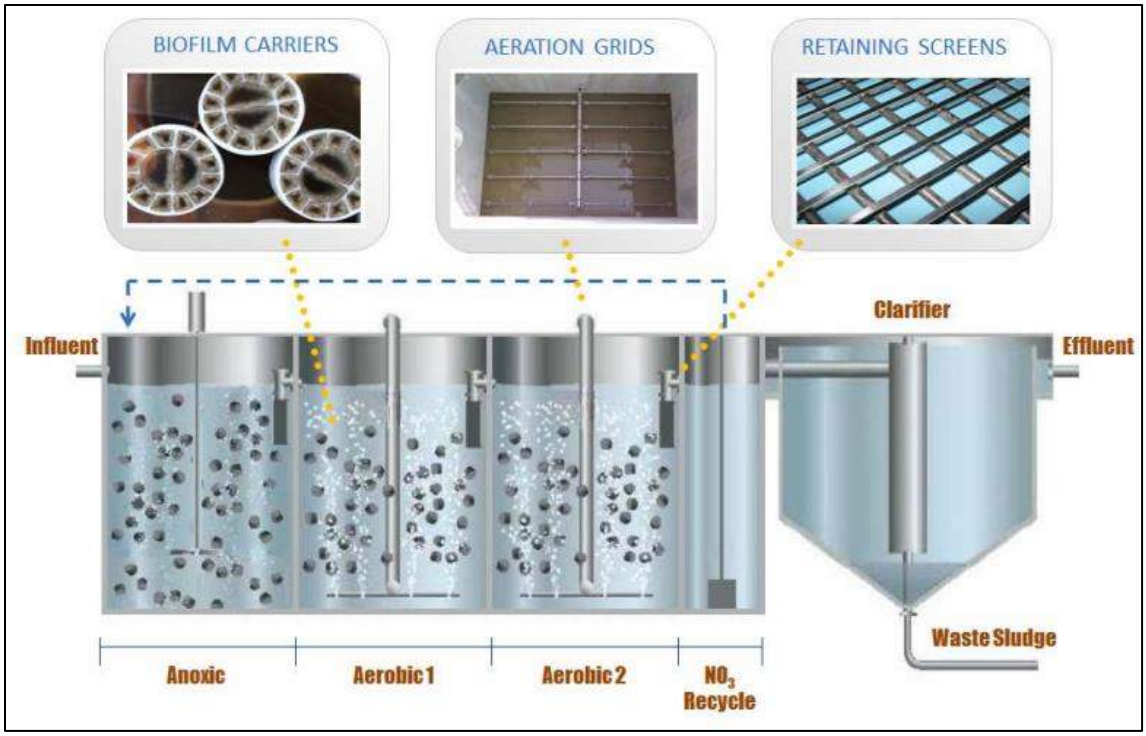

Figure 6.6
AquaCELL MBBR System Process Flow Diagram

The AquaCELL MBBR systems have been installed in several locations in New York including Dutchess County. A few installations include:

- 16,500 gpd system at Jeffery Grove Estates in Hyde Park, NY
- 15,000 gpd system at Golden Apartments in Hyde Park, NY
- 8,000 gpd system at Camp Hill in Ghent, NY
- 27,000 gpd system at Camp Malka in Greenville, NY
- 125,000 gpd system at Tioga Downs Casino in Nichols, NY

6.2.3 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 6.7.

Figure 6.7
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. The primary components included in the preliminary design of an Orenco AdvanTex PBF system for each return scenario are summarized in Table 6.2.

Table 6.2 – Orenco PBF System Preliminary Design Summary

Treatment Component	Subsurface Return	Surface Return
80,000 gallon Flow EQ Tank/Pre-Anoxic Tank w/ pumps	✓[1]	✓
Stage 1 - AX-Max300-42 Treatment Units (11)	✓	✓
Return Line and Alkalinity Feed		✓
Stage 2 - AX-Max300-42 Treatment Units (4)		✓
Stage 2 - AX-Max250-42 Treatment Units (1) w/ pumps		✓

[1]Primary function is flow equalization only

As shown in Table 6.2, a flow equalization tank is installed for each scenario to provide stability by leveling out peaks in flow and allowing consistent loading of the treatment system. For the surface return scenario, 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. In each scenario, eleven 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.

For the subsurface return scenario, treated flow would simply leave the last stage 1 treatment unit to the disposal field. But for the surface return scenario, a portion of the filtrate from stage 1 would be recirculated to the 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 6.8 represents a simplified process flow diagram for the Orenco AdvanTex PBF system with a surface return. The same process flow diagram is applied for a subsurface return, but the return line and stage 2 treatment are eliminated. 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 H.

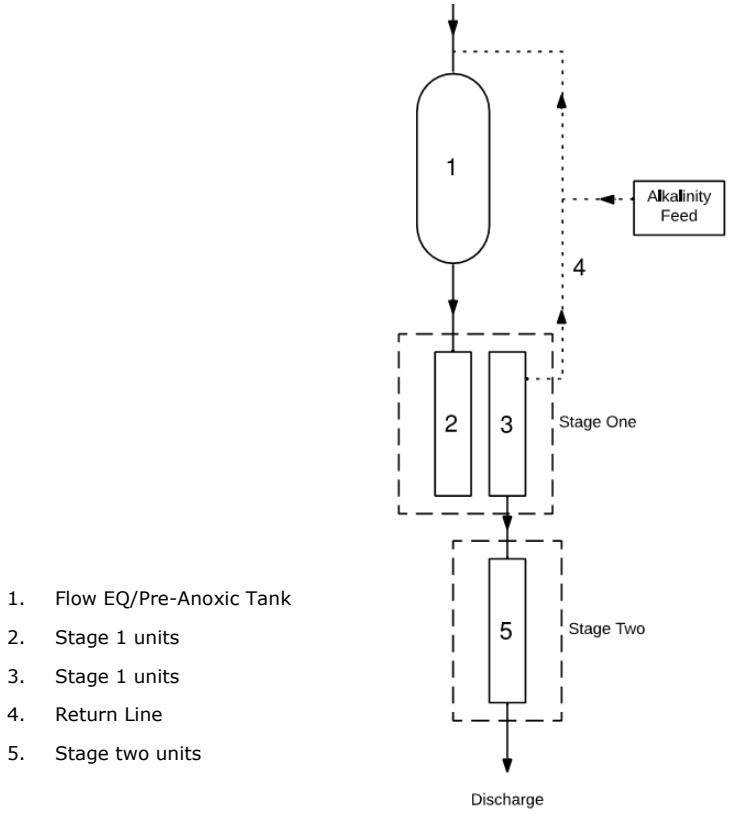

Figure 6.8
Orenco PBF System Process Flow Diagram

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')
- UV system (for surface return only)
- Post-aeration system (for surface return only)
- 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

6.2.4 KleanTU NitROE System

General Description

The KleanTU NitROE system is designed specifically for subsurface return applications. KleanTU also produces a system that is designed for surface return applications. However, only the NitROE subsurface system has been considered as part of this alternative analysis. Although the KleanTU NitROE system is relatively new to the market, it has been considered in the alternative analysis because of its minimal visual impacts, simplicity, and anticipated low construction and O&M costs.

The NitROE system consists of multiple below grade concrete tanks which contain the treatment components to remove organic matter and nitrogen. After primary settling (septic tank effluent) the wastewater flows to the first part of the treatment process which involves a submerged aerated bed. The second part of the treatment process involves a denitrification bed which takes place in a separate tank or a separate compartment of a common tank. The system uses wood chips and limestone to convert the wastewater ammonia into an innocuous gas. A schematic diagram of the KleanTU NitROE (for residential application) is shown in Figure 6.9.

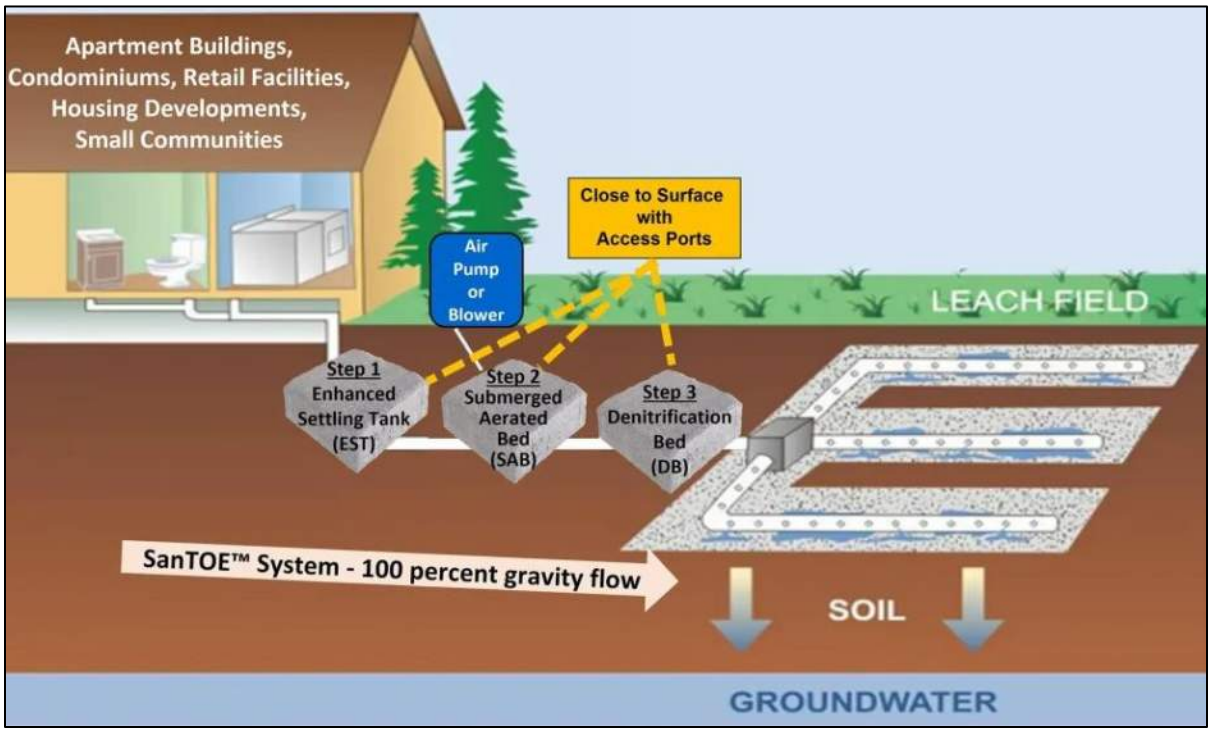

Figure 6.9
KleanTU NitROE System Process Flow Diagram

The KleanTU system is gravity fed where the topography allows with the only mechanical equipment being air blowers. The system is completely below grade except for access ports to the tanks and blowers. The blowers can be installed within FRP enclosures or within a small control building.

Preliminary KleanTU NitROE Design

The preliminary design of the KleanTU NitROE system consists of a large, single cast-in-place concrete tank with several common walls to create separate compartments within the tank. The approximate footprint of the tank will be 7,200 sqft (65' x 110'). The liquid depth in the tanks will be 6 ft with gravity flow through the tank system to a final pump chamber (if needed based on topography). Conveyance to the subsurface return field will be by pumping from this chamber or by gravity if topography allows.

Figure 6.10 shows a block diagram of the preliminary NitROE system. The septic tank effluent flow will be split between two parallel trains. Each train consists of a submerged aeration chamber followed by a denitrification chamber. The effluent from both denitrification chambers will flow to the common pump chamber. The tanks will all be below grade with various access ports. The air blowers and controls will be in a small control building (approximately 15' x 20').

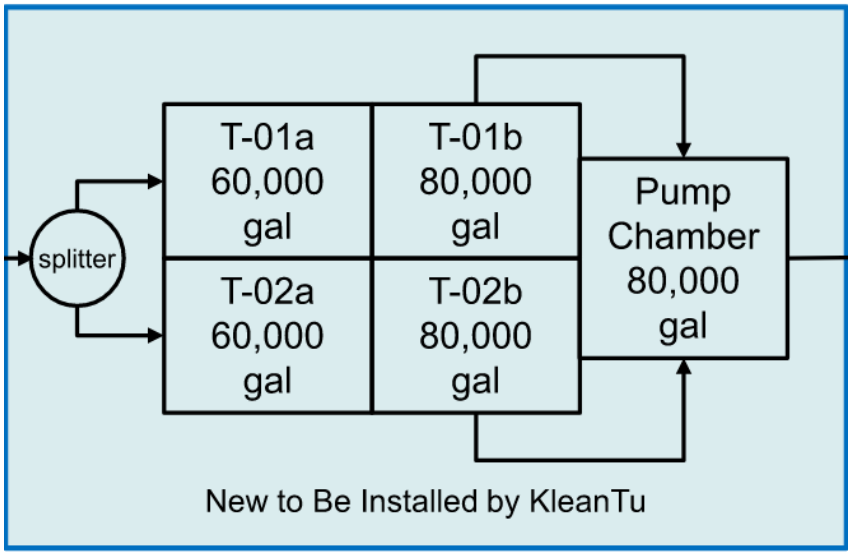

Figure 6.10
KleanTU NitROE Preliminary Design Block Diagram

Other components which will be installed as part of the system but are not included in the KleanTU package include:

- Influent flow meter in a buried vault
- 25,000 gallon FRP flow equalization tank with submersible duplex pumps and a submersible mixer/aerator
- Control building on a concrete slab (approximately 15' x 20')
- Electrical service and back-up generator
- Buried process piping

To date, the KleanTU NitROE systems have been installed exclusively in Massachusetts with several installations in operation since 2017. However, to date, no KleanTU NitROE systems have been installed in New York or for a community application.

6.3 Return Systems

Two options exist for return of the treated wastewater:

- Return to a surface water
- Return to the subsurface

Methods for each type of return are discussed in the following Sections.

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 5.4, the surface water body where treated wastewater would be returned from the Amenia water resource recovery system is Amenia Stream.

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 all the water resource recovery systems discussed in Section 6.2 would utilize a UV system if returning to a surface water body.

For Amenia, a surface water return to Amenia Stream 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 as discussed in Section 4.3. A schematic of a multiport fully submerged cross-channel diffuser is shown in Figure 6.11.

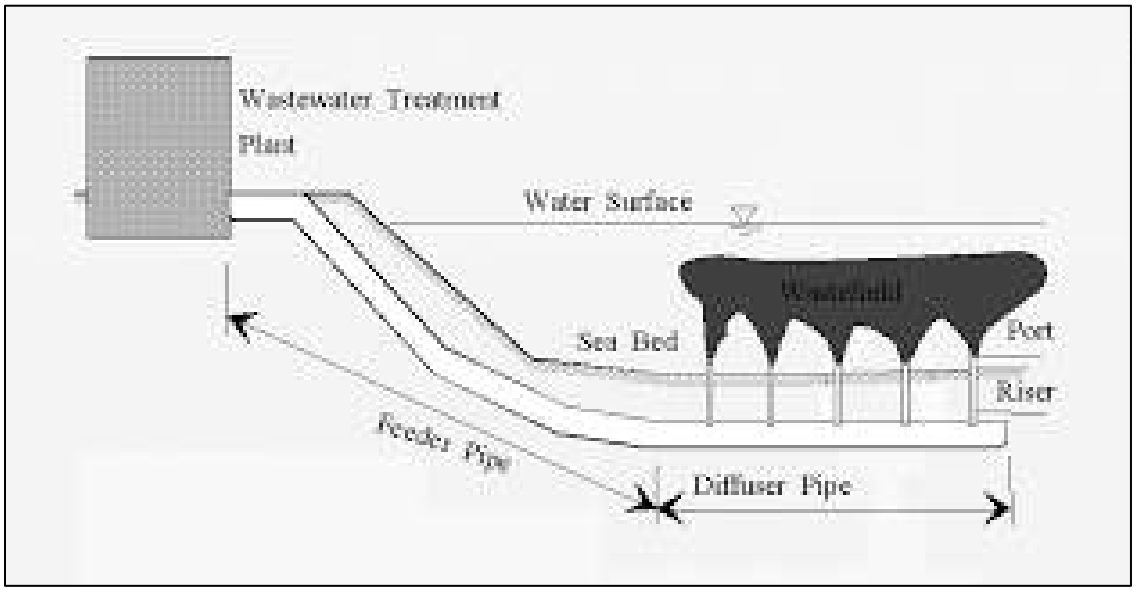

Figure 6.11
Typical Multiport Fully Submerged Cross-Channel Diffuser

6.3.2 Subsurface Return

In general, the subsurface return of treated effluent avoids the costs and maintenance concerns associated with disinfection. Subsurface return is considered by regulators as having lower environmental impacts, as it allows recharge of the water table rather than return to a surface water body where it is immediately removed from the watershed. The absorption fields also have minimal visual impact on the surrounding community. Additionally, subsurface return allows for much less licensed operator involvement and water quality testing.

There are many different types of subsurface return systems, both conventional and alternative. The types of subsurface return systems that were analyzed for Amenia include:

1. Conventional Absorption Fields (trench configuration)
2. Infiltration Chambers (trench configuration)
3. Gravelless Geotextile Sand Filters (trench configuration)
4. Drip Dispersal

There are two important considerations which impact the preliminary sizing and cost estimates of a subsurface return system including, 1) depth to the seasonal high groundwater table and 2) allowable application rates. The seasonal high groundwater table is not anticipated to be a concern for the Silo Ridge Property since no groundwater or mottling was encountered in any of the deep test pits (see Section 5.3.2).

When absorption fields are used for treatment (such as with conventional septic tanks and leachfields), it is anticipated that microorganisms in the soil assist in removal of any remaining organic matter, solids, and nutrients. When absorption fields are used after secondary treatment, they are primarily intended for return of the treated effluent into the ground since they are not relying on the soil for treatment. In this case, a 33% increase in application rate may be allowed when a "Responsible Management Entity" owns the treatment system such as a municipality (Appendix 75-A.6(6)(ii)(d)).

Therefore, for preliminary sizing of the subsurface return systems, it has been assumed that the Town of Amenia would qualify as a responsible management entity and that a 33% increase in application rate would be granted, provided that secondary treatment is supplied. It should be noted that this reduction does not apply for absorption beds. The preliminary sizing for each of the subsurface return methods listed above have been calculated with and without the 33% increase in application rate for comparison purposes.

Conventional Absorption Fields

Subsurface return is typically accomplished using absorption fields, especially for smaller residential systems. However, absorption fields can also be used for larger systems if the space is available. There are two configurations of absorption fields including absorption trenches and absorption beds. The trench is the most common and preferred of the two options and consists of a trench or series of trenches in which perforated PVC pipe is placed in a bed of gravel or synthetic aggregate. Sewage is delivered to the PVC pipes by gravity, pressure, or by dosing and seeps slowly out of the perforated PVC pipe, into the aggregate, and finally into the soil. A typical trench absorption field utilizing perforated PVC pipe and gravel aggregate is shown in Figure 6.12.

Figure 6.12
Conventional Trench Absorption Field Under Construction

Absorption beds (also referred to as seepage beds) are similar to trenches in that they also utilize perforated PVC pipes and an aggregate. The difference between absorption trenches and absorption beds is that for beds there is no native soil that separates the rows of PVC pipes; rather, the pipes are all placed in a common bed of aggregate. Trenches are preferred over beds because beds have very little sidewall area and lower oxygen transfer. Beds are also better suited for pressure systems and for flat sites to minimize the potential groundwater mounding and/or down gradient seepage. Only conventional trench style absorption fields have been analyzed for the Silo Ridge Property since the property is sloped.

Table 6.3 presents the preliminary sizing criteria for a conventional absorption trench return system. The field size calculations have been completed using 2-foot wide trenches, 4-foot spacing between trenches, a maximum lateral length of 100 feet for dosed distribution, an application rate of 1.0 gallons/day/square foot, and a 100% reserve area.

Table 6.3 – Conventional Absorption Trench System Sizing

	Value (w/o 33% increase)	**Value (w/ 33% increase)**
Percolation Rate (mpi)	6-7	6-7
Application Rate (gpd/sq ft)	1.00	1.33
Design Average Day Flow (gpd)	75,000	75,000
Required Absorption Area (sq ft)	75,000	56,391
Total Length of Trench Required (ft)	37,500	28,200
No. of Laterals Required (@100’ ea)	375	282
Approximate Field Size (acres)[1]	7.83	5.92
Total Area Required Inc. Reserve (acres)	15.66	11.85

[1]Includes trench spacing, slope fill, and area for tight pipes

As shown in Table 6.3, approximately 11.9 acres is required for a conventional trench absorption field with the 33% increase in application rate. The Silo Ridge Property is only 8.5 acres and therefore a conventional absorption trench system will not fit at the Silo Ridge Property.

Infiltration Chambers

Infiltration chambers are similar to conventional trench absorption fields except that the perforated PVC pipes are replaced with high-density polyethylene chambers that interlock to form a continuous drainage area with a much greater storage volume than a PVC pipe-in-gravel system. The infiltration chambers have an open bottom which allows the sewage to seep into the ground. With the infiltration chambers, sewage has more time to percolate slowly and effectively, ensuring greater strength, performance, and longevity. Infiltration chambers can also be installed without an aggregate if soil conditions allow. However, aggregates are typically used regardless for best practice, particularly for higher flow systems. Infiltration chambers can be gravity fed or pressurized. Figure 6.13 shows infiltration chambers installed in a trench configuration.

Figure 6.13
Absorption Trench with Infiltration Chambers

Infiltration chambers are more expensive than conventional PVC pipe-in-gravel trench absorption systems, however using infiltration chambers in a trench configuration in lieu of perforated PVC pipes allows for a 25% reduction in trench length granted that the chambers meet certain criteria (Appendix 75-A.8(c)(3)(i)). This may typically present a cost savings compared to conventional absorption trenches. However, in this case, the 25% trench length reduction cannot be in conjunction with the 33% increase in application rate.

For these reasons, infiltration chambers will require the same area as a conventional absorption trench system as discussed above and thus an infiltration chamber return system will not work fit at the Silo Ridge Property.

Gravelless Geotextile Sand Filters

The use of gravelless absorption systems is becoming more common as the technology is easier to install compared to traditional absorption fields and also provides distinct advantages at certain sites. There are several types of gravelless absorption systems including open-bottom gravelless chambers (discussed above), gravelless media-wrapped corrugated pipe sand-lined systems, and gravelless geotextile sand filters.

Gravelless geotextile sand filters (GGSF) are similar to conventional absorption trench systems but consist of a geotextile wrapped "unit" surrounded by system sand instead of a single pipe surrounded by gravel aggregate. There are several manufacturers of GGSF products which vary slightly from one manufacturer to the next, but each generally consists of a perforated pipe surrounded by or placed on top of a synthetic aggregate or media which is then contained around the diameter of the pipe or covered by a geotextile fabric. The unit(s) are placed in a 4 foot wide trench and are surrounded by 6 inches of system sand below and on the sides of the unit(s).

In accordance with NYS DEC design standards, a trench bottom sizing criteria of 6 square feet per linear foot of trench may be used for the design of GGSF systems provided that the GGSF product has an overall unit width of 3 feet, a storage capacity of 12 gallons per linear foot, and six inches of system sand is installed below and on the sides of the unit(s). The GGSF systems must have a minimum of 4 foot edge-to-edge trench separation. The Advanced Treatment Leachfield (ATL) system manufactured by Infiltrator Water Technologies was used as the basis for the preliminary sizing of a GGSF system. An example of a GGSF system (manufactured by Infiltrator) is shown in Figure 6.14.

Figure 6.14
Gravelless Geotextile Sand Filter Trench System (by Infiltrator)

Table 6.4 presents the preliminary sizing criteria for a GGSF return system. The field size calculations have been completed using 4 foot wide trenches, 4 foot spacing between trenches, a maximum lateral length of 100 feet for dosed distribution, an application rate of 1.0 gallons/day/square foot, and a 100% reserve area.

Table 6.4 – GGSF Trench System Sizing

	Value (w/o 33% increase)	**Value (w/ 33% increase)**
Percolation Rate (mpi)	6-7	6-7
Application Rate (gpd/sq ft)	1.00	1.33
Design Average Day Flow (gpd)	75,000	75,000
Required Absorption Area (sq ft)	75,000	56,391
Total Length of Trench Required (ft)	12,500	9,400
No. of Laterals Required (@ 100' ea)	125	94
Approximate Field Size (acres)[1]	3.56	2.71
Total Area Required Inc. Reserve (acres)	7.12	5.42

[1]Includes trench spacing, slope fill, and area for tight pipes

As shown in Table 6.4, approximately 5.4 acres is required for a GGSF trench absorption field with the 33% increase in application rate. Approximately 1.5 acres of the property will be unusable for the absorption fields because of zoning setbacks, the area for the access road, and the area for the water resource recovery system. The Silo Ridge Property is approximately 8.5 acres leaving approximately 7.0 acres available for the absorption field and reserve area. Therefore, a GGSF absorption field is expected to fit on the property if the 33% increase in application rate is approved but there is very limited spare room. The GGSF absorption field will not fit on the property without the 33% increase in application rate. The impacts of a groundwater mounding analysis (completed during the design phase) may also impact the layout of the GGSF absorption field and could necessitate a larger area.

Drip Dispersal Systems

Subsurface drip dispersal technologies apply water to the root zone using perforated small diameter piping or porous diffusers, typically placed 6 to 12 inches below the soil surface (minimum of 18 inches in cold climates such as New York). This technology has been successfully used in the northeast for several years and has been accepted as a reliable method for subsurface wastewater return. Drip dispersal systems are often used in areas where marginal or shallow soils are found. Figure 6.15 shows a typical drip dispersal system under construction.

Drip dispersal systems consist of a pre-treatment unit, a pump tank, filtration system, subsurface drip tubing, and a controller. For drip dispersal systems, the pump tank stores effluent until the controller turns on the pump to dose pre-treated wastewater through a filtering system into the soil. The filtration system removes solids from the effluent and flushes them back to the pretreatment device. Drip tubing is placed directly into the soil without the use of trenches. The system relies on specially designed emitters to apply effluent uniformly.

Figure 6.15
Drip Dispersal System Before Backfill

Drip tubing is typically placed approximately 2' apart in the landscape so emitters are on a grid pattern within the existing landscape. Drip lines are buried relatively shallow so the soil can provide treatment, landscape plants can use the nutrients and water, and the system can maximize evaporation.

A benefit of the drip dispersal systems is that they require minimum backfill compared to traditional leachfields thus cutting down on excavation costs for installation. Drip dispersal systems also have controls which allow for monitoring of the system performance. Drip dispersal systems allow the water to disperse into the ground very slowly over a larger area and do not require gravel placement.

One of the disadvantages of a drip dispersal system compared to a standard absorption field is that they are more maintenance heavy. The drip dispersal system needs to be monitored, cleaned, and filters changed on a regular basis for efficient operation. There is also greater risk associated with a drip dispersal system if the dispersal tubing becomes fouled due to a failed filter, or lack of maintenance.

Similar to conventional absorption fields, drip dispersal requires a significant area for the disposal field. The design of drip dispersal fields must meet the same design standards as a conventional absorption field. Therefore, there is no distinct advantage of a drip dispersal system in terms of reduced field size compared to a conventional absorption field. The advantage for using a drip dispersal field comes when a particular site has marginal soils, a shallow depth to a restrictive layer, or high groundwater. If a site does not have one of these conditions, then a conventional absorption field is preferred. In addition, drip dispersal systems are best suited for flat sites. They should not be used for sloped sites to minimize the potential groundwater mounding and/or down gradient seepage.

For these reasons, a drip dispersal system is not recommended for use at the Silo Ridge Property.

6.4 Opinion of Probable Cost

6.4.1 Cost Estimate Approach

Conceptual opinions of probable costs (OPC) have been prepared for each of the collection system, water resource recovery system, and return system approaches discussed in the Sections above. The opinion of probable cost 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.

6.4.2 Cost Comparison

Table 6.5 summarizes the opinion of probable construction cost (OPCC) for a conventional gravity/pumped collection system and a septic tank effluent collection system as described in Section 6.1. The costs for the collection system are slightly different depending on the location of the water resource recovery system. The costs presented in Table 6.5 are construction costs only and do not include the engineering and contingency costs. The detailed opinion of probable costs are provided in Appendix I.

It is important to note that while the conventional system is more costly, there are additional costs that are not presented. The conventional system transports all solids to the treatment location. This means an additional solids handling process would need to be located at the treatment site, further increasing construction costs. As we have not recommended alternatives utilizing the conventional collection system, those additional costs are not presented.

Table 6.5 – Collection System Construction Costs

Collection System Type	WWRS Location	Cost
Conventional Gravity/Pumped	Leonard Property	$13,838,000
Conventional Gravity/Pumped	Mechanic Street Property	$13,312,000
Septic Tank Effluent	Silo Ridge Property	$8,091,000
Septic Tank Effluent	Leonard Property	$8,353,000
Septic Tank Effluent	Mechanic Street Property	$7,920,000

Table 6.6 summarizes the opinion of probable construction costs for each of the water resource recovery systems described in Section 6.2. The costs for each type of water resource recovery system are separated by the type of return (subsurface vs surface). The capital construction costs for each of the water resource recovery systems are for the most part independent on the system location and therefore the costs presented in Table 6.6 do not include site specific costs including site work, access roads, electric utilities, and property acquisition. The costs associated with site work and property acquisition are presented in the alternative cost analysis (Section 7.2).

In addition, the costs presented in Table 6.6 do not include the engineering, contingency, or property acquisition costs. Based on feedback from the AWC, it has been assumed that there will be no cost to acquire the Silo Ridge Property or the Mechanic Street Property (already owned by the Town) and that the cost to acquire the Leonard Property would be $300,000. The detailed opinion of probable construction costs are provided in Appendix I.

Table 6.6 – Water Resource Recovery System Construction Costs

Water Resource Recovery Type	Return Type	Cost
MBR	Surface	$3,745,000
MBBR	Subsurface	$1,667,000
MBBR	Surface	$3,020,000
PBF	Subsurface	$3,159,000
PBF	Surface	$4,321,000
KleanTU NitROE	Subsurface	$2,860,000

Table 6.7 summarizes the opinion of probable construction costs for a surface water return to Amenia Stream at the Mechanic Street Property and at the Leonard Property and a GGSF subsurface return system at the Silo Ridge Property. As discussed in Section 6.3.2, the Silo Ridge Property does not have enough room for a conventional trench system, an infiltration chamber system, or a drip dispersal system and therefore the costs for these systems are not discussed. The opinion of probable construction cost for the surface return assumes a gravity outfall pipe with a multiport fully submerged cross-channel diffuser at the locations described in Section 5.4.

The costs presented in Table 6.7 are construction costs only and do not include the engineering and contingency costs. The detailed opinion of probable costs are provided in Appendix I.

Table 6.7 – Return System Construction Costs

Return System Type	Location	Cost
Surface Return	Mechanic Street Property	$282,000
Surface Return	Leonard Property	$139,000
Gravelless Geotextile Sand Filters[1]	Silo Ridge Property	$1,043,000

[1]With 33% reduction in field area

Section 7
Alternatives Analysis

7.1 Identification of Alternatives

Two types of collection systems were analyzed in Section 6.1 including conventional collection systems and alternative septic tank effluent collection systems. As shown in Table 6.5, the septic tank effluent collection systems are expected to have a lower capital construction cost compared to conventional collection systems. Therefore, only septic tank effluent collection systems have been included in the final comparison of alternatives.

As discussed in Section 6.2, a conventional water resource recovery system was not analyzed due to the size of the proposed district and the associated costs and staffing requirements of a conventional system. Therefore, four alternative water resource recovery systems were discussed including an MBR system, a MBBR system, a PBF system, and a KleanTU NitROE system. As shown in Table 6.6, the MBBR system is expected to have the lowest capital construction costs for both a subsurface return application and a surface return application and therefore an MBBR system has been included in the final comparison of alternatives.

A surface return option and four types of subsurface return options were analyzed in Section 6.3. Of the four subsurface return options considered, only the GGSF option is expected to fit within the Silo Ridge Property. Both the surface return option and the GGSF subsurface return option have been considered in the final comparison of alternatives.

Based upon the alternative cost comparison and the discussion above, four alternatives should be considered regarding implementation of a sewer system for the Town of Amenia. The alternatives include:

- Alternative No. 1:
  - Septic Tank Effluent Collection System
  - MBBR Water Resource Recovery System at the Silo Ridge Property
  - GGSF Return System
- Alternative No. 2:
  - Septic Tank Effluent Collection System
  - MBBR Water Resource Recovery System at the Mechanic Street Property
  - Surface Return to Amenia Stream
- Alternative No. 3:
  - Septic Tank Effluent Collection System
  - MBBR Water Resource Recovery System at the Leonard Property
  - Surface Return to Amenia Stream
- Alternative No. 4:
  - No Action

7.1.1 Alternative No. 1

Alternative No. 1 consists of the following:

1. Construction of a septic tank effluent collection system for the proposed sewer district with conveyance to the Silo Ridge Property.
2. Installation of the AquaPoint AquaCELL MBBR system for secondary treatment of the septic tank effluent at the Silo Ridge Property. The treatment system will be sized to treat an average daily flow of 75,000 gpd.
3. Construction of a GGSF subsurface return system at the Silo Ridge Property for return of the treated wastewater to the subsurface sized for an average daily flow of 75,000 gpd. The sizing has been estimated using the 33% reduction.

Site work for Alternative No. 1 would include construction of an access road off Route 22, a new electric service, extension of the water service, grading and fill for the return field, excavation for the buried piping, tanks, and treatment units, a small control building on a concrete pad, and security fencing and landscaping. After the GGSF system is installed, the area would be seeded and mulched and would be mowed a few times a year for maintenance. There would be minimal visual impact once construction is complete for the nearby residences as almost all equipment would be below grade. A preliminary layout of the MBBR and GGSF systems for Alternative No. 1 is shown in Figure 7.1.

Figure 7.1
Alternative No. 1 Preliminary Site Layout

7.1.2 Alternative No. 2

Alternative No. 2 consists of the following:

1. Construction of a septic tank effluent collection system for the proposed sewer district with conveyance to the Mechanic Street Property.
2. Installation of the AquaPoint AquaCELL MBBR system for secondary treatment of the septic tank effluent at the Mechanic Street Property. The treatment system will be sized to treat an average daily flow of 75,000 gpd.
3. Construction of surface return to Amenia Stream near the Mechanic Street Bridge.

Site work for Alternative No. 2 would include clearing and grubbing the Mechanic Street Property, site grading and fill, construction of an access drive/parking area, a new electric service, extension of the water service, excavation for the buried piping, tanks, and treatment units, a building for the controls and filters (and potentially the UV system), and security fencing and landscaping. Construction would also involve the installation of a gravity surface return pipe to the Amenia Stream near the Mechanic Street Bridge. Given the small size of the Mechanic Street Property, it will be a challenge to meeting zoning setbacks for the MBBR system components. In addition, the topography at the site is challenging and will require grading and fill or potentially a retaining wall. A preliminary layout of the MBBR system and surface return for Alternative No. 2 is shown in Figure 7.2.

Figure 7.2
Alternative No. 2 Preliminary Site Layout

7.1.3 Alternative No. 3

Alternative No. 3 consists of the following:

1. Construction of a septic tank effluent collection system for the proposed sewer district with conveyance to the Leonard Property.
2. Installation of the AquaPoint AquaCELL MBBR system for secondary treatment of the septic tank effluent at the Leonard Property. The treatment system will be sized to treat an average daily flow of 75,000 gpd.
3. Construction of surface return to Amenia Stream near the Silo Ridge Golf Course.

Site work for Alternative No. 3 would include clearing and grubbing, site grading, construction of an access road, extension of the electric service, extension of the water service, excavation for the buried piping, tanks, and treatment units, a building for the controls and filters (and potentially the UV system), and security fencing and landscaping. Construction would also involve the installation of a gravity surface return pipe to the Amenia Stream near the Silo Ridge Golf Course. A preliminary layout of the MBBR system and surface return for Alternative No. 3 is shown in Figure 7.3.

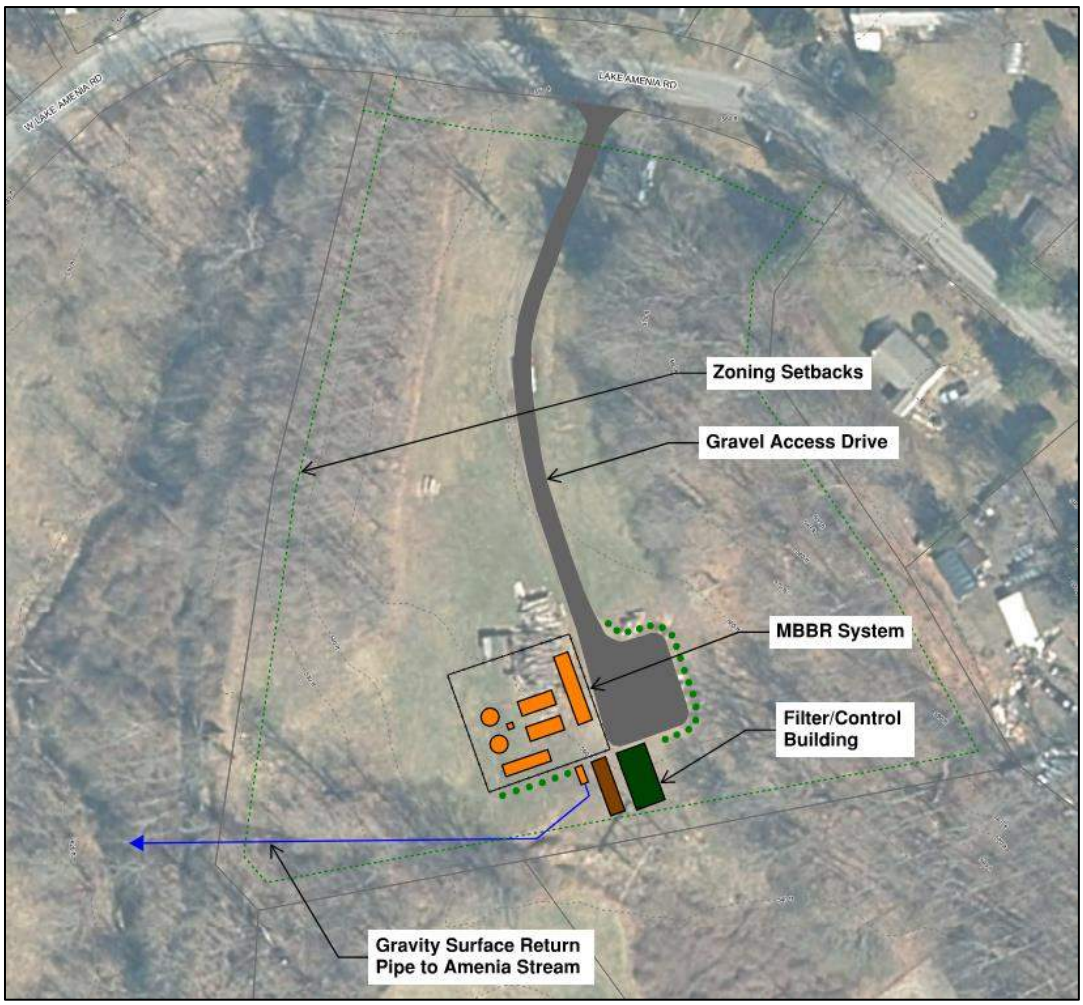

Figure 7.3
Alternative No. 3 Preliminary Site Layout

7.1.4 Alternative No. 4

The "no action" alternative means that no centralized sewer collection, recovery, or return system would be installed for the hamlet. In this scenario, the existing individual sewer systems would remain in use. This option does not address the isolated sewer issues and leaves the responsibility of fixing these issues on the homeowners. In addition, the no action alternative will not address issues that businesses in the hamlet center are experiencing with limited expansion due to restrictions of their existing septic systems. This will prevent certain facilities such as restaurants and multi-use buildings from being able to expand due to limited 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 burden for those hamlet residents who would not be serviced by the sewer 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 return and no disruption of traffic which is likely to occur during construction of a new sewage collection system.

7.2 Life Cycle Cost Analysis

Capital Costs

The opinion of probable cost for each of the three alternatives is summarized in Table 7.1, Table 7.2, and Table 7.3, respectively. The costs in these tables include the construction costs for the collection system, water resource recovery system, return system, and site work associated with the water resource recovery system as well as engineering, contingency, and property acquisition. Detailed tables showing the total OPC for each alternative are provided in Appendix I.

Table 7.1 - Alternative No. 1 Opinion of Probable Cost

Item	Cost
Septic Tank Effluent Collection System	$8,091,000
MBBR Water Resource Recovery System	$1,667,000
GGSF Subsurface Return System	$1,043,000
Site Work	$108,000
Subtotal Construction Costs	$10,909,000
Engineering (20%)	$2,182,000
Contingency (30%)	$3,273,000
Property Acquisition	$0
Opinion of Probable Cost	**$16,364,000**

Table 7.2 - Alternative No. 2 Opinion of Probable Cost

Item	Cost
Septic Tank Effluent Collection System	$7,920,000
MBBR Water Resource Recovery System	$3,020,000
Surface Return System	$282,000
Site Work	$153,000
Subtotal Construction Costs	$11,375,000
Engineering (20%)	$2,275,000
Contingency (30%)	$3,413,000
Property Acquisition	$0
Opinion of Probable Cost	**$17,063,000**

Table 7.3 - Alternative No. 3 Opinion of Probable Cost

Item	Cost
Septic Tank Effluent Collection System	$8,353,000
MBBR Water Resource Recovery System	$3,020,000
Surface Return System	$139,000
Site Work	$98,000
Subtotal Construction Costs	$11,610,000
Engineering (20%)	$2,322,000
Contingency (30%)	$3,483,000
Property Acquisition	$300,000
Opinion of Probable Cost	**$17,715,000**

Operation and Maintenance Costs

If Alternative No. 4 is selected, costs for maintenance and repairs of existing septic systems will remain the cost of the individual property owners including costs for repair or replacement of failing systems. Table 7.4 presents a summary of the anticipated annual operation and maintenance (O&M) costs for Alternative No. 1, Alternative No. 2, and Alternative No. 3. The opinion of probable O&M costs includes the annual operation and maintenance costs for the collection, recovery, and return 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 I.

Table 7.4 – Annual O&M Costs for each Alternative

Alternative	Annual O&M Cost
Alternative No. 1	$143,000
Alternative No. 2	$181,000
Alternative No. 3	$181,000

A life cycle cost analysis was utilized to better compare the three alternatives to determine the most cost-effective alternative, rather than just the alternative with the lowest capital construction cost. The net present value was calculated for each alternative as the capital cost (which includes construction and non-construction costs such as land acquisition and engineering) 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 each alternative is presented in Table 7.5.

Table 7.5 - Alternative Life Cycle Cost Analysis

Item	Alt. No. 1	Alt. No. 2	Alt. No. 3
Capital Cost	$16,364,000	$17,063,000	$17,715,000
Annual O&M Cost	$143,000	$181,000	$181,000
Present Day O&M	$3,473,000	$4,396,000	$4,396,000
Present Day Salvage Value	$1,357,000	$1,553,000	$1,666,000
Net Present Value	**$18,480,000**	**$19,906,000**	**$20,445,000**
		Planning Period	20 years
		Inflation Rate	2.30%
		Discount Rate	0.30%

Although the capital cost for the PBF system is higher than the capital cost the for the MBBR system, the PBF systems are expected to have slightly lower annual O&M costs. For example, the annual O&M cost for a PBF system is expected to be approximately $9,000 dollars less than the annual O&M cost of an MBBR system. The lower cost is mostly due to less frequent sludge removal and slightly lower energy consumption. Over a 20 year life cycle, this would equate to a savings of approximately $180,000. Although significant, the savings in O&M for the PBF system is not expected to overcome the capital construction cost savings of the MBBR system.

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, level of treatment, 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 and Alternative No. 3 have the most direct impact on the environment since they involve return directly to Amenia Stream. However, the water resource recovery systems would be designed to meet the SPDES return limits implemented by the NYS DEC. In comparison, the subsurface return systems for Alternative No. 1 would have no direct environmental impact on Amenia Stream. The no-action alternative may have negative environmental impacts if existing systems are to remain and are not functioning properly, including impacts on the drinking water supply. There are no other anticipated environmental impacts.

Land Requirements

Each alternative (besides the no action alternative) requires land for the water resource recovery system and/or return system. Alternative No. 1 and Alternative No. 3 require the procurement of property that is not currently owned by the Town of Amenia. Therefore, Alternative No. 2 has the advantage of no capital expenditure for acquiring land and thus avoiding negotiations with the current property owners which can take time or even prevent the project from moving forward if an agreement cannot be met.

Easements will be required for the surface return pipe for Alternative No. 2 and Alternative No. 3. The easement for the surface return for Alternative No. 2 could be through the Amenia Fire Company property or the National Horse Carriers property. An easement through the Silo Ridge Golf Course Property will be required for the surface return for Alternative No. 3. Easements will also be required for the collection system and access easements will be required for the Town to access each parcel's septic tank for operation and maintenance purposes. This is required for each alternative.

Constructability Concerns

Each of the alternatives have unique constructability challenges. Alternative No. 1 requires soil amendment for a portion of the GGSF return field. Importing septic fill adds cost to the project and it also presents challenges during construction since heavy equipment cannot be driven over the return field. Therefore, the fill must be placed carefully so not to over-compact the field. Often, fill is placed in the Autumn so it can naturally settle over one freeze-thaw season before installing the absorption field components. This approach adds time to the construction schedule but can be important for a proper installation.

Alternative No. 2 has the challenge of fitting the equipment on the Mechanic Street Parcel which is a very small parcel. In addition, the parcel is sloped and will require fill and potentially a retaining wall. The Mechanic Street Property is also very close to residential houses which can cause a disturbance to the residences during construction.

Alternative No. 3 has the challenge of procuring the property from the current owner and obtaining an easement for the surface return to Amenia Creek. There is also potential for shallow depth to bedrock at the Leonard property based on the soil maps which could present challenges for the installation of the subsurface tanks if encountered. The stream near the Leonard Property appears to split into two channels. This may present a challenge during construction of the surface return pipe and diffuser.

Sustainability Considerations

Sustainable utility management practices are important to consider when creating a new sewer district. Each alternative is utilizing a septic tank effluent 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. 1 includes a subsurface return which is generally more energy efficient compared to Alternative No. 2 and Alternative No. 3 with the surface return. This is because the water resource recovery system for a subsurface return has less components, and thus there are less pumps, blowers, and there is no UV system which consumes a large amount of electricity. Alternative No. 2 and Alternative No. 3 require chemical usage while Alternative No. 1 does not. The operational simplicity of Alternative No. 1 compared to Alternative No. 2 and 3 in turn reduces the amount of operator visits, time and fuel driving back and forth, sending samples to the lab, etc. which, although minimal, helps to reduce the carbon footprint of the system.

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 service even in cases of electricity outages. However, STEP tanks present 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. STEP tanks are included in each of the three alternatives. Alternative No. 2 has less STEP tanks since the Depot Hill Area can be served by STEG tanks. Each water resource recovery system design will include an emergency back-up generator to ensure continuous operation even during a power failure.

Availability for Future Expansion

Having area available for expansion of the sewer system is a very important consideration. Each of the alternatives has a septic tank effluent 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.

Alternative No. 1 uses the Silo Ridge Property for treatment and return to the subsurface. As shown in Figure 7.1, the water resource recovery system and GGSF return system will utilize nearly the entire site. As discussed in Section 6.3.2, a GGSF absorption field is expected to fit on the property only if the 33% increase in application rate is approved. In addition, the impacts of a groundwater mounding analysis (completed during the design phase) may also impact the layout of the GGSF absorption field and could necessitate a larger area. Therefore, Alternative No. 1 has no room for future expansion.

The Mechanic Street Property (Alternative No. 2) also has restrictions on future expansion. Although the system is modular and can be expanded by adding additional MBBR tanks, the site is very small and has limited room for additional tanks. As shown in Figure 7.2, this site will likely require zoning variances for property line setbacks. The Leonard Property (Alternative No. 3) is larger than the Mechanic Street Property and has room for future expansion of the water resource recovery system, if needed.

Level of Treatment

The anticipated return limits are discussed in Section 4.3. Alternative No. 1 (subsurface return) has the least restrictive return limits which in turn results in a smaller, less complex, and less expensive water resource recovery system. Alternative No. 2 and Alternative No. 3 both involve a surface return but at different locations points in Amenia Stream. As discussed in Section 4.3, the return to Amenia Stream near the Mechanic Street Bridge is expected to have more restrictive return limits compared to further downstream near the Leonard Property. This is particularly true for the Ammonia limit. For the surface return to Amenia Stream near the Mechanic Street Bridge, the ammonia limit is expected to be 0.2 mg/L in the summer while the limit near the Leonard Property is expected to be 0.8 mg/L in the summer (at the maximum dilution).

An ammonia limit of 0.8 mg/L can be achieved more consistently than a limit of 0.2 mg/L. The 0.2 mg/L ammonia limit can be more challenging to achieve and may require more frequent operator monitoring of the system. The more stringent return limits at the Mechanic Street Bridge are likely due to the size and classification of the stream at this location. For these reasons, and from level of treatment perspective, a surface return near the Leonard Property is the more desirable of the two locations.

Public Perception

Nuisances such as odors and noise are commonly associated with water resource recovery systems. However, very limited noise or odor concerns are expected for any of the three alternatives.

Public perception of the surface water return to Amenia Stream may be seen negatively by members of the community. This can be especially true for recreational users of the creek or property owners immediately downstream of the return. The Mechanic Street bridge location is upstream of residential areas in the Hamlet and upstream of a nearby pond which may be seen as a negatively especially when compared to the surface return location near the Leonard Property which is downstream of the hamlet and flows through a long stretch with limited development.

The water resource recovery system components for each alternative are primarily below grade but will include fencing as a security measure. The fencing and the control buildings can be screened with landscaping. The Leonard Property is somewhat isolated from nearby residences and my not require landscape screening. However, the Mechanic Street property is surrounded by residential properties and will be easily visible from the road and to the neighbors. The Mechanic Street Property is the least desirable location from a public perception perspective.

Operation and Maintenance Requirements

Each of the alternatives require a similar degree of operation and maintenance. For the septic tank effluent collection 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 septic tanks will periodically be required.

The anticipated operation and maintenance tasks for the MBBR water resource recovery system primarily involves regular maintenance of pumps, blowers, and controls, and periodically checking MBBR effluent screens to confirm that they are in acceptable condition and clean off any biofilm that has accumulated on the screens. The media has a long life span and should last over 20 years. The fine bubble aerators should be inspected every few years and maintained as needed.

Generally, the MBBR system for the subsurface return (Alternative No. 1) has less O&M then the MBBR system for surface return (Alternative No. 2 and Alternative No. 3). The MBBR system for surface return has additional process components including feed pumps for the disc filters, disc filters, disc filter backwash pumps, chemical skids, a UV disinfection system, and a post-aeration system. This means more pumps, blowers, and controls to maintain. Alternative No. 2 and Alternative No. 3 will also require more frequent operational check-ins including daily compliance sampling. Sludge removal frequencies for each alternative will be similar.

Besides maintenance for the effluent dosing system, there is practically no maintenance associated with the GGSF subsurface return system (Alternative No. 1). Maintenance of the surface return to Amenia Stream (Alternative No. 2 and Alternative No. 3) will consist of regular inspections of the surface return and periodic cleaning. The surface return will need to be kept clean of debris and accumulation which could build up over time.

Regulator Familiarity

Regulator familiarity with the water resource recovery system will help expedite regulatory review of the project. Water resource recovery system technologies that have not been previously approved by the NYS DEC Region 3 for a community application will have a much longer review period and have a significant chance of delaying project schedule. The AquaPoint MBBR treatment systems have been installed for applications in NYS DEC Region 3 including a couple of apartment complexes in Dutchess County, NY. Therefore, no regulator familiarity issues are anticipated for the MBBR system.

A summary of the non-monetary considerations is provided in Table 7.6 on the following page.

Table 7.6 – Non-Monetary Considerations

Item	Alt No. 1	Alt. No. 2	Alt. No. 3
Environmental Impacts	- Minimal	- Direct return to Amenia Stream	- Direct return to Amenia Stream - Further upstream
Land Requirements	- Silo Ridge Prop. - Anticipate no cost	- Mechanic Street Property - Town owned	- Leonard Property - Privately Owned - $300k cost
Constructability Concerns	- Soil Amendment - Site just big enough	- Very small site - Topography challenges - Easement for return	- Easement for return - Potential bedrock
Sustainability Considerations	- More energy efficient	- Less energy efficient	- Less energy efficient
Potential for Service Interruption	- Service interruptions for STEP tanks	- Service interruptions for STEP tanks - Has some STEG tanks	- Service interruptions for STEP tanks
Availability for Future Expansion	- No room for expansion	- No room for expansion	- Does have room for expansion
Level of Treatment	- Lowest level of treatment required = simpler	- Highest level of treatment required	- Potentially lower level of treatment required compared to Alt. No. 2 based on max dilution
Public Perception	- Minimal nuisances	- Very visible location near residential areas and rail trail - Surface return near Mechanic Street could be seen negatively	- Site is isolated and should cause very little nuisances - Surface return could be seen negatively
Operation and Maintenance Requirements	- Less O&M	- More O&M	- More O&M
Regulator Familiarity	- Familiar	- Familiar	- Familiar

Section 8
Proposed Project

8.1 Basis of Selection

Based on the alternative life cycle cost analysis shown in Table 7.5, the alternatives are ranked in the following order from lowest net present value to highest net present value.

1. Alternative No. 1 - $18,480,000
2. Alternative No. 2 - $19,906,000
3. Alternative No. 3 - $20,445,000

As shown above, Alternative No. 1 has the lowest net present value. However, considering the non-monetary factors discussed in Section 7.3 and the fact that the cost of each alternative are within the same order of magnitude, Alternative No. 3 is the recommended alternative.

The basis for selection of Alternative No. 3 is as follows:

- Provides room for future expansion
- Is not dependent on needing the 33% reduction in application rate
- Few constructability concerns
- Lower level of treatment required compared to Alternative No. 2
- Site is isolated – better public perception, can meet recommended setbacks
- Regulator familiarity with the system
- Will allow growth of businesses within the hamlet center

Providing a system with room for future expansion is an extremely important consideration and Alternative No. 3 is the only alternative that provides this benefit. In addition, when compared to Alternative No. 1, Alternative No. 3 does not have the risk associated with failing to fit the system on the site because the reduction in application rate was not acceptable to regulatory agencies or because of mounding analysis results which may necessitate more area, both of which are unknown at this time.

8.2 Project Costs and Anticipated Rates

There are several financial grant or low-interest loan programs available which may assist the Town with funding this project such as the Clean Water State Revolving Fund (CWSRF) or the USDA Rural Development program. This engineering report has been prepared in anticipation of pursuit of a low-interest loan or grant. Table 8.1 provides the conceptual opinion of probable cost for implementation of Alternative No. 3 in a format that is consistent with funding agency requirements. Note that a 3% escalation has been applied to the construction, engineering, and contingency costs. The escalation accounts for inflation and increases in costs from the time this OPC was developed until the time the design and construction will take place, estimated to be 2 and 3 years, respectively.

We would like to note that over the last year and a half there has been unusually high inflation and significant increases in construction material pricing. The price increases are a result of multiple, complex factors including the COVID-19 pandemic. The Engineering News-Record (ENR) construction cost index increased by 8% in 2021 and current market projections indicate a similar trend through 2022. The costs presented here are based on 2022 pricing and have been escalated at 3% per year as discussed above (the average historic ENR cost index is approximately 2.5% per year). An increase of 8% per year is abnormally high and we suspect that the market is unable to maintain this level of increase for a prolonged period. Therefore, we anticipate that construction prices will return to a normal rate of increase over the next couple of years and thus the 3% yearly cost escalation is appropriate. However, this is subject to change given the market complexities and uncertainty at this time.

Table 8.1 - Recommended Project Costs

Item	Cost
1. Construction Costs[1]	$12,687,000
2. Engineering Costs	
a. Design[2]	$986,000
b. Construction[1]	$1,523,000
3. Other Expenses	
a. Local Counsel	$95,000
b. Bond Counsel	$159,000
c. Work Force	$0
d. Financial Services	$0
e. Miscellaneous	$0
4. Equipment	$0
5. Land Acquisition	$0
6. Project Contingency (30%)[1]	$3,806,000
7. Total Project Costs	$19,256,000
8. Less Other Sources of Financing	$0
9. Project Costs to be Financed	$19,256,000
10. Financing Insurance Costs	
a. Direct Expense (1%)	$193,000
b. State Bond Issuance Charge (0.84%)	$162,000
c. Administrative Fee (1.1%)	$212,000
Total Project Cost Including Financing	**$19,823,000**

[1]Includes an escalation of 3%/year for 3 years

[2]Includes an escalation of 3%/year for 2 years

As discussed in Section 1.3.3, it is likely that the Town would meet hardship financing criteria and could assume interest free financing over 30 years. Table 8.2 develops potential sewer use fees based upon the equivalent dwelling unit (EDU) calculation method. This method is very simple; parcels with greater EDU assignments (and theoretically higher flow) will pay a greater portion of the costs than those with lower EDU assignments. Annual O&M costs would also be proportional to the EDU assignments. One EDU represents a typical single-family residence.

Table 8.2 - EDU Based User Fees

Total Project Cost Including Financing	$19,823,000
Annual Dept Service Payment, 30 years @ 0%	$660,767
Number of EDUs in Proposed Sewer District[1]	393
Annual Cost Per EDU	$1,681
Annual O&M Costs	$181,000
Number of EDUs in Proposed Sewer District[1]	393
Annual O&M Cost per EDU	$461
Total Annual Cost per EDU	**$2,142**

In accordance with US Environmental Protection Agency (EPA) guidance, sewer use rates are considered affordable if the annual cost for a single-family user (1 EDU) is less than 2% of the MHI. For Amenia, this equates to a single-family user fee of $1,085. Therefore, the EDU based methodology will not result in an affordable user fee.

Another very common billing method is to address capital costs based on a cost per $1,000 of assessed parcel value per user and an operation and maintenance fee based upon a usage rate so users with higher flows pay a greater portion of the annual O&M cost then users with lower flows. An example using this scenario is provided in Table 8.3.

Table 8.3 - Assessment and Flow Based User Fees

Total Project Cost Including Financing	$19,823,000
Annual Dept Service Payment, 30 years @ 0%	$660,767
Proposed Sewer District Total Assessed Value	$65,762,055
Annual Cost per $1,000 Assessed Value	$10.05
Annual Cost Per Single Family Residence[1]	$1,929
Annual O&M Costs	$181,000
Annual O&M Flat Rate ($40/quarter)	$160
Annual O&M Cost (per 1,000 gallons > 40,000 gallons)	$7.80
Annual Usage per Single Family (gallons)[2]	73,000
Annual O&M Usage Cost per Single Family	$417
Total Annual Cost per Single Family	**$2,347**

[1]Based on an assessed value of $192,000 per single family residence

[2]Based on 200 gpd per single family residence

Typically, the assessed value methodology provides a reduction for single family costs compared to the EDU methodology. However, in this case, it increases the annual cost per single family residence and therefore it also does not achieve EPA designated affordability levels. To meet EPA affordability requirements, a maximum single-family rate must be held, and a non-residential rate developed. Table 8.4 presents this approach. Two columns are provided in Table 8.4, the first column assumes annual single family cost of $1,000 and the second column assumes an annual single family cost of $750. These values can be adjusted to meet the community's needs.

Table 8.4 - Residential and Non-Residential User Fees

Total Project Cost Including Financing	$19,823,000	$19,823,000
Annual Dept Service Payment, 30 years @ 0%	$660,767	$660,767
Annual Single Family Residential Maximum Fee	$583	$333
Number of Residential EDUs in Proposed District	217	217
Annual Total Residential Payment	$126,423	$72,173
Remaining Debt Service Payment	$534,344	$588,594
Number of Non-Residential EDUs in Proposed District	176	176
Non-Residential User Fee	$3,036	$3,344
Annual Cost per Single Family Residence	$583	$333
Annual Cost per Small Commercial User	$3,036	$3,344
Annual O&M Costs	$181,000	$181,000
Annual O&M Flat Rate ($40/quarter)	$160	$160
Annual O&M Cost (per 1,000 gallons > 40,000 gallons)	$7.80	$7.80
Annual Usage (gallons)[1]	73,000	73,000
Annual O&M Usage Cost	$417	$417
Total Annual Cost per Single Family	**$1,000**	**$750**
Total Annual Cost per Small Commercial User	**$3,453**	**$3,762**

[1]Based on 200 gpd per single family residence

Figure 8.1 provides the relationship between residential and non-residential costs per EDU.

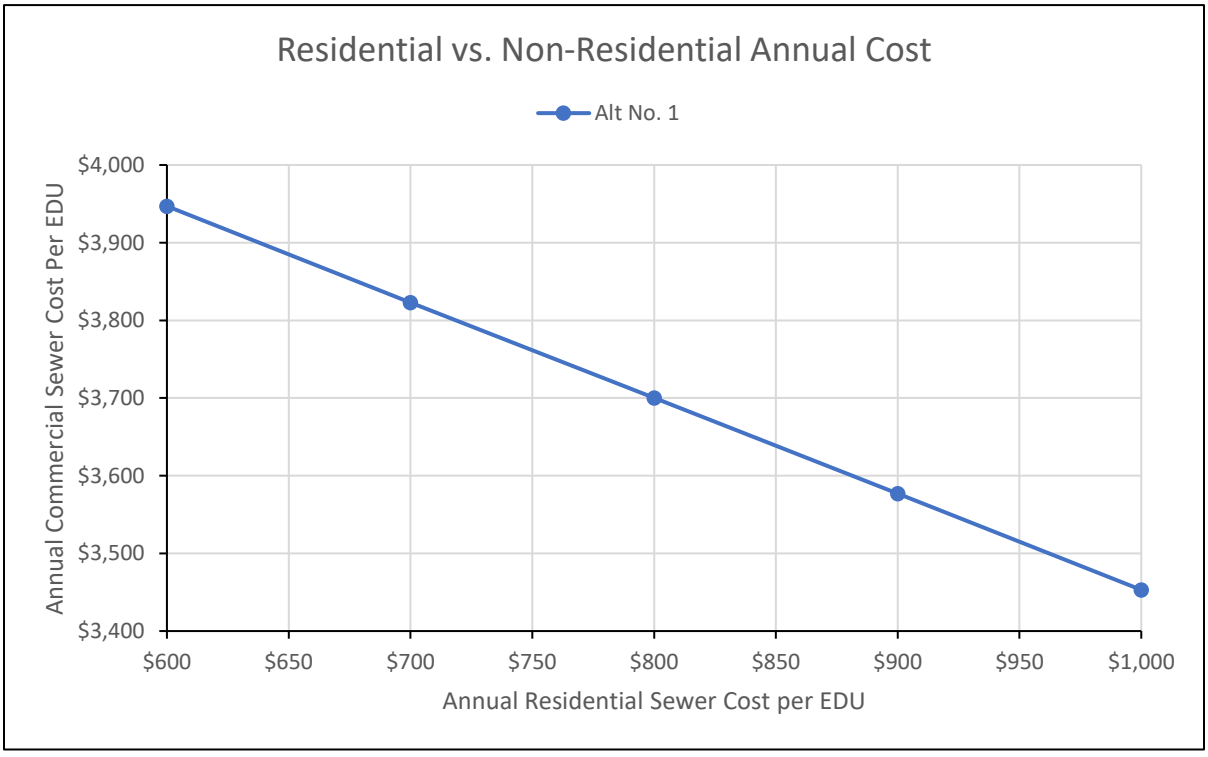

Figure 8.1
Annual Cost per EDU

8.3 Project Implementation Plan

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

1. Map, Plan, & Report and SEQR – The Town will need to develop a Map, Plan, and Report which is a succinct document available for public review as required for the formation of a sewer service area. It includes the background of the service area formation, a description of the proposed service area including the specific parcels, the projected flows for the system, and descriptions of the system. The State Environmental Quality Review Act (SEQR) review will also need to be completed as part of this stage. Grant funding opportunities including the CWSRF, NYSEFC WQIP and the Water Infrastructure Improvement Act typically require that the sewer district is already formed and thus the cost for district formation is not typically included in the construction implementation costs. The Dutchess County Municipal Investment Grant Program does cover sewer district formation costs and has awarded this to other Dutchess County communities recently. Table 8.5 provides the anticipated costs for district formation.

Table 8.5 - Anticipated District Formation Costs

Cost	Annual O&M
Map, Plan, and Report	$16,000
SEQR	$10,000
Archeological Report	$25,000
Ecological Report	$6,000
Legal	$25,000
TOTAL	**$82,000**

2. Secure Project Funding - As indicated in this report, the cost of the proposed system is substantial. It is recommended that this report is used to apply for financial assistance for funding the design and construction of the recommended alternative.
3. Engineering & Design:
    a. Engineering – The Town should hire an engineering consultant to design and oversee construction of the collection system, water resource recovery system, and return system.
    b. Site Survey - A topographic and boundary survey of the water resource recovery and return site will be conducted by the engineering consultant. The engineer will utilize the survey during the design.
    c. Parcel Investigations – A parcel by parcel survey will be required to determine the type and location of the existing septic systems to determine the appropriate connection points and locations for the new STEP tanks.
    d. Collection System Survey – A survey of the collection system will be completed to locate existing utilities and avoid conflicts with the utilities during construction of the new collection system.
    e. Soil Testing – Geotechnical information will be collected at the site and will be used for final design of the treatment system and return system components.

f. Design Phases– Design of the collection, water resource recovery, and return systems will advance in stages including 30%, 60%, and 100% (permit set) design phases. The engineering consultant will have discussions with regulators during the design including the NYS DEC and the Dutchess County Department of Behavioral and Community Health. Design modifications may be required depending on discussions with regulators.

g. Contract Documents - Contract documents appropriate for permitting and construction will be developed and will consist of drawings and specifications for each phase of the design process.

h. Regulatory Review – It is anticipated that the NYS DEC and the Dutchess County Department of Behavioral and Community Health will need to review and approve the 100% design prior to bidding.

i. Bidding – The project will go out to public bid after receiving approval.

4. Easements – Easements must be obtained for sewer mains which would pass through a parcel not being served. Permanent easements for system maintenance will also be required at each parcel in the proposed district. This needs to be completed prior to construction.
5. Permitting - Permits will be required for construction of the sewer mains where the sewer mains cross state and county roads. A SPDES permit will also be required for the new water resource recovery system.
6. Construction – Construction will be awarded and commence following receipt of reasonable bids. It is anticipated that the construction project will be split into two prime contracts: general construction and electrical construction per Wick's Law. The sequence of construction would likely start with installation of the water resource recovery and return system, installation of the sewer mains, and then making the service connections to each user.
7. Testing and Start-up – Testing and start-up will begin as construction nears completion and service connections are made.

8.4 Project Implementation Schedule

Table 8.6 presents an estimated project schedule based on the recommended project and a start date of June 2022. The anticipated schedule assumes that engineering will commence after project funding is secured but the Map, Plan, and Report phase will be completed concurrently during the project funding phase.

Table 8.6 – Estimated Project Implementation Schedule

Task	Duration
Map, Plan and Report	6 months
Project Funding	12 months
30% Design	8 months
60% Design	4 months
100% Design (Permit Set)	2 months
Regulatory Review and Approval	6 months
Easements/Permitting (concurrent with review)	6 months
Bidding and Award	3 months
Construction	18 months
Testing and Start-up	2 months

Figure 8.2 shows the estimated project implementation schedule in a gantt chart format assuming that the project implementation tasks shown in Table 8.5 will begin in June 2022.

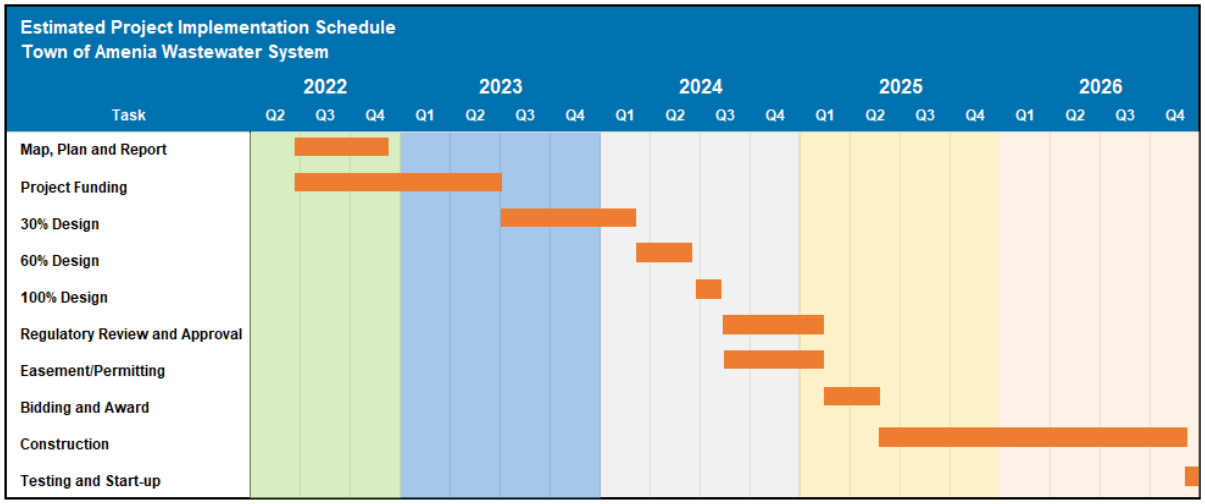

Figure 8.2
Estimated Project Implementation Schedule

Tighe&Bond

APPENDIX A

Legend

Hamlet of Amenia

N

1. Ortho imagery provided by dhses.ny.gov (2016).
2. Tax Parcel data provided by Dutchess County Real Property Tax Service Agency.
3. Soil data provided by USDA Natural Resource Conservation Service.
4. Hydrography data provided by USGS.
5. Wetland data provided by US Fish and Wildlife Service and CUGIR.
6. Structure data provided by Dutchess County Office of Central and Information Services.
7. Flood zone data provided by the Federal Emergency Management Agency.
8. Topography data provided by Dutchess County.
9. Zoning data provided by Dutchess County Department of Planning & Development.
10. Hamlet boundary provided by United States Census Bureau.

1 in = 800 ft

0 400 800

Feet

Tighe&Bond

Figure A.1
Hamlet of Amenia

Town of Amenia
Sewer Feasibility Study

April 2022

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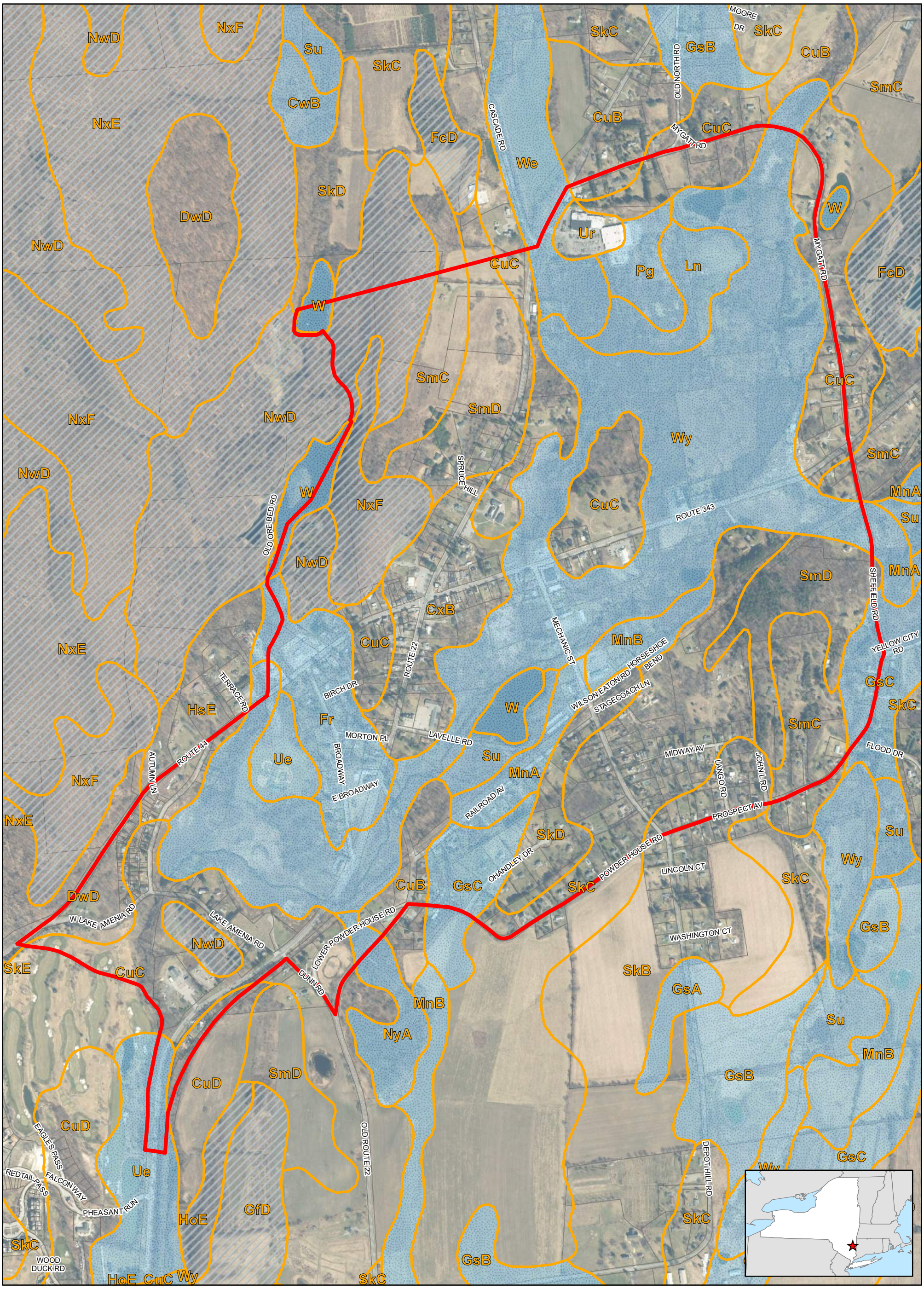
A5010-04



Legend

- Soil Group
- Potential Shallow Depth to Water
- Potential Shallow Depth to Bedrock

1. Ortho imagery provided by dhses.ny.gov (2016).
2. Tax Parcel data provided by Dutchess County Real Property Tax Service Agency.
3. Soil data provided by USDA Natural Resource Conservation Service.
4. Hydrography data provided by USGS.
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8. Topography data provided by Dutchess County.
9. Zoning data provided by Dutchess County Department of Planning & Development.
10. Hamlet boundary provided by United States Census Bureau.

1 in = 800 ft

0 400 800

Feet

Tighe&Bond

Figure A.2
Soil Types and Restrictions

Town of Amenia
Sewer Feasibility Study

April 2022

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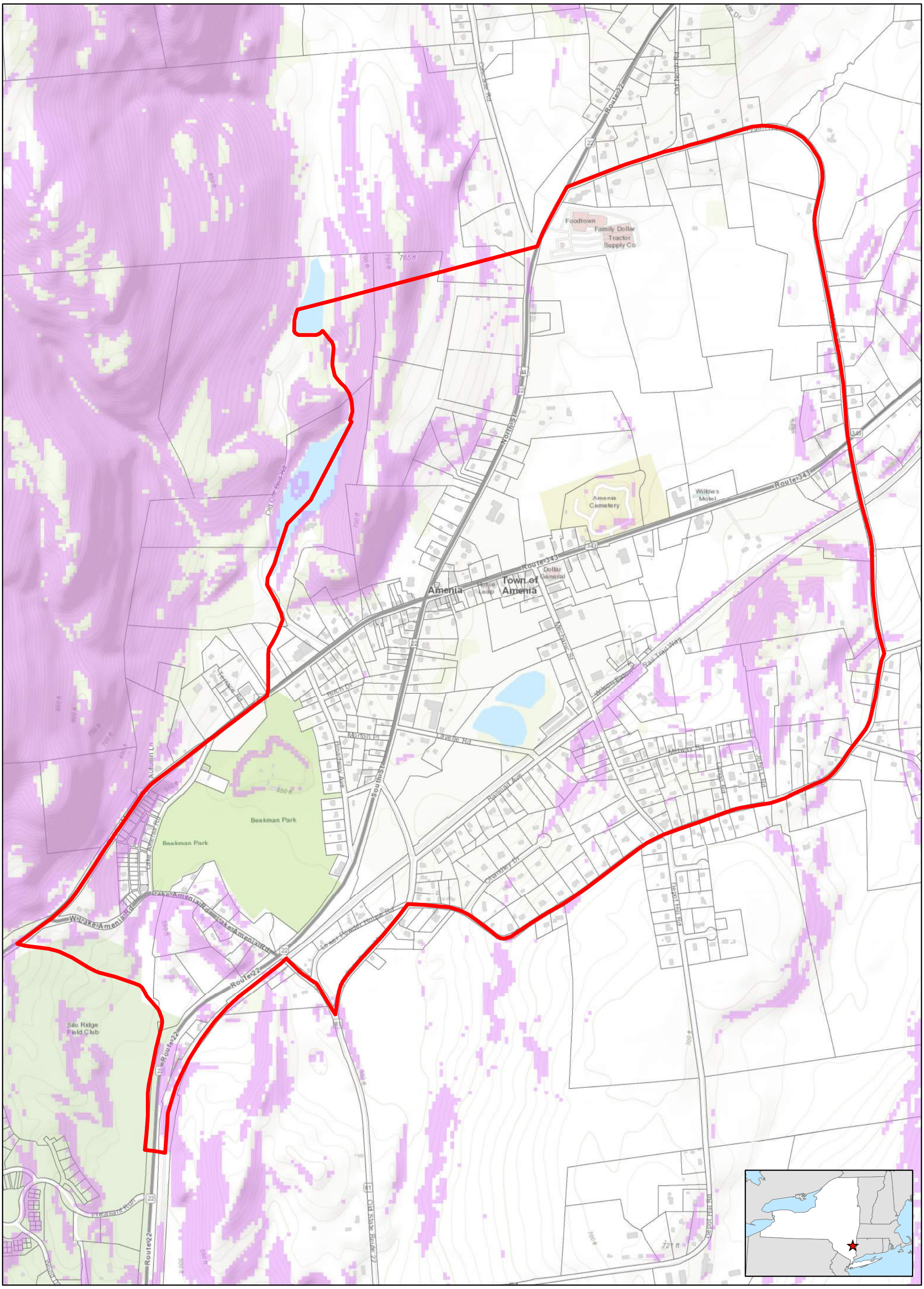

Legend

Steep Slopes (>15%)

1. Ortho imagery provided by dhses.ny.gov (2016).
2. Tax Parcel data provided by Dutchess County Real Property Tax Service Agency.
3. Soil data provided by USDA Natural Resource Conservation Service.
4. Hydrography data provided by USGS.
5. Wetland data provided by US Fish and Wildlife Service and CUGIR.
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9. Zoning data provided by Dutchess County Department of Planning & Development.
10. Hamlet boundary provided by United States Census Bureau.

1 in = 800 ft

0 400 800

Feet

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Figure A.3
Topography

Town of Amenia
Sewer Feasibility Study

April 2022

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MOORE DR
OLD NORTH RD
CASCADE RD
MYGATT RD
MYGATT RD
SPRUCE HILL
ROUTE 343
OLD ORE BED RD
SHEFFIELD RD
YELLOW CITY RD
MECHANIC ST
HORSESHOE BEND
WILSON EATON RD
STAGECOACH LN
TERRACE RD
BIRCH DR
ROUTE 22
MORTON PL
LAVELLE RD
BROADWAY
E BROADWAY
ROUTE 44
AUTUMN LN
MIDWAY AV
LANGO RD
JOHN L RD
FLOOD DR
RAILROAD AV
PROSPECT AV
OHANDLEY DR
LINCOLN CT
W LAKE AMENIA RD
LAKE AMENIA RD
LOWER POWDER HOUSE RD
POWDER HOUSE RD
WASHINGTON CT
DUNN RD
EAGLES PASS
REDTAIL PASS
FALCON WAY
PHEASANT RUN
WOOD DUCK RD
OLD ROUTE 22
DEPOT HILL RD

Legend

Hamlet of Amenia
100-Year Flood Zone
Stream
NWI Wetlands

N

1. Ortho imagery provided by dhses.ny.gov (2016).
2. Tax Parcel data provided by Dutchess County Real Property Tax Service Agency.
3. Soil data provided by USDA Natural Resource Conservation Service.
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9. Zoning data provided by Dutchess County Department of Planning & Development.
10. Hamlet boundary provided by United States Census Bureau.

1 in = 800 ft

0 400 800

Feet

Tighe&Bond

Figure A.4
Hydrography

Town of Amenia
Sewer Feasibility Study

June 2022

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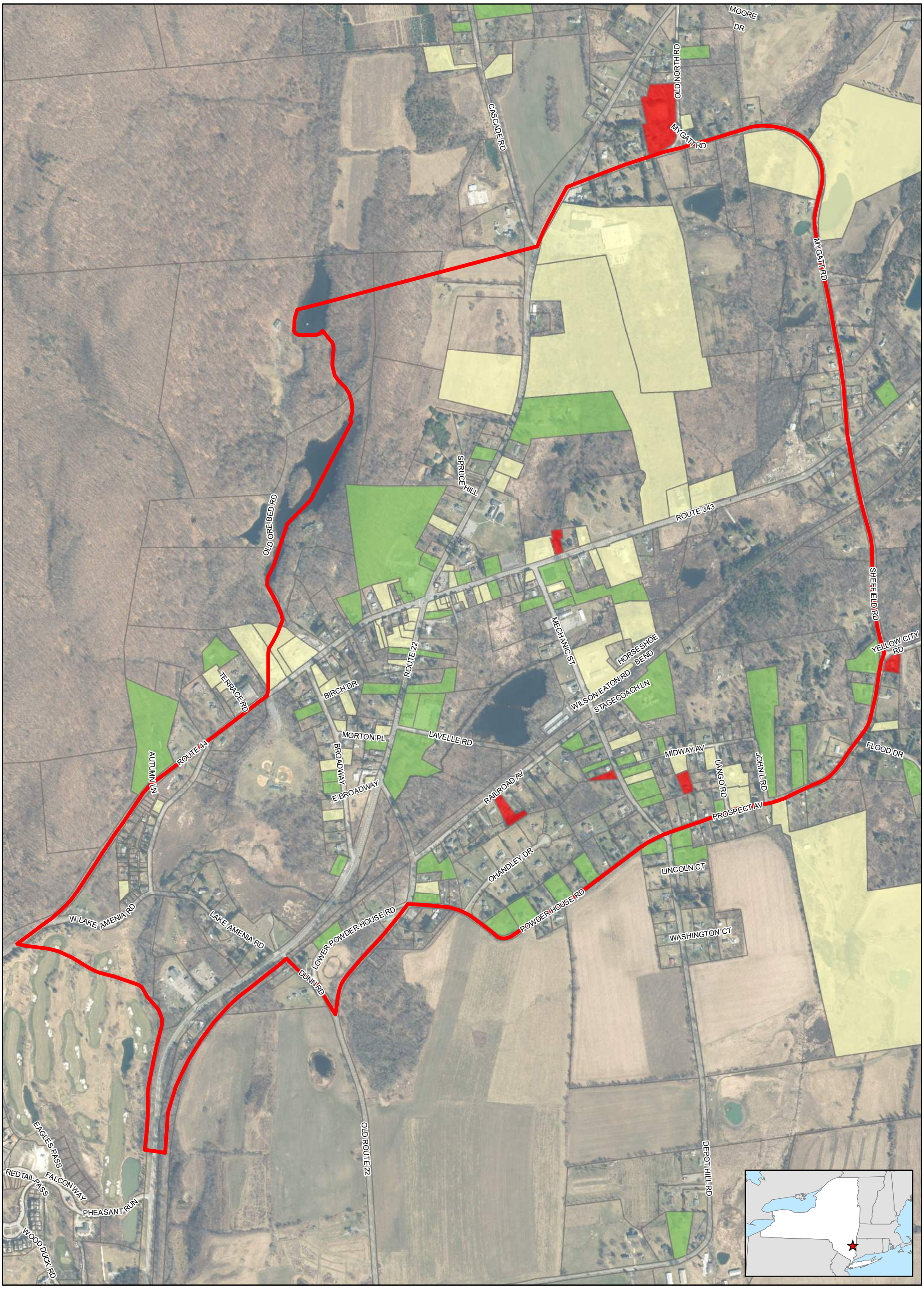
A5010-04



Legend

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

1. Ortho imagery provided by dhses.ny.gov (2016).
2. Tax Parcel data provided by Dutchess County Real Property Tax Service Agency.
3. Soil data provided by USDA Natural Resource Conservation Service.
4. Hydrography data provided by USGS.
5. Wetland data provided by US Fish and Wildlife Service and CUGIR.
6. Structure data provided by Dutchess County Office of Central and Information Services.
7. Flood zone data provided by the Federal Emergency Management Agency.
8. Topography data provided by Dutchess County.
9. Zoning data provided by Dutchess County Department of Planning & Development.
10. Hamlet boundary provided by United States Census Bureau.

1 in = 800 ft

0 400 800

Feet

Tighe&Bond

Figure A.5
Reported Septic Problems

Town of Amenia
Sewer Feasibility Study

April 2022

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A5010-04

MOORE DR
OLD NORTH RD
CASCADE RD
MY GATT RD
MY GATT RD
SPRUCE HILL
ROUTE 343
OLD ORE BED RD
SHEFFIELD RD
YELLOW CITY RD
MECHANIC ST
HORSESHOE BEND
WILSON EATON RD
STAGECOACH LN
TERRACE RD
BIRCH DR
ROUTE 22
MORTON PL
LAVELLE RD
MIDWAY AV
FLOOD DR
AUTUMN LN
ROUTE 44
BROADWAY
E BROADWAY
RAILROAD AV
LANGO RD
JOHN L RD
PROSPECT AV
OHANDLEY DR
LINCOLN CT
W LAKE AMENIA RD
LAKE AMENIA RD
LOWER POWDER HOUSE RD
POWDER HOUSE RD
DUNN RD
WASHINGTON CT
EAGLES PASS
REDTAIL PASS
FALCON WAY
PHEASANT RUN
WOOD DUCK RD
OLD ROUTE 22
DEPOT HILL RD

Legend

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

N

1. Ortho imagery provided by dhses.ny.gov (2016).
2. Tax Parcel data provided by Dutchess County Real Property Tax Service Agency.
3. Soil data provided by USDA Natural Resource Conservation Service.
4. Hydrography data provided by USGS.
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8. Topography data provided by Dutchess County.
9. Zoning data provided by Dutchess County Department of Planning & Development.
10. Hamlet boundary provided by United States Census Bureau.

1 in = 800 ft

0 400 800

Feet

Tighe&Bond

Figure A.6
Reported Flooding Problems

Town of Amenia
Sewer Feasibility Study

April 2022

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A5010-04

MOORE DR
OLD NORTH RD
CASCADE RD
MYGATT RD
MYGATT RD
SPRUCE HILL
ROUTE 343
OLD ORE BED RD
MECHANIC ST
HORSESHOE BEND
SHEFFIELD RD
YELLOW CITY RD
TERRACE RD
BIRCH DR
ROUTE 22
WILSON EATON RD
STAGECOACH LN
MORTON PL
LAVELLE RD
MIDWAY AV
FLOOD DR
AUTUMN LN
ROUTE 44
BROADWAY
E BROADWAY
RAILROAD AV
LANGO RD
JOHN L RD
PROSPECT AV
OHANDLEY DR
LINCOLN CT
W LAKE AMENIA RD
LAKE AMENIA RD
LOWER POWDER HOUSE RD
POWDER HOUSE RD
WASHINGTON CT
DUNN RD
EAGLES PASS
REDTAIL PASS
FALCON WAY
PHEASANT RUN
WOOD DUCK RD
OLD ROUTE 22
DEPOT HILL RD

Legend

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

N

1. Ortho imagery provided by dhses.ny.gov (2016).
2. Tax Parcel data provided by Dutchess County Real Property Tax Service Agency.
3. Soil data provided by USDA Natural Resource Conservation Service.
4. Hydrography data provided by USGS.
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10. Hamlet boundary provided by United States Census Bureau.

1 in = 800 ft

0 400 800

Feet

Tighe&Bond

Figure A.7
Parcels Interested in Connecting to Sewer System

Town of Amenia
Sewer Feasibility Study

April 2022

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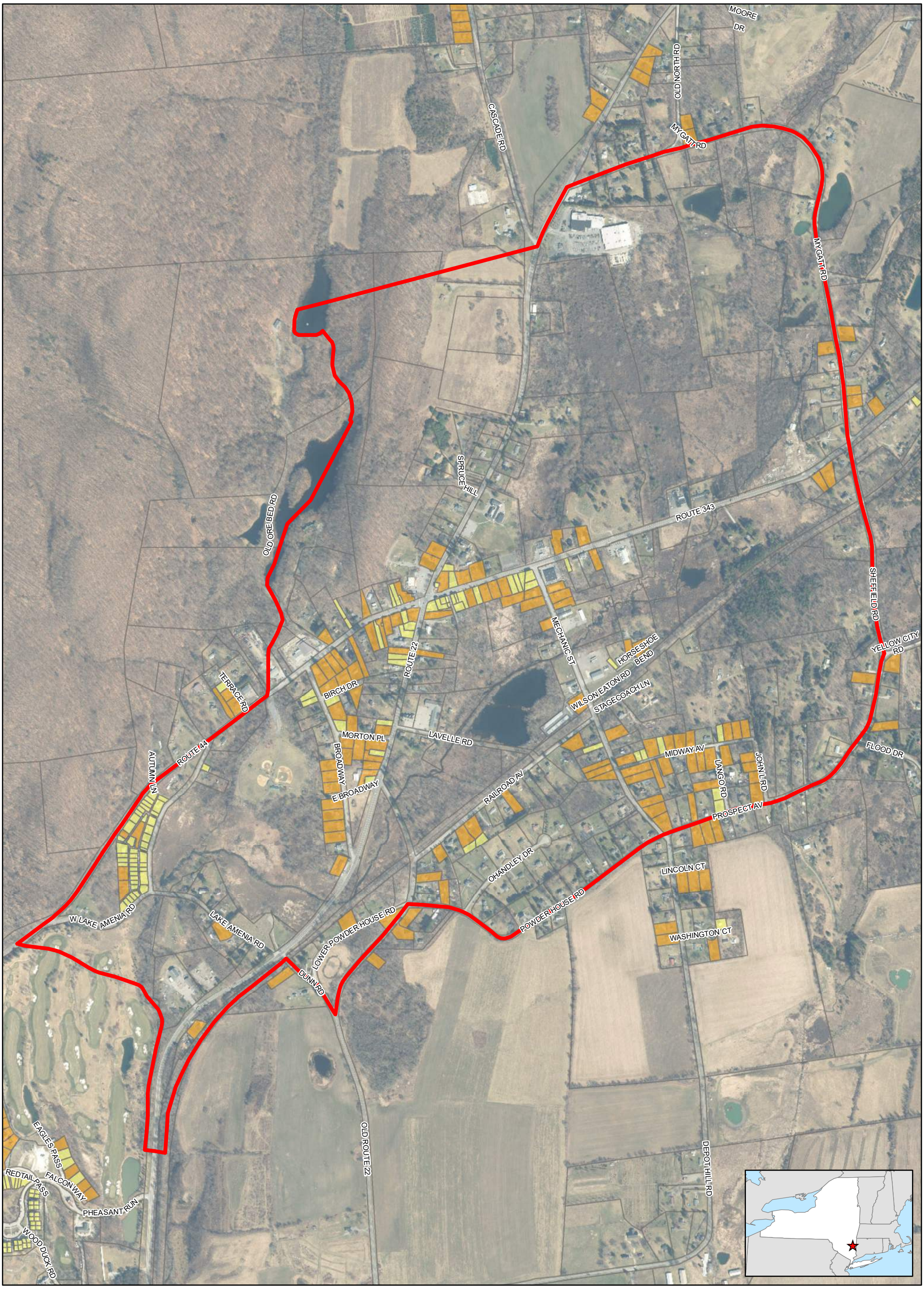
A5010-04



Legend

- Parcels < 0.25 Acres
- Parcels 0.25 - 0.5 Acres
- Parcels > 0.5 Acres

N

1. Ortho imagery provided by dhses.ny.gov (2016).
2. Tax Parcel data provided by Dutchess County Real Property Tax Service Agency.
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1 in = 800 ft

0 400 800

Feet

Tighe&Bond

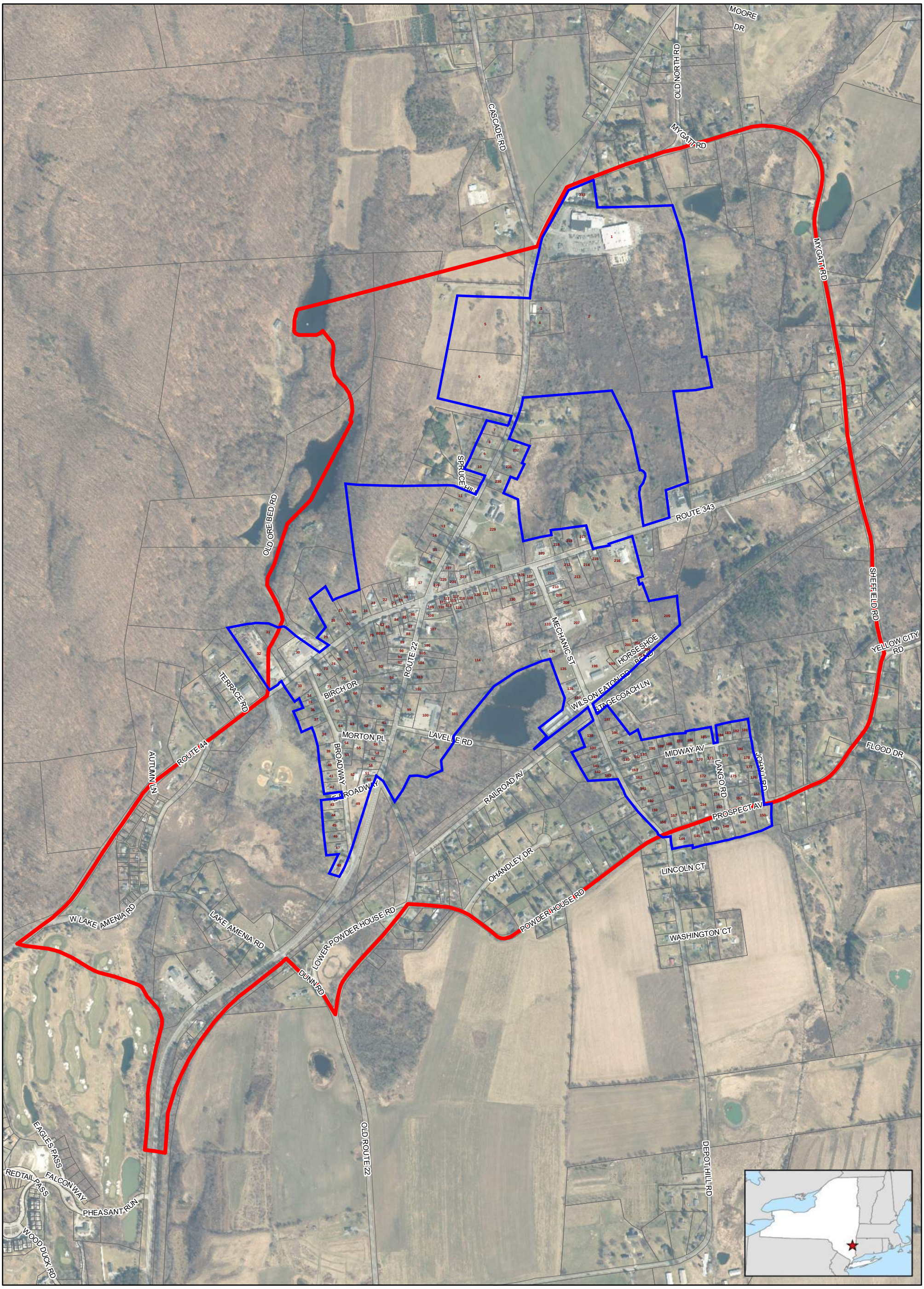
Figure A.8
Parcel Sizes

Town of Amenia
Sewer Feasibility Study

April 2022

J:\A\A5010 Amenia NY\04 Wastewater Eval\Drawings_Figures\GIS\Figure_A.8.mxd

A5010-04



Legend

Hamlet of Amenia

Sewer District

N

1. Ortho imagery provided by dhses.ny.gov (2016).
2. Tax Parcel data provided by Dutchess County Real Property Tax Service Agency.
3. Soil data provided by USDA Natural Resource Conservation Service.
4. Hydrography data provided by USGS.
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10. Hamlet boundary provided by United States Census Bureau.

1 in = 800 ft

0 400 800

Feet

Tighe&Bond

Figure A.9
Proposed Sewer District

Town of Amenia
Sewer Feasibility Study

May 2022

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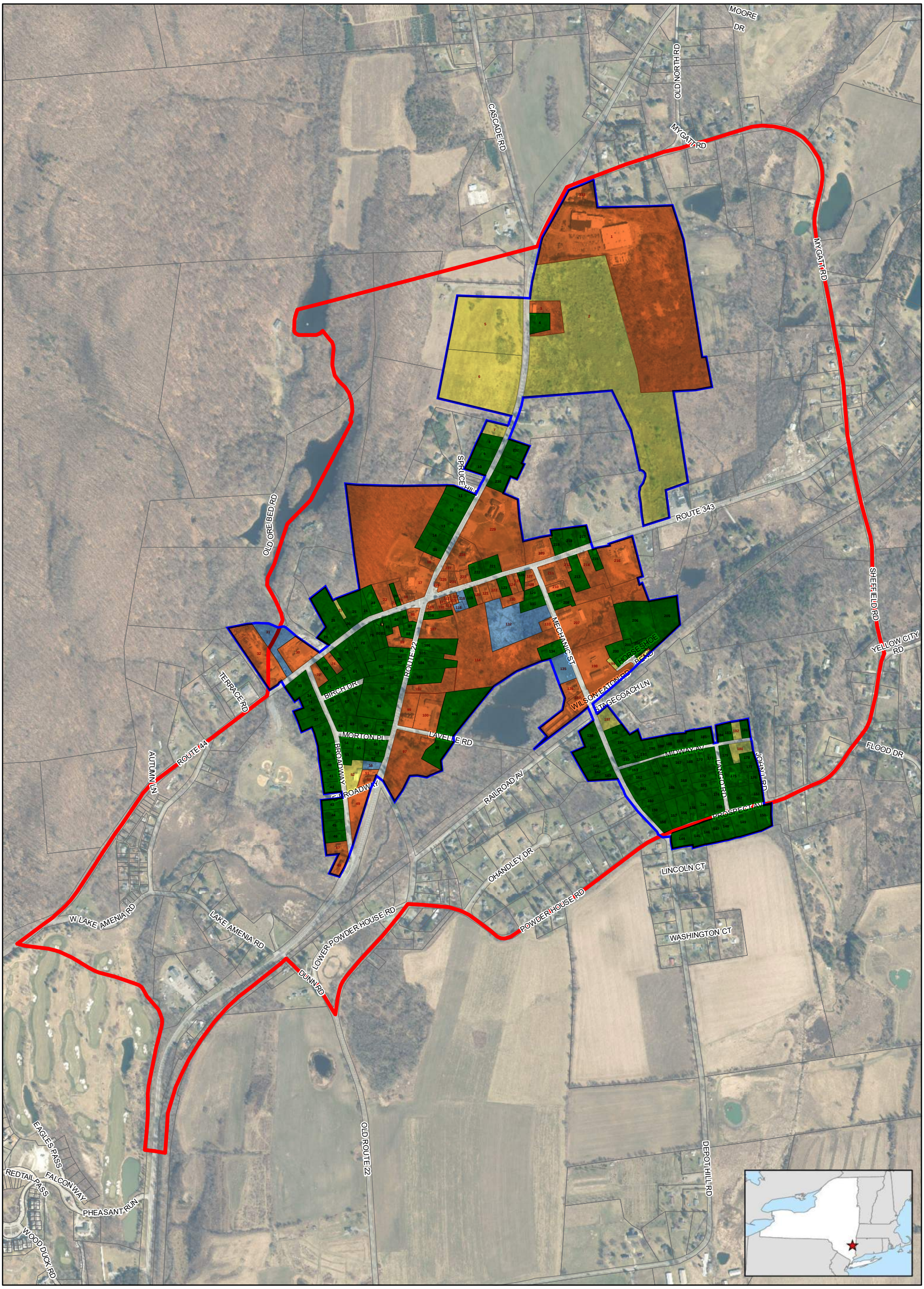
A5010-04



Legend

- Hamlet of Amenia
- Sewer District
- Residential Parcel
- Residential Vacant Parcel
- Commercial Parcel
- Commercial Vacant Parcel

N

1. Ortho imagery provided by dhses.ny.gov (2016).
2. Tax Parcel data provided by Dutchess County Real Property Tax Service Agency.
3. Soil data provided by USDA Natural Resource Conservation Service.
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9. Zoning data provided by Dutchess County Department of Planning & Development.
10. Hamlet boundary provided by United States Census Bureau.

1 in = 800 ft

0 400 800

Feet

Tighe&Bond

Figure A.10
Parcel Types

Town of Amenia
Sewer Feasibility Study

May 2022

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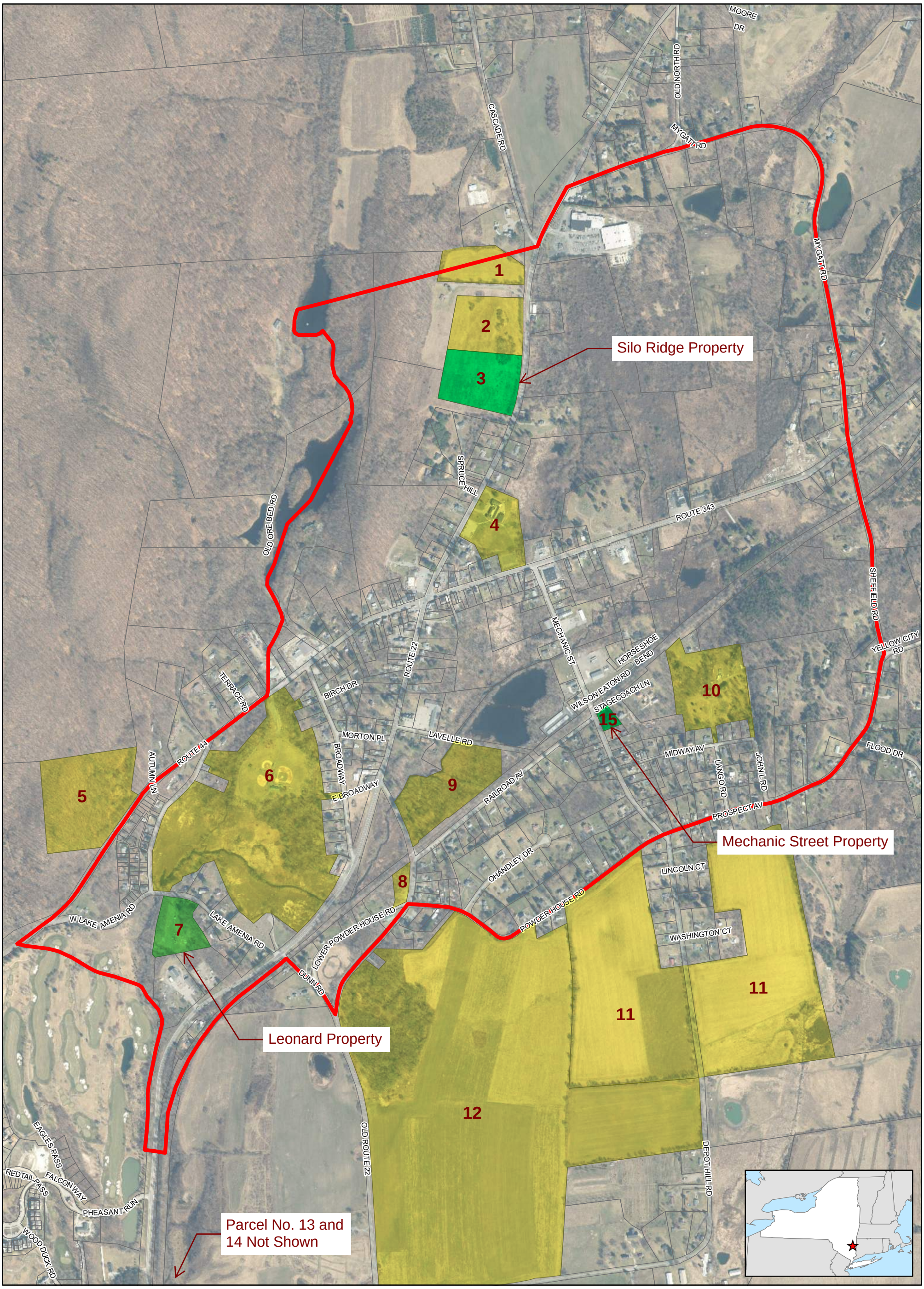

Legend

- Hamlet of Amenia
- Potential Location - Considered
- Potential Location - Eliminated

N

1. Ortho imagery provided by dhses.ny.gov (2016).
2. Tax Parcel data provided by Dutchess County Real Property Tax Service Agency.
3. Soil data provided by USDA Natural Resource Conservation Service.
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8. Topography data provided by Dutchess County.
9. Zoning data provided by Dutchess County Department of Planning & Development.
10. Hamlet boundary provided by United States Census Bureau.

1 in = 800 ft

0 400 800

Feet

Tighe&Bond

Figure A.11
Potential Treatment Locations

Town of Amenia
Sewer Feasibility Study

April 2022

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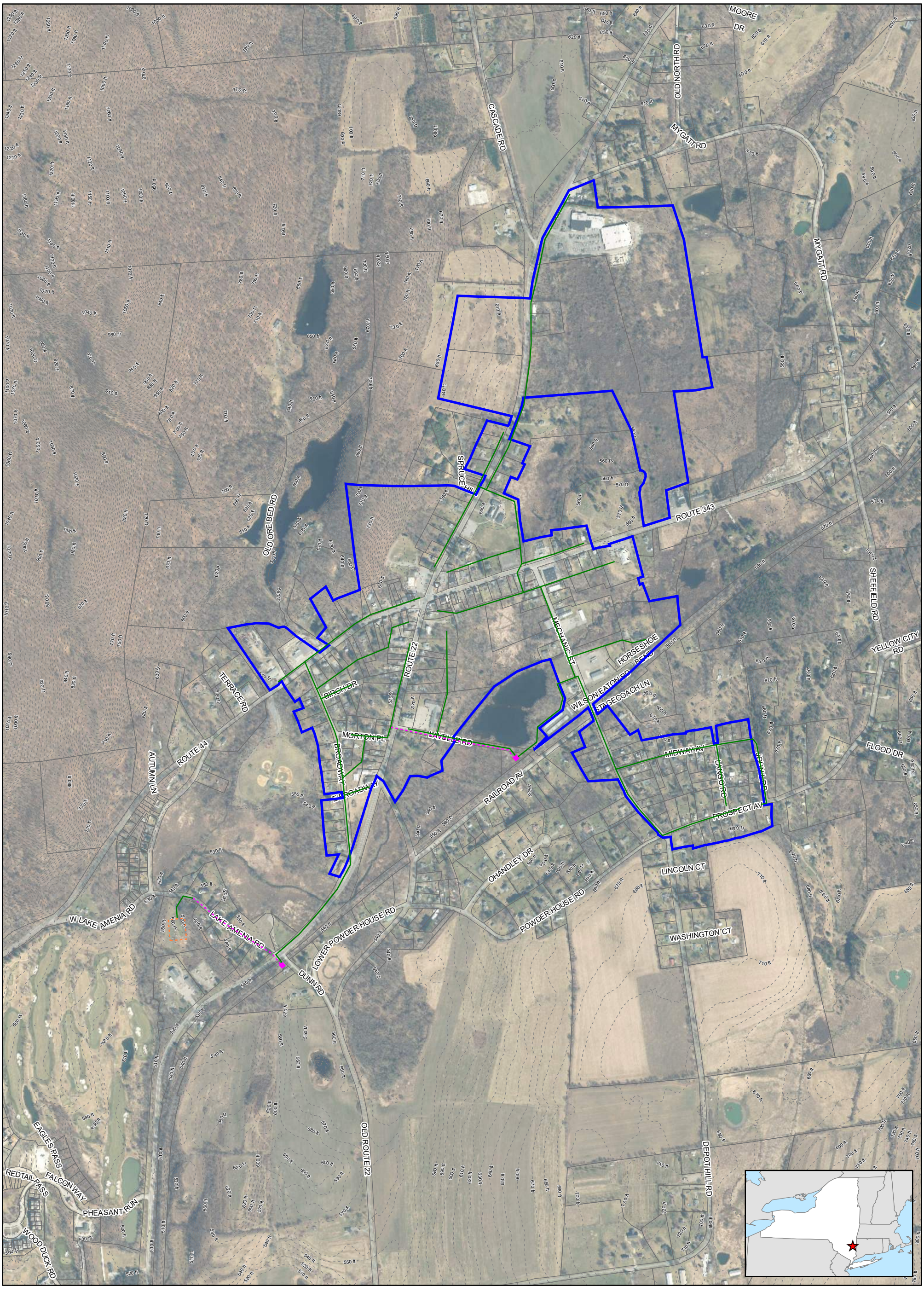
A5010-04



Legend

- Gravity Sewer Main
- Sewer Force Main
- Pump Station
- Proposed Sewer District
- Water Resource Recovery System

1. Ortho imagery provided by dhses.ny.gov (2016).
2. Tax Parcel data provided by Dutchess County Real Property Tax Service Agency.
3. Soil data provided by USDA Natural Resource Conservation Service.
4. Hydrography data provided by USGS.
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8. Topography data provided by Dutchess County.
9. Zoning data provided by Dutchess County Department of Planning & Development.
10. Hamlet boundary provided by United States Census Bureau.

1 in = 800 ft

0 400 800

Feet

Tighe&Bond

Figure A.12a
Preliminary Conventional Collection System Layout - Leonard Property

Town of Amenia
Sewer Feasibility Study

May 2022

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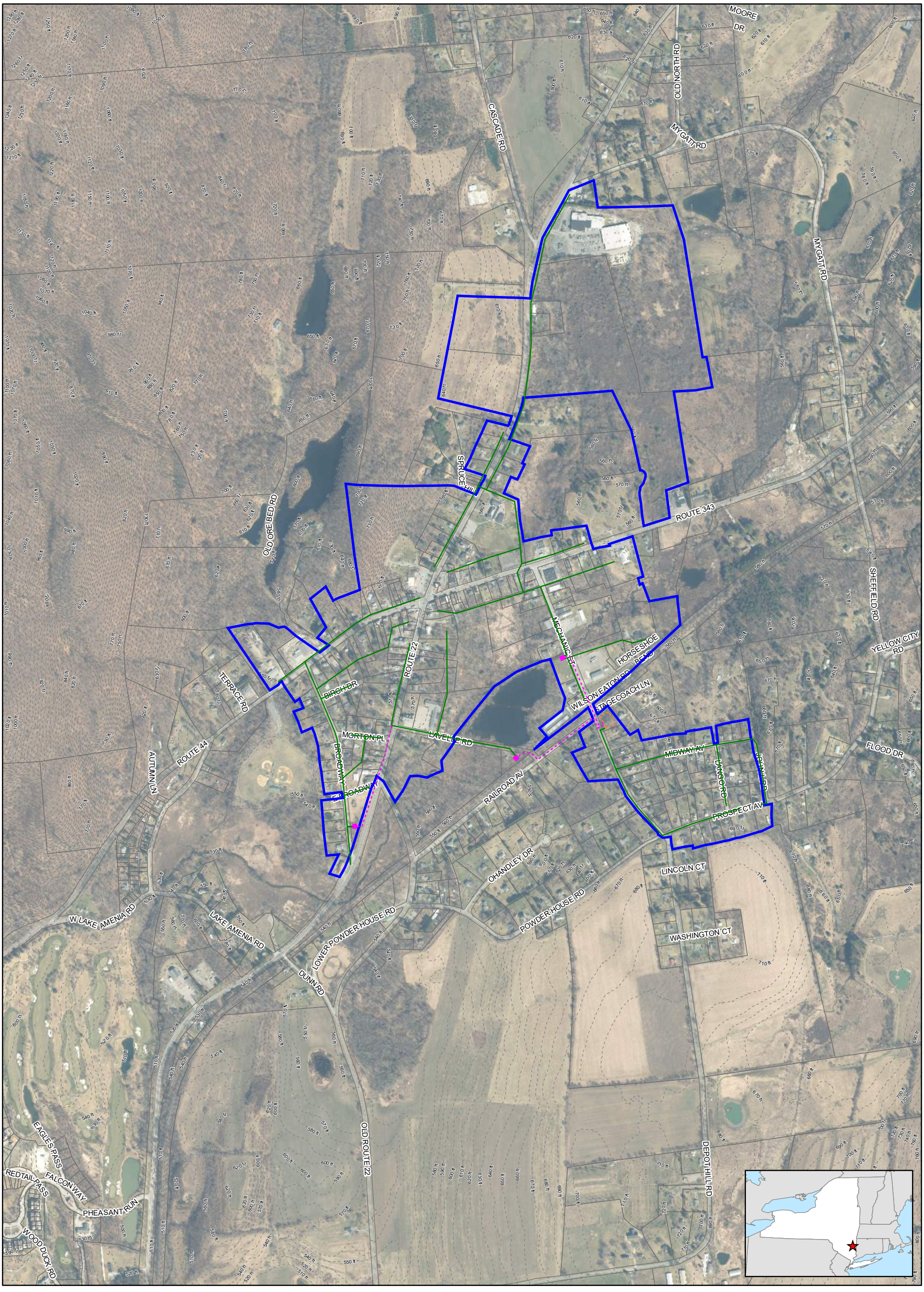
A5010-04



Legend

- Gravity Sewer Main
- Sewer Force Main
- Pump Station
- Proposed Sewer District
- Water Resource Recovery System

1. Ortho imagery provided by dhses.ny.gov (2016).
2. Tax Parcel data provided by Dutchess County Real Property Tax Service Agency.
3. Soil data provided by USDA Natural Resource Conservation Service.
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7. Flood zone data provided by the Federal Emergency Management Agency.
8. Topography data provided by Dutchess County.
9. Zoning data provided by Dutchess County Department of Planning & Development.
10. Hamlet boundary provided by United States Census Bureau.

1 in = 800 ft

0 400 800

Feet

Tighe&Bond

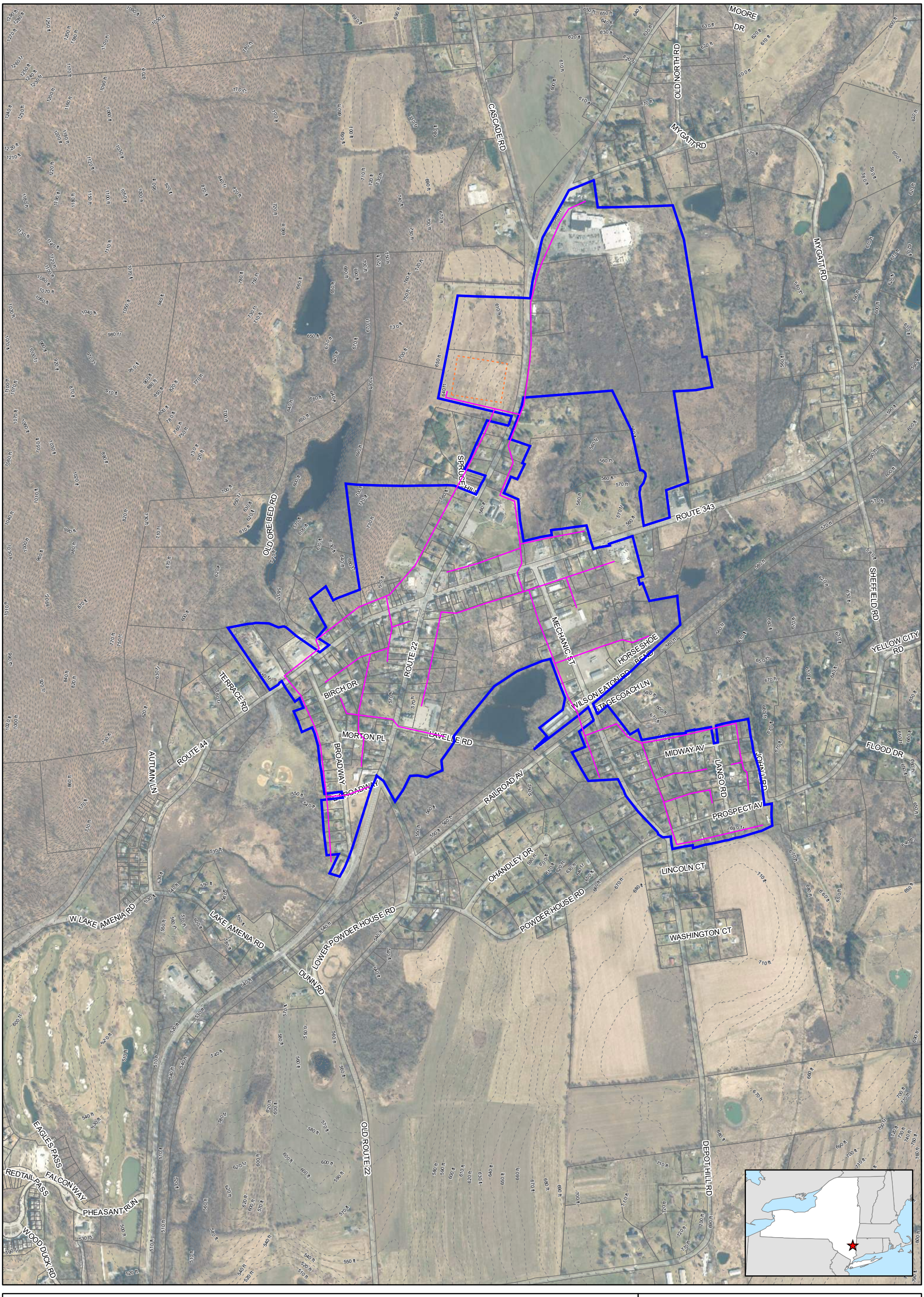
Figure A.12b
Preliminary Conventional Collection System Layout - Mech. St Property

Town of Amenia
Sewer Feasibility Study

May 2022

J:\A\A5010 Amenia NY\04 Wastewater Eval\Drawings_Figures\GIS\Figure_A.12.mxd

A5010-04



Legend

STEP Sewer Main

Water Resource Recovery System

Proposed Sewer District

N

1. Ortho imagery provided by dhses.ny.gov (2016).
2. Tax Parcel data provided by Dutchess County Real Property Tax Service Agency.
3. Soil data provided by USDA Natural Resource Conservation Service.
4. Hydrography data provided by USGS.
5. Wetland data provided by US Fish and Wildlife Service and CUGIR.
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7. Flood zone data provided by the Federal Emergency Management Agency.
8. Topography data provided by Dutchess County.
9. Zoning data provided by Dutchess County Department of Planning & Development.
10. Hamlet boundary provided by United States Census Bureau.

1 in = 800 ft

0 400 800

Feet

Tighe&Bond

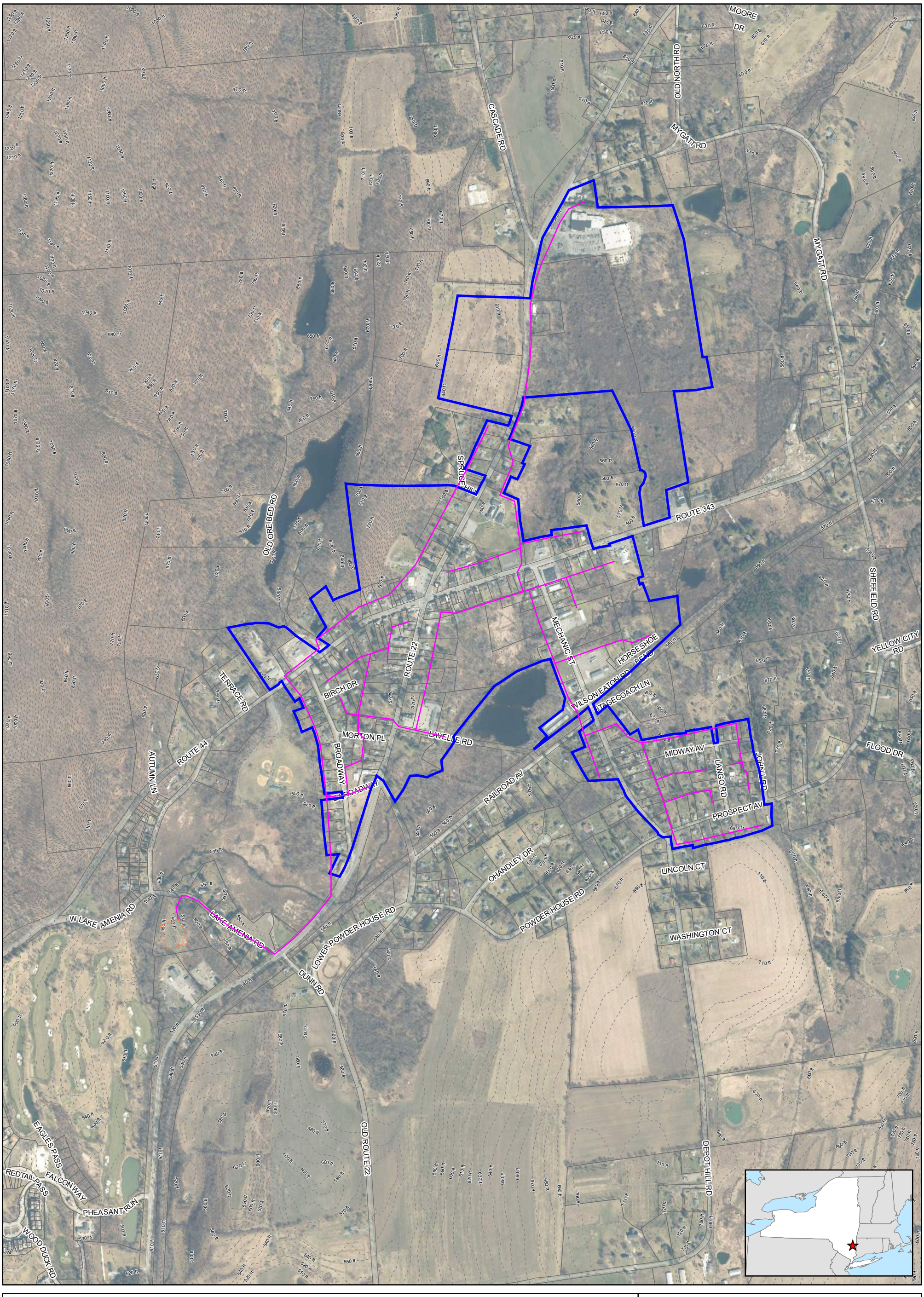
Figure A.12c
Preliminary Alternative Collection System Layout - Silo Ridge Property

Town of Amenia
Sewer Feasibility Study

May 2022

J:\A\A5010 Amenia NY\04 Wastewater Eval\Drawings_Figures\GIS\Figure_A.12.mxd

A5010-04



Legend

STEP Sewer Main

Water Resource Recovery System

Proposed Sewer District

N

1. Ortho imagery provided by dhses.ny.gov (2016).
2. Tax Parcel data provided by Dutchess County Real Property Tax Service Agency.
3. Soil data provided by USDA Natural Resource Conservation Service.
4. Hydrography data provided by USGS.
5. Wetland data provided by US Fish and Wildlife Service and CUGIR.
6. Structure data provided by Dutchess County Office of Central and Information Services.
7. Flood zone data provided by the Federal Emergency Management Agency.
8. Topography data provided by Dutchess County.
9. Zoning data provided by Dutchess County Department of Planning & Development.
10. Hamlet boundary provided by United States Census Bureau.

1 in = 800 ft

0 400 800

Feet

Figure A.12d
Preliminary Alternative Collection System Layout - Leonard Property

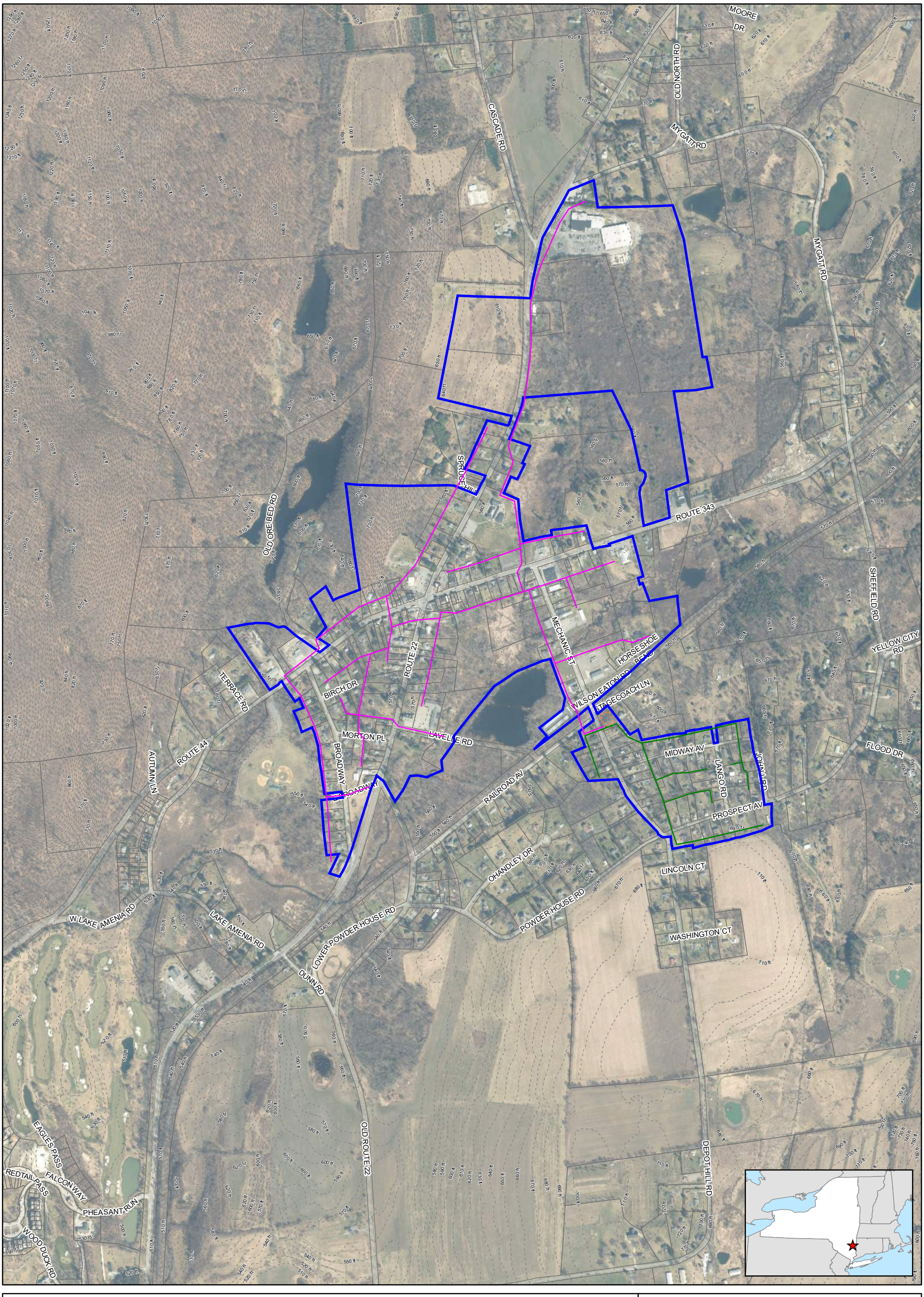
Town of Amenia
Sewer Feasibility Study

May 2022

Tighe&Bond

J:\A\A5010 Amenia NY\04 Wastewater Eval\Drawings_Figures\GIS\Figure_A.12.mxd

A5010-04



Legend

- STEP Sewer Main
- STEG Sewer Main
- Water Resource Recovery System
- Proposed Sewer District

1. Ortho imagery provided by dhses.ny.gov (2016).
2. Tax Parcel data provided by Dutchess County Real Property Tax Service Agency.
3. Soil data provided by USDA Natural Resource Conservation Service.
4. Hydrography data provided by USGS.
5. Wetland data provided by US Fish and Wildlife Service and CUGIR.
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8. Topography data provided by Dutchess County.
9. Zoning data provided by Dutchess County Department of Planning & Development.
10. Hamlet boundary provided by United States Census Bureau.

1 in = 800 ft

0 400 800

Feet

Figure A.12e
Preliminary Alternative Collection System Layout - Mech. St Property

Town of Amenia
Sewer Feasibility Study

May 2022

Tighe&Bond

J:\A\A5010 Amenia NY\04 Wastewater Eval\Drawings_Figures\GIS\Figure_A.12.mxd

A5010-04

Tighe&Bond

APPENDIX B

United States Department of Agriculture

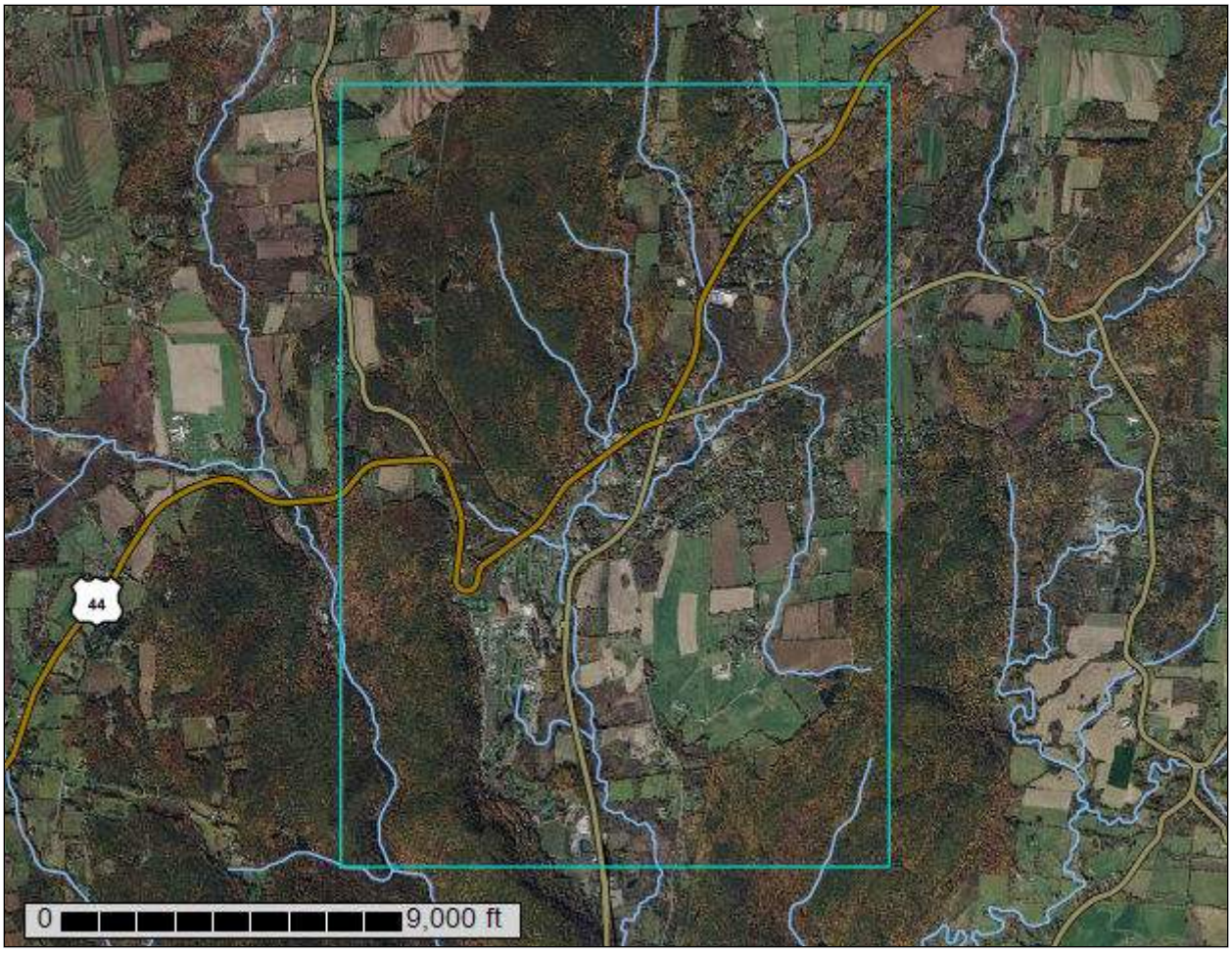
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Dutchess County, New York

Amenia Sewer Feasibility Study



April 21, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

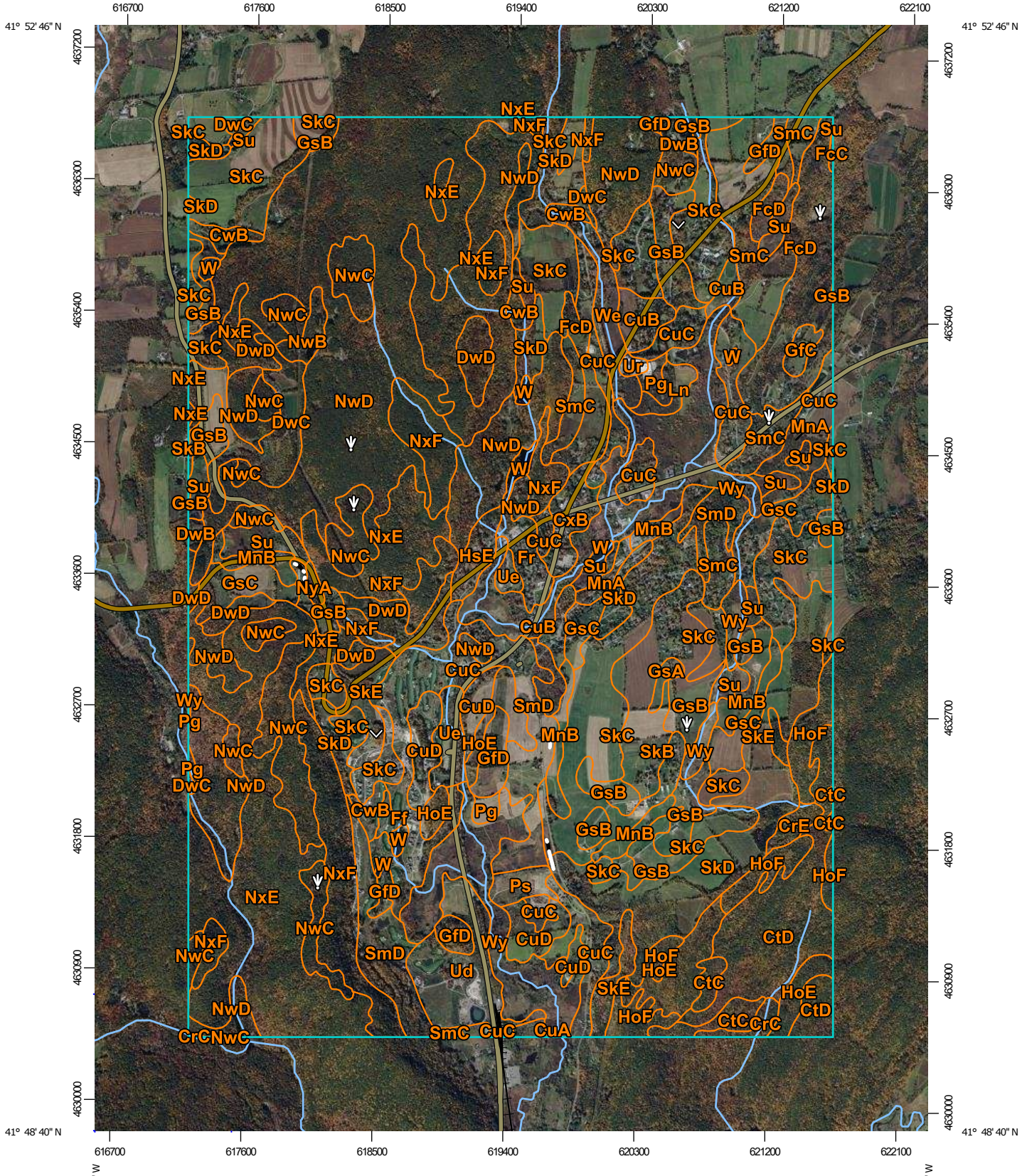
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:36,900 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 500 1000 2000 3000

Feet: 0 1500 3000 6000 9000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

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

Soil Survey Area: Dutchess County, New York
Survey Area Data: Version 18, Sep 1, 2021

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

Date(s) aerial images were photographed: Oct 8, 2020—Oct 14, 2020

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CrC	Charlton-Chatfield complex, rolling, rocky	13.2	0.2%
CrE	Charlton-Chatfield complex, steep, rocky	14.7	0.2%
CtC	Chatfield-Hollis complex, rolling, very rocky	36.8	0.5%
CtD	Chatfield-Hollis complex, 15 to 35 percent slopes, very rocky	191.1	2.8%
CuA	Copake gravelly silt loam, nearly level	5.5	0.1%
CuB	Copake gravelly silt loam, undulating	55.7	0.8%
CuC	Copake gravelly silt loam, rolling	429.5	6.2%
CuD	Copake gravelly silt loam, hilly	87.5	1.3%
CwB	Copake channery silt loam, fan, 3 to 8 percent slopes	41.0	0.6%
CxB	Copake-Urban land complex, undulating	39.3	0.6%
DwB	Dutchess-Cardigan complex, undulating, rocky	22.5	0.3%
DwC	Dutchess-Cardigan complex, rolling, rocky	98.2	1.4%
DwD	Dutchess-Cardigan complex, hilly, rocky	116.4	1.7%
FcC	Farmington-Galway complex, rolling, very rocky	1.4	0.0%
FcD	Farmington-Galway complex, hilly, very rocky	170.9	2.5%
Ff	Fluvaquents-Udifluvents complex, frequently flooded	7.2	0.1%
Fr	Fredon silt loam	33.2	0.5%
GfC	Galway-Farmington complex, rolling, rocky	13.0	0.2%
GfD	Galway-Farmington complex, hilly	63.5	0.9%
GsA	Georgia silt loam, 0 to 3 percent slopes	8.7	0.1%
GsB	Georgia silt loam, 3 to 8 percent slopes	206.3	3.0%
GsC	Georgia silt loam, 8 to 15 percent slopes	135.6	2.0%
HoE	Hollis-Chatfield-Rock outcrop complex, steep	94.2	1.4%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
HoF	Hollis-Chatfield-Rock outcrop complex, very steep	100.5	1.5%
HsE	Hoosic gravelly loam, 25 to 45 percent slopes	27.4	0.4%
Ln	Linlithgo silt loam	17.9	0.3%
MnA	Massena silt loam, 0 to 3 percent slopes	42.1	0.6%
MnB	Massena silt loam, 3 to 8 percent slopes	86.8	1.3%
NwB	Nassau-Cardigan complex, undulating, very rocky	19.3	0.3%
NwC	Nassau-Cardigan complex, rolling, very rocky	256.1	3.7%
NwD	Nassau-Cardigan complex, hilly, very rocky	1,061.7	15.4%
NxE	Nassau-Rock outcrop complex, steep	713.8	10.3%
NxF	Nassau-Rock outcrop complex, very steep	273.9	4.0%
NyA	Natchaug muck, 0 to 2 percent slopes	21.4	0.3%
Pg	Pawling silt loam	21.4	0.3%
Ps	Pits, gravel	21.2	0.3%
SkB	Stockbridge silt loam, 3 to 8 percent slopes	116.5	1.7%
SkC	Stockbridge silt loam, 8 to 15 percent slopes	711.9	10.3%
SkD	Stockbridge silt loam, 15 to 25 percent slopes	367.3	5.3%
SkE	Stockbridge silt loam, 25 to 45 percent slopes	68.2	1.0%
SmC	Stockbridge-Farmington complex, rolling, rocky	208.9	3.0%
SmD	Stockbridge-Farmington complex, hilly, rocky	158.7	2.3%
Su	Sun silt loam	99.8	1.4%
Ud	Udorthents, smoothed	105.3	1.5%
Ue	Udorthents, wet substratum	39.5	0.6%
Ur	Urban land	5.5	0.1%
W	Water	28.7	0.4%
We	Wappinger loam	46.8	0.7%
Wy	Wayland silt loam	406.2	5.9%
Totals for Area of Interest		**6,912.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas

shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Dutchess County, New York

CrC—Charlton-Chatfield complex, rolling, rocky

Map Unit Setting

National map unit symbol: 9rf3
Elevation: 100 to 1,310 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Charlton and similar soils: 50 percent
Chatfield and similar soils: 30 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Charlton

Setting

Landform: Till plains, ridges, hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Acid loamy till derived mainly from schist, gneiss, or granite

Typical profile

H1 - 0 to 8 inches: loam
H2 - 8 to 30 inches: gravelly loam
H3 - 30 to 72 inches: gravelly loam

Properties and qualities

Slope: 5 to 16 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Chatfield

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Shoulder

Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mainly from granite, gneiss, or schist

Typical profile

H1 - 0 to 9 inches: fine sandy loam
H2 - 9 to 30 inches: loam
H3 - 30 to 34 inches: unweathered bedrock

Properties and qualities

Slope: 5 to 16 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Hollis

Percent of map unit: 9 percent
Hydric soil rating: No

Georgia

Percent of map unit: 5 percent
Hydric soil rating: No

Massena

Percent of map unit: 4 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 1 percent
Hydric soil rating: Unranked

Sun

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

CrE—Charlton-Chatfield complex, steep, rocky

Map Unit Setting

National map unit symbol: 9rf5
Elevation: 100 to 1,380 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Charlton and similar soils: 45 percent
Chatfield and similar soils: 35 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Charlton

Setting

Landform: Till plains, ridges, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Acid loamy till derived mainly from schist, gneiss, or granite

Typical profile

H1 - 0 to 8 inches: loam
H2 - 8 to 30 inches: gravelly loam
H3 - 30 to 72 inches: gravelly loam

Properties and qualities

Slope: 25 to 45 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Chatfield

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mainly from granite, gneiss, or schist

Typical profile

H1 - 0 to 9 inches: fine sandy loam
H2 - 9 to 30 inches: loam
H3 - 30 to 34 inches: unweathered bedrock

Properties and qualities

Slope: 25 to 45 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Sun

Percent of map unit: 10 percent
Landform: Depressions
Hydric soil rating: Yes

Hollis

Percent of map unit: 9 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 1 percent
Hydric soil rating: Unranked

CtC—Chatfield-Hollis complex, rolling, very rocky

Map Unit Setting

National map unit symbol: 9rf7
Elevation: 0 to 1,360 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Chatfield and similar soils: 45 percent
Hollis and similar soils: 35 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chatfield

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mainly from granite, gneiss, or schist

Typical profile

H1 - 0 to 9 inches: fine sandy loam
H2 - 9 to 30 inches: loam
H3 - 30 to 34 inches: unweathered bedrock

Properties and qualities

Slope: 5 to 16 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Hollis

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: A thin mantle of loamy till derived mainly from schist, granite, and gneiss

Typical profile

H1 - 0 to 3 inches: loam
H2 - 3 to 15 inches: loam
H3 - 15 to 19 inches: unweathered bedrock

Properties and qualities

Slope: 5 to 16 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Minor Components

Charlton

Percent of map unit: 10 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 5 percent
Hydric soil rating: Unranked

Georgia

Percent of map unit: 3 percent
Hydric soil rating: No

Massena

Percent of map unit: 1 percent
Hydric soil rating: No

Sun

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

CtD—Chatfield-Hollis complex, 15 to 35 percent slopes, very rocky

Map Unit Setting

National map unit symbol: 2w69w
Elevation: 230 to 1,360 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Chatfield, very stony, and similar soils: 45 percent
Hollis, very stony, and similar soils: 35 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chatfield, Very Stony

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 2 inches: fine sandy loam
Bw - 2 to 30 inches: gravelly fine sandy loam
2R - 30 to 40 inches: bedrock

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 41 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F142XB008VT - Steep Acidic Till Upland
Hydric soil rating: No

Description of Hollis, Very Stony

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Summit, backslope, shoulder
Landform position (three-dimensional): Nose slope, crest, side slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 7 inches: gravelly fine sandy loam
Bw - 7 to 16 inches: gravelly fine sandy loam
2R - 16 to 26 inches: bedrock

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 8 to 23 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Charlton, very stony

Percent of map unit: 9 percent
Landform: Hills, ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Rock outcrop

Percent of map unit: 6 percent
Landform: Ridges, hills
Hydric soil rating: No

Sun, very stony

Percent of map unit: 3 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Pittsfield, very stony

Percent of map unit: 1 percent
Landform: Ground moraines, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Sutton, very stony

Percent of map unit: 1 percent
Landform: Ground moraines, hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

CuA—Copake gravelly silt loam, nearly level

Map Unit Setting

National map unit symbol: 9rf9
Elevation: 230 to 850 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Copake and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Copake

Setting

Landform: Terraces, outwash plains, deltas
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy over calcareous sandy and gravelly glaciofluvial deposits

Typical profile

H1 - 0 to 6 inches: gravelly silt loam
H2 - 6 to 36 inches: gravelly loam
H3 - 36 to 80 inches: stratified very gravelly coarse sand to gravelly loamy fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: A
Ecological site: F144AY044VT - Semi-Rich Well Drained Outwash
Hydric soil rating: No

Minor Components

Hoosic

Percent of map unit: 10 percent
Hydric soil rating: No

Fredon

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Halsey

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

CuB—Copake gravelly silt loam, undulating

Map Unit Setting

National map unit symbol: 9rfb
Elevation: 30 to 950 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Copake and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Copake

Setting

Landform: Terraces, outwash plains, deltas
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy over calcareous sandy and gravelly glaciofluvial deposits

Typical profile

H1 - 0 to 6 inches: gravelly silt loam
H2 - 6 to 36 inches: gravelly loam
H3 - 36 to 80 inches: stratified very gravelly coarse sand to gravelly loamy fine sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Ecological site: F144AY044VT - Semi-Rich Well Drained Outwash
Hydric soil rating: No

Minor Components

Hoosic

Percent of map unit: 10 percent
Hydric soil rating: No

Halsey

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Fredon

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

CuC—Copake gravelly silt loam, rolling

Map Unit Setting

National map unit symbol: 9rfc
Elevation: 80 to 840 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Copake and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Copake

Setting

Landform: Terraces, outwash plains, deltas
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy over calcareous sandy and gravelly glaciofluvial deposits

Typical profile

H1 - 0 to 6 inches: gravelly silt loam
H2 - 6 to 36 inches: gravelly loam
H3 - 36 to 80 inches: stratified very gravelly coarse sand to gravelly loamy fine sand

Properties and qualities

Slope: 5 to 16 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Ecological site: F144AY044VT - Semi-Rich Well Drained Outwash
Hydric soil rating: No

Minor Components

Hoosic
Percent of map unit: 10 percent
Hydric soil rating: No

Fredon
Percent of map unit: 3 percent
Landform: Depressions
Hydric soil rating: Yes

Halsey
Percent of map unit: 2 percent
Landform: Depressions
Hydric soil rating: Yes

CuD—Copake gravelly silt loam, hilly

Map Unit Setting
National map unit symbol: 9rfd
Elevation: 100 to 800 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition
Copake and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Copake

Setting
Landform: Terraces, outwash plains, deltas
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy over calcareous sandy and gravelly glaciofluvial deposits

Typical profile
H1 - 0 to 6 inches: gravelly silt loam
H2 - 6 to 36 inches: gravelly loam
H3 - 36 to 80 inches: stratified very gravelly coarse sand to gravelly loamy fine sand

Properties and qualities
Slope: 15 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: F144AY044VT - Semi-Rich Well Drained Outwash
Hydric soil rating: No

Minor Components

Hoosic

Percent of map unit: 10 percent
Hydric soil rating: No

Fredon

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

CwB—Copake channery silt loam, fan, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9rfh
Elevation: 300 to 850 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Copake, fan, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Copake, Fan

Setting

Landform: Terraces, outwash plains, deltas
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy over calcareous sandy and gravelly glaciofluvial deposits

Typical profile

H1 - 0 to 6 inches: channery silt loam
H2 - 6 to 36 inches: channery loam
H3 - 36 to 80 inches: stratified very gravelly coarse sand to gravelly loamy fine sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: About 36 to 72 inches
Frequency of flooding: RareNone
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Ecological site: F144AY044VT - Semi-Rich Well Drained Outwash
Hydric soil rating: No

Minor Components

Hoosic

Percent of map unit: 10 percent
Hydric soil rating: No

Halsey

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Fredon

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

CxB—Copake-Urban land complex, undulating

Map Unit Setting

National map unit symbol: 9rfj
Elevation: 340 to 740 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Copake and similar soils: 40 percent
Urban land: 35 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Copake

Setting

Landform: Terraces, outwash plains, deltas
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy over calcareous sandy and gravelly glaciofluvial deposits

Typical profile

H1 - 0 to 6 inches: gravelly silt loam
H2 - 6 to 36 inches: gravelly loam
H3 - 36 to 80 inches: stratified very gravelly coarse sand to gravelly loamy fine sand

Properties and qualities

Slope: 1 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Ecological site: F144AY044VT - Semi-Rich Well Drained Outwash
Hydric soil rating: No

Description of Urban Land

Typical profile

H1 - 0 to 6 inches: variable

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Minor Components

Udorthents

Percent of map unit: 10 percent
Hydric soil rating: No

Fredon
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Halsey
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Hoosic
Percent of map unit: 5 percent
Hydric soil rating: No

DwB—Dutchess-Cardigan complex, undulating, rocky

Map Unit Setting
National map unit symbol: 9rfn
Elevation: 0 to 1,330 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Dutchess and similar soils: 40 percent
Cardigan and similar soils: 30 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dutchess

Setting
Landform: Ridges, hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mainly from phyllite, slate, schist, and shale

Typical profile
H1 - 0 to 8 inches: silt loam
H2 - 8 to 28 inches: silt loam
H3 - 28 to 86 inches: channery silt loam

Properties and qualities
Slope: 1 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Cardigan

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till or colluvium derived from phyllite, slate, shale, and schist

Typical profile

H1 - 0 to 8 inches: channery silt loam
H2 - 8 to 20 inches: channery loam
H3 - 20 to 30 inches: channery silt loam
H4 - 30 to 34 inches: unweathered bedrock

Properties and qualities

Slope: 1 to 6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Georgia

Percent of map unit: 10 percent
Hydric soil rating: No

Nassau

Percent of map unit: 9 percent
Hydric soil rating: No

Massena

Percent of map unit: 9 percent
Hydric soil rating: No

Sun

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

Rock outcrop

Percent of map unit: 1 percent
Hydric soil rating: Unranked

DwC—Dutchess-Cardigan complex, rolling, rocky

Map Unit Setting

National map unit symbol: 9rfp
Elevation: 0 to 1,330 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Dutchess and similar soils: 40 percent
Cardigan and similar soils: 30 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dutchess

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mainly from phyllite, slate, schist, and shale

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 28 inches: silt loam
H3 - 28 to 86 inches: channery silt loam

Properties and qualities

Slope: 5 to 16 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Cardigan

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till or colluvium derived from phyllite, slate, shale, and schist

Typical profile

H1 - 0 to 8 inches: channery silt loam
H2 - 8 to 20 inches: channery loam
H3 - 20 to 30 inches: channery silt loam
H4 - 30 to 34 inches: unweathered bedrock

Properties and qualities

Slope: 5 to 16 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Georgia

Percent of map unit: 10 percent
Hydric soil rating: No

Nassau

Percent of map unit: 9 percent
Hydric soil rating: No

Massena
Percent of map unit: 9 percent
Hydric soil rating: No

Rock outcrop
Percent of map unit: 1 percent
Hydric soil rating: Unranked

Sun
Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

DwD—Dutchess-Cardigan complex, hilly, rocky

Map Unit Setting
National map unit symbol: 9rfq
Elevation: 20 to 1,230 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition
Dutchess and similar soils: 40 percent
Cardigan and similar soils: 30 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dutchess

Setting
Landform: Ridges, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mainly from phyllite, slate, schist, and shale

Typical profile
H1 - 0 to 8 inches: silt loam
H2 - 8 to 28 inches: silt loam
H3 - 28 to 86 inches: channery silt loam

Properties and qualities
Slope: 15 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Cardigan

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till or colluvium derived from phyllite, slate, shale, and schist

Typical profile

H1 - 0 to 8 inches: channery silt loam
H2 - 8 to 20 inches: channery loam
H3 - 20 to 30 inches: channery silt loam
H4 - 30 to 34 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Sun

Percent of map unit: 10 percent
Landform: Depressions
Hydric soil rating: Yes

Nassau

Percent of map unit: 9 percent
Hydric soil rating: No

Massena
Percent of map unit: 5 percent
Hydric soil rating: No

Georgia
Percent of map unit: 5 percent
Hydric soil rating: No

Rock outcrop
Percent of map unit: 1 percent
Hydric soil rating: Unranked

FcC—Farmington-Galway complex, rolling, very rocky

Map Unit Setting
National map unit symbol: 9rfv
Elevation: 100 to 1,000 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition
Farmington and similar soils: 40 percent
Galway and similar soils: 30 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Farmington

Setting
Landform: Till plains, ridges, benches
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till or congeliturbate derived from limestone, dolomite, shale, and sandstone, and in many places mixed with wind and water deposits

Typical profile
H1 - 0 to 7 inches: loam
H2 - 7 to 15 inches: very fine sandy loam
H3 - 15 to 19 inches: unweathered bedrock

Properties and qualities
Slope: 5 to 16 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: F144AY035MA - Shallow Semi-Rich Well Drained Till Uplands
Hydric soil rating: No

Description of Galway

Setting

Landform: Till plains, ridges, benches
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Calcareous loamy till

Typical profile

H1 - 0 to 6 inches: gravelly loam
H2 - 6 to 30 inches: gravelly loam
H3 - 30 to 31 inches: gravelly loam
H4 - 31 to 35 inches: unweathered bedrock

Properties and qualities

Slope: 5 to 16 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Ecological site: F144AY036NY - Semi-Rich Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Stockbridge

Percent of map unit: 10 percent
Hydric soil rating: No

Georgia

Percent of map unit: 10 percent
Hydric soil rating: No

Rock outcrop
Percent of map unit: 5 percent
Hydric soil rating: Unranked

Massena
Percent of map unit: 4 percent
Hydric soil rating: No

Sun
Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

FcD—Farmington-Galway complex, hilly, very rocky

Map Unit Setting
National map unit symbol: 9rfw
Elevation: 100 to 1,000 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition
Farmington and similar soils: 40 percent
Galway and similar soils: 30 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Farmington

Setting
Landform: Till plains, ridges, benches
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till or congeliturbate derived from limestone, dolomite, shale, and sandstone, and in many places mixed with wind and water deposits

Typical profile
H1 - 0 to 7 inches: loam
H2 - 7 to 15 inches: very fine sandy loam
H3 - 15 to 19 inches: unweathered bedrock

Properties and qualities
Slope: 15 to 30 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY035MA - Shallow Semi-Rich Well Drained Till Uplands
Hydric soil rating: No

Description of Galway

Setting

Landform: Till plains, ridges, benches
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Calcareous loamy till

Typical profile

H1 - 0 to 6 inches: gravelly loam
H2 - 6 to 30 inches: gravelly loam
H3 - 30 to 31 inches: gravelly loam
H4 - 31 to 35 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: F144AY036NY - Semi-Rich Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Stockbridge

Percent of map unit: 10 percent
Hydric soil rating: No

Georgia

Percent of map unit: 5 percent

Hydric soil rating: No

Rock outcrop

Percent of map unit: 5 percent
Hydric soil rating: Unranked

Sun

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Massena

Percent of map unit: 5 percent
Hydric soil rating: No

Ff—Fluvaquents-Udifluvents complex, frequently flooded

Map Unit Setting

National map unit symbol: 9rfy
Elevation: 100 to 3,000 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Fluvaquents and similar soils: 50 percent
Udifluvents and similar soils: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fluvaquents

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Alluvium with highly variable texture

Typical profile

H1 - 0 to 5 inches: gravelly silt loam
H2 - 5 to 70 inches: very gravelly silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very high (0.06 to 19.98 in/hr)

Depth to water table: About 0 inches
Frequency of flooding: FrequentNone
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: A/D
Hydric soil rating: Yes

Description of Udifluvents

Setting

Landform: Flood plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Alluvium with a wide range of texture

Typical profile

H1 - 0 to 4 inches: gravelly loam
H2 - 4 to 70 inches: very gravelly loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very high (0.06 to 19.98 in/hr)
Depth to water table: About 24 to 72 inches
Frequency of flooding: FrequentNone
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Wayland

Percent of map unit: 2 percent
Landform: Flood plains
Hydric soil rating: Yes

Linlithgo

Percent of map unit: 2 percent
Landform: Depressions
Hydric soil rating: No

Wappinger

Percent of map unit: 1 percent

Landform: Depressions
Hydric soil rating: No

Pawling
Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: No

Carlisle
Percent of map unit: 1 percent
Landform: Marshes, swamps
Hydric soil rating: Yes

Copake, fan
Percent of map unit: 1 percent
Hydric soil rating: No

Palms
Percent of map unit: 1 percent
Landform: Swamps, marshes
Hydric soil rating: Yes

Hoosic, fan
Percent of map unit: 1 percent
Hydric soil rating: No

Fr—Fredon silt loam

Map Unit Setting
National map unit symbol: 9rfz
Elevation: 250 to 1,200 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition
Fredon and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fredon

Setting
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loamy over sandy and gravelly glaciofluvial deposits

Typical profile

H1 - 0 to 9 inches: silt loam
H2 - 9 to 31 inches: very fine sandy loam
H3 - 31 to 70 inches: stratified very gravelly sand to loamy fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: RareNone
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Ecological site: F144AY029NY - Semi-Rich Wet Outwash
Hydric soil rating: No

Minor Components

Fredon, poorly drained

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Unnamed soils, glacial outwash

Percent of map unit: 5 percent
Hydric soil rating: No

Halsey

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

GfC—Galway-Farmington complex, rolling, rocky

Map Unit Setting

National map unit symbol: 9rg1
Elevation: 100 to 1,000 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Galway and similar soils: 40 percent
Farmington and similar soils: 30 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Galway

Setting

Landform: Till plains, ridges, benches
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Calcareous loamy till

Typical profile

H1 - 0 to 6 inches: gravelly loam
H2 - 6 to 30 inches: gravelly loam
H3 - 30 to 31 inches: gravelly loam
H4 - 31 to 35 inches: unweathered bedrock

Properties and qualities

Slope: 5 to 16 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F144AY036NY - Semi-Rich Well Drained Till Uplands
Hydric soil rating: No

Description of Farmington

Setting

Landform: Till plains, ridges, benches
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till or congeliturbate derived from limestone, dolomite, shale, and sandstone, and in many places mixed with wind and water deposits

Typical profile

H1 - 0 to 7 inches: loam
H2 - 7 to 15 inches: very fine sandy loam
H3 - 15 to 19 inches: unweathered bedrock

Properties and qualities

Slope: 5 to 16 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: F144AY035MA - Shallow Semi-Rich Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Stockbridge

Percent of map unit: 10 percent
Hydric soil rating: No

Georgia

Percent of map unit: 10 percent
Hydric soil rating: No

Massena

Percent of map unit: 8 percent
Hydric soil rating: No

Sun

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

Rock outcrop

Percent of map unit: 1 percent
Hydric soil rating: Unranked

GfD—Galway-Farmington complex, hilly

Map Unit Setting

National map unit symbol: 9rg2
Elevation: 100 to 1,000 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days

Farmland classification: Not prime farmland

Map Unit Composition

Galway and similar soils: 40 percent
Farmington and similar soils: 35 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Galway

Setting

Landform: Till plains, ridges, benches
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Calcareous loamy till

Typical profile

H1 - 0 to 6 inches: gravelly loam
H2 - 6 to 30 inches: gravelly loam
H3 - 30 to 31 inches: gravelly loam
H4 - 31 to 35 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F144AY036NY - Semi-Rich Well Drained Till Uplands
Hydric soil rating: No

Description of Farmington

Setting

Landform: Till plains, ridges, benches
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till or congeliturbate derived from limestone, dolomite, shale, and sandstone, and in many places mixed with wind and water deposits

Typical profile

H1 - 0 to 7 inches: loam
H2 - 7 to 15 inches: very fine sandy loam

H3 - 15 to 19 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: F144AY035MA - Shallow Semi-Rich Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Stockbridge

Percent of map unit: 10 percent
Hydric soil rating: No

Sun

Percent of map unit: 9 percent
Landform: Depressions
Hydric soil rating: Yes

Georgia

Percent of map unit: 5 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 1 percent
Hydric soil rating: Unranked

GsA—Georgia silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9rg5
Elevation: 90 to 1,000 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Georgia and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Georgia

Setting

Landform: Till plains, hills, drumlinoid ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Loamy till derived mainly from limestone, shale, or slate

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 27 inches: loam
H3 - 27 to 80 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Ecological site: F144AY038NY - Semi-Rich Moist Till Uplands
Hydric soil rating: No

Minor Components

Stockbridge

Percent of map unit: 5 percent
Hydric soil rating: No

Massena

Percent of map unit: 5 percent
Hydric soil rating: No

Charlton

Percent of map unit: 3 percent
Hydric soil rating: No

Dutchess

Percent of map unit: 3 percent
Hydric soil rating: No

Sun

Percent of map unit: 2 percent

Landform: Depressions
Hydric soil rating: Yes

Punsit
Percent of map unit: 2 percent
Hydric soil rating: No

GsB—Georgia silt loam, 3 to 8 percent slopes

Map Unit Setting
National map unit symbol: 9rg6
Elevation: 90 to 1,000 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Georgia and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Georgia

Setting
Landform: Till plains, hills, drumlinoid ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Loamy till derived mainly from limestone, shale, or slate

Typical profile
H1 - 0 to 8 inches: silt loam
H2 - 8 to 27 inches: loam
H3 - 27 to 80 inches: gravelly fine sandy loam

Properties and qualities
Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: C
Ecological site: F144AY038NY - Semi-Rich Moist Till Uplands
Hydric soil rating: No

Minor Components

Massena
Percent of map unit: 5 percent
Hydric soil rating: No

Stockbridge
Percent of map unit: 5 percent
Hydric soil rating: No

Charlton
Percent of map unit: 5 percent
Hydric soil rating: No

Dutchess
Percent of map unit: 3 percent
Hydric soil rating: No

Pittstown
Percent of map unit: 2 percent
Hydric soil rating: No

GsC—Georgia silt loam, 8 to 15 percent slopes

Map Unit Setting
National map unit symbol: 9rg7
Elevation: 90 to 1,000 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Georgia and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Georgia

Setting
Landform: Till plains, hills, drumlinoid ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Loamy till derived mainly from limestone, shale, or slate

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 27 inches: loam
H3 - 27 to 80 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F144AY038NY - Semi-Rich Moist Till Uplands
Hydric soil rating: No

Minor Components

Massena

Percent of map unit: 5 percent
Hydric soil rating: No

Stockbridge

Percent of map unit: 5 percent
Hydric soil rating: No

Dutchess

Percent of map unit: 3 percent
Hydric soil rating: No

Charlton

Percent of map unit: 3 percent
Hydric soil rating: No

Sun

Percent of map unit: 2 percent
Landform: Depressions
Hydric soil rating: Yes

Pittstown

Percent of map unit: 2 percent
Hydric soil rating: No

HoE—Hollis-Chatfield-Rock outcrop complex, steep

Map Unit Setting

National map unit symbol: 9rgg
Elevation: 100 to 1,410 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Hollis and similar soils: 40 percent
Chatfield and similar soils: 30 percent
Rock outcrop: 20 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hollis

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: A thin mantle of loamy till derived mainly from schist, granite, and gneiss

Typical profile

H1 - 0 to 3 inches: loam
H2 - 3 to 15 inches: loam
H3 - 15 to 19 inches: unweathered bedrock

Properties and qualities

Slope: 25 to 45 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Description of Chatfield

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mainly from granite, gneiss, or schist

Typical profile

H1 - 0 to 9 inches: fine sandy loam
H2 - 9 to 30 inches: loam
H3 - 30 to 34 inches: unweathered bedrock

Properties and qualities

Slope: 25 to 45 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Rock Outcrop

Typical profile

H1 - 0 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 25 to 45 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Capacity of the most limiting layer to transmit water (Ksat): Very low to very high (0.00 to 19.98 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydric soil rating: Unranked

Minor Components

Charlton

Percent of map unit: 5 percent
Hydric soil rating: No

Sun

Percent of map unit: 5 percent

Landform: Depressions
Hydric soil rating: Yes

HoF—Hollis-Chatfield-Rock outcrop complex, very steep

Map Unit Setting

National map unit symbol: 9rgh
Elevation: 0 to 1,590 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Hollis and similar soils: 40 percent
Rock outcrop: 25 percent
Chatfield and similar soils: 25 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hollis

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: A thin mantle of loamy till derived mainly from schist, granite, and gneiss

Typical profile

H1 - 0 to 3 inches: loam
H2 - 3 to 15 inches: loam
H3 - 15 to 19 inches: unweathered bedrock

Properties and qualities

Slope: 45 to 60 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Description of Chatfield

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mainly from granite, gneiss, or schist

Typical profile

H1 - 0 to 9 inches: fine sandy loam
H2 - 9 to 30 inches: loam
H3 - 30 to 34 inches: unweathered bedrock

Properties and qualities

Slope: 45 to 70 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Rock Outcrop

Typical profile

H1 - 0 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 45 to 70 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Capacity of the most limiting layer to transmit water (Ksat): Very low to very high (0.00 to 19.98 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydric soil rating: Unranked

Minor Components

Charlton

Percent of map unit: 5 percent
Hydric soil rating: No

Sun

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

HsE—Hoosic gravelly loam, 25 to 45 percent slopes

Map Unit Setting

National map unit symbol: 9rgn
Elevation: 100 to 1,100 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Hoosic and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hoosic

Setting

Landform: Terraces, outwash plains, deltas
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy and gravelly glaciofluvial deposits

Typical profile

H1 - 0 to 9 inches: gravelly loam
H2 - 9 to 24 inches: very gravelly sandy loam
H3 - 24 to 70 inches: extremely gravelly loamy sand

Properties and qualities

Slope: 25 to 45 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (1.98 to 19.98 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Copake

Percent of map unit: 5 percent
Hydric soil rating: No

Knickerbocker

Percent of map unit: 5 percent
Hydric soil rating: No

Fredon

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Ln—Linlithgo silt loam

Map Unit Setting

National map unit symbol: 9rh6
Elevation: 50 to 500 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Linlithgo and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Linlithgo

Setting

Landform: Flood plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy alluvium over sandy and gravelly water-sorted deposits

Typical profile

H1 - 0 to 9 inches: silt loam
H2 - 9 to 21 inches: silt loam
H3 - 21 to 72 inches: gravelly loamy fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: FrequentNone
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Ecological site: F144AY015NY - Wet Silty Low Floodplain
Hydric soil rating: No

Minor Components

Wayland

Percent of map unit: 10 percent
Landform: Flood plains
Hydric soil rating: Yes

Wappinger

Percent of map unit: 5 percent
Hydric soil rating: No

Pawling

Percent of map unit: 5 percent
Hydric soil rating: No

MnA—Massena silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9rh9
Elevation: 100 to 1,000 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Massena and similar soils: 80 percent

Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Massena

Setting

Landform: Till plains, hills, drumlinoid ridges
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy till dominated by siliceous rocks with varying proportions of limestone

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 33 inches: loam
H3 - 33 to 72 inches: fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: About 12 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Available water supply, 0 to 60 inches: Moderate (about 7.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F144AY039NY - Semi-Rich Wet Till Depressions
Hydric soil rating: No

Minor Components

Sun

Percent of map unit: 10 percent
Landform: Depressions
Hydric soil rating: Yes

Georgia

Percent of map unit: 5 percent
Hydric soil rating: No

Punsit

Percent of map unit: 5 percent
Hydric soil rating: No

MnB—Massena silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9rhb
Elevation: 100 to 1,000 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Massena and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Massena

Setting

Landform: Till plains, hills, drumlinoid ridges
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy till dominated by siliceous rocks with varying proportions of limestone

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 33 inches: loam
H3 - 33 to 72 inches: fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: About 12 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Available water supply, 0 to 60 inches: Moderate (about 7.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F144AY039NY - Semi-Rich Wet Till Depressions
Hydric soil rating: No

Minor Components

Sun

Percent of map unit: 10 percent
Landform: Depressions
Hydric soil rating: Yes

Punsit

Percent of map unit: 5 percent
Hydric soil rating: No

Georgia

Percent of map unit: 5 percent
Hydric soil rating: No

NwB—Nassau-Cardigan complex, undulating, very rocky

Map Unit Setting

National map unit symbol: 9rhc
Elevation: 0 to 1,800 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Nassau and similar soils: 45 percent
Cardigan and similar soils: 35 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nassau

Setting

Landform: Till plains, ridges, benches
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Channery loamy till derived mainly from local slate or shale

Typical profile

H1 - 0 to 5 inches: channery silt loam
H2 - 5 to 16 inches: very channery silt loam
H3 - 16 to 20 inches: unweathered bedrock

Properties and qualities

Slope: 1 to 6 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained

Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Description of Cardigan

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till or colluvium derived from phyllite, slate, shale, and schist

Typical profile

H1 - 0 to 8 inches: channery silt loam
H2 - 8 to 20 inches: channery loam
H3 - 20 to 30 inches: channery silt loam
H4 - 30 to 34 inches: unweathered bedrock

Properties and qualities

Slope: 1 to 6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Dutchess

Percent of map unit: 10 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 5 percent
Hydric soil rating: Unranked

Massena

Percent of map unit: 4 percent
Hydric soil rating: No

Sun

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

NwC—Nassau-Cardigan complex, rolling, very rocky

Map Unit Setting

National map unit symbol: 9rhd
Elevation: 0 to 1,800 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Nassau and similar soils: 45 percent
Cardigan and similar soils: 35 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nassau

Setting

Landform: Till plains, ridges, benches
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Channery loamy till derived mainly from local slate or shale

Typical profile

H1 - 0 to 5 inches: channery silt loam
H2 - 5 to 16 inches: very channery silt loam
H3 - 16 to 20 inches: unweathered bedrock

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Available water supply, 0 to 60 inches: Very low (about 1.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Description of Cardigan

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till or colluvium derived from phyllite, slate, shale, and schist

Typical profile

H1 - 0 to 8 inches: channery silt loam
H2 - 8 to 20 inches: channery loam
H3 - 20 to 30 inches: channery silt loam
H4 - 30 to 34 inches: unweathered bedrock

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Dutchess

Percent of map unit: 9 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 5 percent
Hydric soil rating: Unranked

Unnamed soils, very shallow

Percent of map unit: 5 percent
Hydric soil rating: No

Sun

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

NwD—Nassau-Cardigan complex, hilly, very rocky

Map Unit Setting

National map unit symbol: 9rhf
Elevation: 0 to 1,800 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Nassau and similar soils: 45 percent
Cardigan and similar soils: 30 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nassau

Setting

Landform: Till plains, ridges, benches
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Channery loamy till derived mainly from local slate or shale

Typical profile

H1 - 0 to 5 inches: channery silt loam
H2 - 5 to 16 inches: very channery silt loam
H3 - 16 to 20 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Description of Cardigan

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till or colluvium derived from phyllite, slate, shale, and schist

Typical profile

H1 - 0 to 8 inches: channery silt loam
H2 - 8 to 20 inches: channery loam
H3 - 20 to 30 inches: channery silt loam
H4 - 30 to 34 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Dutchess

Percent of map unit: 10 percent
Hydric soil rating: No

Sun

Percent of map unit: 10 percent
Landform: Depressions
Hydric soil rating: Yes

Rock outcrop

Percent of map unit: 5 percent
Hydric soil rating: Unranked

NxE—Nassau-Rock outcrop complex, steep

Map Unit Setting

National map unit symbol: 9rhg
Elevation: 600 to 1,800 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Nassau and similar soils: 45 percent
Rock outcrop: 30 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nassau

Setting

Landform: Till plains, ridges, benches
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Channery loamy till derived mainly from local slate or shale

Typical profile

H1 - 0 to 5 inches: channery silt loam
H2 - 5 to 16 inches: very channery silt loam
H3 - 16 to 20 inches: unweathered bedrock

Properties and qualities

Slope: 25 to 45 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Description of Rock Outcrop

Typical profile

H1 - 0 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 25 to 45 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydric soil rating: Unranked

Minor Components

Cardigan

Percent of map unit: 10 percent
Hydric soil rating: No

Dutchess

Percent of map unit: 10 percent
Hydric soil rating: No

Sun

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

NxF—Nassau-Rock outcrop complex, very steep

Map Unit Setting

National map unit symbol: 9rhh
Elevation: 600 to 1,800 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Nassau and similar soils: 50 percent
Rock outcrop: 30 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nassau

Setting

Landform: Till plains, ridges, benches
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Channery loamy till derived mainly from local slate or shale

Typical profile

H1 - 0 to 5 inches: channery silt loam
H2 - 5 to 16 inches: very channery silt loam
H3 - 16 to 20 inches: unweathered bedrock

Properties and qualities

Slope: 45 to 65 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Description of Rock Outcrop

Typical profile

H1 - 0 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 45 to 70 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydric soil rating: Unranked

Minor Components

Sun

Percent of map unit: 10 percent
Landform: Depressions
Hydric soil rating: Yes

Cardigan

Percent of map unit: 10 percent

Hydric soil rating: No

NyA—Natchaug muck, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2w68z
Elevation: 0 to 1,550 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Natchaug and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Natchaug

Setting

Landform: Depressions, depressions, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Highly decomposed organic material over loamy glaciofluvial deposits and/or loamy glaciolacustrine deposits and/or loamy till

Typical profile

Oa1 - 0 to 12 inches: muck
Oa2 - 12 to 31 inches: muck
2Cg1 - 31 to 39 inches: silt loam
2Cg2 - 39 to 79 inches: fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.01 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 25 percent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Very high (about 17.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D

Ecological site: F144AY042NY - Semi-Rich Organic Wetlands
Hydric soil rating: Yes

Minor Components

Catden
Percent of map unit: 8 percent
Landform: Depressions, depressions, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Limerick
Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Sun
Percent of map unit: 4 percent
Landform: Depressions, hills
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Halsey
Percent of map unit: 3 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Pg—Pawling silt loam

Map Unit Setting
National map unit symbol: 9rhk
Elevation: 50 to 500 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Pawling and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pawling

Setting

Landform: Flood plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Loamy over sandy and gravelly alluvium

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 33 inches: silt loam
H3 - 33 to 72 inches: very gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Available water supply, 0 to 60 inches: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D
Ecological site: F144AY012CT - Sandy Low Floodplain
Hydric soil rating: No

Minor Components

Linlithgo

Percent of map unit: 10 percent
Hydric soil rating: No

Wappinger

Percent of map unit: 5 percent
Hydric soil rating: No

Wayland

Percent of map unit: 5 percent
Landform: Flood plains
Hydric soil rating: Yes

Ps—Pits, gravel

Map Unit Setting

National map unit symbol: 9rhl
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Pits, gravel: 70 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pits, Gravel

Typical profile

H1 - 0 to 6 inches: very gravelly sand
H2 - 6 to 60 inches: very gravelly coarse sand

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Minor Components

Udorthents

Percent of map unit: 10 percent
Hydric soil rating: No

Copake

Percent of map unit: 5 percent
Hydric soil rating: No

Fredon

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Halsey

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Hoosic

Percent of map unit: 5 percent
Hydric soil rating: No

SkB—Stockbridge silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9rhv
Elevation: 200 to 1,310 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Stockbridge and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Stockbridge

Setting

Landform: Till plains, hills, drumlinoid ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Calcareous loamy till

Typical profile

H1 - 0 to 6 inches: silt loam
H2 - 6 to 23 inches: silt loam
H3 - 23 to 80 inches: silt loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F144AY036NY - Semi-Rich Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Georgia
Percent of map unit: 5 percent
Hydric soil rating: No

Galway
Percent of map unit: 4 percent
Hydric soil rating: No

Massena
Percent of map unit: 4 percent
Hydric soil rating: No

Charlton
Percent of map unit: 3 percent
Hydric soil rating: No

Bernardston
Percent of map unit: 2 percent
Hydric soil rating: No

Farmington
Percent of map unit: 1 percent
Hydric soil rating: No

Sun
Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

SkC—Stockbridge silt loam, 8 to 15 percent slopes

Map Unit Setting
National map unit symbol: 9rhw
Elevation: 180 to 1,340 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Stockbridge and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Stockbridge

Setting
Landform: Till plains, hills, drumlinoid ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest

Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Calcareous loamy till

Typical profile

H1 - 0 to 6 inches: silt loam
H2 - 6 to 23 inches: silt loam
H3 - 23 to 80 inches: silt loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F144AY036NY - Semi-Rich Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Georgia

Percent of map unit: 5 percent
Hydric soil rating: No

Galway

Percent of map unit: 4 percent
Hydric soil rating: No

Massena

Percent of map unit: 4 percent
Hydric soil rating: No

Charlton

Percent of map unit: 3 percent
Hydric soil rating: No

Bernardston

Percent of map unit: 2 percent
Hydric soil rating: No

Farmington

Percent of map unit: 1 percent
Hydric soil rating: No

Sun

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

SkD—Stockbridge silt loam, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: 9rhx
Elevation: 160 to 1,310 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Stockbridge and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Stockbridge

Setting

Landform: Till plains, hills, drumlinoid ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Calcareous loamy till

Typical profile

H1 - 0 to 6 inches: silt loam
H2 - 6 to 23 inches: silt loam
H3 - 23 to 80 inches: silt loam

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F144AY036NY - Semi-Rich Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Bernardston
Percent of map unit: 5 percent
Hydric soil rating: No

Charlton
Percent of map unit: 5 percent
Hydric soil rating: No

Georgia
Percent of map unit: 4 percent
Hydric soil rating: No

Galway
Percent of map unit: 4 percent
Hydric soil rating: No

Sun
Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

Farmington
Percent of map unit: 1 percent
Hydric soil rating: No

SkE—Stockbridge silt loam, 25 to 45 percent slopes

Map Unit Setting
National map unit symbol: 9rhy
Elevation: 230 to 1,120 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition
Stockbridge and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Stockbridge

Setting
Landform: Till plains, hills, drumlinoid ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Calcareous loamy till

Typical profile

H1 - 0 to 6 inches: silt loam
H2 - 6 to 23 inches: silt loam
H3 - 23 to 80 inches: silt loam

Properties and qualities

Slope: 25 to 45 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: F144AY036NY - Semi-Rich Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Charlton

Percent of map unit: 5 percent
Hydric soil rating: No

Bernardston

Percent of map unit: 4 percent
Hydric soil rating: No

Galway

Percent of map unit: 4 percent
Hydric soil rating: No

Farmington

Percent of map unit: 1 percent
Hydric soil rating: No

Sun

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

SmC—Stockbridge-Farmington complex, rolling, rocky

Map Unit Setting

National map unit symbol: 9rj0
Elevation: 100 to 1,080 feet

Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Stockbridge and similar soils: 50 percent
Farmington and similar soils: 30 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Stockbridge

Setting

Landform: Till plains, hills, drumlinoid ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Calcareous loamy till

Typical profile

H1 - 0 to 6 inches: silt loam
H2 - 6 to 23 inches: silt loam
H3 - 23 to 80 inches: silt loam

Properties and qualities

Slope: 5 to 16 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F144AY036NY - Semi-Rich Well Drained Till Uplands
Hydric soil rating: No

Description of Farmington

Setting

Landform: Till plains, ridges, benches
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till or congeliturbate derived from limestone, dolomite, shale, and sandstone, and in many places mixed with wind and water deposits

Typical profile

H1 - 0 to 7 inches: loam
H2 - 7 to 15 inches: very fine sandy loam
H3 - 15 to 19 inches: unweathered bedrock

Properties and qualities

Slope: 5 to 16 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: F144AY035MA - Shallow Semi-Rich Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Galway

Percent of map unit: 10 percent
Hydric soil rating: No

Georgia

Percent of map unit: 5 percent
Hydric soil rating: No

Massena

Percent of map unit: 3 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 1 percent
Hydric soil rating: Unranked

Sun

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

SmD—Stockbridge-Farmington complex, hilly, rocky

Map Unit Setting

National map unit symbol: 9rj1

Elevation: 100 to 1,000 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Stockbridge and similar soils: 50 percent
Farmington and similar soils: 30 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Stockbridge

Setting

Landform: Till plains, hills, drumlinoid ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Calcareous loamy till

Typical profile

H1 - 0 to 6 inches: silt loam
H2 - 6 to 23 inches: silt loam
H3 - 23 to 80 inches: silt loam

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F144AY036NY - Semi-Rich Well Drained Till Uplands
Hydric soil rating: No

Description of Farmington

Setting

Landform: Till plains, ridges, benches
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till or congeliturbate derived from limestone, dolomite, shale, and sandstone, and in many places mixed with wind and water deposits

Typical profile

H1 - 0 to 7 inches: loam
H2 - 7 to 15 inches: very fine sandy loam
H3 - 15 to 19 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: F144AY035MA - Shallow Semi-Rich Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Galway

Percent of map unit: 10 percent
Hydric soil rating: No

Sun

Percent of map unit: 9 percent
Landform: Depressions
Hydric soil rating: Yes

Rock outcrop

Percent of map unit: 1 percent
Hydric soil rating: Unranked

Su—Sun silt loam

Map Unit Setting

National map unit symbol: 9rj3
Elevation: 600 to 1,800 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Sun and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sun

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loamy till derived primarily from limestone and sandstone, with a component of schist, shale, or granitic rocks in some areas

Typical profile

H1 - 0 to 4 inches: silt loam
H2 - 4 to 22 inches: loam
H3 - 22 to 80 inches: gravelly loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Occasional
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 6.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Ecological site: F144AY039NY - Semi-Rich Wet Till Depressions
Hydric soil rating: Yes

Minor Components

Massena

Percent of map unit: 5 percent
Hydric soil rating: No

Palms

Percent of map unit: 5 percent
Landform: Swamps, marshes
Hydric soil rating: Yes

Sun, stony

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Canandaigua
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Ud—Udorthents, smoothed

Map Unit Setting
National map unit symbol: 9rj7
Elevation: -30 to 950 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition
Udorthents, smoothed, and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents, Smoothed

Typical profile
H1 - 0 to 4 inches: gravelly loam
H2 - 4 to 70 inches: very gravelly loam

Properties and qualities
Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 5.95 in/hr)
Depth to water table: About 36 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Low (about 5.5 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Urban land
Percent of map unit: 10 percent
Hydric soil rating: Unranked

Udorthents, wet substratum
Percent of map unit: 10 percent
Hydric soil rating: No

Unnamed soils, undisturbed
Percent of map unit: 4 percent
Hydric soil rating: Unranked

Rock outcrop
Percent of map unit: 1 percent
Hydric soil rating: Unranked

Ue—Udorthents, wet substratum

Map Unit Setting
National map unit symbol: 9rj8
Elevation: 50 to 2,400 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition
Udorthents, wet substratum, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents, Wet Substratum

Typical profile
H1 - 0 to 4 inches: gravelly loam
H2 - 4 to 72 inches: very gravelly loam

Properties and qualities
Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 5.95 in/hr)
Depth to water table: About 12 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Low (about 5.5 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Udorthents, smoothed
Percent of map unit: 10 percent
Hydric soil rating: No

Urban land
Percent of map unit: 5 percent
Hydric soil rating: Unranked

Unnamed soils, undisturbed
Percent of map unit: 4 percent
Hydric soil rating: Unranked

Rock outcrop
Percent of map unit: 1 percent
Hydric soil rating: Unranked

Ur—Urban land

Map Unit Setting
National map unit symbol: 9rjb
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition
Urban land: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Typical profile
H1 - 0 to 6 inches: variable

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Minor Components

Udorthents, smoothed
Percent of map unit: 5 percent
Hydric soil rating: No

Udorthents, wet substratum
Percent of map unit: 3 percent
Hydric soil rating: No

Rock outcrop
Percent of map unit: 1 percent
Hydric soil rating: Unranked

Unnamed soils, undisturbed
Percent of map unit: 1 percent
Hydric soil rating: Unranked

W—Water

Map Unit Setting
National map unit symbol: 9rjc
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition
Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

We—Wappinger loam

Map Unit Setting
National map unit symbol: 9rjd
Elevation: 50 to 500 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Wappinger and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wappinger

Setting
Landform: Flood plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy alluvium washed from soils derived mainly from shale and slate, overlying sand and gravel deposits

Typical profile

H1 - 0 to 9 inches: loam
H2 - 9 to 33 inches: loam
H3 - 33 to 37 inches: sandy loam
H4 - 37 to 60 inches: extremely gravelly sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 36 to 60 inches
Frequency of flooding: NoneOccasional
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: B
Ecological site: F144AY010NH - Sandy High Floodplain
Hydric soil rating: No

Minor Components

Pawling

Percent of map unit: 10 percent
Hydric soil rating: No

Linlithgo

Percent of map unit: 8 percent
Hydric soil rating: No

Wayland

Percent of map unit: 2 percent
Landform: Flood plains
Hydric soil rating: Yes

Wy—Wayland silt loam

Map Unit Setting

National map unit symbol: 9rjf
Elevation: 200 to 1,500 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Wayland and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wayland

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Silty and clayey alluvium washed from uplands that contain some calcareous drift

Typical profile

H1 - 0 to 9 inches: silt loam
H2 - 9 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: FrequentNone
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: High (about 11.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Ecological site: F144AY016MA - Very Wet Low Floodplain
Hydric soil rating: Yes

Minor Components

Pawling

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: No

Linlithgo

Percent of map unit: 5 percent
Hydric soil rating: No

Palms

Percent of map unit: 3 percent
Landform: Swamps, marshes
Hydric soil rating: Yes

Fluvaquents

Percent of map unit: 3 percent

Landform: Flood plains
Hydric soil rating: Yes

Udifluvents

Percent of map unit: 2 percent
Hydric soil rating: No

Carlisle

Percent of map unit: 2 percent
Landform: Marshes, swamps
Hydric soil rating: Yes

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Tighe&Bond

APPENDIX C

Town of Amenia Zoning Map

Effective August 4, 2011,
as amended August 7, 2016

Legend

- MUNICIPAL BOUNDARIES
- PARCEL BOUNDARIES

Zoning Districts

- HC, HIGHWAY COMMERCIAL
- HM, HAMLET MIXED USE
- HR, HAMLET RESIDENTIAL
- M, INDUSTRIAL/MANUFACTURING
- OC, OFFICE COMMERCIAL/INDUSTRIAL
- RA, RURAL AGRICULTURAL
- RR, RURAL RESIDENTIAL
- SR, SUBURBAN RESIDENTIAL
- MOBILE HOME OVERLAY DISTRICT
- SOIL MINING OVERLAY DISTRICT
- HISTORIC PRESERVATION OVERLAY DISTRICT
- HAMLET MIXED USE OVERLAY DISTRICT
- FLOOD PLAIN OVERLAY DISTRICT
- MIXED USE INSTITUTIONAL CONVERSION OVERLAY DISTRICT
- RESORT DEVELOPMENT OVERLAY DISTRICT
- ROAD VISUAL PROTECTION CORRIDOR
- TRAIL VISUAL PROTECTION CORRIDOR
- STREAM CORRIDOR BUFFER
- SCENIC VISUAL PROTECTION ZONE

Miles
0 0.5 1

N
W E
S

Map Prepared By Dutchess County
Department of Planning and Development

Zoning District boundaries are enacted by the Municipalities. These maps are based on information supplied by the Municipalities, per agreement with Dutchess County Department of Planning and Development. Zoning district lines are updated at the pleasure of the Municipality. Check with local municipal officials for most recent boundary delineations.

Tighe&Bond

APPENDIX D

Dutchess County Department of Health

William R. Steinhaus
County Executive

Michael C. Caldwell, MD, MPH
Commissioner

Environmental Health

387 Main Street
Poughkeepsie
New York
12601
(845) 486-3404
Fax (845) 486-3545

May 1, 2009

Mr. Ronald Magee
New York State Environmental Facilities Corporation
625 Broadway
Albany, NY 12207-2997

Re: Clean Water State Revolving Fund Intended Use Plan

Dear Mr. Magee:

This office has been requested to comment on the need for a sewer district for the Town of Amenia.

This Department recommends the creation of municipal services in the Town of Amenia to address problems of residential and commercial sewage failures which can cause illegal discharge to the surface of the ground.

The repair of failing systems in this area is extremely difficult due to small lot sizes not conducive to code-compliant septic tank/subsurface sewage disposal.

We therefore support this application.

I may be phoned at (845) 486-3404 if there are any additional questions related to this matter.

Very truly yours,

W. Stephen Sapowski
Director of Environmental Health Services
Dutchess County Department of Health

WSC:lc

cc: Dr. Caldwell, Commissioner of Health
Dan Keeler
Ed Mills, Dutchess County Water & Wastewater Authority

Tighe&Bond

APPENDIX E

Town of Amenia Wastewater Survey

Name of Owner/Business: _____

Tax parcel ID #: _____

Address: _____

A. Type of Use: ____ Single Family Residential ____Multi-Family/Apartment ____Commercial

If **Single Family Residential**: How many bedrooms do you have? _____ (helps estimate flow)

If **Multi-Family/Apartment**: How many units do you have?_____ How many bedrooms each?
Unit # 1 ___ Unit #2 ___ Unit #3 ___ Unit #4 ___ Unit #5 ___ Unit #6 ___ Unit #7___ Unit #8 ___

Additional:_____

If **Non-Residential/Commercial**:

- Church # of seats _____
- Office or Retail Business # of employees _____
- Motel, Hotel, Inn # of rooms _____
- Service station or Convenience store # of toilets _____
- Restaurant # of seats _____
- Vacant lot

1) What type of wastewater system do you have (circle all that apply) and what is the maximum capacity, if you know?

- Septic tank Capacity_____ Don't know___
- Leachfield/Drainfield Capacity_____ Don't know___
- Seepage Pit Capacity_____ Don't know___
- Cesspool Capacity_____ Don't know___
- Holding tank Capacity_____ Don't know___

2) How old is your system? ___ How often do you pump it out? Every ___ years

3) What is your septic tank made of? Concrete__ Plastic __ Metal __ Fiberglass __ Unknown ___

4) Do you have a problem with your system? ____ If yes, please check all that apply:
Odor ___ Sewage in basement ___ System drains slowly ___ Sewage surfaces on lawn ___
Backs up in house ___ Other_____

5) Do you have a sump pump in your basement? ___ If yes, how often does it run? _____

6) Do you experience issues with flooding? Yes _____ No _____

7) Has the use of your property, or the function/expansion/capability of your business been impacted by septic system limitations? YES / NO / NOT SURE

8) Do you think there are septic disposal problems somewhere in the Town? YES / NO / NOT SURE

   If you answered yes, where?_____

9) Do you think the hamlet would benefit from a community wastewater collection and treatment system? YES / NO / NOT SURE

10) Would you be interested in connecting to a municipal wastewater system if your property/business is located in the hamlet? YES / NO / NOT SURE

11) Additional comments?

THANK YOU!

Town of Amenia
Sewer Feasibility Study
Wastewater Survey Response Summary Table

Parcel Number	Parcel Address	Owner Name (primary)	Buisness(es) located here	Lot Size	Land Use	Type Group	If Multi-Family/Apartment : How many units?	In Multi-Family apartments: How many bedrooms for each apartment? Please fill in information for all apartments in the building.	If Non Residential: Church, How many seats?	If Non Residential: Office or Retail, How many employees?	If Non Residential: Motel, Hotel, Inn, How many rooms?	If Non Residential: Service Station or convenience store, How many toilets?	If Non Residential: Restaurant, How many seats?	If Non Residential: vacant lot?	If Single family, How many bedrooms? (Helps estimate flow)	What type of wastewater system do you have (Choose all that apply)?	What is the capacity of your system?	How old is your system?	How often do you pump it out? (Every____years?)	What is your septic tank made of?	Do you have a problem with your system?	If you are having problems check all that apply:	Do you have a sump pump in your basement?	If you answered yes to the above question, how often does your sump pump run?	Do you experience issues with flooding?	Has the use of your property, or the functionalexpansioncapability of your business been impacted by septic limitations?	Do you think there are septic disposal problems somewhere in the Town?	If you answered yes to the above question, where?	Do you think the hamlet would benefit from a community wastewater collection and treatment system?	Would you be interested in connecting to a municipal wastewater system if your propertybusiness is located in the hamlet?	Additional Comments:
132000-7167-14-313331-0000	17 Depot Hill Rd	Babino , Alfred V		0.34	1 Family Res (210)	Single-Family									4	Leach-field/Drain-field	Unknown	30		Concrete	No		No		No	No	No		No		The issue as it stands now, is that if the downtown projected area gets approved for a wastewater system, we all will have to pay for it and the yearly maintenance and all the businesses will get an upgrade for free. It will be YEARS, if ever, until the rest of the town would be able to get or use the system all the while paying for it. If the rest of the town gets approved, it would cost MUCH more because the system would need to be expanded at an additional cost to us. At this time, the town SHOULD NOT approve a wastewater system for the projected area and the downtown businesses that all want it, because it is an upgrade to them for FREE, should pay for their own upgrades to the sceptics they have on their dime not mine.
132000-7167-09-152544-0000	4977 Route 22	Owens , Mary Rachel		0.53	2 Family Res (220)	Multi-Family									4	Cesspool	Unknown	Unknown		Unkown	Maybe	Odor, System drains slowly	Yes	Only when groundwater has really gotten high, maybe 6x a year	Yes	No	Not Sure		Yes	I'm totally in favor of this. We have extremely high groundwater so new septics are extremely expensive. Why not do this together as a community and help our town grow!
132000-7167-14-257472-0000	40 Mechanic St	Flanagan , Ellen Louise		0.33	Mfg housing (270)	Single-Family									3	Septic, Leach-field/Drain-field	Unknown	40	10.00	Metal	No		No		No	No	Not Sure		Yes	A wastewater system would help me be able to upgrade
132000-7067-00-890328-0000	6 Autumn Ln	Pinkzoya LLC	Serevan	6.62	Restaurant (421)	Business	3	2,2,3				80				Septic, Leach-field/Drain-field	Unknown	Unknown		Unkown	No		No		Yes	No	Not Sure		Yes	the hamlet would greatly benefit from a wastewater collection and treatment system. such a facility would ensure our ability to expand and create more jobs in the area.
132000-7167-14-324321-0000	23 Depot Hill Rd	Dorfman , Joseph		0.50	1 Family Res (210)	Single-Family										Septic	Unknown	20		Unkown	No	Odor	Yes		No	No	Yes		Yes	
132000-7167-14-295312-0000	22 Depot Hill Rd	Cole , Robert W		0.34	1 Family Res (210)	Single-Family									3	Septic, Leach-field/Drain-field	1,000	3		Plastic	Yes	Odor	No		No	No	Yes	Center of Town	Yes	
132000-7167-09-105536-0000	4957 Route 22	Four Brothers Pizza Inc	Four Brothers	15.30	Restaurant (421)	Business							100			Septic, Leach-field/Drain-field, Holding tank	1,000	40	0.50	Unkown	No		No		No	No	Not Sure		Yes	
132000-7167-13-121478-0000	5329 Route 44	Patel , Bharat M	Freshco Deli Amenia	0.39	Det row bldg (482)	Business	6		1	12		2 Toilets for store+ 4 toilets in 4 apartment.				Septic, Leach-field/Drain-field	1,000	5	2.00	Concrete	No		No		No	No	Not Sure		Not sure	The Wastewater Committee did not explain in detail that how this going to work out. Who is paying ? Government is paying part of the total estimate? Gulf course paying part of it or the full expense of the sewage system? You did not answer all of these. My thinking of this system is if people of our beautiful town has to pay , nobody is going to ready to pay anything—Town people- most of them do not have that kind of income. Some people even have a problem to put food (for their family) on the table. They have hard time to make ends meet at the end of the month. I am always a positive thinker but for this I am not sure. Good Luck. Bharat.
132000-7167-13-140394-0000	4892 Route 22	722 Ventures LLC ,		1.20	Apartment (411)	Multi-Family	4		1							Septic, Leach-field/Drain-field, Holding tank	1,500	18	1.00	Concrete	No		No		No	No	Not Sure		Yes	The water bill is already very high in Amenia, in comparison to other nearby towns. My one is concern is how high it would become with the inclusion of a wastewater system.
132000-7167-14-290481-0000	3338 Route 343	Redl , Herbert	Dollar General	3.50	>1use sm bld (485)	Business				20		4				Septic	Unknown	Unknown	3.00	Concrete	No		No		No	No	Not Sure		Not sure	
132000-7167-13-174496-0000	3309 Route 343	Amenia Free Library Assn	Library	0.40	Library (611)	Business				3						Septic, Leach-field/Drain-field	1,000	1		Plastic	No		Yes	Depends on the water coming down or what is in the ground. It runs very little when the ground is dry and runs a lot when the rain is coming down or the water table is high.	No	No	Yes	############	Yes	I'm absolutely believe a wastewater system would be an amazing asset to the community, but we just replaced ours, so it depends on what the financial impact would be and any limitations or issues that arise down the line.
132000-7167-09-236520-0000	3339 Route 343	CFI PROPCO 2 LLC	Cumberland Farms	1.50	>1use sm bld (485)	Business							2			Septic, Leach-field/Drain-field	1,500	Unknown	0.01	Concrete	Maybe	System drains slowly, backs up	No		No	No	Yes		Yes	
132000-7167-10-262505-0000	3344 Route 343	Beth David Congregation	Congregation Beth David	46 X 126	Religious (620)	Religious				90						Septic	Unknown	Unknown	10.00	Unknow	No		No		Yes	Yes	Yes	Center of Town	Yes	Yes	A lack of municipal sewerage has economically and physically limited the growth and health of the town. This should be a priority for Amenia.
132000-7167-13-112429-0000	4913 Route 22	Walter , James A		0.26	1 Family Res (210)	Single-Family									4	Septic Leachfield	Unknown	Unknown	Unknow	Concrete	No		No		No	No	Not Sure		Not sure	Not sure	Connecting depends on cost. Has to be right deal.
132000-7167-14-346344-0000	33 Midway Ave	Sullivan , Teresa Z		0.23	1 Family Res (210)	Single-Family									3	Septic/leach	250	Unknown	4.50	Concrete	No		No		No	No	Not Sure		Not sure	Not sure	Depends on what's involved
132000-7167-13-141374-0000	11 Lavelle Rd	Roman Catholic Church of ,		1.80	Religious (620)	Religious							4			Septic	Unknown	Unknown	Unknow	Concrete	No		No		No	No	Not Sure		Yes	Yes	Cardinal Hayes School for Children 10 beds
132000-7167-13-126327-0000	12 Lavelle Rd	Roman Catholic Church of ,		5.28	Religious (620)	Religious										Septic	Unknown	Unknown	Unknow	Unknow	No										Church just sold this house. Parcel ID has not been updated; listed as 12 Lavelle Rd
132000-7167-13-122364-0000	3 Lavelle Rd	Roman Catholic Church of ,		1.10	Religious (620)	Religious				300			2			Septic	Unknown	Unknown	Unknow	Concrete	No		No		No	No	Not Sure		Yes	Yes	If the church can afford it.
132000-7167-13-126462-0000	5330 Route 44	Gas Land Petroleum Inc	Shell	0.27	Gas station (432)	Business					4		1			Unknown	Unknown	Unknown	Unknow	Unknow	Unknown				No		Not Sure		Not sure	Not sure	Has no information regarding the septic. Believes there is no room for a leach field. Could not connect me with anyone who knows the answers. Believes the property does not have a problem because no one has informed him of a problem. Had no interest in continuting a conversation. (Personal cell is 845-656-5066)
132000-7167-13-110418-0000	4905 Route 22	Johnson , Louis N III		0.20	1 Family Res (210)	Single-Family									3	Septic Tank	Unknown	30	Never	Concrete			No		Yes		Yes	Yes	Yes	(Spoke to Lorena Johnson, owner) Problem in Town by Cumberland with odor. We need a wastewater system.
132000-7167-00-363563-0000	3387 Route 343	Haymann , Greg		1.10	1 use sm bld (484)	Business										Septic Tank	Shallow	Unknown	Never	Unknown		System drains slowly, backs up	No		No		Yes	Yes	Not sure	
132000-7167-00-313507-0000	3360 Route 343	Hudson River Healthcare Inc	Sunriver	2.80	Health bldg (642)	Business										Septic Tank	Unknown	13	Unknow	Unknown			No		No		Yes		Yes	Yes	The facility has 5 providers, 150 patients/day, 30 employees, 4 toilets. There are dry wells to collect rain runoff from the parking lot. They drain very slowly
132000-7167-13-157475-0000	3300 Route 343	Good Boys Truck LLC ,	Good Boys Truck LLC	0.04	Det row bldg (482)	Business		2								Septic tank	Unknown	Unknown	1.50	Unknown			No		Yes		Not Sure		Yes	Yes	This property has a commercial space and one apartment w/1 bedroom
132000-7167-13-158470-0000	3300 Route 343 Rear	Good Boys Truck LLC ,	Good Boys Truck LLC ,	0.02	Other Storage (449)	Business										Septic tank	shared septic w/other Good Boys property	Unknown	1.50	Unknown			No		Yes		Not Sure		Yes	Yes	For both Good Boys properties there is a problem not so much with flooding as with dampness. This property has a commercial space and an apartment with 2 bedrooms
132000-7167-13-141469-0000	4950 Route 22	William & Peter Inc ,	William & Peter Inc , owners/Tent/Havens RE/	0.26	1 use sm bld (484)	Business										Septic tank	Unknown	Unknown	0.50	Unknown			No		No		Not Sure		Yes	Yes	There are two buildings w/this parcel ID. Tent and Havens and at least one more company are commercial tenants. In addition there are 6 apts - 3 w/1 bedroom and 3 w/2 bedrooms
132000-7167-13-099479-0000	5321 Route 44	Stefanopoulos Bros LLC	Stefanopoulos Bros LLC = owner + a baking company (John S not sure of name)	0.76	1 use sm bld (484)	Business										Septic tank	Unknown	Unknown	1.00	Unknown			No		No		Not Sure		Yes	Yes	This is a building containing a comm'l space and an apartment w/1 bedroom
132000-7167-13-107476-0000	5323 Route 44	Stefanopoulos , William	Stefanopoulos, William = owner Amenia Massage and Wellness = business	0.13	Converted Res (483)	Business							1			Septic tank	Unknown	Unknown	1.00	Unknown			No		No		Not Sure		Yes	Yes	
132000-7167-13-086310-0000	4825 Route 22	4825 Route 22 Inc ,	New England Village Center + 4 apartments	0.22	Small Retail (457)	Business										Septic tank	2,000	30	3.00	Unknown			Yes	Only after a heavy rainfall	No		Yes		Not Sure	Not sure	Not sure leaning to yes. There are two septic tanks. The property contains 4 apartments - 1 w/1 bedroom and 3 studios. Plus there are two bathrooms downstairs in the shop.
132000-7167-13-165477-0000	3306 Route 343	Heelan , James P	Yellow Submarine PLUS 3 apartments	0.05	Det row bldg (482)	Business										Septic tank;Leach-field/Drain-field	3,000	1	1.00	Plastic			No		No		Not Sure		Yes	Yes	3 apts 1 bedm eacg
132000-7167-13-113439-0000	4919 Route 22	Linden , Ann	Greyhouse Publishing	0.68	1 use sm bld (484)	Business										Septic tank;Holding tank	Unknown	Unknown	1.00	Unknown			No		No		Not Sure		Yes	Not sure	Connect subject to price
132000-7167-09-157504-0000	4966 Route 22	Linden , Ann Mansard	CPA Services	0.20	Converted Res (483)	Business										Septic tank	1,000	Unknown	as needed	Concrete			No		No		No		Yes	Not sure	The Estate of Ann Linden properties - Greyhouse, this one and the "parsonage" across from GHouse - are represented by Larry Havens (845-373-8555), but the Executor - Christopher Keane calls the shots. Larry will send Chris Jim's email to have him send us his email address.
132000-7167-00-022426-0000	5291 Route 44	Page Amenia LLC	HGPage	1.70	Lumber yd/ml (444)	Business										Septic tank;Leach-field/Drain-field	Unknown	Unknown	1.00	Concrete			No		No		Not Sure		Yes	Yes	Keep at it and good luck!
132000-7167-00-002440-0000	Route 44	Page Amenia LLC	Vacant comm (330) - owned by HG Page	2.00	Vacant comm (330)	Business										Unknown	Unknown	Unknown		Unknown			No		No		Not Sure		Yes	Yes	Holding the land for future business expansion
132000-7167-13-150468-0000	3294 Route 343	La Morte , Vito	Tienda mi Esquina and Bethany Frank	0.16	Det row bldg (482)	Business										Septic tank;Cesspool;Don't Know	Unknown	20	3.50	Concrete			No		No		Not Sure		Yes	Yes	It is necessary because town is limited by kind of businesses it could have like restaurants and laundromat. This should have been done 30 years ago (Vito LaMorte) (There are 5 apartments, each with one toilet and one toilet in each of the businesses.)
132000-7167-13-160492-0000	3305 Route 343	Del Regno Corp	Del Regno Corp	0.23	Auto dealer (431)	Business										Unknown	Unknown	80	Never	Unknown			No		No		Yes		Yes	Yes	Should have been installed 50 yrs ago
132000-7167-13-172477-0000	Route 343	Del Regno Corp	Del Regno Corp Vacant comm (330	0.21	Vacant comm (330)	Business										Unknown	Unknown	Unknown		Unknown			No		No		Not Sure		Yes	Yes	See Jim's files
132000-7167-13-040407-0000	66 Broadway	Broadway Amenia LLC	Broadway Amenia LLC Dr. Cheung	0.42	Prof. bldg. (465)	Business										Septic tank;Leach-field/Drain-field	Unknown	20	5.00	Unknown			No		No		Not Sure		Yes	Yes	
132000-7167-00-340765-0000	5086-5094 Route 22	Amenia K Realty LLC	Freshtown, Tractor Supply, Amenia Pharmacy, Santos Pizza, Bank of Millbrook	31.58	Nbh shop ctr (452)	Business										Leach-field/Drain-field;Holding tank	Unknown	20		Unknown			No		No		Not Sure		Yes	Yes	We are in support of the project.
132000-7167-00-280706-0000	Route 22	Amenia Meadows LLC	Rural vac >10 (322)	32.78	Rural vac>10 (322)	Business									NA	NA	NA	NA	NA	Unknown			No		No		Not Sure		Yes	Yes	We are in support of the project.
132000-7167-13-192481-0000	3314 Route 343	Collins , Michael T	Payne's Corners. 2 vacant storefronts/1 apt w/1 bdrm/2 apts w/2 bdrms	0.38	Converted Res (483)	Business										Septic tank;Leach-field/Drain-field	1,500	12	1.00	Concrete			Yes	in the spring thaw and after a heavy rain	No		Yes		Yes	Yes	A treatment system would "save" Amenia. Small % of long time residents oppose its introduction, but they have the loudest voices.
132000-7167-13-095443-0000	5316 Route 44	Foley , Thomas J		0.25	1 Family Res (210)	Single-Family									3	Septic Tank;Leach-field/Drain-field	Unknown	25	3.00	Plastic			No		No		Not Sure		Yes	Yes	
132000-7167-13-099447-0000	5318 Route 44	Foley , Thomas J		0.22	1 Family Res (210)	Single-Family									4	Septic Tank;Leach-field/Drain-field	Unknown	25	3.00	Plastic			No		No		Not Sure		Yes	Yes	5316 and 5318 Rte 44 share one tank

Town of Amenia
Sewer Feasibility Study
Wastewater Survey Response Summary Table

Parcel Number	Parcel Address	Owner Name (primary)	Buisness(es) located here	Lot Size	Land Use	Type Group	If Multi-Family/Apartment : How many units?	In Multi-Family apartments: How many bedrooms for each apartment? Please fill in information for all apartments in the building.	If Non Residential: Church, How many seats?	If Non Residential: Office or Retail, How many employees?	If Non Residential: Motel, Hotel, Inn, How many rooms?	If Non Residential: Service Station or convenience store, How many toilets?	If Non Residential: Restaurant, How many seats?	If Non Residential: vacant lot?	If Single family, How many bedrooms? (Helps estimate flow)	What type of wastewater system do you have (Choose all that apply)?	What is the capacity of your system?	How old is your system?	How often do you pump it out? (Every____years?)	What is your septic tank made of?	Do you have a problem with your system?	If you are having problems check all that apply:	Do you have a sump pump in your basement?	If you answered yes to the above question, how often does your sump pump run?	Do you experience issues with flooding?	Has the use of your property, or the functionexpansioncapability of your business been impacted by septic limitations?	Do you think there are septic disposal problems somewhere in the Town?	If you answered yes to the above question, where?	Do you think the hamlet would benefit from a community wastewater collection and treatment system?	Would you be interested in connecting to a municipal wastewater system if your propertybusiness is located in the hamlet?	Additional Comments:
132000-7167-14-391331-0000	17 Lango Rd	Culligan , John Peter		0.44	1 Family Res (210)	Single-Family									4	Septic Tank;Leach-field/Drain-field	300	4		Concrete			No				Not Sure		Yes	Yes	
132000-7167-13-227496-0000	3330 Route 343	Bird's Nest LLC The	Great Cape Baking Company	0.14	Det row bldg (482)	Business									5	Septic Tank	Unknown	10	1.00	Concrete		Odor, System drains slowly	Yes	Often	Yes		Yes		Yes	Yes	
132000-7167-13-066380-0000	8 Birch Dr	Mac Arthur , Donald		0.51	1 Family Res (210)	Single-Family									2	Septic Tank	Unknown	Unknown	3.00	Concrete			No		No		No		No	No	
132000-7167-13-050396-0000	60 Broadway	Wyckoff , Peter L Trustees		0.38	1 Family Res (210)	Single-Family									3	Septic Tank	Unknown	10	8.00	Concrete			Yes		No		Yes		Not Sure	No	
132000-7167-09-212594-0000	5004 Route 22	Euvrard , Wayne		0.78	1 Family Res (210)	Single-Family									4	Septic Tank	Unknown	10	5.00	Concrete			No		No		Yes		Yes	No	
132000-7167-13-120445-0000	4925 Route 22	Linden , Ann C		0.22	2 Family Res (220)	Multi-Family									4	Septic Tank;Leach-field/Drain-field	Unknown	Unknown	2.00	Metal			No		No		Yes		Yes	Yes	This is a rental with 2 apts
132000-7167-10-278532-0000	3353 Route 343	Havens , Lawrence J		0.44	2 Family Res (220)	Multi-Family									4	Septic Tank;Leach-field/Drain-field	700	25	0.02	Fiberglass		System drains slowly	No		Yes		Yes		Yes	Yes	
132000-7067-16-941402-0000	15 Terrace Rd	Butts , William S		0.46	2 Family Res (220)	Multi-Family									3	Septic Tank	Unknown	65	5.00	Unknown			No		No		Not Sure		Not Sure	No	Both of the listed owners - Marilyn and William - have died. I spoke to their daughter Linda Butts - 845-418-0828, who answered the survey as best she could.
132000-7067-16-948392-0000	11 Terrace Rd	Butts , William S		100 X 70	Mfg housing (270)	Single-Family									3	Septic Tank	Unknown	65		Unknown			No		No		Not Sure		Not Sure	Not sure	Listed owners have passed away. Linda Butts - 845-418-0828 - their daughter answered the survey questions to the best of her ability. The structure on this parcel is a trailer that was occupied by her brother Joseph, who is recuperating off site.
132000-7167-14-325334-0000	17 Midway Ave	Bailey Family Real Estate		0.12	1 Family Res (210)	Single-Family									3	Cesspool	Unknown	Unknown	2.00	Unknown			No		No		Yes		Yes	Yes	
132000-7167-13-060359-0000	3 Morton Pl	Bailey Family Real Estate		0.25	1 Family Res (210)	Single-Family									3	Septic Tank;Leach-field/Drain-field	Unknown	4	2.00	Concrete			No		No		Yes		Yes	Yes	
132000-7167-14-327315-0000	25 Depot Hill Rd	Bailey , Samuel		0.51	2 Family Res (220)	Multi-Family									3	Cesspool	Unknown	Unknown		Unknown			Yes	Seldom	No		Yes		Yes	Yes	
132000-7167-13-097356-0000	4857 Route 22	Bailey , Samuel		0.34	2 Family Res (220)	Multi-Family									3	Septic Tank;Leach-field/Drain-field	Unknown	2	2.00	Unknown			No		No		Yes		Yes	Yes	
132000-7167-14-250486-0000	46 Mechanic St	46 Mechanic Street LLC	Conklin's Auto Body	0.29	Auto body (433)	Business										Unknown	Unknown	Unknown		Unknown			No		Yes		Yes		Yes	Yes	Spoke to Mike Conklin - said he did NOT want to participate as he did last time and nothing came of it. Feels like a waste of time to him - system too expensive & wont happen.
132000-7067-00-980425-0000	5275 Route 44	Panichi , Emil	Welsh Carting	3.09	Auto body (433)	Business										Septic tank	2,000	25	0.25	Concrete			No		No		Yes		Yes	Yes	
132000-7167-13-152474-0000	3296 Route 343	Rossinver LLC	Post Office	50 X 65	Det row bldg (482)	Business										Septic tank	Unknown	15	0.50	Concrete			No		No		Yes		Yes	Yes	Hope this can be accomplished - greatly needed in biz district
132000-7167-13-186479-0000	3312 Route 343	Rossinver LLC	Peggy's Back in the Kitchn, Wholey Oats, Moira's ptg studio	0.19	Govt bldgs (652)	Business										Septic tank	Unknown	13	0.33	Concrete		System drains slowly	Yes	rarely - ground sometimes gets soggy from rain	Yes		Yes		Yes	Yes	Don't use ton of water - but limits # of seats in cafe.
132000-7167-00-390573-0000	3393 Route 343	Willows Inn Inc	Willows Inn	2.17	Motel (415)	Business										Septic tank;Leach-field/Drain-field	Unknown	20	1.00	Concrete			Yes	1-2 times a year when beavers stop up creek	Yes		Not Sure		Yes	Not sure	Need to talk to owner re interest, but Anthony feels needed everywhere downtown.
132000-7167-14-415315-0000	10 Lango Rd	Miles , George W		0.82	1 Family Res (210)	Single-Family									3	Septic Tank;Leach-field/Drain-field	Unknown	Unknown	don't know	Concrete			No		No		Not Sure		Not Sure	No	
132000-7167-13-065332-0000	34 Broadway	Walcott , Wilbert		0.32	1 Family Res (210)	Single-Family									3	Septic Tank;Leach-field/Drain-field	1,000	25	2.00	Concrete			Yes	anytime it rains it runs for a day	Yes		Yes		Yes	Yes	neighbor had an issue a few years ago
132000-7167-14-324453-0000	24 Wilson Eaton Rd	Wilson Eaton-Mechanic LLC		2.45	1 Family Res (210)	Single-Family									1	Septic Tank;Leach-field/Drain-field	Unknown	7	1.00	Concrete					No		Not Sure		Yes	Yes	There are two homes on this parcel. This one is an apt above a garage
132000-7167-13-124451-0000	4931-4935 Route 22	O'Neil , Patricia Louise		0.18	1 Family Res (210)	Single-Family									3	Septic Tank	Unknown	20	5.00	Unknown			No		No		Not Sure		Yes	Yes	
132000-7167-14-285340-0000	10 Depot Hill Rd	Staib , Jill Marie		0.22	1 Family Res (210)	Single-Family									3	Septic/Leach	Unknown	Unknown	2.00	Unkown	No	Odor	Yes	When the road drain floods into basement from road drain only	Yes	No	Yes	Center of Town	Yes	Yes	Would much rather have a town septic than my own septic tank
132000-7167-14-313347-0000	11 Depot Hill Rd	Graff , Melissa L		0.60	1 Family Res (210)	Single-Family									3	Septic tank	1,000	Unknown	2.00	Unkown			No			No	Not Sure			Yes	
132000-7167-14-398287-0000	11 Prospect Ave	Nowak , John		0.24	1 Family Res (210)	Single-Family									3	Septic Tank	Unknown	Unknown		Concrete	No		No		No	No	Yes	Center of Town	Yes	Not sure	Connecting depends on cost
132000-7167-13-092343-0000	14 Morton Pl	Witt , Gary E		0.46	1 Family Res (210)	Single-Family	2	3 and 1								Septic/Leach	1,000	11	5.00	Fiberglass	No		No		No	No	Not Sure		No	No	We don't want to be forced to supplement a system for a commercial district. We are content with pumping every 5 years at $300-400 per pump; which averages to about $75/year. A system will cost us multitudes more no matter what you do or how many grants you get, (9 and 10) No because people on fixed incomes with a good system will be forced to pay exorbitant fees when it's not necessary.
132000-7167-13-051284-0000	15 Broadway	Stapf , Lauren		0.46	1 Family Res (210)	Single-Family									3	Septic/Leach	Unknown	Unknown		Concrete			No		No	No	Not Sure		Not sure	Not sure	
132000-7167-00-441331-0000	17 Prospect Ave	Walsh , James Brian		4.50	1 Family Res (210)	Single-Family									4	Septic/Leach	Unknown	55	3.00	Concrete	No		No		No	No	No		Yes	No	The hamlet of Amenia needs a wastewater treatment system due to it's topography and massive aquifer system. The town cannot expand without the suggested infrastructure.
132000-7167-14-289324-0000	18 Depot Hill Rd	Couse , Brian E		0.30	1 Family Res (210)	Single-Family									3	Septic/Leach	Unknown	Unknown		Unknow	No		No		No	No	Not Sure		Not sure	Not sure	My husband and I don't know nearly enough information to say whether we would want to tap into a system. Our biggest concern is our potential cost in tappinto into a system. Would there be an initial lump sum in tapping in? Would there be ongoing billing? What amount would these come to? How might this project present a challenge to other Amenia residents with a less stable financial situation? Thank you for your work on this!
132000-7167-13-051304-0000	25 Broadway	Carder , James		0.37	1 Family Res (210)	Single-Family									2	Septic tank	Unknown	25	2.00	Concrete	No		No		No	No	Not Sure		No	No	
132000-7167-13-049314-0000	29 Broadway	Curtis , Sherrill J		0.37	1 Family Res (210)	Single-Family									3	Septic/Leach	750	Unknown	5.00	Concrete	No		No		No	No	No		Not sure	No	
132000-7167-14-333304-0000	31 Depot Hill Rd	Salladay , Tracy A		1.00	1 Family Res (210)	Single-Family									4	Old stone "tank" w/connection to a drainfield area.	Unknown	Unknown	10.00	Stone	No									Yes	
132000-7167-13-048324-0000	33 Broadway	Mirra , Corey		0.37	1 Family Res (210)	Single-Family									3	Septic/Leach	Unknown	Unknown	2.00	Concrete			No		No	No	Not Sure		Not sure	Yes	
132000-7167-09-197506-0000	3319 Route 343	Moore , Maureen		132 X 165	1 Family Res (210)	Single-Family									3	Septic/Leach	Unknown	Unknown		Unknow	No		Yes	when it rains		No	Not Sure		Depends on Cost	Depends on Cost	After Silo Ridge renovated the Presbyterian Church, they raised the ground level of the backyard. This has resulted in water collecting around our garage when it rains.
132000-7167-10-252527-0000	3343 Route 343	Cayea , Norman R		0.50	1 Family Res (210)	Single-Family									3	Septic/Leach	Unknown	Unknown	5.00	Concrete	Yes	air bubbles in toilet	Yes	Often	Yes	No	Yes	Center of Town	Yes	Yes	
132000-7167-10-289510-0000	3352 Route 343	D'aleo , Christopher		0.25	1 Family Res (210)	Single-Family									3	Septic	Unknown	10		Plastic		system drains slowly	Yes	Every Day		Yes	Yes	can smell sewage from nearby properties	Yes	Yes	
132000-7167-14-337292-0000	35 Depot Hill Rd	Taylor-Hafford , Brenda		0.40	1 Family Res (210)	Single-Family									2	Septic/Leach	Unknown	10	3.00	Plastic	No		Yes	when water table hi from exsessive rain		No	Yes		Yes	Yes	*illegible lenthy comment
132000-7167-14-363330-0000	40 Midway Ave	Knode , Jennifer Lea		0.63	1 Family Res (210)	Single-Family									4	Septic/Leach	Unknown	13	4.00	Unkown			No		No	Yes	Not Sure		Yes	Yes	I would support this at any cost. And would be very interested in connecting to it.
132000-7167-13-232471-0000	43 Mechanic St	Mangione , Anthony		0.49	1 Family Res (210)	Single-Family									4	Unknown	Unknown	Unknown		Unkown	No		Yes	Every Day	Yes	No	Yes	Corner of Mechanic St & 343	Yes	Yes	
132000-7167-14-368311-0000	48 Midway Ave	Eberhard , Jesse J		0.52	1 Family Res (210)	Single-Family									3	Septic tank	Unknown	Unknown	2.00	Concrete	Yes	Odor	No		Yes	No	Yes		Yes	Yes	
132000-7167-13-096395-0000	4887 Route 22	Dietrich , Walter		0.79	1 Family Res (210)	Single-Family										Septic tank	Unknown	Unknown		Unkown	No		Yes		No	No	Yes	Center of Town	Yes	Yes	
132000-7167-13-141426-0000	4916 Route 22	Hawken , Leila		0.30	1 Family Res (210)	Single-Family									3	Septic/Leach	Unknown	50	7.00	Concrete	No		No		No	No	Yes	down 343 hill	Yes	Yes	There are rumors of problems down the 343 hill, due to swampy conditions-seasonable high water table.....What comes to mind first is the cost, of course. This is the time to do the engineering studies for the project, and to get government grants lined up. No commercial center can develop properly without a wastewater system. Gravity flow is less costly than engineered pumping uphill to the treatment plant. Wonderful advances have been made to such plants, reducing their size and visibility. Congratulations on moving ahead with planning and eventual implementation!
132000-7167-13-145461-0000	4942 Route 22	Jenkins , Harry J Jr		0.33	1 Family Res (210)	Single-Family									3	Septic tank	Unknown	70	4.00		No		No		No	No	Yes	Center of Town	Yes	Yes	
132000-7167-09-203582-0000	5002 Route 22	Sinclair , Marnie		0.60	1 Family Res (210)	Single-Family									4	Septic tank	Unknown	Unknown	3.00	Plastic			Yes	Every Day	Yes		Yes	Cumberland Farms	Yes	Yes	
132000-7167-09-190608-0000	5005 Route 22	Rivara , Diane L		0.56	1 Family Res (210)	Single-Family									4	Unknown	1,000	Unknown		Concrete	No		No			No	Not Sure		Not sure	Yes	
132000-7167-14-364257-0000	51 Depot Hill Rd	Thompson , Philip B		0.76	1 Family Res (210)	Single-Family									3	Septic/Leach	Unknown	Unknown	10.00	Concrete	No		No		No	No	Not Sure		Yes	Yes	
132000-7167-13-071468-0000	5309 Route 44	Pilus , Linda B		1.10	1 Family Res (210)	Single-Family									2	Septic tank	1,000	9		Concrete	No		No		No	No	Yes	East and West of 5309 Rte 44	Yes	Not sure	There is an odor reeking from neighbor just west and if wind/breeze is east/west passes sewage odor from east...How much would it cost me. i spent big bucks to replae my tank 9 years ago. As a pensioner, I would need financial support to participate. i hope it would be an optional to join system unlike town.
132000-7167-14-342251-0000	54 Depot Hill Rd	Intrieri , Deanna J		0.52	1 Family Res (210)	Single-Family									4	Septic Leach-field	1,000	Unknown	2.50	Plastic	No		No		No	No	Yes	see additional comments	Not sure	Not sure	Herbert Johnson, 58 Depot Hill Rd knows he has an issue w/septic. Nothing has been done about the fields. Wish he would get it fixed. I and my neighbors are tired of smelling it! More so in the summer.
132000-7167-13-030372-0000	55 Broadway	Doyle , Larry C		0.60	1 Family Res (210)	Single-Family									2	Septic tank	1,000	Unknown		Concrete	No		Yes	Seldom	No	No	Not sure		Not sure	No	There are only about 140 people in the wastewater district. That is too few to support the system without a high cost per household. The sewer district includes the ceenter of town where ithere isn't room for a lot of businesses. The selling point I have heard as it would benefit the whole town. If that's the case the whole town should pay for it! I am against this!
132000-7167-00-466326-0000	21 Prospect Ave	Robert , Anthony		0.88	1 Family Res (210)	Single-Family									3	Septic tank	1,000	30	3.00	Concrete	No		Yes	Seldom	No	No	Yes	Center of Town	Yes	NA	I think we all would benefit from a wastewater system even if not in the district.

Town of Amenia
Sewer Feasibility Study
Wastewater Survey Response Summary Table

Parcel Number	Parcel Address	Owner Name (primary)	Buisness(es) located here	Lot Size	Land Use	Type Group	If Multi-Family/Apartment : How many units?	In Multi-Family apartments: How many bedrooms for each apartment? Please fill in information for all apartments in the building.	If Non Residential: Church, How many seats?	If Non Residential: Office or Retail, How many employees?	If Non Residential: Motel, Hotel, Inn, How many rooms?	If Non Residential: Service Station or convenience store, How many toilets?	If Non Residential: Restaurant, How many seats?	If Non Residential: vacant lot?	If Single family, How many bedrooms? (Helps estimate flow)	What type of wastewater system do you have (Choose all that apply)?	What is the capacity of your system?	How old is your system?	How often do you pump it out? (Every____years?)	What is your septic tank made of?	Do you have a problem with your system?	If you are having problems check all that apply:	Do you have a sump pump in your basement?	If you answered yes to the above question, how often does your sump pump run?	Do you experience issues with flooding?	Has the use of your property, or the functionexpansioncapability of your business been impacted by septic limitations?	Do you think there are septic disposal problems somewhere in the Town?	If you answered yes to the above question, where?	Do you think the hamlet would benefit from a community wastewater collection and treatment system?	Would you be interested in connecting to a municipal wastewater system if your propertybusiness is located in the hamlet?	Additional Comments:
132000-7167-00-470350-0000	23 Prospect Ave	Robert , Anthony		0.92	1 Family Res (210)	Single-Family									2	Septic tank	1,000	30	3.00	Concrete	No		Yes	Seldom	No	No	Yes	Center of Town	Yes	NA	I think we all would benefit from a wastewater system even if not in the district.
132000-7167-17-210182-0000	41 Powder House Rd	Russell , John S		1.00	1 Family Res (210)	Single-Family									4	Cesspool	Unknown	Unknown		Concrete	No		No		No	Yes	Not Sure		Yes	Yes	SEE ATTACHED WRITTEN LETTER I'm accompanying this letter to your survey to emphasize that if you were to gauge our interest in a community wastewater system for the town on a scale of 1-10, we're at an 11. My wife and I moved to this area last year, and we agree with the consensus that a municipal sewage treatment system is a prerequisite to meaningful growth and economic sustainability. It would benefit us personally as well as collectively. Looking forward to seeing this develop.
32000-7167-13-114476-0000	5327 Route 44	Dutchess Living Spaces LLC		0.04	1 Family Res (210)	Single-Family	2	1								Septic/Leach	Unknown	Unknown		Unkown			No		No	No	Not Sure		Yes	Yes	
132000-7167-17-228192-0000	49 Powder House Rd	Voigt , Erik		1.01	2 Family Res (220)	Single-Family									5	Septic/Leach	Unknown	Unknown		unknown	No				No						
132000-7167-13-200483-0000	3316 Route 343	Apple Antiques Ltd ,		0.33	Det row bldg (482)	Business				1			1			Septic, leach/drain??	Unknown	Unknown	2.00		No										
132000-7167-17-057238-0000	4789 Route 22	Jetson Properties LLC	Fudgy's Multiple Stores	0.46	Det row bldg (482)	Business	5	1							5	Septic/Leach	Unknown	Unknown	3.00	Concrete	No		No		No	No	No		Yes	Not sure	
132000-7167-09-141511-0000	4963 Route 22	4963B Route 22 Property LLC	Riemer Architecture/R Riemer Real Estate/Barnes Insurance	0.47	Mult-use bld (480)	Business										Septic/Leach	1,200	30	5.00	Concrete	No		No		Yes	Yes	Yes	Behind Post Office	Yes	Yes	I would be interested in adding another building to y property (retial/commercial) with 1-2 bedroom apartment above on second floor. I would like to see more apartments (1-2 bedrooms) in some of the larger residences on Main Sreet. not welfare, but for use by people who have jobs locally and pay their rent to owners can maintain their buildings from the revenue generated.
132000-7167-14-338392-0000	18 Stagecoach Ln	Spano , Elizabeth A		4.30	Multiple res (281)	Multi-Family	4	6,3,3,2 total14							10	Septic/Leach	Unknown	20	1.00	Concrete	No		No		No	No	Yes	Business district	Yes	No	We are not along the proposed routes. Our economic development has been severely hampered by the lack of a sewer system. We are bing left behid as other business districts in Dutchess County are flourishing. This is essential to Amenia to be a thriving and prosperous place to live.
132000-7167-00-268641-0000	5026 Route 22	Thompson , Jerry L		8.30	Multiple res (281)	Multi-Family										Septic tank	1,000	40	3.00	Concrete	No		No		No	No	Not Sure		No	No	House is ca. 500 feet from roadway.
132000-7167-14-288416-0000	18-20 Mechanic St	Mechanic Street Inc	Judge Manning	3.52	Truck termnl (447)	Business							2			Leach-field	Unknown	20		unknown			No		No	No	Yes		Yes	Yes	
132000-7167-14-416297-0000	13 Prospect Ave	Langlands , Bryan A M		0.90	1 Family Res (210)	Single-Family									4	Septic	Unknown	20	10.00				Yes	Rarely	Yes	Yes	Not Sure		Yes	Yes	
132000-7165-01-087807-0000	3 Main Street	Wassaic Commons				Business				6						Septic/Leach	450	0	3	plastic	No		No		no	yes	Yes	There are a lot of undersized, undermaintained, and illegal systems in town due to the enormous complexity and expense of installing new systems. The technology exits, but Dutchess Health will not approve.	yes	yes	This is an existential issue for the survival of our hamlet. If we do not have an easier path to safe, legal, affordable water and wastewater systems, homes and businesses cannot adapt or grow. They will be abandoned and the town will die.
132000-7167-00-529390-0000	35 Prospect Ave	Maria				Single-Family									4	Septic tank		1	3	plastic	No										
135200-6868-00-821263-0000	689 Bangall Amenia Rd	Andrew, Holly				Single-Family									5	Septic/Leach	Unknow	2		unknown			didn't fill out 2nd page								
132000-7167-00-201952-0000	60 Cascade Road	Kenneth & Ashley				Single-Family									2	Septic tank	1,200	6	3	concrete											
132000-7267-00-294624-0000	501 Leedsville Rd	John				Single-Family									3	Septic tank	Unknow	6		concrete	No		Yes	?	no	no	Yes	throughout	yes	not in Hamlet	
13200-7166-03-158074-0000	330 Old Rte. 22	Robert J.				Single-Family										Septic tank	1,000	7		concrete			No		no	no	Yes	areas around Main St	not sure	no	For the amount of businesses and residencial properties that would benefit I'm not sure it would be worth the cost.
132000-7165-01-094844-0000	10 Main Street	Wassaic Lantern Inn				Business	5									WWTP parallel	3,000	7	0.5	concrete	Yes	costly	Yes	not sure	yes	yes	Yes	Up and down the stream	yes	yes	
132000-7167-00-350905-0000	39 Old North Road					Single-Family									4	Septic tank	1,200	9	5	unknown	Yes	odor	Yes	rarely	no	(not sure)	Yes	word of mouth	yes	yes	Thanks for reaching out
132000-7165-01-101774-0000	203 Old Route 22	Wassaic Project				Multi-Family	2	3 and 4								Septic tank	Unknow	10	3	concrete	No		Yes	In spring, often	yes	yes	Yes	Up and down Old Rt 22 in the hamlet	yes	yes	
132000-1765-01-108728-0000	185 Old Roteu 22	Thomas				Single-Family									3	Septic/Leach	Unknow	10		plastic	No		No		no	no	not sure		not sure	no	I moved to this house in January of 2020 and I've been the only person living in the house most of the time since then I'm still learning about the house and property. Fortunately I'm able to communicate with the previous owners.
132000-7165-01-054910-0000	9 and 5 Old Cross Road	Lauren/Adam				Single-Family									2	Septic/Leach	1,200	15	3	concrete	No		Yes	Not often it is there just in case of bad flooding	yes	no	yes	In Wassaic, w/houses and busineses close to the river.	yes	not sure	
132000-7267--00-512214-0000	318 Leedsville Rd	Harold				Single-Family										Septic tank	1,000	16	5	plastic	No		Yes	heavy rain	no	no	yes	Main Street	yes		
135200-6769-00-315117-0000	80 Depot Hill Rd	Aloysius/Margherite				Single-Family									3	Septic tank	1,250	17	3	concrete	No		No		no	no	yes	Downtown area	yes		This ha been a problem in downtown area. We lived on Rt 22. Never had a problem. Main Street area from traffic light east to just past old Brooks? etc. always a problem with stream and high water table. Long overdue to pet it done.
13200-7165-01-102895-0000	26 Firehouse Road	Frederick & Linda				Single-Family									5	Septic tank	750	20	5	plastic	No		Yes		yes	no	not sure		yes	not sure	Wassaic needs flood mitigation measures. That may not be "waste water" but it is an issue.
132000-7265-00-427698-0000	240 Clark Hill Rd	Suzanne				Single-Family									1	Septic/Leach	1200/250'	20	5	concrete	No		reverse not filled out								
132000-7065-00-544366-0000	118 Kennel Rd, Wassaic	Thomas				Single-Family									5	Septic tank	2,500	20	5	concrete			No		no	no	not sure		yes	no	
132000-7166-03-159025-0000	312 Old Route 22	Alejandro				Single-Family									4	Septic/Leach	Unknow	20	2	unknown	Yes	odor, sewage in basement, system drains slowly	No		no	not sure	not sure		yes	yes	Please rush!
132000-7168-00-215120-0000	25 Folan Road	Moria/Ann				Single-Family									2	Septic tank	Unknow	22	Never	metal					no	no	yes	downtown	yes	no	Amenia downtown desperately needs a wastewater sysem for apartments, restaurants and shops.
132000-6968-00-841194-0000	169 Separate Rd	James and Eileen				Single-Family									3	Septic tank	Unknow	26	2	concrete	No		No		no	no	yes	Downtown	yes		
132000-7167-00-552660-0000	3469 Rte 343	Gerald				Single-Family									3	Septic/Seepage	1,000	27	3	concrete	No		No		no	no	not sure		yes		Cost and maintenance seems prohibitive for the potential reward. $$$$$???
132000-7265-00-265787-0000	140 Clark Hill Road	Dorothy				Single-Family									3	Septic, leach/drain		29	0	concrete	No		No		no	no	not sure		not sure	no	
132000-7264-00-355515-0000	387 Bog Hollow Rd, Wassaic	Gaye				Single-Family									2	Septic/Leach	1,000	30	5	concrete & plastic	No		No		no	no	not sure		yes	no	I hope the town and county would consider alternative systems for waste removal such as - Clivus Multrum Ind - for trail head locations - i.e. railtrail. Also grey water sysems so that we don't use potable water to care for lawns and gardens.
132000-7165-00-907210-0000	32 Bog Hollow Rd	James and Lindsay				Single-Family									3	Septic/Leach	1,000	30	2-3	concrete	No		Yes	once in while	no	no	yes	Apartments on Sinpatch			I feel there needs to be adjustments to the tax base for those on or off such a system if it should go forward. Why as a homeowner at the very edges of Town would we have to pay for the water/sewage system that on ly serves a relative few. Let's fact it such service would never be extended to Bog Hollow Road and we don't want to pay for it! As for placement - why not use the old garbage dump on Route 22 just south of the village?
132000-7168-00-205012-0000	84 Cascade Road	David/Diane				Single-Family									3	Septic/Leach	1,000	30	5	concrete	No		No		no	no	no		not sure	no	
132000-7165-01-094853-0000	16 Main Street. Wassaic	Brian				Single-Family									2	Septic/Leach	1000/250'	30	5	concrete	No		reverse not filled out								
132000-7167-00-764315-0000	38 Yellow City Road					Single-Family									3	Septic tank	Unknow	30	3	unknown	No		No		no	no	not sure		yes	no	Needs doing but not relevant to us here.
	724 Bangall Amenia Rd	Carolyn				Single-Family									6	Septic tank	Unknow	30	1	unknown	No		No		no	no	yes	Silo Ridge	yes	no	Why is the sign for Monte's still up? The restaurant closed years ago!
132000-7265-00-188792-0000	102 Clark Hill Road	David				Single-Family									3	Septic/Leach	Unknow	30	4	concrete	No		No		no	no	yes	Wassaic Hamlet	yes	n/a	
132000-7068-00-310623-0000	23 Flint Hill Rd	Maxine				Single-Family									3	Septic/Leach		30	5	concrete	No		No		no	no	not sure		yes	no	
132000-7267-00-202419-0000	28 Troutbeck Crescent	Calvin/Diane				Single-Family									3	Septic/Leach	Unknow	31	5	unknown	No		Yes	almost never	yes	no	yes	Probably in the center of town	yes	no	
132000-7167-18-278232-0000	73 Powder House Road	Kevin				Single-Family									3	Septic/leach	Unknow	35	7	concrete	No		No		no	no	yes	Downtown	Yes	yes	Thank you
132000-7167-00-268641-0000	5026 Rte 22	Jerry/Marcia				Single-Family										Septic tank	1,000	40	3	concrete	No		No		no	no	not sure		no	no	House is ca. 500 feet from roadway.
132000-7165-00-236227-0000	3951 Rte 22	Mike and Marcella				Single-Family									2	Septic	Unknow	40	5	concrete	No		No		no	no	not sure		not sure	no	
132000-7165-01-020900-0000	23 Furnace Bank Rd	Wassaic Project				Single-Family									5	Septic tank	Unknow	42	1	concrete	No		No		no	no	yes	near streams	yes	yes	
132000-7266-00-380986-0000	223 Leedsville Rd	Craig and Valerie				Single-Family									3	Septic/Leach	Unknow	46	4	concrete	No		No		no	no	not sure		no	no	Don't want to pay for something I won't have an opportunity to use
132000-7167-00-767434-0000	39 Yellow City Road	John R. and Cynthia				Single-Family									3	Septic/Leach	1,000	47	3	concrete	No		No		no	no	yes	Main St. (Rte 343)	no	no	Let the owners of the buildings fix their septic problems!
132000-7167-18-370241-0000	57 Depot Hill Road	Francis X.				Single-Family									3	Septic tank	1,000	49	5	concrete	No		No		no	no	yes	Across the street from me odor is present in the summer. Built as a single family house, you guess is as good as mine how many families live there legally?	yes	yes	
132000-7167-17-044165-0000	13 Lower Powder House	Neil				Single-Family									2	Septic Tank/Cesspool	500	50	5	concrete	No		No		no	no	yes	Downtown	yes	not sure	
132000-7166-00-196343-0000	432 Old Route 22	Albert				Single-Family									2	Septic tank	1,000	50	8	concrete	No		No		no	no	yes	East Main Street	yes	no	
13200-7265-00-130235-0000	117 Bog Hollow Rd,Wassaic	Michael and Julie				Single-Family									2	Septic/Leach		50	5	concrete	No		Yes	3 times a year for several days	yes	no	yes	Village needs WW for business	yes	N/A	Would love to see more businesses be able to do business in Amenia and the village prosper as we think it would from a municipal WW system.
132000-7168-00-280040-0000	56 Folan Rd	Betty				Single-Family									4			50	5	unknown	No		No		no	no	yes	East of traffic light at Rte 22 and Rte 44/343	yes		Yes, a system only if paid by all landowners in town not just those impacted by wastewater system or who have problems as described above.
132000-7166-00-180207-0000	378 Old Rte 22, Wassaic	Richard and Patricia				Single-Family									3	Septic/Leach	1,000	53	2-3	concrete	No		No		no	no	not sure		not sure	no	Raised a large family with no problems with our septic

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Parcel Number	Parcel Address	Owner Name (primary)	Buisness(es) located here	Lot Size	Land Use	Type Group	If Multi-Family/Apartment : How many units?	In Multi-Family apartments: How many bedrooms for each apartment? Please fill in information for all apartments in the building.	If Non Residential: Church, How many seats?	If Non Residential: Office or Retail, How many employees?	If Non Residential: Motel, Hotel, Inn, How many rooms?	If Non Residential: Service Station or convenience store, How many toilets?	If Non Residential: Restaurant, How many seats?	If Non Residential: vacant lot?	If Single family, How many bedrooms? (Helps estimate flow)	What type of wastewater system do you have (Choose all that apply)?	What is the capacity of your system?	How old is your system?	How often do you pump it out? (Every____years?)	What is your septic tank made of?	Do you have a problem with your system?	If you are having problems check all that apply:	Do you have a sump pump in your basement?	If you answered yes to the above question, how often does your sump pump run?	Do you experience issues with flooding?	Has the use of your property, or the function/expansion/capability of your business been impacted by septic limitations?	Do you think there are septic disposal problems somewhere in the Town?	If you answered yes to the above question, where?	Do you think the hamlet would benefit from a community wastewater collection and treatment system?	Would you be interested in connecting to a municipal wastewater system if your property/business is located in the hamlet?	Additional Comments:
132000-7165-00-209209-0000	3945 Rt 22, Wassaic	Susan and Terry				Single-Family									2	Septic/Leach		58	Never	concrete	No		No		no	no	yes	Main St	no	no	
132000-7168-00-245635-0000	255 Perrys Corners Rd	Emily				Single-Family									2	Cesspool		60	10	concrete	No		No		no	no	not sure		yes	yes	
132000-7267-00-363540-0000	453 Leedsville Road	Susan				Single-Family									1 person	Septic tank	Unknow	60	3	unknown	No		No		no/water flows through basement to spot under porch	no	no		no	no	We pay for our septic system and cleanout. The people in the hamlet need to take care of their own issues.
132000-7167-00-372904-0000	58 Old North Road	Thomas/Peter				Single-Family									2	Cesspool		65	?	concrete			Yes	2/yearly	once in 16 years				yes	not sure	
132000-7167-00-553415-0000	40 Prospect Ave	Michael & Angela				Single-Family									3	Septic tank	Unknow	52	1	concrete	Yes	sewage surfaces on lawn	No		no	no	not sure		yes	yes	But concerned about the cost to connect to the municipal system.
132000-7167-00-576314-0000	6 Flood Drive	Jennifer				Single-Family									3	Septic/Leach	Unknow	48	3-4	concrete	No		No		no	n/a	not sure		no	no	
132000-7168-00-340170-0000	61 Perrys Corners Road	Stacy				Single-Family									3	Septic, Leach-field/Drain-field		37	4	Concrete	No		Yes	after a rain can be constant for several days. After large snow melt can be constantly active for several days.	No	Yes	Yes	On various days, while out for a walk or going to stores, I have detected foul odors along Rte 343 between Post Office and Cumberland Farms.	Yes		
132000-7165-00-759663-0000	234 S. Amenia Rd.	Doris				Single-Family									3	Septic tank	1,000	24	4	concrete	No		Yes	When there is a heavy rain for several days	no bc "B-Dry" system	not sure	not sure		yes	no	I think the "Town proper" has a problem (businesses) I'm outside of main town.
132000-7268-00-099630-0000	382 Sharon Station Rd	Anne				Single-Family										Septic tank	3,500	16	Never	concrete	Yes	odor, backs up	reverse not filled out								
132000-7167-00-679504-0000	19 Yellow City Road	Jonathan/Minnea				Single-Family									3	Septic/Leach	1,000	Unknow	2	concrete	No		No		no	no	not sure		not sure	not sure	New to home ownership and the town, live in home 1 year.
132000-7167-00-380965-0000	78 Old North Road	Tom				Single-Family										Cesspool	Unknow	Unknow			No									I'm trying to have a new septic installed. I'm told there's a problem getting tanks.
132000-7165-03-308467-0000	4 Steelworks Circle	Wray Gray LLC				Single-Family									2	Septic tank	Unknow	Unknow	5	unknown	No		Yes	in spring frequently	y	not sure	yes		yes	yes	
132000-7165-01-085850-0000	14 Main Street, Wassaic	Jeff				Single-Family									3	Septic tank	Unknow	Unknow	1-4 years	unknown	Yes	Way too small. Lot is also too small for well separation.	No		no	yes	yes	up and down stream	yes	yes	
132000-7167-17-143230-0000	4 Railroad Avenue	Jessica				Single-Family									3	Septic tank	Unknow	Unknow	?	unknown	No		No		yes	not sure	not sure		not sure	not sure	
132000-7165-01-001902-0000	19&15 Furnace Bank Rd	Wassaic Project				Single-Family									1 & 5	Septic tank	Unknow	Unknow	1	unknown	No		No		no	not sure	yes	Near the streams in Wassaic	yes	yes	
132000-7167-18-256213-0000	61 Powder House Rd	Jennifer				Single-Family										Septic tank	Unknow	Unknow	5	unknown	No		No		no	no	not sure		yes	yes	
132000-7067-00-940420-0000	5267 Route44	Margaret/Pamela				Single-Family									2	Septic/Leach	Unknow	Unknow	5	concrete	No		Yes	?	no	no	not sure		not sure	no	
132000-7165-03-320487-0000	62 Old Route 22	Marsha				Single-Family									2	Septic/Leach	Unknow	Unknow	3	concrete			No		no	no	not sure		yes		
132000-7166-00-160257-0000	399 Old Route 22	Leon & Colleen				Single-Family									3	Septic/Leach	Unknow	Unknow	2	concrete	No		No		no	no	not sure		no	no	Not enough people/properties to justify the cost. Property owners in Amenia and Wassaic should repair and/or maintain their wells and septic systems.
132000-7166-00-365912-0000	200 Depot Hill Rd	Charlotte				Single-Family									4	Septic/Leach	Unknow	Unknow		unknown	No		No		no	no	yes	Downtown-Main St. and Mechanic	yes	no	
132000-7068-00-488579-0000	96 Flint hill Road	James and Elizabeth				Multi-Family		no answer							5	Septic/Leach	Unknow	Unknow	4	concrete	No		No		no	no	yes	Septic odor E. of traffic light on 343 often very noticable in summer especially.	yes	not in hamlet	A functioning modern wastewater system would benefit town residences and businesses and also greatly contribute to the health of the tem mile river inthe town and to the watershed down river. Silo Ridge included asstance with a septic solution in the early presentation of their development proposal to the town board. Solution of this situation is crucial, in the present era of recurrent flooding, an historic and ongoing problem.
132000-7165-01-103969-0000	287 Old Rte 22	Mark/Alison				Single-Family									2	Septic, seepage pit	1,000	Unknow		Concrete	No		Yes	almost never	no	no	not sure*		yes	yes	
132000-7166-00-106805-0000	610 Old Route 22	Nina				Single-Family									3	Septic, Leach-field/Drain-field	1,000	15	5	Unknown	No		Yes	manual pump during periods of high water table	Yes	No	Not Sure		Yes		We strongly support the installation of a community wastewater collection and treatment system as vital component of business and economic development in downtown Amenia.
132000-7168-00-965455-0000	245 Sharon Station Road	John				Single-Family									5	Septic		1	8	Concrete	No		Yes	hard rain	No	No	Not Sure		Yes		I strongly support a community wastewater collection and treatment system.
132000-7164-00571821-0000	303 Sinpatch Rd	Richard A				Single-Family									2	Septic, Leach-field/Drain-field	1,250	10	Never	Concrete	No		No		No	No	Not Sure		Not sure		
132000-7168-00-525145-0000	5174 RT 22	Paul				Single-Family									3	Leach-field/Drain-field		100	5	Unknown	Maybe	Sewage in basement			Yes	No	Yes	Downtown	Yes		
132000-7064-02-648772-0000	3661 RT 22 Wassaic	Sam and Wendy				Single-Family									3	Septic		12	2	Concrete	No		No		No	No	No		yes	yes	It would create jobs. So good no matter what.
132000-7265-00-195060-0000	182 Bog Hollow Road	Joshua&Melissa				Single-Family									3	Septic tank	Unknow	14	2	unknown	No		No		no	no	not sure		not sure	not sure	
132000-7165-00-022968-0000	4820 Route 22	Wassaic Project				Business				15						Septic tank	Unknow	1950s?	1	concrete	No		No		yes	yes	yes	near streams	yes	yes	
132000-7165-00-391539-0000	36 Benson Rd, Wassaic	Kim E.				Single-Family									2	Septic Leach-field	1000 gallons/6000	2	2	Concrete	No		No		No	No	Yes	village area	Yes	no	
132000-7267-00-330520-0000	441 LEEDSVILLE ROAD	M S				Single-Family									3	Septic		20	4	Concrete	No		Yes	ONCE IN 20 YEARS	No	No	No		Yes		
132000-7066-00-150354-0000	462 Deep Hollow Rd, Wassaic	Gladys				Single-Family									4	Septic, Leach-field		20			No		No		No				Yes	No	
132000-7165-01-051895-0000	7 Old Cross Road	Nancy				Single-Family									3	Septic/Leach	Unknow	25	never	unknown	No		reverse not filled out								
	405 Sharon Station Rd	Edwin				Single-Family									4	Septic tank	Unknow	20	3	concrete					no		not sure				We are too far away from the center of Amenia to benefit from a municipal wastewatersystem, but we appreciate and support the initiative.
132000-7267-00-335715-0000	20 Randalls Rd	Mary and Kevin				Single-Family									3	Septic		22	3 - 5	Concrete	No		No		Sometimes	No	Yes	Downtown	Yes	no	Lack of a system effects business growth
132000-7167-00-150965-0000	65 Cascade Rd	Catherine				Multi-Family	2	2,3								Septic		23	every 2	Concrete	Maybe	not sure leach fields work since I need to pump every 2 years	No		No		Not Sure		Yes	Yes	
132000-7266-00-340380-0000	189 Amenia Union Rd	Michael				Single-Family									4	Septic		25	every 5		No		No		No		Yes	Downtown	Yes	N/A	
132000-7165-01-280500-0000	74 Old Route 22	Leo				Single-Family									4	Septic, Leach-field/Drain-field, Holding tank	2,500	3	new - haven't pumped yet	Concrete	No		No		No	No	Yes	the business district, Broadway	Yes		We MUST make this happen in the center of Amenia!!!
132000-7266-00-531549-0000	339 Amenia Union Rd., Wassaic 12592	James				Single-Family									4	Septic, Leach-field/Drain-field	1,000	50	3	Concrete	Maybe	System drains slowly	Yes	Only during very heavy rains	Yes	No	Yes	Throughout the hamlets of Amenia and Wassaic	Yes		
132000-7165-00-857842-0000	320 S. Amenia Rd.	Mark				Single-Family									2	Cesspool	1,000	50	10	Concrete	No		No		No	No	Yes	Centers of Wassaic and Amenia	Yes		From a purely selfish point of view, I think that the development of wastewater systems in the hamlet centers of Wassaic and Amenia will increase the value of my house and improve the quality of my family's life. This will be the result of the rapid growth of businesses and services in town, along with the revival of residential foot-traffic due to the ability to build more densely and include much needed housing with the commercial development. Instead of driving to another town, we'd be glad to spend time and money in our own. For this reason I would be prepared to pay, essentially invest in, a property tax increase to support the development of these systems.
132000-7165-00-312622-0000	23 Benson Road	Jeff				Single-Family									4	Septic tank	Unknow	50	4	concrete	No		No		no	no	yes	Wassaic hamlet center	yes	no	We are too far up a hill to make financial sense.
132000-70640-263575-00000	3655 Route 22 Wassaic, NY 12592	Wanda E				Single-Family									2	Septic	750	67	5	Concrete	No		No		No	No	Not Sure		Yes		
132000-7167-00-530417-0000	39 Prospect Avenue	M.				Single-Family									4	Leach/Cesspool		86	10	unknown	No		No		yes	no	yes	Downtown areas/Freshtown Plaza	yes	not sure	A big need in the area is for a public laundromat. It would bring people from surrounding towns who would likely patronize other businesses and would help landlords who don't have the septic capacity for tenants to do laundry. A community wastewater system would make this a viable option inthe downton area or shopping plaza. This is part of the low income housing problem in our area. Answers to this survey may be affected by some residents concerns that it would raise taxes for everyone. i was disappointed there was not a question to address the fear of additional tax burden.
32000-7165-00-960205-0000	52 Bog Hollow Road	Charlie				Single-Family									3	Septic, Leach-field/Drain-field	Unknow	8	3	Concrete	No		No		No	Yes	Yes	Wassaic hamlet	Yes		The hamlet is unable to accommodate new businesses because of waster water limitations.
132000-7167-13-207285-0000	38 Railroad Avenue	Michael/Celia				Single-Family									3	Septic tank	1,000	Unknow	3	concrete	Yes	odor	Yes	24/7	no	yes	not sure		yes	yes	
132000-7167-14-36427-0000	51 Depot Hill Road	Christine				Single-Family									3	Septic/Leach	Unknow	Unknow	10	concrete	No		No		no	not sure	not sure		yes	yes	
132000-7165-01-130965-0000	288 Old Route 22, Wassaic, NY 12592	Katherine				Single-Family									5	Septic	1,000	Unknow	3	Plastic	No		No			No	Yes	Near the creek in Wassaic. Also in the heart of Amenia, where most of the businesses are clustered	Yes		
132000-7167-14-269344-0000	68 Railroad Ave					Single-Family									3	Septic tank	1,000	20	1	concrete	No		No		no	no		Town itself flows into river into pond maybe Silo Ridge, too.	yes	not sure	
132000-7266-00-394934-0000	208 Leedsville Road	Herb and Susan				Single-Family									2			Unknow													
132000-7264-00-308927-0000	245 Bog Hollow Rd., Wassaic NY 12592	Jessica				Single-Family									3	Septic	Unknow	Unknow		Metal	No		No		No	Yes	Not Sure		Yes		
132000-7264-00-260860-0000	271 Bog Hollow Rd.	Jim & Miriam				Single-Family									3	Septic tank	Unknow	46	7	concrete			No		only heavy rain						

Town of Amenia
Sewer Feasibility Study
Wastewater Survey Response Summary Table

Parcel Number	Parcel Address	Owner Name (primary)	Buisness(es) located here	Lot Size	Land Use	Type Group	If Multi-Family/Apartment: How many units?	In Multi-Family apartments: How many bedrooms for each apartment? Please fill in information for all apartments in the building.	If Non Residential: Church, How many seats?	If Non Residential: Office or Retail, How many employees?	If Non Residential: Motel, Hotel, Inn, How many rooms?	If Non Residential: Service Station or convenience store, How many toilets?	If Non Residential: Restaurant, How many seats?	If Non Residential: vacant lot?	If Single family, How many bedrooms? (Helps estimate flow)	What type of wastewater system do you have (Choose all that apply)?	What is the capacity of your system?	How old is your system?	How often do you pump it out? (Every____years?)	What is your septic tank made of?	Do you have a problem with your system?	If you are having problems check all that apply:	Do you have a sump pump in your basement?	If you answered yes to the above question, how often does your sump pump run?	Do you experience issues with flooding?	Has the use of your property, or the functionexpansioncapability of your business been impacted by septic limitations?	Do you think there are septic disposal problems somewhere in the Town?	If you answered yes to the above question, where?	Do you think the hamlet would benefit from a community wastewater collection and treatment system?	Would you be interested in connecting to a municipal wastewater system if your propertybusiness is located in the hamlet?	Additional Comments:
132000-7165-00-857842-0000	320 S. Amenia Road, Wassaic, NY 12592	Victoria				Single-Family									3	Leach-field/Drain-field, Cesspool	1,000	Unknow	10	Unknown	No		No		No	No	Yes	E Main Street in Amenia and Wassaic Main Street. Businesses and high density affordable housing units, particularly ADUs) are limited until the downtowns have additional sewer capacity.	Yes		Downtown Amenia is the highest priority for municipal sewer system.
132000-7165-01-113899-0000	30 Firehouse Road	Terrence & Rita				Single-Family									3	Cesspool	Unknow	Unknow	1-2				Yes	depends on rain	yes		not sure	Many have cesspools here. Could pose a problem.	yes	yes	This project could be quite beneficial to the halmet/town. Would also like to understand what happened with Silo Ridge's commitment to providing wastewater treatment plant for Amenia & Wassaic.
132000-7268-0028038-00000	PO Box 469	Hounds Pond Farm				Single-Family									3	Septic	Unknow	Unknow	5	Unknown	No		No		No	Not sure	Not Sure		Yes		
132000-7168-00-410305-0000	112 Perrys Corners Rd	Andrew				Multi-Family	2	3, 1								Septic	1,250	Unknow	3	Concrete	No		No		No	No	Not Sure		Maybe		
132000-7266-00-554602-0000	36 Leedsville Rd.	Laurie/Nicholas				Single-Family									4	Cess/leach/drain	Unknow	very old	2.5	metal w/wood frame			Yes		yes	no	yes	Town Center	yes	no	We are as far away from the town center as it is possible to be and, though we support creation of such a system and would be more than willing to help funt it with our tax dollars, it is not an efficient use of resources to bring it to our location.
132000-7068-00-244272-0000	378 Smithfield Valley Rd	Allen				Single-Family									8	Septic tank	Unknow	very old	? Haven't yet	unknown	No		Yes	rarely. Only when I plug it in	yes	no	not sure		yes	no	
132000-7165-01-104763-0000	199 Old Route 22	Jessica				Single-Family									4	don't know	Unknow			unknown					no	no	not sure			not sure	
132000-7164-00-490780-0000	282 Sinpatch Road	Nancy				Single-Family										Septic tank	Unknow		2	unknown	No		Yes	after heavy rain	no	yes	not sure		not sure	not sure	
132000-7064-02-605695-0000	3631 Rte. 22	Maryanne and Cindy				Single-Family									2	don't know			10	concrete			reverse not filled out								
132000-7168-00-250165-000	37 Folan Road	Amy				Single-Family									1	Leach-field/Drain-field				Unknown	No		No		No	Yes	Yes	Downtown/ Main Street Area	Not sure		
132000-7168-00-465115-0000	5158 RT 22	Isaura				Single-Family									3	Septic			4		No		No		No	No	Not sure		Not sure	Not sure	
132000-7167-00-170994-0000	79 Cascade Rd	William G				Single-Family									4	Septic, leach field			not in 26 years		No		No		no	no	yes	center of town	yes	not sure	
132000-7167-17-139202-0000	3 Powder House Road	Joseph				Single-Family									3	Septic/Leach				concrete	No		No		no	no	no			no	Would be too expensive to connect to. If there was no charge to hook up from house to main sewer pipe I would do it.
132000-7067-00-611263-0000	4965 Rt 44	Amy				Single-Family									4	Septic/Leach/cess pool			7		No		No		no	no/but it certainly limits our town a great deal	Not sure		yes	Not sure/too far up Delavergne	I thought the whole point of allowing Silo Ridge to build...was so they would put in a wastewater plant large enough for the entire town. What was in it for the town to give them everything they wanted? Hope we got something out of it.
132000-7167-00-186672-0000	Rte 22 Flag lot					Vacant								Yes	0										yes	yes			yes	Unimproved land. Would benefit from access to a munipal system.
132000-7267-00-343654-0000	496 Leedsville Rd	Dan				Single-Family									4						No		Yes		No	No	Not Sure		Yes		
134689-6261-01-173790-0000	23 Mountain View Rd	Anne				Single-Family																									All set here, happy with my septic system, don't need to connect to a municipal wastewater system.
132000-7167-00-470350-0000	21 Prospect	Anthony				Single-Family																									
132000-7167-00-547358-0000	32 Prospect	Anthony				Single-Family																									
						Single-Family										Septic, Leach-field/Drain-field			5	Concrete					no	no				no	On fixed income, can't afford all utilities now, and the Town wants to add more? Not substainably by the water district? Who on this goup or the Town Board are in the District? You won't have to pay right?! But I will?
		Wassaic resident				Single-Family									1								No		no	no	not sure			no	Cost of the system installation. Future costs, including maintenance. Tax implications now and in the future for all residents including those that do not choose to or are unable to participate.
		George				Single-Family									2	Septic tank		?	not in 6 yrs they're there	concrete	No		No		yes	no	not sure		not sure	no	A community wastewater system for the business area of Amenia seems completely unnecessary to me. The small area and low density of the buildings in that area should be able to thrive with private septic systems. In addition, the cost of such a system can't be supported by so small a number of properties. I would support the town setting up a fund to help residents pump their septic tanks, install backup cutoffs, put in dry wells and otherwise improve failing systems. But I strongly oppose a community waste system. I have to think that the reason for the proposal is to enable development and bring in more businesses. I don't want Amenia to grow bigger. Our town is almost a nature reserve. Preserving the rural nature of Amenia should be our first priority.
		Bryan				NA																				not sure if septic can					
		Wassaic Project				Multi-Family	2	2,1																									
						Commercial				44752					n/a	Septic tank	don't know	?	1	unknown	Yes	too small but works	Yes	In spring	yes	yes	yes	All over small hamlet of Wassaic Wassaic and Amenia	yes	yes	
						NA																									
						NA																									
		ANONYMOUS				NA																									I do not live anywhere near the area under discussion. However, I support a town sewerage (sic) system. Let's make the arrogant, self-entitled, rich creeps who own property in Silo Ridge pay for it!
132000-7067-16-893286-0000	29 Lake Amenia Rd	Wormell , Phyllis		0.25	1 Family Res (210)	Single-Family									3	Septic Tank;Leach-field/Drain-field	?	?	2	Unknown		-	No	-	No		Yes		Yes	Yes	0	
132000-7167-00-570145-0000	18 Prospect Ave	Rhamelia Inc		62.10	Field crops (120)	Single-Family									1	Septic Tank;Cesspool	?	?	2	Unknown		-	No	-	No		Yes		Yes	Yes	0	
132000-7164-00-600635-0000	61 Poplar Hill Rd	Centrillo , Mark		5.00	1 Family Res (210)	Single-Family									4	Septic Tank	1200 g	25 yrs	1	Concrete		-	Yes	whenever there's heavy rain	Yes		Not Sure		Not Sure	Yes	0	
132000-7168-00-430225-0000	90 Perrys Corners Rd	Rule , Maureen		76.77	Rural res&ag (241)	Single-Family									3	Septic Tank;Leach-field/Drain-field	large	10 yrs	3	Unknown		-	No	-	No		Yes		Yes	No	I've heard Main St doesn't have capacity needed for business.	
132000-7167-00-505879-0000	47 Mygatt Rd	Cowin , Dana		31.41	Rural res&ag (241)	Single-Family									5	Septic Tank	?	?	4	Concrete		-	Yes	?	Yes		Yes		Yes	Yes	RE: flooding - Only when we lose power, which has happened more in the past 2 yrs. RE: problems in town - We hear the lack of a sewage system prevents business from building and the town from growing or modernizing. We heard that Silo Ridge was supposed to help pay for sewage in exchange for destroying a unique vista, but was allowed to back out. Why??
132000-7167-17-139211-0000	782 Old Route 22	Stone Resource Inc ,	Stone Resource Inc ,	0.49	2 Family Res (220)	Multi-Family			2.00	4						Cesspool							No		No		Yes		Yes	Yes		
132000-7067-20-861211-0000	35 W Lake Amenia Rd	Bailey Family Real Estate		0.36	2 Family Res (220)	Multi-Family			2.00	4						Septic tank;Leach-field/Drain-field			2				Yes	seasonally	No		Yes		Yes	Yes		

Tighe&Bond

APPENDIX F

Town of Amenia
Sewer District Master File
Updated - May 19, 2022

ID	Tax Parcel ID No.	Parcel Address	Primary Owner Name	Lot Size (Ac)	Land Use Code	Land Use Type	Category	Total Assessed Value	Base Design Flow (gpd)	Base Design Flow Notes	No. Residential EDUs	No. of Commercial EDUs
1	132000-7167-00-340765-0000	5086-5094 Route 22	Amenia K Realty LLC	31.58	452	Nbh shop ctr	Commercial	$4,896,000	5,815	Multiple businesses, see comment		30
2	132000-7167-00-280706-0000	Route 22	Amenia Medows LLS	32.78	322	Rural vac>10	Residential Vacant	$600,000	0	Vacant, no flow	0	
3	132000-7167-00-240740-0000	5058 Route 22	Bates, Letecia	1.34	484	1 use sm bld	Commercial	$214,200	270	Liquor Store (2,700 sqft *0.1 gpd/sqft)		2
4	132000-7167-00-240726-0000	5054 Route 22	Bailey Family Real Estate	0.76	220	2 Family Res	Residential	$214,200	400	Two Family Residence, 400 gpd	2	
5	132000-7167-00-191723-0000	Route 22	Gregory, Jack	7.79	314	Rural vac<10	Residential Vacant	$107,700	0	Vacant, no flow	0	
6	132000-7167-00-186672-0000	Route 22	Silo Ridge Ventures Property B	8.47	314	Rural vac<10	Residential Vacant	$111,800	0	Vacant, no flow	0	
7	132000-7167-09-200630-0000	5019 Route 22	Doyle, Wilhelmina	0.57	311	Res vac land	Residential Vacant	$53,100	0	Vacant, no flow	0	
8	132000-7167-09-195619-0000	5013 Route 22	Scaraville, Thomas J	0.57	210	1 Family Res	Residential	$207,600	200	Single Family Residence, 200 gpd	1	
9	132000-7167-09-190608-0000	5005 Route 22	Rivara, Diane L	0.56	210	1 Family Res	Residential	$249,300	200	Single Family Residence, 200 gpd	1	
10	132000-7167-09-184597-0000	5001 Route 22	Kyriacou, Elizabeth F	0.74	210	1 Family Res	Residential	$265,400	180	Metered data	1	
11	132000-7167-09-168571-0000	4989 Route 22	Gast, Christina	0.53	210	1 Family Res	Residential	$184,200	80	Metered data	1	
12	132000-7167-09-161560-0000	4981 Route 22	Bed & Breakfast Amenia LLC	1.30	210	1 Family Res	Residential	$397,200	280	Metered data	2	
13	132000-7167-09-152544-0000	4977 Route 22	Owens, Mark Rachel	0.53	220	2 Family Res	Residential	$303,600	400	Two Family Residence, 400 gpd	2	
14	132000-7167-09-142534-0000	4975 Route 22	Murphy, Catherine M	0.91	210	1 Family Res	Residential	$190,700	430	Metered data	3	
15	132000-7167-09-147522-0000	4971 Route 22	Wixom, Llewelyn	0.46	210	1 Family Res	Residential	$319,400	10	Metered data	1	
16	132000-7167-09-141511-0000	4963B Route 22	4963B Route 22 Property LLC	0.47	480	Mult-use bld	Commercial	$260,000	20	Metered data		1
17	132000-7167-09-105536-0000	4957 Route 22	Four Brothers Pizza Inc.	15.30	421	Restaurant	Commercial	$1,027,500	5,180	Metered data		26
18	132000-7167-13-121478-0000	5329 Route 44	Patel, Bharat M	0.39	482	Det row bldg	Commercial	$475,000	290	Metered data		2
19	132000-7167-13-114476-0000	5327 Route 44	Dutchess Living Spaces LLC	0.04	484	1 use sm bld	Commercial	$150,000	130	Metered data		1
20	132000-7167-13-110479-0000	5325 Route 44	5325 Rental LLC	0.20	220	2 Family Res	Residential	$149,800	140	Metered data	2	
21	132000-7167-13-107476-0000	5323 Route 44	Stefanopoulos, William	0.13	483	Converted Res	Commercial	$160,000	640	Metered data		4
22	132000-7167-13-099479-0000	5321 Route 44	Stefanopoulos Bros LLC	0.76	484	1 use sm bld	Commercial	$180,000	40	Metered data		1
23	132000-7167-13-089475-0000	5319 Route 44	Siconolfi, Elena	0.62	220	2 Family Res	Residential	$228,800	150	Metered data	2	
24	132000-7167-13-082468-0000	5313 Route 44	Singleton, William	0.23	210	1 Family Res	Residential	$180,200	200	Single Family Residence, 200 gpd	1	
25	132000-7167-13-071468-0000	5309 Route 44	Pilus, Linda B	1.10	210	1 Family Res	Residential	$169,100	90	Metered data	1	
26	132000-7167-13-067454-0000	5307 Route 44	Philip, Jose	0.10	210	1 Family Res	Residential	$152,400	200	Metered data says 0 flow, changed to 200 gpd for single family	1	
27	132000-7167-13-059466-0000	W Main St Rear	Philip, Jose	0.20	311	Res vac land	Residential Vacant	$2,500	0	Vacant, no flow	0	
28	132000-7167-13-053455-0000	5305 Route 44	Rochford, Daniel Joy	1.85	281	Multiple res	Residential	$207,300	320	Metered data	2	
29	132000-7167-13-046440-0000	5299 Route 44	Howard, Cari Ann	0.30	210	1 Family Res	Residential	$185,500	120	Metered data	1	
30	132000-7167-00-022426-0000	5291 Route 44	Page Amenia LLC	1.70	444	Lumber yd/mi	Commercial	$760,000	40	Metered data		1
31	132000-7167-00-002440-0000	Route 44	Page Amenia LLC	2.00	330	Vacant comm	Commercial Vacant	$75,000	0	Vacant, no flow		0
32	132000-7167-00-980425-0000	5275 Route 44	Panichi, Emil	3.09	433	Auto body	Commercial	$350,000	330	Metered data		2
33	132000-7167-13-022397-0000	5282 Route 44	Merino, Kelly Ryan	0.82	210	1 Family Res	Residential	$179,100	200	Single Family Residence, 200 gpd	1	
34	132000-7167-13-030386-0000	61 Broadway	Dutton, William Richard	0.16	210	1 Family Res	Residential	$147,000	120	Metered data	1	
35	132000-7167-13-031382-0000	59 Broadway	Wilcox, David A	0.18	210	1 Family Res	Residential	$159,900	60	Metered data	1	
36	132000-7167-13-030372-0000	55 Broadway	Doyle, Larry C	0.60	210	1 Family Res	Residential	$192,800	130	Metered data	1	
37	132000-7167-13-033363-0000	53 Broadway	Shepley, Michael LT	0.60	210	1 Family Res	Residential	$176,200	80	Metered data	1	
38	132000-7167-13-044352-0000	43 Broadway	Bates, Myron W Jr	0.69	210	1 Family Res	Residential	$224,000	200	Metered data says 0 flow, changed to 200 gpd for single family	1	
39	132000-7167-13-047335-0000	37 Broadway	Walsh, Patrick	0.51	210	1 Family Res	Residential	$204,600	30	Metered data	1	
40	132000-7167-13-048324-0000	33 Broadway	Mirra, Corey	0.37	210	1 Family Res	Residential	$187,400	70	Metered data	1	
41	132000-7167-13-049314-0000	29 Broadway	Curtis, Sherrill J	0.37	210	1 Family Res	Residential	$169,100	120	Metered data	1	
42	132000-7167-13-051304-0000	25 Broadway	Carder, James	0.37	210	1 Family Res	Residential	$175,700	40	Metered data	1	
43	132000-7167-13-050294-0000	17 Broadway	McRoberts, Jered	0.46	210	1 Family Res	Residential	$203,900	200	Metered data says 0 flow, changed to 200 gpd for single family	1	
44	132000-7167-13-051284-0000	15 Broadway	Stapf, Lauren	0.46	210	1 Family Res	Residential	$167,300	120	Metered data	1	
45	132000-7167-13-052274-0000	11 Broadway	Fimbel, Jennifer E	0.46	210	1 Family Res	Residential	$183,000	230	Metered data	2	
46	132000-7167-13-053264-0000	9 Broadway	Horton, Kirk	0.46	210	1 Family Res	Residential	$174,600	180	Metered data	1	
47	132000-7167-13-056253-0000	5 Broadway	DeMarco, John	0.55	411	Apartment	Commercial	$360,000	300	Metered data		2
48	132000-7167-17-057238-0000	4789 Route 22	Jetson Properties LLC	0.46	482	Det row bldg	Commercial	$577,100	1,635	Metered data said negative flow, see comment		9
49	132000-7167-13-074283-0000	4813 Route 22	Bevilacque, Thomas J Trustee	1.10	484	1 use sm bld	Commercial	$155,000	0	One old building, no service or flow		1
50	132000-7167-13-086310-0000	4825 Route 22	4825 Route 22 Inc	0.22	457	Small Retail	Commercial	$284,000	160	Metered data		1
51	132000-7167-13-081315-0000	4827 Route 22	Bevilacque, Thomas J Trustee	0.32	431	Auto dealer	Commercial	$705,600	20	Metered data		1
52	132000-7167-13-070316-0000	Broadway	Bevilacque, Thomas J Trustee	0.78	311	Res vac land	Residential Vacant	$55,000	0	Vacant, no flow	0	
53	132000-7167-13-065332-0000	34 Broadway	Walcott, Wilbert	0.32	210	1 Family Res	Residential	$209,300	210	Metered data	2	
54	132000-7167-13-065345-0000	40 Broadway	Baldino, Anthony	0.29	210	1 Family Res	Residential	$189,700	200	Metered data says 0 flow, changed to 200 gpd for single family	1	
55	132000-7167-13-075339-0000	8 Morton Pl	Ryder, Edna	0.45	210	1 Family Res	Residential	$191,900	40	Metered data	1	
56	132000-7167-13-087324-0000	Route 22	Bevilacque, Thomas J Trustee	0.29	330	Vacant comm	Commercial Vacant	$45,000	0	Vacant, no flow		0
57	132000-7167-13-088330-0000	4835 Route 22	Bishop Homes Inc.	0.26	210	1 Family Res	Residential	$167,600	210	Metered data	2	
58	132000-7167-13-093336-0000	4839 Route 22	Wesley, Aimee	0.17	210	1 Family Res	Residential	$144,600	140	Metered data	1	
59	132000-7167-16-092343-0000	14 Morton Pl	Witt, Gary E	0.46	210	1 Family Res	Residential	$196,100	130	Metered data	1	
60	132000-7167-13-097356-0000	4857 Route 22	Bailey, Samuel	0.34	220	2 Family Res	Residential	$164,600	170	Metered data	2	
61	132000-7167-13-100364-0000	4865 South St	Jaquish, Robert	0.17	210	1 Family Res	Residential	$143,800	70	Metered data	1	
62	132000-7167-13-083360-0000	9 Morton Pl	James, Lynda	0.55	210	1 Family Res	Residential	$238,000	30	Metered data	1	
63	132000-7167-13-070361-0000	5 Morton Pl	Iovino, Robert J	0.34	210	1 Family Res	Residential	$170,400	230	Metered data	2	
64	132000-7167-13-060359-0000	3 Morton Pl	Bailey Family Real Estate	0.25	210	1 Family Res	Residential	$174,400	170	Metered data	1	
65	132000-7167-13-057372-0000	52 Broadway	Calabrese, Jeremy M	0.40	210	1 Family Res	Residential	$183,800	340	Metered data	2	
66	132000-7167-13-052383-0000	56 Broadway	56 Wheelhaus LLC	0.21	210	1 Family Res	Residential	$142,400	200	Metered data says 0 flow, changed to 200 gpd for single family	1	
67	132000-7167-13-066380-0000	8 Birch Dr	MacArthur, Donald	0.51	210	1 Family Res	Residential	$179,000	30	Metered data	1	
68	132000-7167-13-073388-0000	12 Birch Dr	Nadeau, Arthur LT	0.35	210	1 Family Res	Residential	$173,200	250	Metered data	2	
69	132000-7167-13-072409-0000	11 Birch Dr	Gangloff, Darryl P	0.39	210	1 Family Res	Residential	$155,200	70	Metered data	1	
70	132000-7167-13-062403-0000	9 Birch Dr	MacArthur, Donald	0.37	230	3 Family Res	Residential	$192,900	140	Metered data	3	
71	132000-7167-13-050396-0000	60 Broadway	Wyckoff, Peter L Trustees	0.38	210	1 Family Res	Residential	$173,000	180	Metered data	1	
72	132000-7167-13-040407-0000	66 Broadway	Broadway Amenia LLC	0.42	465	Prof. bldg	Commercial	$220,000	190	Metered data		1

Town of Amenia
Sewer District Master File
Updated - May 19, 2022

ID	Tax Parcel ID No.	Parcel Address	Primary Owner Name	Lot Size (Ac)	Land Use Code	Land Use Type	Category	Total Assessed Value	Base Design Flow (gpd)	Base Design Flow Notes	No. Residential EDUs	No. of Commercial EDUs
73	132000-7167-13-046411-0000	5294 Route 44	Ducillo, Joseph P III	0.41	220	2 Family Res	Residential	$251,500	240	Metered data	2	
74	132000-7167-13-053417-0000	5296 Route 44	Verizon New York Inc.	0.30	831	Tele Comm	Commercial	$210,000	0	Metered data, verizon station		1
75	132000-7167-13-059420-0000	5298 Route 44	Kearney, Jo-Anne C	0.30	210	1 Family Res	Residential	$149,300	60	Metered data	1	
76	132000-7167-13-066426-0000	5304 Route 44	Lowmar LLC	0.58	210	1 Family Res	Residential	$203,500	200	Metered data says 0 flow, changed to 200 gpd for single family	1	
77	132000-7167-13-076423-0000	5308 Route 44	Deyo, Ernest P	0.45	210	1 Family Res	Residential	$119,200	50	Metered data	1	
78	132000-7167-13-081434-0000	5310 Route 44	Crum, Curt A	0.80	210	1 Family Res	Residential	$295,200	590	Metered data, used average flow rate instead of max	3	
79	132000-7167-13-090440-0000	5314 Route 44	Teruel, Angela	0.43	210	1 Family Res	Residential	$152,100	120	Metered data	1	
80	132000-7167-13-095443-0000	5316 Route 44	Foley, Thomas J	0.25	210	1 Family Res	Residential	$129,900	200	Single Family Residence, 200 gpd	1	
81	132000-7167-13-099447-0000	5318 Route 44	Foley, Thomas J	0.22	210	1 Family Res	Residential	$166,800	350	Metered data	2	
82	132000-7167-13-098453-0000	Route 44	Foley, Thomas J	0.01	311	Res vac land	Residential Vacant	$400	0	Vacant, no flow	0	
83	132000-7167-13-103452-0000	5322 Route 44	Alexiev, Grisha W	0.27	210	1 Family Res	Residential	$184,100	90	Metered data	1	
84	132000-7167-13-110457-0000	5324 Route 44	Daisey May Realty LLC	0.27	210	1 Family Res	Residential	$187,800	60	Metered data	1	
85	132000-7167-13-118460-0000	5326 Route 44	Goff, Shawn	0.14	210	1 Family Res	Residential	$183,500	170	Metered data	1	
86	132000-7167-13-126462-0000	5330 Route 44	Gas Land Petroleum Inc	0.27	432	Gas station	Commercial	$500,000	500	Used same flow as Cumberland Farms (Parcel No. 218), 500 gpd		3
87	132000-7167-13-124451-0000	4931-4935 Route 22	O'Neil, Patricia Louise	0.18	210	1 Family Res	Residential	$176,400	50	Metered data	1	
88	132000-7167-13-120445-0000	4925 Route 22	Linden, Ann C	0.22	220	2 Family Res	Residential	$227,600	160	Metered data	2	
89	132000-7167-13-113439-0000	4919 Route 22	Linden, Ann	0.68	484	1 use sm bld	Commercial	$360,000	300	Metered data		2
90	132000-7167-13-112429-0000	4913 Route 22	Walter, James A	0.26	210	1 Family Res	Residential	$241,500	40	Metered data	1	
91	132000-7167-13-111423-0000	4909 Route 22	South Main Street LLC	0.22	220	2 Family Res	Residential	$164,400	170	Metered data	2	
92	132000-7167-13-110418-0000	4905 Route 22	Johnson, Louis N III	0.20	210	1 Family Res	Residential	$155,100	140	Metered data	1	
93	132000-7167-13-109412-0000	4903 Route 22	DPDJ LLC	1.05	281	Multiple res	Residential	$331,700	290	Metered data	2	
94	132000-7167-13-100403-0000	4895 Route 22	McCaffrey, Peter	0.66	210	1 Family Res	Residential	$463,300	140	Metered data	1	
95	132000-7167-13-096395-0000	4887 Route 22	Dietrich, Walter	0.79	210	1 Family Res	Residential	$342,000	230	Metered data	2	
96	132000-7167-13-092378-0000	4873-4879 Route 22	S & A Limitless LLC	1.70	281	Multiple res	Residential	$364,900	140	Metered data	1	
97	132000-7167-13-126327-0000	12 Lavelle Rd	Roman Catholic Church of	5.28	620	Religious	Commercial	$980,000	880	Metered data		5
98	132000-7167-13-145335-0000	16 Lavelle Rd	Sweet Home LLC	1.00	210	1 Family Res	Residential	$170,500	200	Metered data abnormally high, changed to 200 gpd for single family	1	
99	132000-7167-13-122364-0000	3 Lavelle Rd	Roman Catholic Church of	1.10	620	Religious	Commercial	$770,000	20	Metered data		1
100	132000-7167-13-141374-0000	11 Lavelle Rd	Roman Catholic Church of	1.80	620	Religious	Commercial	$1,700,000	0	Metered data		1
101	132000-7167-13-164372-0000	17-19 Lavelle Rd	17-19 Lavelle Rd LLC	2.70	281	Multiple res	Residential	$279,300	40	Metered data	1	
102	132000-7167-13-140394-0000	4892 Route 22	722 Ventures LLC	1.20	411	Apartment	Commercial	$389,855	410	Metered data		3
103	132000-7167-13-139406-0000	4898 Route 22	Wiegard, Michael A	1.02	220	2 Family Res	Residential	$318,400	110	Metered data	2	
104	132000-7167-13-145417-0000	4912-4914 Route 22	Salamone, Constantina L H	1.00	281	Multiple res	Residential	$281,000	30	Metered data	1	
105	132000-7167-13-141426-0000	4916 Route 22	Hawken, Leila	0.30	210	1 Family Res	Residential	$203,400	40	Metered data	1	
106	132000-7167-13-149433-0000	4920 Route 22	D'Souza, Deirdre C	0.98	220	2 Family Res	Residential	$237,500	80	Metered data	2	
107	132000-7167-13-150449-0000	4930-4936 Route 22	Amenia Homes LLC	1.54	411	Apartment	Commercial	$443,000	950	Metered data		5
108	132000-7167-13-145461-0000	4942 Route 22	Jenkins, Harry J Jr	0.33	210	1 Family Res	Residential	$176,400	40	Metered data	1	
109	132000-7167-13-141469-0000	4950 Route 22	William & Peter Inc.	0.26	484	1 use sm bld	Commercial	$637,200	470	Metered data		3
110	132000-7167-13-150468-0000	3294 Route 343	La Morte, Vito	0.16	482	Det row bldg	Commercial	$431,200	410	Metered data		3
111	132000-7167-13-152474-0000	3296 Route 343	Rossinver LLC	0.07	482	Det row bldg	Commercial	$260,000	1,510	Metered data		8
112	132000-7167-13-157475-0000	3300 Route 343	Good Boys Truck LLC	0.04	482	Det row bldg	Commercial	$160,000	360	Metered data		2
113	132000-7167-13-158470-0000	3300 Route 343 Rear	Good Boys Truck LLC	0.02	449	Other Storage	Commercial	$15,000	0	Appears to be unserved storage building/garage, no flow		1
114	132000-7167-13-220425-0000	3302 Route 343	ASA Construction and Mgmt	8.20	411	Apartment	Commercial	$359,900	340	Metered data		2
115	132000-7167-13-162476-0000	3304 Route 343	3304 Route 343 Corp.	0.07	482	Det row bldg	Commercial	$240,000	290	Metered data		2
116	132000-7167-13-168468-0000	E Main St	Heelan, James P	0.14	330	Vacant comm	Commercial Vacant	$35,000	0	Vacant, no flow		0
117	132000-7167-13-165477-0000	3306 Route 343	Heelan, James P	0.05	482	Det row bldg	Commercial	$270,000	660	1,800 sq ft retail, two 1 bdrm apartments, DEC flow estimate		4
118	132000-7167-13-172477-0000	Route 343	Del Regno Corp	0.21	330	Vacant comm	Commercial Vacant	$50,000	0	Vacant, no flow		0
119	132000-7167-13-180478-0000	3310 Route 343	KCD Real Estate LLC	0.34	210	1 Family Res	Residential	$193,400	10	Metered data	1	
120	132000-7167-13-186479-0000	3312 Route 343	Rossinver LLC	0.19	652	Govt bldgs	Commercial	$252,500	330	Metered data		2
121	132000-7167-13-192481-0000	3314 Route 343	Collins, Michael T	0.38	483	Converted Res	Commercial	$260,000	120	Metered data		1
122	132000-7167-13-200483-0000	3316 Route 343	Apple Antiques Ltd	0.33	482	Det row bldg	Commercial	$260,000	110	Metered data		1
123	132000-7167-13-208486-0000	3318 Route 343	MEK LLC	0.31	220	2 Family Res	Residential	$160,000	230	Metered data	2	
124	132000-7167-13-214488-0000	3322 Route 343	DIAC LLC	0.19	482	Det row bldg	Commercial	$145,000	210	Metered data		2
125	132000-7167-13-218490-0000	3324 Route 343	WEGETBY LLC	0.14	483	Converted Res	Commercial	$180,000	90	Metered data		1
126	132000-7167-13-221495-0000	3326 Route 343	WEGETBY LLC	0.13	220	2 Family Res	Residential	$183,300	40	Metered data	2	
127	132000-7167-13-227496-0000	3330 Route 343	Bird's Nest LLC The	0.14	482	Det row bldg	Commercial	$400,000	370	Metered data		2
128	132000-7167-13-229486-0000	51 Mechanic St	WEGETBY LLC	0.18	483	Converted Res	Commercial	$195,000	200	Metered data		1
129	132000-7167-13-230478-0000	47 Mechanic St	DeSimone, Gennaro IV	0.30	210	1 Family Res	Residential	$198,500	230	Metered data	2	
130	132000-7167-13-214475-0000	3320 Route 343	Boissey, Bruce J	0.41	822	Water supply	Commercial	$8,000	0	Old wellhouse on property, no flow		1
131	132000-7167-13-232471-0000	43 Mechanic St	Mangione, Anthony	0.49	210	1 Family Res	Residential	$188,200	120	Metered data	1	
132	132000-7167-13-216456-0000	Mechanic St	Infinity Solutions NY LLC	3.50	330	Vacant comm	Commercial Vacant	$35,000	0	Vacant, no flow		0
133	132000-7167-13-243451-0000	35 Mechanic St	Haverty, John E Trustee	0.29	484	1 use sm bld	Commercial	$300,000	10	Metered data		1
134	132000-7167-13-248426-0000	25 Mechanic St	Shelters Properties Inc	0.71	281	Multiple res	Residential	$341,400	660	Metered data says 0 flow, 1 bedroom cottage + 5 bedroom house	4	
135	132000-7167-14-258411-0000	21 Mechanic St	Ducillo, Joseph P Jr	0.92	330	Vacant comm	Commercial Vacant	$55,000	0	Vacant, no flow		0
136	132000-7167-14-261376-0000	13 Mechanic St	Mechanic Street LLC	1.53	449	Other Storage	Commercial	$583,500	200	Metered data		1
137	132000-7167-14-272380-0000	9 Mechanic St	Janecek, Arthur	0.51	411	Apartment	Commercial	$367,400	120	Metered data		1
138	132000-7167-14-282353-0000	6 Depot Hill Rd	Lilley, Charles F	0.78	230	3 Family Res	Residential	$220,300	360	Metered data	2	
139	132000-7167-14-285340-0000	10 Depot Hill Rd	Staib, Jill Marie	0.22	210	1 Family Res	Residential	$155,400	90	Metered data	1	
140	132000-7167-14-285332-0000	14 Depot Hill Rd	Mahar, William H	0.65	210	1 Family Res	Residential	$245,000	120	Metered data	1	
141	132000-7167-14-289324-0000	18 Depot Hill Rd	Couse, Brian E	0.30	210	1 Family Res	Residential	$187,700	130	Metered data	1	
142	132000-7167-14-291320-0000	20 Depot Hill Rd	Gerdes, Gary A	0.40	210	1 Family Res	Residential	$250,300	240	Metered data	2	
143	132000-7167-14-295312-0000	22 Depot Hill Rd	Cole, Robert W	0.34	210	1 Family Res	Residential	$188,700	80	Metered data	1	
144	132000-7167-14-364257-0000	51 Depot Hill Rd	Thompson, Philip B	0.76	210	1 Family Res	Residential	$228,500	200	Metered data	1	

Town of Amenia
Sewer District Master File
Updated - May 19, 2022

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145	132000-7167-14-382262-0000	6 Prospect Ave	Wagner, Judith	0.45	210	1 Family Res	Residential	$174,100	80	Metered data	1	
146	132000-7167-14-387263-0000	8 Prospect Ave	Fanelli, Francesca	0.50	210	1 Family Res	Residential	$182,100	10	Metered data	1	
147	132000-7167-14-397269-0000	10 Prospect Ave	Taylor, Jean	0.51	210	1 Family Res	Residential	$217,400	130	Metered data	1	
148	132000-7167-14-405269-0000	12 Prospect Ave	Stevener, Richard	0.50	210	1 Family Res	Residential	$197,000	120	Metered data	1	
149	132000-7167-14-420272-0000	14 Prospect Ave	Collins, Michael A	1.10	220	2 Family Res	Residential	$221,300	100	Metered data	2	
150	132000-7167-14-439277-0000	16 Prospect Ave	Murphy, Brian F	0.66	270	Mfg housing	Residential	$83,300	50	Metered data	1	
151	132000-7167-14-431300-0000	15 Prospect Ave	Marmer, Jess	0.53	210	1 Family Res	Residential	$188,200	120	Metered data	1	
152	132000-7167-14-416297-0000	13 Prospect Ave	Langlands, Bryan A M	0.90	210	1 Family Res	Residential	$227,500	10	Metered data	1	
153	132000-7167-14-398287-0000	11 Prospect Ave	Nowak, John	0.24	210	1 Family Res	Residential	$155,600	150	Metered data	1	
154	132000-7167-14-386290-0000	9 Prospect Ave	Lofaso, Benedetto	0.94	210	1 Family Res	Residential	$198,200	130	Metered data	1	
155	132000-7167-14-375286-0000	5 Prospect Ave	Preciado-Ramirez, Enrique	0.38	210	1 Family Res	Residential	$134,300	410	Metered data	3	
156	132000-7167-14-367283-0000	3 Prospect Ave	Hale, Blake	0.62	210	1 Family Res	Residential	$135,700	90	Metered data	1	
157	132000-7167-14-357280-0000	1 Prospect Ave	Poveromo, Anthony	0.60	210	1 Family Res	Residential	$179,800	190	Metered data	1	
158	132000-7167-14-349273-0000	43 Depot Hill Rd	Johnson, Gordon W	0.47	220	2 Family Res	Residential	$325,500	1,000	Metered data	5	
159	132000-7167-14-343284-0000	39 Depot Hill Rd	Hoffa, Andrea E	0.47	210	1 Family Res	Residential	$229,500	90	Metered data	1	
160	132000-7167-14-337292-0000	35 Depot Hill Rd	Taylor-Hafford, Brenda	0.40	210	1 Family Res	Residential	$161,100	60	Metered data	1	
161	132000-7167-14-333304-0000	31 Depot Hill Rd	Salladay, Tracy A	1.00	210	1 Family Res	Residential	$220,600	60	Metered data	1	
162	132000-7167-14-327315-0000	25 Depot Hill Rd	Bailey, Samuel	0.51	220	2 Family Res	Residential	$205,600	50	Metered data	2	
163	132000-7167-14-324321-0000	23 Depot Hill Rd	Dorfman, Joseph	0.50	210	1 Family Res	Residential	$197,900	200	Metered data says 0 flow, changed to 200 gpd for single family	1	
164	132000-7167-14-343318-0000	24 Midway Ave	McDonald, Gerald	0.34	210	1 Family Res	Residential	$172,300	100	Metered data	1	
165	132000-7167-14-351312-0000	30 Midway Ave	Brandt, Mary	0.87	210	1 Family Res	Residential	$186,400	30	Metered data	1	
166	132000-7167-14-351325-0000	34 Midway Ave	Angun, Lana A	0.42	210	1 Family Res	Residential	$126,900	50	Metered data	1	
167	132000-7167-14-363330-0000	40 Midway Ave	Knode, Jennifer Lea	0.63	210	1 Family Res	Residential	$207,100	400	Metered data	2	
168	132000-7167-14-368311-0000	48 Midway Ave	Eberhard, Jesse J	0.52	210	1 Family Res	Residential	$138,000	60	Metered data	1	
169	132000-7167-14-375328-0000	52 Midway Ave	Davies, Amanda M	0.37	210	1 Family Res	Residential	$164,700	330	Metered data	2	
170	132000-7167-14-383329-0000	54 Midway Ave	Clapper, Joshua	0.37	210	1 Family Res	Residential	$210,100	190	Metered data	1	
171	132000-7167-14-391331-0000	17 Lango Rd	Culligan, John Peter	0.44	210	1 Family Res	Residential	$195,600	120	Metered data	1	
172	132000-7167-14-386316-0000	13 Lango Rd	US Bank Trust NA, Trustee	0.50	210	1 Family Res	Residential	$177,800	50	Metered data	1	
173	132000-7167-14-388307-0000	9 Lango Rd	Johnson, Jeffrey J	0.50	220	2 Family Res	Residential	$233,400	210	Metered data	2	
174	132000-7167-14-397299-0000	5 Lango Rd	Oleynikov, Konstantin	0.27	220	2 Family Res	Residential	$235,000	140	Metered data	2	
175	132000-7167-14-415315-0000	10 Lango Rd	Miles, George W	0.82	210	1 Family Res	Residential	$189,500	160	Metered data	1	
176	132000-7167-14-429314-0000	11 John L Rd	Hafford, Eunice A	0.23	270	Mfg housing	Residential	$85,800	140	Metered data	1	
177	132000-7167-14-426323-0000	13 John L Rd	Storms, Vernon Mark	0.28	210	1 Family Res	Residential	$176,800	290	Metered data	2	
178	132000-7167-14-424332-0000	17 John L Rd	Colleran, Susan Trustee	0.28	210	1 Family Res	Residential	$154,600	60	Metered data	1	
179	132000-7167-14-406333-0000	20 Lango Rd	Urena, Rosanny	0.39	210	1 Family Res	Residential	$204,000	200	Metered data	1	
180	132000-7167-14-419338-0000	Midway Ave	McEniff, Thomas K	0.49	311	Res vac land	Residential Vacant	$42,000	0	Vacant, no flow	0	
181	132000-7167-14-425356-0000	85 Midway Ave	Robbins, Jennifer J	0.27	210	1 Family Res	Residential	$148,200	260	Metered data	2	
182	132000-7167-14-416355-0000	Midway Ave	Apuglia Holdings LLC	0.27	311	Res vac land	Residential Vacant	$45,000	0	Vacant, no flow	0	
183	132000-7167-14-407355-0000	75 Midway Ave	O'Connell, Evelyn	0.29	210	1 Family Res	Residential	$176,000	130	Metered data	1	
184	132000-7167-14-401353-0000	71 Midway Ave	Flynn, Patrick Henry	0.29	210	1 Family Res	Residential	$168,000	170	Metered data	1	
185	132000-7167-14-384346-0000	59-61 Midway Ave	Farese, Paul	0.51	220	2 Family Res	Residential	$260,900	200	Metered data	1	
186	132000-7167-14-372349-0000	51 Midway Ave	Leary, Donald L	0.28	210	1 Family Res	Residential	$186,600	140	Metered data	1	
187	132000-7167-14-363346-0000	43 Midway Ave	Guevara, Luis	0.34	210	1 Family Res	Residential	$159,900	360	Metered data	2	
188	132000-7167-14-354345-0000	37 Midway Ave	Butts, Brian	0.29	210	1 Family Res	Residential	$157,100	210	Metered data	2	
189	132000-7167-14-346344-0000	33 Midway Ave	Sullivan, Teresa Z	0.23	210	1 Family Res	Residential	$166,600	280	Metered data	2	
190	132000-7167-14-338342-0000	25 Midway Ave	Fletcher, William B	0.44	210	1 Family Res	Residential	$179,700	80	Metered data	1	
191	132000-7167-14-331336-0000	19 Midway Ave	McEnroe, Michael	0.12	210	1 Family Res	Residential	$162,400	70	Metered data	1	
192	132000-7167-14-325334-0000	17 Midway Ave	Bailey Family Real Estate	0.12	210	1 Family Res	Residential	$123,900	90	Metered data	1	
193	132000-7167-14-313331-0000	17 Depot Hill Rd	Babino, Alfred V	0.34	210	1 Family Res	Residential	$231,900	220	Metered data	2	
194	132000-7167-14-317341-0000	15 Depot Hill Rd	Kasakian, Gary	0.55	210	1 Family Res	Residential	$212,300	200	Metered data says 0 flow, changed to 200 gpd for single family	1	
195	132000-7167-14-313347-0000	11 Depot Hill Rd	Graff, Melissa L	0.60	210	1 Family Res	Residential	$212,300	290	Metered data	2	
196	132000-7167-14-305355-0000	9 Depot Hill Rd	McGovern, Michael S	0.49	210	1 Family Res	Residential	$272,300	200	Metered data says 0 flow, changed to 200 gpd for single family	1	
197	132000-7167-14-297367-0000	Depot Hill Rd	Town of Amenia	0.70	311	Res vac land	Residential Vacant	$55,000	0	Vacant, no flow	0	
198	132000-7167-14-288416-0000	18-20 Mechanic St	Mechanic Street Inc	3.52	447	Truck termni	Commercial	$479,800	150	Metered data		1
199	132000-7167-14-305413-0000	34 Wilson Eaton Rd	Mechanic Street Inc	0.11	311	Res vac land	Residential Vacant	$15,000	0	Vacant, no flow	0	
200	132000-7167-14-310419-0000	30 Wilson Eaton Rd	LaCurto, John	0.66	210	1 Family Res	Residential	$227,800	200	Single Family Residence, 200 gpd	1	
201	132000-7167-14-317424-0000	28 Wison Eaton Rd	Killearn Properties LLC	0.25	210	1 Family Res	Residential	$141,300	200	Single Family Residence, 200 gpd	1	
202	132000-7167-14-326426-0000	3 Horseshoe Bnd	Hill, Marvin D	0.27	210	1 Family Res	Residential	$137,800	200	Single Family Residence, 200 gpd	1	
203	132000-7167-14-328423-0000	Mechanic St Rear	Parker, Frederica	0.07	311	Res vac land	Residential Vacant	$5,000	0	Vacant, no flow	0	
204	132000-7167-14-333427-0000	Mechanic St Rear	Tax Sal In-Rem 2004 Dut Co	0.08	312	Vac w/imprv	Residential Vacant	$54,100	0	Vacant, no flow	0	
205	132000-7167-14-350450-0000	7 Horseshoe Bnd	Parker, JoAnn	2.30	220	2 Family Res	Residential	$165,700	400	Two Family Residence, 400 gpd	2	
206	132000-7167-14-324453-0000	24 Wilson Eaton Rd	Wilson Eaton-Mechanic LLC	2.45	210	1 Family Res	Residential	$191,300	200	Single Family Residence, 200 gpd	1	
207	132000-7167-14-279456-0000	36 Mechanic St	Amenia Fire Company No 1 Inc	4.29	662	Police/fire	Commercial	$667,400	60	Metered data		1
208	132000-7167-14-257472-0000	40 Mechanic St	Flanagan, Ellen Louise	0.33	270	Mfg housing	Residential	$85,800	120	Metered data	1	
209	132000-7167-14-255478-0000	44 Mechanic St	Gregory, Robert	0.46	210	1 Family Res	Residential	$221,500	620	Metered data	4	
210	132000-7167-14-250486-0000	46 Mechanic St	46 Mechanic Street LLC	0.29	433	Auto body	Commercial	$240,000	30	Metered data		1
211	132000-7167-14-290481-0000	3338 Route 343	Redl, Herbert	3.50	485	>1 use sm bld	Commercial	$508,900	60	Metered data		1
212	132000-7167-14-262505-0000	3344 Route 343	Beth David Congregation	0.13	620	Religious	Commercial	$254,800	20	Metered data		1
213	132000-7167-14-270497-0000	3346 Route 343	Lauricella, Nancy A	0.91	230	3 Family Res	Residential	$263,200	290	Metered data	2	
214	132000-7167-14-285499-0000	3350 Route 343	3350 Route 343 LLC	1.10	411	Apartment	Commercial	$342,100	470	Metered data		3
215	132000-7167-10-289510-0000	3352 Route 343	D'aleo, Christopher	0.25	210	1 Family Res	Residential	$192,400	90	Metered data	1	
216	132000-7167-00-313507-0000	3360 Route 343	Hudson River Healthcare Inc	2.80	642	Health bldg	Commercial	$1,353,600	50	Metered data		1

Town of Amenia
Sewer District Master File
Updated - May 19, 2022

ID	Tax Parcel ID No.	Parcel Address	Primary Owner Name	Lot Size (Ac)	Land Use Code	Land Use Type	Category	Total Assessed Value	Base Design Flow (gpd)	Base Design Flow Notes	No. Residential EDUs	No. of Commercial EDUs
217	132000-7167-10-278532-0000	3353 Route 343	Havens, Lawrence J	0.44	220	2 Family Res	Residential	$193,500	200	Metered data	1	
218	132000-7167-10-264529-0000	3347 Route 343	Palmieri, David	0.64	230	3 Family Res	Residential	$319,100	160	Metered data	3	
219	132000-7167-10-252527-0000	3343 Route 343	Cayea, Norman R	0.50	210	1 Family Res	Residential	$169,900	100	Metered data	1	
220	132000-7167-09-236520-0000	3339 Route 343	CFI PROPCO 2 LLC	1.50	485	>1 use sm bld	Commercial	$952,000	490	Metered data		3
221	132000-7167-09-197506-0000	3319 Route 343	Moore, Maureen	0.50	210	1 Family Res	Residential	$254,100	170	Metered data	1	
222	132000-7167-09-184501-0000	3313 Route 343	Syms, Richard	0.50	220	2 Family Res	Residential	$275,500	400	Two Family Residence, 400 gpd	2	
223	132000-7167-13-174496-0000	3309 Route 343	Amenia Free Library Assn	0.40	611	Library	Commercial	$299,000	20	Metered data		1
224	132000-7167-13-160492-0000	3305 Route 343	Del Regno Corp	0.23	431	Auto dealer	Commercial	$340,000	40	Metered data		1
225	132000-7167-13-152492-0000	4962 Route 22	Fishkill National	0.32	470	Misc service	Commercial	$125,000	0	Bank parking lot, no flow		1
226	132000-7167-13-147488-0000	4958 Route 22	Fishkill National	0.03	461	Bank	Commercial	$425,000	20	Metered data		1
227	132000-7167-09-157504-0000	4966 Route 22	Linden, Ann Mansard	0.20	483	Converted Res	Commercial	$225,000	30	Metered data		1
228	132000-7167-09-170520-0000	4974 Route 22	Stonelead Partners LLC	1.40	464	Office bldg.	Commercial	$677,000	130	Metered data		1
229	132000-7167-09-196542-0000	4988 Route 22	Town of Amenia	6.50	652	Govt bldgs	Commercial	$4,000,000	300	Office building, 15 gpd per employee, 20 employees		2
230	132000-7167-09-203582-0000	5002 Route 22	Sinclair, Marnie	0.60	210	1 Family Res	Residential	$188,900	200	Single Family Residence, 200 gpd	1	
231	132000-7167-09-212594-0000	5004 Route 22	Euvrard, Wayne	0.78	210	1 Family Res	Residential	$223,500	200	Single Family Residence, 200 gpd	1	
232	132000-7167-09-218608-0000	5010 Route 22	Boardman, Jessica	0.73	210	1 Family Res	Residential	$211,000	200	Single Family Residence, 200 gpd	1	
233	132000-7167-00-279838-0000	8-10 Old North Rd	Sartori, Alcia M Trustee	1.20	482	Det row bldg	Commercial	$969,600	2,065	Multiple businesses, see comment		11

Tighe&Bond

APPENDIX G

Wastewater Feasibility Study
FINAL

Town of Amenia
Dutchess County, NY

November 2012

Project No. 3901201

CLARK ENGINEERING & SURVEYING, P.C.

20 Shaker Rd., P.O. Box 730, New Lebanon, N.Y. 12125
P: (518) 794-8613 F: (518) 766-5663 www.clarkpc.com

Parcel 7167-00-186672, Route 22, Amenia, NY
Wastewater Feasibility Study - FINAL Results
November 16, 2012

Introduction

The parcel 7167-00-186672 was identified in the July 12, 2012 Wastewater Feasibility Study for the Hamlet of Amenia by Clark Engineering & Surveying, PC. At that time the owners of the parcel were unresponsive to requests from the Town for access to on-site investigation. Since that time, access to the site became available. The results of the on-site analysis are presented here.

Figure 1 Parcel 7167-00-186672 Site

Background

This 8 acre parcel appears to be used as a hay field. The parcel has a very advantageous location for wastewater treatment in due to its close proximity to the hamlet center and and has none of the restrictions that impact other identified parcels (i.e. parkland, agricultural district, wetlands, floodplain)

Soils

The parcel soil type is Stockbridge Loam (Sm). Stockbridge loam consists of very deep, well drained soils formed in loamy calcareous till. They are nearly level to very steep soils on till plains, smooth hills, low ridges and drumloidal landforms. Slope ranges from 0 to 60 percent. Permeability is moderate in the surface layer and subsoil and moderately slow or slow in the substratum.

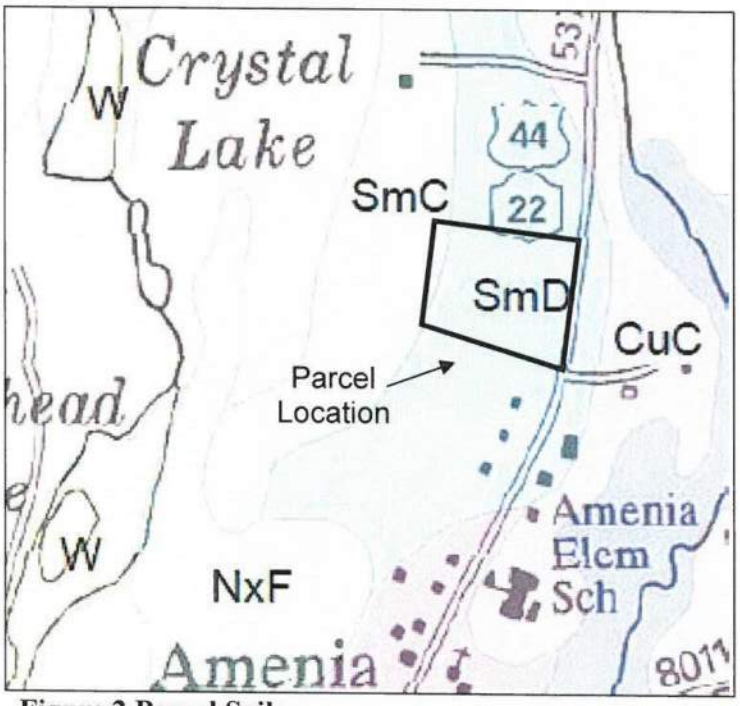


Figure 2 Parcel Soils

Topography

The parcel has an approximate 8% slope toward State Route 22, as shown in Figure 3.

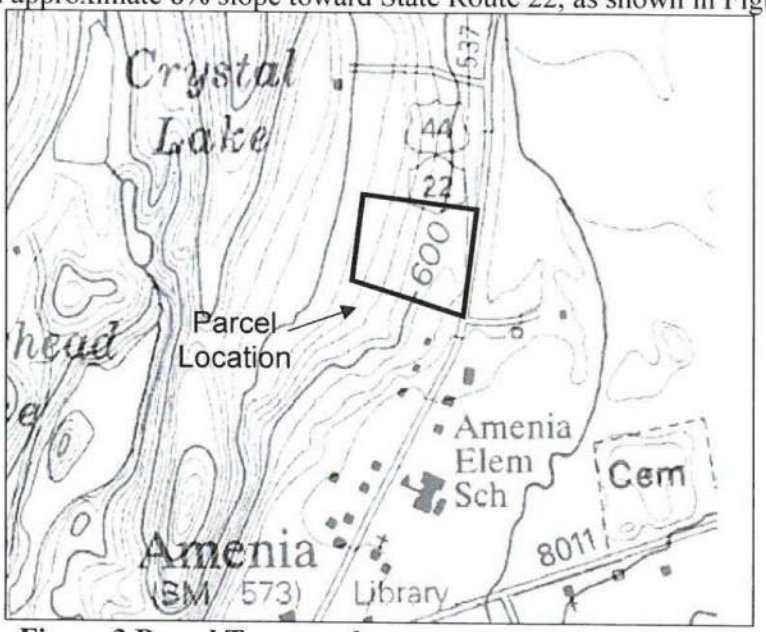


Figure 3 Parcel Topography

Site Investigation

On-site investigation was completed on this parcel on October 11th 2012. The details results of this can be found in Attachment A. In general soils were found to be silty loam with under layers of sandy gravel and the percolation rate was found to be less than 6 minutes per inch in all but one location. In one area a rate of 9 minutes per inch was noted, but given the percolation rates at other areas of the property, we would recommend soil amendment in this area to increase the percolation rate.

Site Capacity
The calculations to determine the disposal capacity of the site are outlined below:

Total Parcel Area:	8.0 acres	
Offset Areas:	1.0 acres	(Includes 10' property line offset per NYSDEC, area for treatment system and treatment system expansion, 20' sideline offset for vehicular access around disposal beds)
Remaining Area:	7.0 acres	
	292,708 sf	
50% Reserve Area:	97,569 sf	(50% of treatment area required for reserve capacity)
Abs. Field Area:	195,139 sf	
Area Width:	620 ft	
Pipe Spacing:	6 ft	(2 ft trenches, 6 ft on center)
Potential Laterals:	103 each	(Area Width / Pipe Spacing)
Avg. Area Length:	315 ft	(Abs. Field Area / Area Width)
Total Lateral Length:	32,445 ft	(Potential Laterals x Avg. Area Length)
Trench Width:	2.0 ft	
Leaching Area:	64,890 sf	(Lateral Length x Trench Width)
Applications Rate:	1.0 gpd/sf	(Based upon percolation rate of 7 min/inch)
Total Area Capacity:	64,890 gpd	
Factor of Safety:	10%	(Provides additional area for manifolds as well)
Treatment Capacity:	**58,000 gpd**	

These calculations are based upon NYSDEC Design Standards for Wastewater Treatment Works, an application rate of 1.0 gallon/day /square foot is appropriate for the fields. The resulting capacity of the parcel is 58,000 gpd. Note this is theoretical capacity of the site based upon the field investigation and standard design assumptions. Actual design may result in a slightly higher or lower capacity depending on field layout and the willingness of NYSDEC to allow fill/soil modification in any area they deviate from the typical conditions encountered during the field investigation.

Subsurface Treatment Layout
If subsurface disposal at parcel 7167-00-186672 can be successfully pursued, then the treatment components will consist of:

- Flow Meter
- Anoxic Tank
- Equalization Tank
- Orenco Advantex Treatment Modules
- Effluent Dosing Pump Station
- Absorption Fields

The preliminary site layout is provided in Figure 4.

Figure 4 Proposed Site Layout

This layout is based upon 24,000 gpd which was presented as the design wastewater flow rate for the hamlet.

Costs

Detailed cost estimates are included as Attachment B. The system capital costs for the collection system are presented in Table 1 below and are in accordance with the methodologies presented in the July 2012 study.

Table 1 Collection System Capital Cost Summary	
Item	Amount
Subtotal (STEP):	$1,455,390
Subtotal (Collection):	$ 460,565
Subtotal Collection System Construction Cost:	$1,915,955
Construction Contingency (10%)	$ 191,595
Collection System Construction Cost:	$2,107,550
(Design Development (30%)	$ 632,265
ROW Easements:	$ 40,000
DCWWA Project Costs (3.65%)	$ 76,926
Project Cost	$2,856,741
Project Contingency (10%)	$ 285,674
Total Project Cost - June 2012	$3,142,415
June 2012 ENR CC Index	9,291
Estimated December 2012 ENR CC Index	9,367
Total Project Cost - December 2012	$3,168,119
ENR Projected Annual CCI Escalation	2.10%
Total Project Cost - December 2014[1]	**$3,302,578**

Note 1: Does not include project financing

This collection system cost is slightly higher than the costs associated with the Town Hall or Beekman Park as the parcel is slightly further from the service area then these two locations.

The following Table 2 provides the capital costs for the subsurface treatment systems utilizing the Orenco Advantex system:

Table 2 Treatment System Capital Cost Summary	
Item	Amount
Subtotal (Treatment)	$ 504,000
Subtotal (Disposal)	$ 120,488
Subtotal Treatment System Construction Cost:	$ 624,488
Construction Contingency (10%)	$ 62,449
Treatment System Construction Cost:	$ 686,488
(Design Development (30%)	$ 206,081
DCWWA Project Costs (3.65%)	$ 25,073
Project Cost	$ 918,090
Project Contingency (10%)	$ 91,809
Total Project Cost - June 2012	$1,009,899
June 2012 ENR CC Index	9,291
Estimated December 2012 ENR CC Index	9,367
Total Project Cost - December 2012	$1,1018,160
ENR Projected Annual CCI Escalation	2.10%
Total Project Cost - December 2014[1]	**$1,061,372**

The following Table 3 provides the total capital costs for the total wastewater system:

Table 3 Subsurface Disposal Capital Cost Summary			
System	Collection System	Treatment & Disposal	Total[1]
Cost	$3,302,578	$1,061,372	**$4,363,950**

Note 1: Does not include project financing

Operation and maintenance costs presented in Table 4, are as described in the July 2012 study.

Table 4 Annual O&M Cost Summary	
Item	Subsurface
Subtotal (Operation)	$ 24,070
Subtotal (Equipment & Materials):	$ 1,580
Subtotal (Contracted Costs):	$ 8,475
Subtotal (Utilities):	$ 2,840
System Operation Cost Subtotal:	$ 36,965
DCWWA Operational Contingency (5%):	$ 1,848
Annual O&M Cost:	**$ 38,813**

Based upon the CWSRF interest rate of 0% and the 30-year loan term, Table 5 presents the debt service required by the capital costs.

Table 5
Annual Debt Service Fees

Item	Cost
Capital Costs	$4,363,950
DSRF & COI Cost (6.5%)	$283,657
Total Financing Capital Costs	$4,647,607
Annual Debt Service (30 yrs @ 0% interest)	$154,920
BA Fee	$2,500
Trustee Fee	$1,750
Total Annual Debt Service Cost	$159,170

The total annual costs including the operation and maintenance costs are presented in Table 6.

Table 6
Combined Annual Costs

Item	Cost
Total Annual Debt Service Cost	$159,170
Annual O&M Cost:	$38,813
Annual Cost Subtotal:	$197,983
DCWWA Administration Cost (9.5%)	$18,808
Total System Annual Cost:	$216,791

By applying the total annual costs developed in Table 6 to the total benefit units calculated in in the July 2012 study the annual cost per benefit unit is calculated as provided in Table 7.

Table 7
Cost per Benefit Unit

Item	Cost
Total System Annual Cost:	$216,791
Service Area Benefit Units:	154.5
Annual Cost per Benefit Unit:	$1,403

It is important to note that these estimates do not include any costs associated with procurement of real property, including the parcel which is the subject of this investigation.

Conclusion

This property appears well suited to provide for subsurface wastewater disposal to the Amenia hamlet. If subsurface disposal is on this parcel is pursued, additional percolation tests and test holes would be recommended to in the proposed absorption field areas.

Attachment A – Parcel Subsurface Investigation
Attachment B – Cost Estimates

File: G:\Projects\3901201\Documents\Kornicki Parcel Study FINAL 11-16-12.doc

ATTACHMENT A
PARCEL SUBSURFACE INVESTIGATION

Development Site: Town of Amenia
Parcel 7167-00-186672
Date: 10/11/2012
Weather Conditions: Sunny

County: Dutchess
Tests Conducted By: Clark E&S PC
EKM/KSG

New York State Department of Health

Test Pit Data

Bureau of water Supply protection

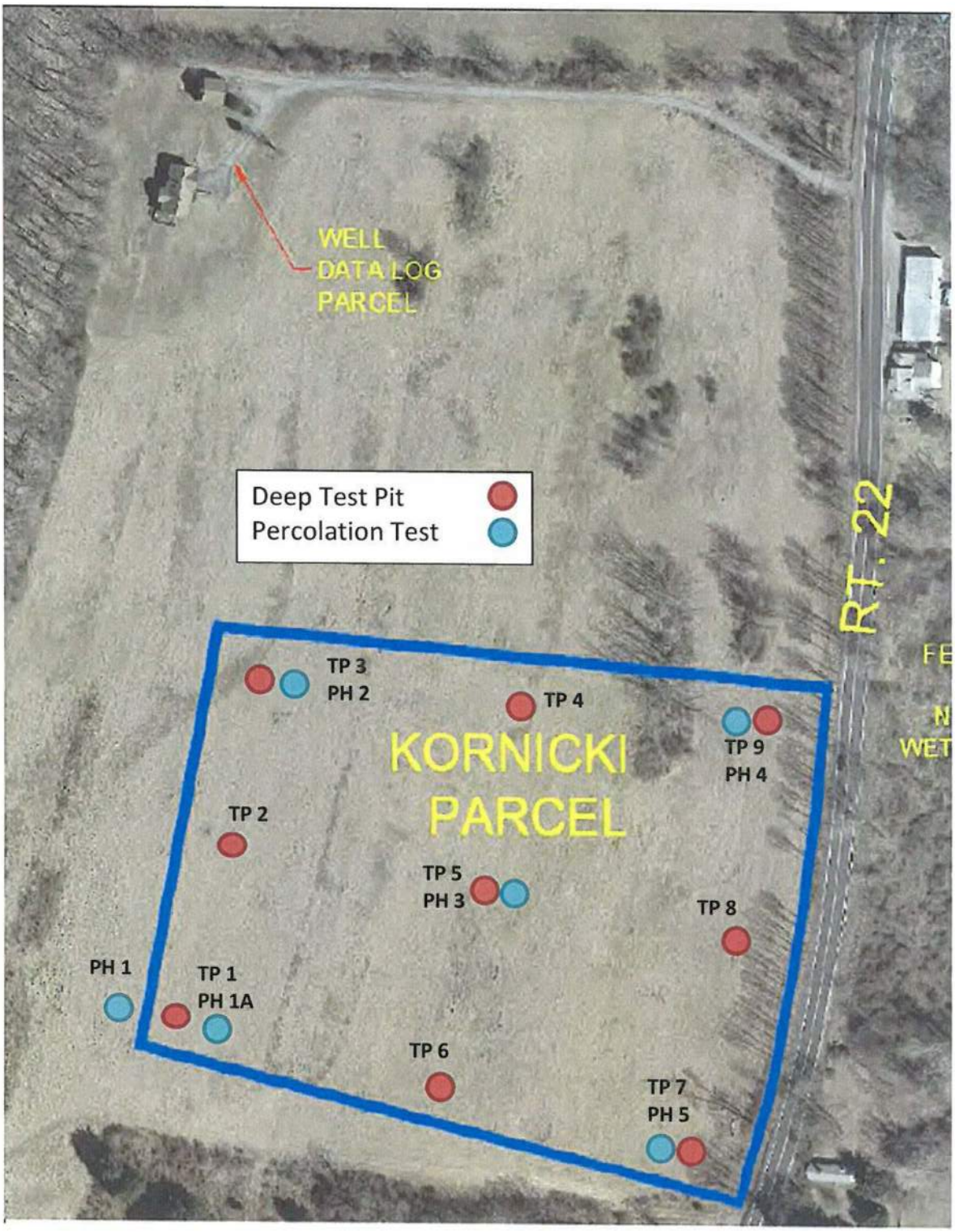
Test Hole No.	Test Hole Depth (inches)	Soil Profile Description and Groundwater Depth (if identified)	Presoaking Date & Time	Time	Percolation Test			
					1	2	3	4
PH1	24"	0"-18" Topsoil with roots 18"-24" Brown silty loam with shale fragments NOTE: This perc. test location is off of the parcel and appears to be on a graded roadway.	10/10/2012	End				
				Begin				
				Result	34 min 13 sec	43 min 25 sec	45 min 32 sec	
TP1 PH1A	73 "	0"-18" Topsoil with roots 18"-48" Brown silty loam 48"-60"Brown medium loam with gravel, some cobbles 60" - 73" Brown sandy gravel with fractured shale fragments increasing with depth 73"+ Fractured Shale No ground water, no mottling	10/10/2012	End				
				Begin				
				Result	2 min 50 sec	3 min 15 sec	3 min 22 sec	3 min 30 sec
TP2	72"	0"-18" Topsoil with roots 18"-36" Brown silty loam w/ some gravel 36"-48" Brown medium loam with gravel, some cobbles 48" - 68" Light brown sandy gravel with fractured shale fragments increasing with depth 68" - 72"+ Fractured Shale No ground water, no mottling	10/10/2012	End				
				Begin				
				Result				
TP3 PH2	76"	0"-18" Topsoil with roots 18"-54" Brown silty loam w/ some gravel 54"-76" Brown grey sandy gravel with fractured shale fragments increasing with depth 68" - 76"+ Fractured Shale No ground water, no mottling	10/10/2012	End				
				Begin				
				Result	4 min 45 sec	5 min 26 sec	5 min 44 sec	
TP4	74"	0"-12" Topsoil with roots 12"-54" Brown silty loam w/ some gravel, cobbles increasing with depth 54"-74" Brown grey sandy gravel No ground water, no mottling	10/10/2012	End				
				Begin				
				Result				
TP5 PH3	72"	0"-18" Topsoil with roots 18"-48" Brown silty clay loam 48"-72"Brown sandy clay loam with gravel No ground water, no mottling	10/10/2012	End				
				Begin				
				Result	7 min 37 sec	9 min 24 sec	9 min 35 sec	

Development Site: Town of Amenia
Parcel 7167-00-186672
Date: 10/11/2012
Weather Conditions: Sunny

County: Dutchess
Tests Conducted By: Clark E&S PC
EKM/KSG

New York State Department of Health
Test Pit Data
Bureau of water Supply protection

TP6	72"	0"-12" Topsoil with roots 12"-42" Brown silty clay loam with fractured shale increasing in depth 48"-72"Brown silty clay loam with gravel and fractured shale No ground water, no mottling	10/10/2012	End				
				Begin				
				Result				
TP7 PH5	74"	0"-24" Topsoil with roots 24"-66" Brown silty clay loam with fractured shale increasing in depth 48"-72"Brown silty clay loam with gravel and fractured shale No ground water, no mottling	10/10/2012	End				
				Begin				
				Result	2 min 43 sec	3 min 8 sec	3 min 12 sec	
TP8	74"	0"-12" Topsoil with roots 12"-74" Brown clean sandy gravel No ground water, no mottling	10/10/2012	End				
				Begin				
				Result				
TP9 PH4	78"	0"-12" Topsoil with roots 12"-74" Brown clean sandy gravel No ground water, no mottling	10/10/2012	End				
				Begin				
				Result	4 min 14 sec	5 min 17 sec	5 min 31 sec	


WELL
DATA LOG
PARCEL
Deep Test Pit
Percolation Test
RT. 22
KORNICKI
PARCEL
TP 3
PH 2
TP 4
TP 9
PH 4
TP 2
TP 5
PH 3
TP 8
PH 1
TP 1
PH 1A
TP 6
TP 7
PH 5

ATTACHMENT B
COST ESTIMATE

Amenia Wastewater Feasibility Study
Construction Cost Estimate - Collection System

Item	Unit	Est. Qty	Unit $	Amount
STEP (septic tank pump effluent system)				
Septic tank, pumps, complete (Single Family)	EA	75	$ 13,000	$ 975,000
Septic tank, pumps, complete (Large Commercial)	EA	6	$ 25,000	$ 150,000
HDPE Serivce Lateral	LF	8,500	$ 28	$ 238,000
Abandon Existing Tanks	EA	100	$ 500	$ 50,000
Mobilization/Demobilization	LS	1	3.0%	$ 42,390
Subtotal (STEP):				$ 1,455,390
Collection				
2"/3" HDPE Forcemain				
Route 22	LF	3600	$ 35	$ 126,000
Route 343	LF	2200	$ 35	$ 77,000
Route 44	LF	1000	$ 35	$ 35,000
Mechanic Street	LF	900	$ 35	$ 31,500
Broadway	LF	900	$ 35	$ 31,500
Morton	LF	0	$ 35	$ -
Additional To Treatment System	LF	800	$ 38	$ 30,400
Air Release	EA	6	$ 3,000	$ 18,000
Cleanouts	EA	25	$ 2,000	$ 50,000
Pavement Repair	SY	70	$ 25	$ 1,750
NYSDOT Crossing	EA	2	$ 3,000	$ 6,000
Lawn Restoration	SY	5000	$ 6	$ 30,000
Driveway/Parking Lot Restoration	SY	500	$ 20	$ 10,000
Mobilization/Demobilization	LS	1	3.0%	$ 13,415
Subtotal (Collection):				$ 460,565
Subtotal Collection System Construction Cost:				$ 1,915,955
Construction Contingency (10%)				$ 191,595
Collection System Construction Cost:				**$ 2,107,550**
(Design Development (30%)				$ 632,265
(includes survey, subsurface tests, engineering, legal, construction admin., construction inspection)				
ROW Easements:	SF	80000	$ 0.5	$ 40,000
(Utility easement cost for mainlines only - no easement value for services or tanks)				
DCWWA Project Costs (3.65%)				$ 76,926
Project Cost				$ 2,856,741
Project Contingency (10%)				$ 285,674
Total Project Cost - June 2012				**$ 3,142,415**
June 2012 ENR CC Index				9,291
Estimated December 2012 ENR CC Index				9,367
Total Project Cost - December 2012				$ 3,168,119
ENR Projected Annual CCI Escalation				2.10%
Total Project Cost - December 2014				**$ 3,302,578**

Amenia Wastewater Feasibility Study
Construction Cost Estimate - Subsurface Treatment - Advantex

Item	Unit	Est. Qty	Unit $	Amount
Advantex Wastewater Treatment				
AdvanTex Treatment Units	EA	9	$ 22,500	$ 202,500
Anoxic Tank	EA	1	$ 85,000	$ 85,000
Recirculation Tank	EA	1	$ 97,000	$ 97,000
Discharge Pump Station	EA	1	$ 25,000	$ 25,000
Discharge Flout	EA	1	$ 8,000	$ 8,000
Control Shed	SF	100	$ 25	$ 2,500
Flow Meter	EA	1	$ 5,000	$ 5,000
Instrumentation & Control	LS	1	$ 5,000	$ 5,000
Electrical Improvements	LS	1	$ 10,000	$ 10,000
Misc. Site Improvement - Fence, Access Road	LS	1	$ 40,000	$ 40,000
Mobilization/Demobilization	LS	1	5.0%	$ 24,000
Subtotal (Treatment)				**$ 504,000**
Subsurface Discharge				
4" Preforated PVC Pipe	LF	12000	$ 5	$ 60,000
4"" PVC Pipe	LF	500	$ 5	$ 2,500
Filter Fabric	SY	2000	$ 2	$ 3,000
Excavation	CY	1200	$ 5	$ 6,000
Washed Stone Borrow	CY	550	$ 30	$ 16,500
Backfill	CY	550	$ 5	$ 2,750
Distribution Boxes	EA	12	$ 250	$ 3,000
Grading & Seeding	SY	4200	$ 5	$ 21,000
Mobilization/Demobilization	LS	1	5.0%	$ 5,738
Subtotal (Disposal)				**$ 120,488**
Subtotal Treatment System Construction Cost:				$ 624,488
Construction Contingency (10%)				$ 62,449
Treatment System Construction Cost:				**$ 686,936**
(Design Development (30%)				$ 206,081
(includes survey, subsurface tests, engineering, legal, construction admin., construction inspection)				
DCWWA Project Costs (3.65%)				$ 25,073
Project Cost[1]				$ 918,090
Project Contingency (10%)				$ 91,809
Total Project Cost - June 2012				**$ 1,009,899**
June 2012 ENR CC Index				9,291
Estimated December 2012 ENR CC Index				9,367
Total Project Cost - December 2012				$ 1,018,160
ENR Projected Annual CCI Escalation				2.10%
Total Project Cost - December 2014				**$ 1,061,372**

Note 1: The Project Cost does not include any costs associated with procurement of real property, including the parcel which is the subjuct of this investigation.

Amenia Wastewater Feasibility Study
Annual O&M Cost Estimate - Subsurface Disposal

Item	Unit	Est. Qty	Unit $	Amount
Operator				
Regular Labor - 4 hrs per week @ $75 per hour	Week	52	$ 300	$ 15,600.00
(Assumes operator carring own insurance and				
overhead, reduce cost if Owner covering)				
Emergency Labor	Hr	12	$ 100	$ 1,200
Landscape Labor - 1 hr per week @ $25 per hour	Week	52	$ 25	$ 1,300
Administration, Billing, & Accounting	LS	1	$ 5,895	$ 5,895
Permitting Fees	LS	1	$ 75	$ 75
Subtotal (Operator):				$ 24,070
Equipment & Materials				
pH Meter - Assume every 5 years	Year	0.2	$ 300	$ 60
pH Meter - Calibration Solution	Year	1	$ 40	$ 40
Flow Meter Calibration	Year	1	$ 100	$ 100
Air Release Valve Seals	Year	1	$ 50	$ 50
Distribution Valve Seals	Year	4	$ 50	$ 200
Septic Tank Lid	Year	2	$ 40	$ 80
Pump Replacement - Assume every 1 per year	Year	1	$ 1,000	$ 1,000
Building Maintenance Supplies	Year	1	$ 50	$ 50
Subtotal (E&M):				$ 1,580
Contracted Costs				
Laboratory Testing - Nitrate - Quarterly	EA	4	$ 50	$ 200
Septic Tank Pumping	Year	22	$ 300	$ 6,600
Anoxic Tank Pumping	Year	0.125	$ 3,000	$ 375
Insurance	LS	1	$ 800	$ 800
Legal	LS	1	$ 200	$ 200
Engineering	LS	1	$ 300	$ 300
Subtotal (Contract):				$ 8,475
Utilities				
Electricty @ 70/kWh/day	kWh	25550	$ 0.09	$ 2,300
(Rate adjusted to include standard charge items)				
Telephone Service	Month	12	$ 45	$ 540
Subtotal (Utility):				$ 2,840
Annual O&M Cost:				**$ 36,965**
DCWWA Operational Contingency (5%):				$ 1,848
Total Annual O&M Costs:				**$ 38,813**

Tighe&Bond

APPENDIX H

Ovivo ecoBLOX

Membrane Bioreactor System

SiCBLOX™

SYSTEMS

LIMITLESS POSSIBILITIES

OVIVO

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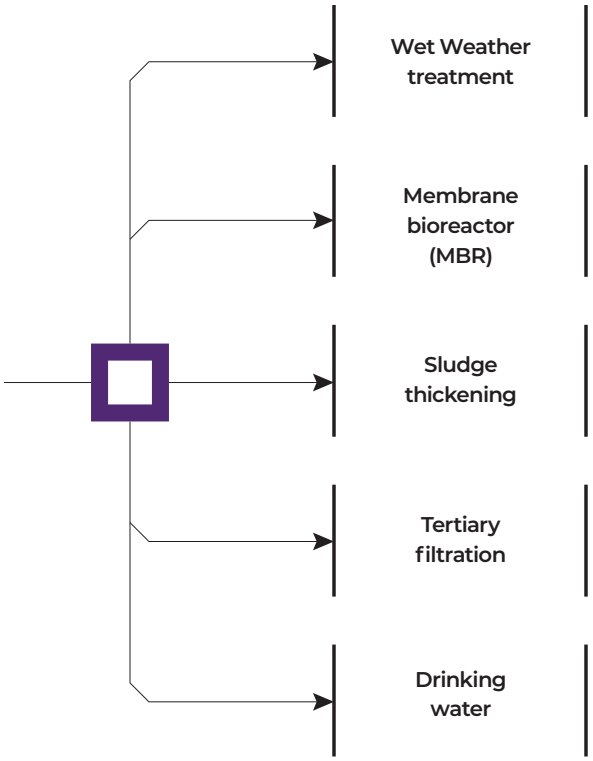
WHERE IS SiC USED?

SiC IS USED IN A WIDE VARIETY OF WATER AND WASTEWATER APPLICATIONS IN BOTH MUNICIPAL AND INDUSTRIAL SECTORS. IT'S PRIMARY GOAL IS TO REMOVE SOLIDS, TOXIC POLLUTANTS, AND PATHOGENS, CREATING A SAFE, CLEAN, AND SUSTAINABLE WATER SOURCE.

SiC is used in applications such as



SiCBLOX™ SYSTEMS

All too often all of the focus is placed on the membrane, portraying it as a black box that is independent of its surroundings. The reality is that membranes are one of many subsystems that go into any water or wastewater treatment plant. While the membranes are often the workhorse of a treatment system, they can only be successful if the rest of the system is designed properly.

The combination of Cembrane SiC Technology with Ovivo's system integration and process expertise have created a powerful new brand of treatment systems: SiC BLOX Systems. SiC BLOX Systems have the widest range of applications with the widest operating window to solve new and existing problems.

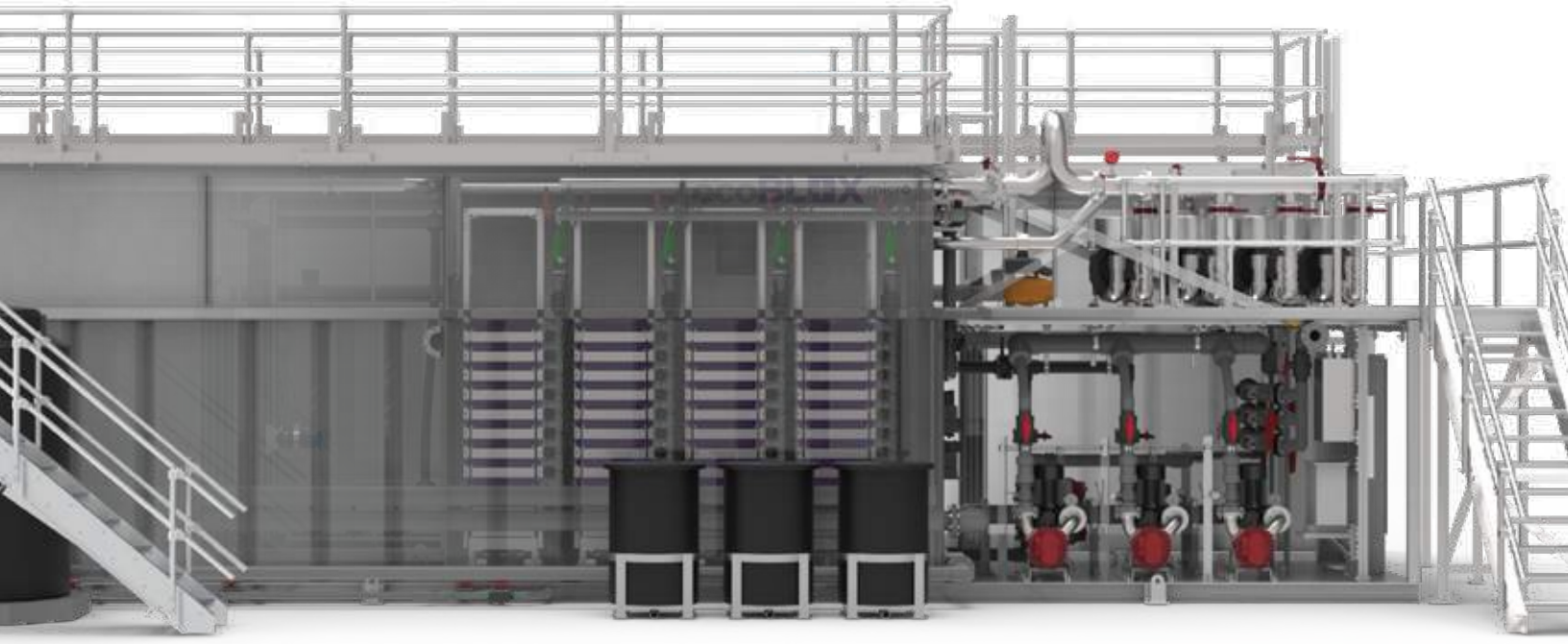
SiC Blox systems come in conventional, in-ground designs, packaged plants ("micro"), and mobile configurations ("remote").

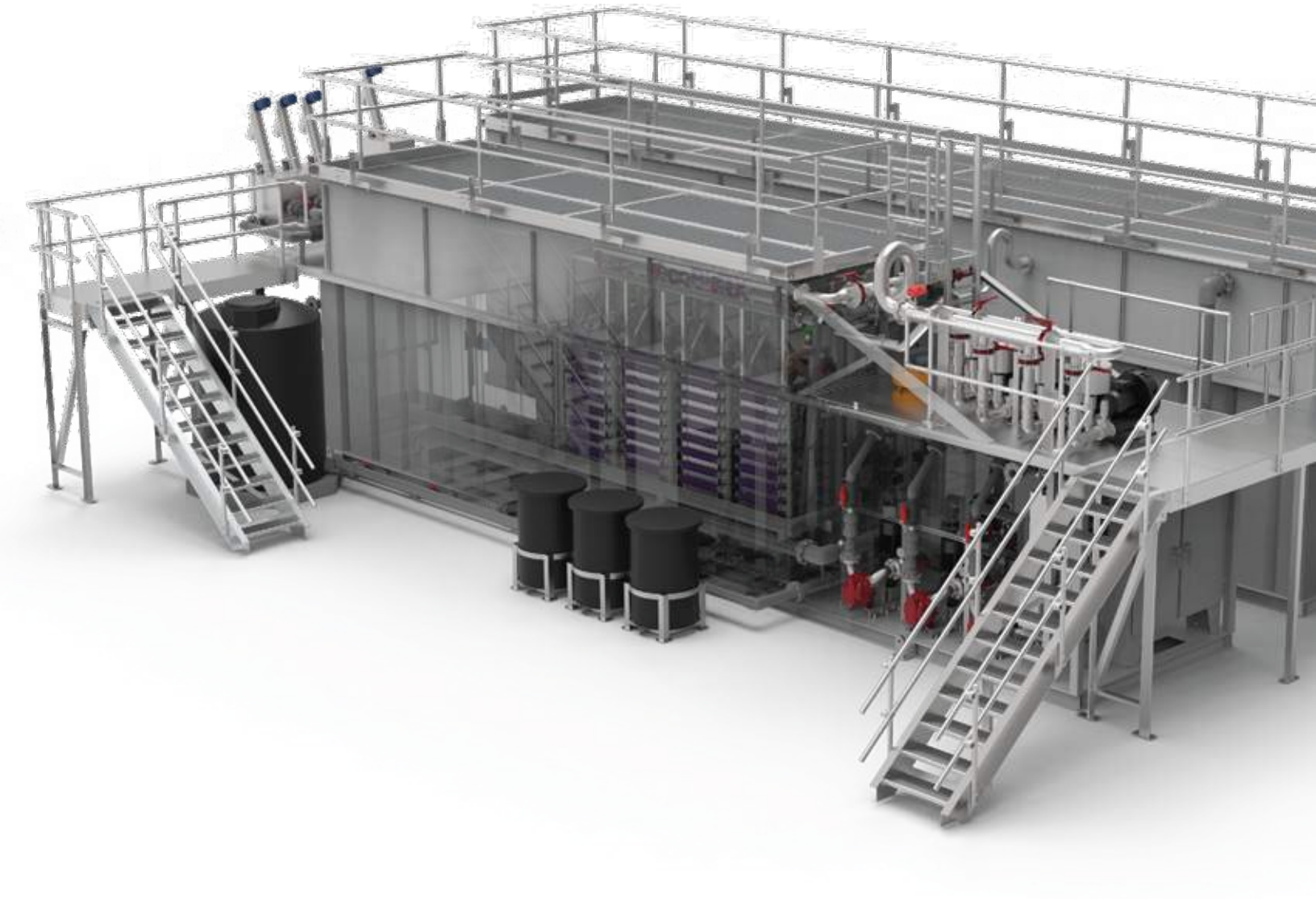
ecoBLOX®

SiC MEMBRANE BIOREACTOR

MBRs are a fantastic technology that we need – it provides a level of wastewater treatment that no other technology can, but they sometimes face operational challenges or difficulties. Let's remember that membranes in an MBR are in a turbulent, high mixed liquor, high fouling environment which can place tremendous stress on any membrane. ecoBLOX systems can endure and withstand the stresses of an MBR environment by utilizing membranes that are a rock!

ecoBLOX systems are truly resilient. ecoBLOX systems have the widest operational window meaning they can adapt, without failure, to changes in process conditions. This ability to adapt ensures smooth operation, long membrane life, and low life cycles costs. ecoBLOX plants are also a great fit for installations with seasonal flow, like ski resorts, where temporarily shutting down the system for an extended period of time makes sense.





ecoBLOX IS USED IN THE FOLLOWING MARKETS:

- Replacement of struggling or failing MBR plants
- Retrofit of CAS plants
- Greenfield plants
- Packaged plants

BENEFITS OF ecoBLOX:

- Increase capacity of existing MBR plants
- 100% recoverability
- Widest operating window
- Membrane life is decoupled from chemical cleaning
- Easy to operate and maintain
- They can be easily placed offline with no special preservation

WHY ecoBLOX?

MBRs are a fantastic technology that we need. It provides a level of wastewater treatment that no other technology can, but they sometimes face operational challenges or difficulties. Let's remember that membranes in an MBR are in a turbulent, high mixed liquor, high fouling environment which can place tremendous stress on any membrane. **ecoBLOX® systems are able to endure and withstand the stresses of an MBR environment** by utilizing membranes that are a rock!

ecoBLOX systems are truly resilient. ecoBLOX systems have the widest operational window meaning they can adapt, without failure, to changes in process conditions. This ability to adapt ensures smooth operation, long membrane life, and low life cycle costs. ecoBLOX plants are also a great fit for installations with seasonal flow like ski resorts, parks and schools where shutting down the system for an extended period of time makes sense.

Eco-friendly, sustainable system is in our name. It is not just a buzz word, it's the truth. **Silicon Carbide (SiC) ceramic membranes are made from sand** extracted from the North Sea and combined with carbon to create the SiC powder used to manufacture membranes. Eco-friendly materials, our manufacturing process and resilient membranes leading to long life are the basis of this truth.

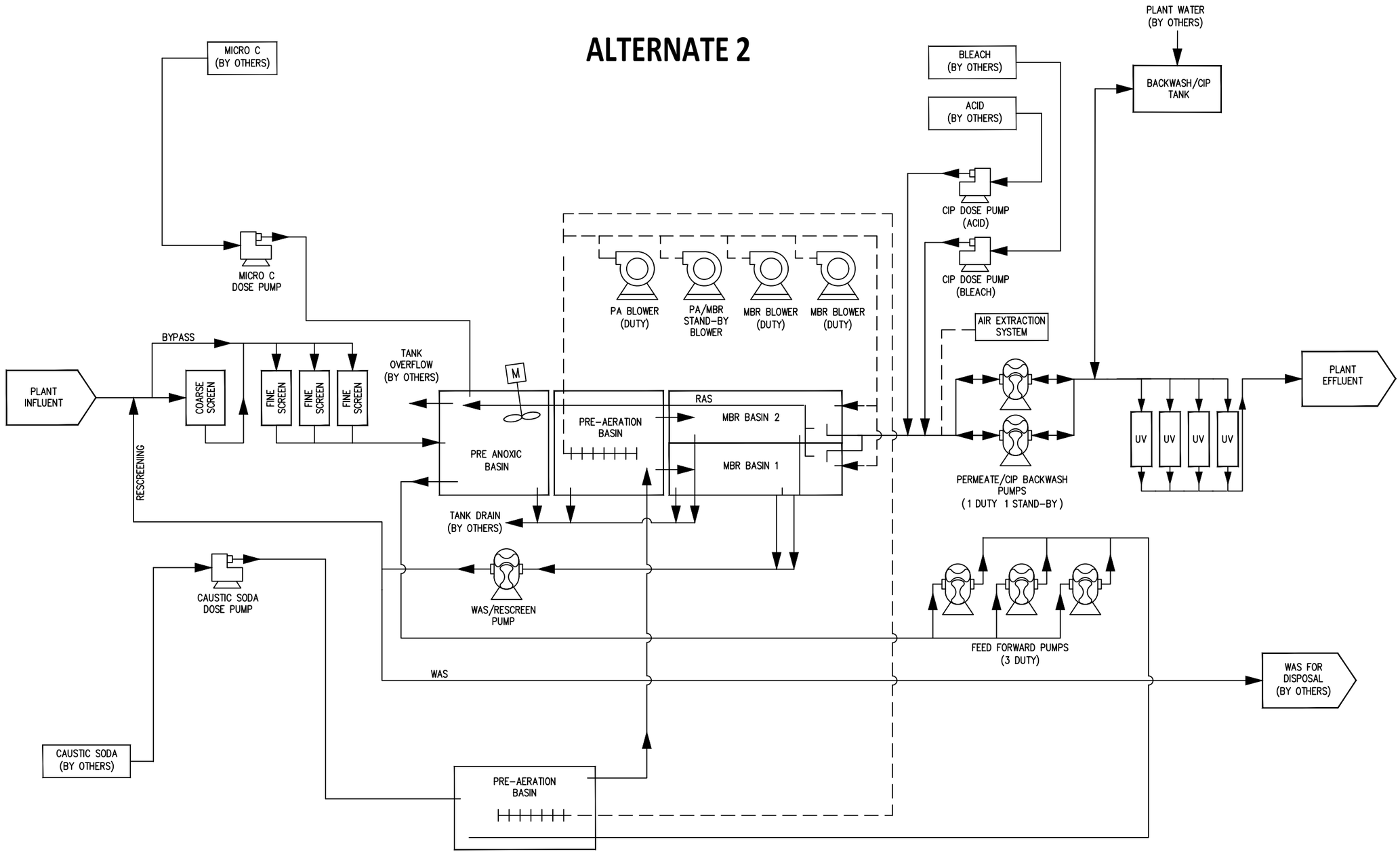
So …. What does + represent?

The symbol plus embodies an integration of multiple components and processes necessary for a MBR system. **SiC membranes + experience + process design + product integration** and so on.

We also believe in the importance of BioHydraulics which is a symbiotic basis of system operational sustainability. The pillars include **Membrane Filtration + Plant Hydraulics + Biological Process**.

To finish out the symbolism, a collaborative effort between **Ovivo + Operator + Engineer + Rep + Contractor + Regulator** will result in a technological advanced and sustainable facility.

ALTERNATE 2



REVISION	EN	BY	CHECK'D	DATE
INITIAL RELEASE				

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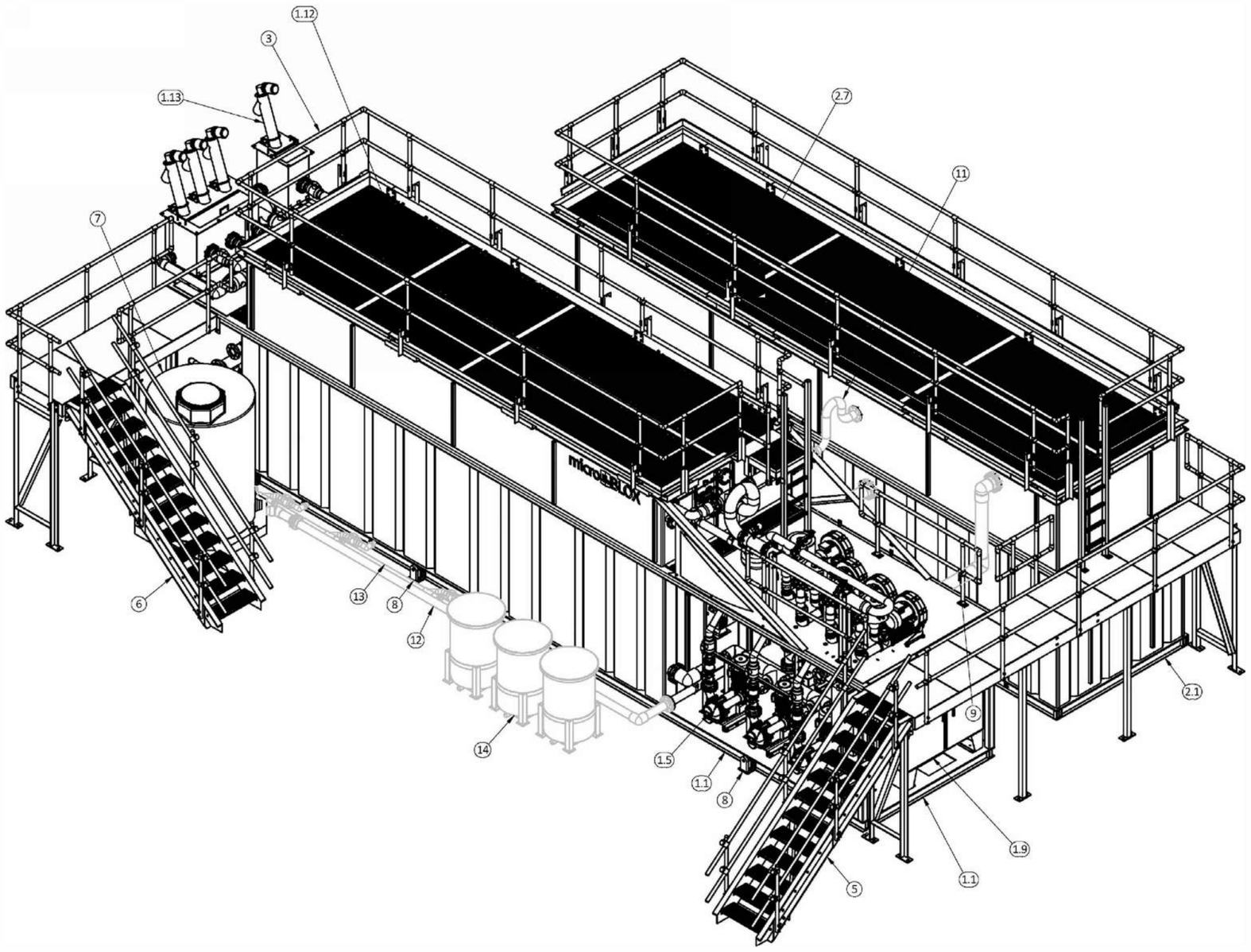
Worldwide Experts in Water Treatment

PFD

DATE	08/17/2020	BY	SMD	CHECK'D	PB
DWG SCALE	NONE				
JOB NUMBER	PFD-4Z-T				
SHEET	1 OF 1				

ALTERNATE 2



ISOMETRIC VIEW

ITEM	QTY	DESCRIPTION	MATERIAL	TOTAL WEIGHT
1	1	AS SHIPPED PROCESS TANK ASSEMBLY		46192.2
1.1	1	TANK,MB,V3,45FT,4Z,FULL BUILD	CS	30095.2
1.2	1	SiC MEMBRANE ASSEMBLY		3129.0
1.3	1	PERMEATE PUMP ASSEMBLY		924.8
1.4	1	UV ASSEMBLY		233.8
1.5	1	TRANSFER PUMP ASSEMBLY		846.9
1.6	1	BLOWERS ASSEMBLY		1607.0
1.7	1	WAS PUMP ASSEMBLY		266.2
1.8	2	MIXER ASSEMBLY		266.5
1.9	1	CONTROL PANEL		2000.0
1.10	1	TRANSFORMER ASSEMBLY		880.2
1.11	1	CHEMICAL DOSING PUMPS ASSEMBLY		92.6
1.12	1	TANK TOP COVER GRATINGS		815.5
1.13	1	FINE SCREEN ASSEMBLY		1229.0
1.14	1	AUTOMATED AIR EXTRACTION SYSTEM		4.6
1.14	1	AIR COMPRESSOR,6 GAL,150PSI MAX, 2.6SCFM	Generic	41.7
2	1	AS SHIPPED SUPPLEMENTAL TANK ASSEMBLY		33742.8
2.1	1	45 FT SUPPLEMENTAL TANK WELDMENT	CS	31580.5
2.2	2	AEROSTRIP ASSEMBLY		394.0
2.3	1	AEROSTRIP ASSEMBLY		156.1
2.4	1	MIXER ASSEMBLY		133.3
2.5	3	FEED ISOLATION VALVE		89.0
2.6	1	ZONE ISOLATION VALVE		26.2
2.7	1	TANK TOP COVER GRATINGS		1341.0
2.8	4	BYPASS LINE FLEXIBLE CAP		2.0
3	1	MAIN TANK TOP HANDRAILING		364.5
4	1	SUPPLEMENTAL TANK TOP HANDRAILING		541.2
4	1	COVER MOUNT CHANNEL		444.0
5	1	STAIRS ASSEMBLY - LARGE PORCH		1295.0
6	1	STAIRS ASSEMBLY - SMALL PORCH		994.7
7	1	MAINTENANCE CLEAN / BACKWASH TANK		2440.0
8	16	LIFTING LUG		566.6
9	1	EQ CONNECTION PIPE HEADER (BY OTHERS)		77.1
10	1	WAS CONNECTION PIPE HEADER (BY OTHERS)		54.9
11	1	BLOWER-PA CONNECTION PIPE HEADER (BY OTHERS)		55.0
12	1	BACKWASH PIPING (NOT BY OVIVO)		82.5
13	1	MAIN TANK DRAIN PIPING (BY OTHERS)		55.6
14	1	CHEMICAL DOSING TANKS (BY OTHERS)		323.8

CONCEPTUAL ONLY
NOT FOR CONSTRUCTION

NOTES:

1. ALL DIMENSIONS ARE ± 1/16.
2. DIMENSIONS WITHIN ( ) ARE FOR Q.C. / REFERENCE ONLY.
3. INTERCONNECTING PIPING PROVIDED BY OTHERS.

INITIAL RELEASE					A
REVISION DESCRIPTION	EN/ECO	BY	CHECK'D	DATE	REV

D — THIRD ANGLE PROJECTION

REF. FROM		DO NOT SCALE PRINTS
DATE mm/dd/yyyy	3/2/2021	WORKMANSHIP STANDARD ES9001 APPLIES
DRAWN	MCS	ORIGINAL S.O.
CHECK'D		

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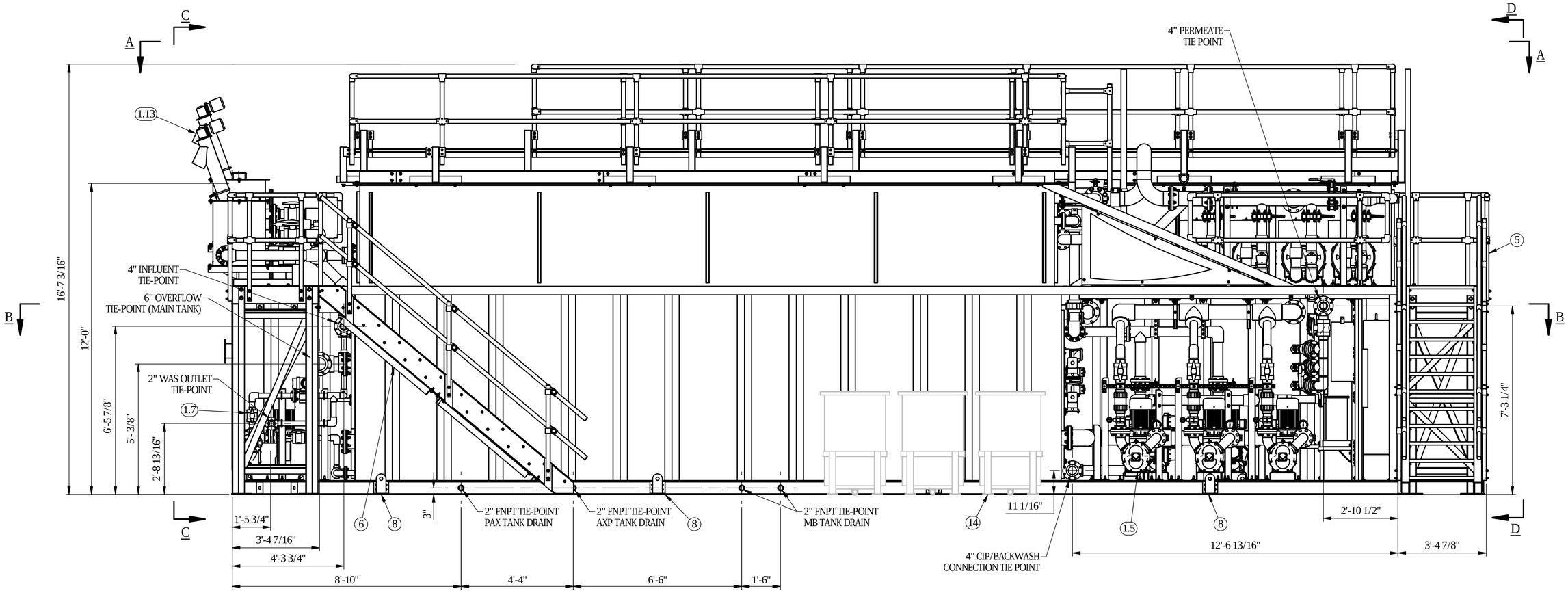
LAYOUT
GENERAL ARRANGEMENT

DWG. NO.	4ZT microBLOX	SHEET 1 OF 6	REV A

ALTERNATE 2



ELEVATION

(BACKWASH TANK AND INTERCONNECTING PIPES NOT SHOWN FOR CLARITY)

CONCEPTUAL ONLY
NOT FOR CONSTRUCTION

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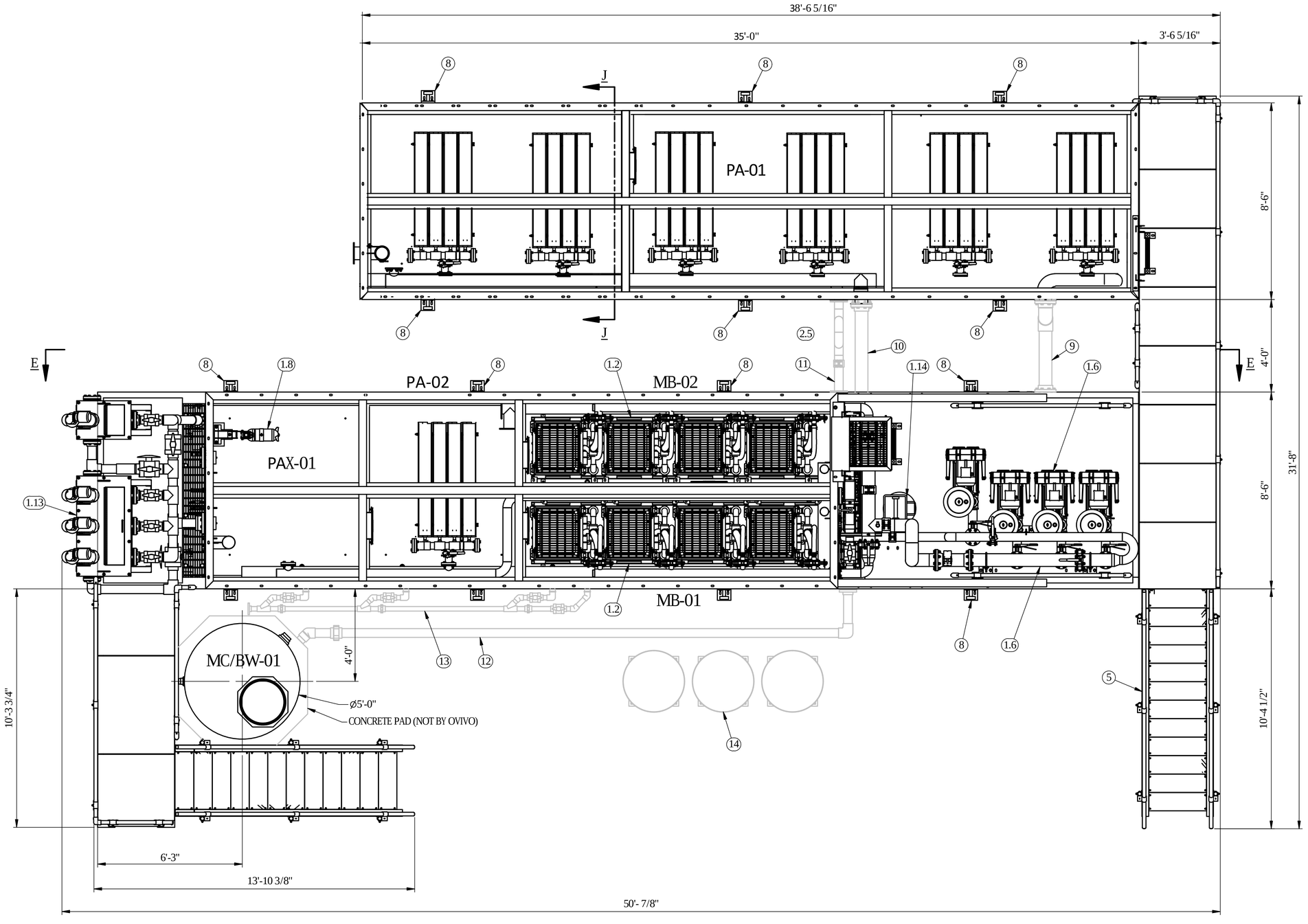
D	DO NOT SCALE PRINTS	DWG. NO.	4ZT microBLOX	SHEET 2 OF 6	REV A

WORKMANSHIP STANDARD ES0001 APPLIES

ALTERNATE 2



VIEW A-A
(PLAN)
(COVERS NOT SHOWN FOR CLARITY)

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D

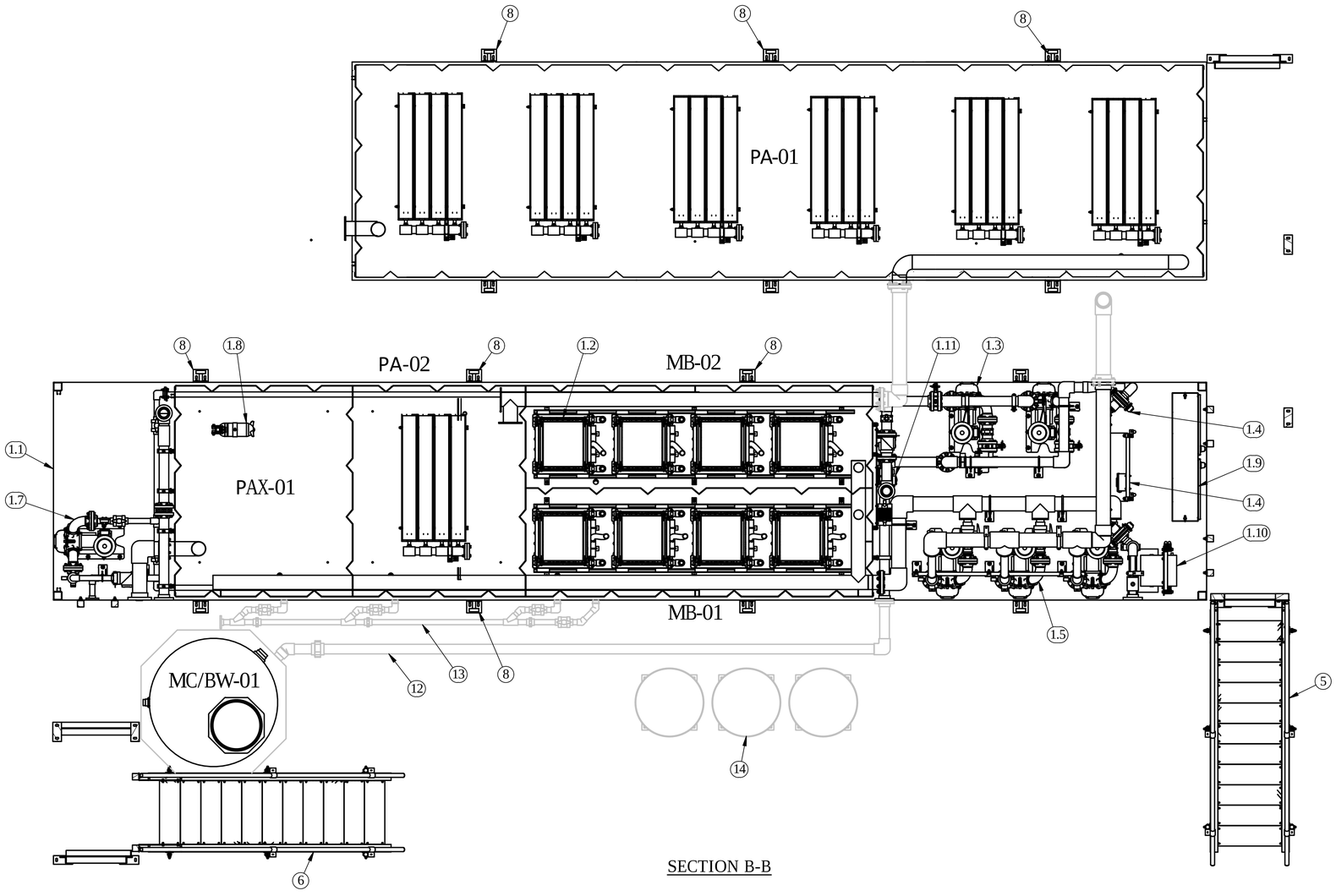
DO NOT SCALE PRINTS
WORKMANSHIP STANDARD ES0001 APPLIES

DWG. NO. 4ZT microBLOX

SHEET 3 OF 6

REV A

ALTERNATE 2



SECTION B-B

CONCEPTUAL ONLY
NOT FOR CONSTRUCTION

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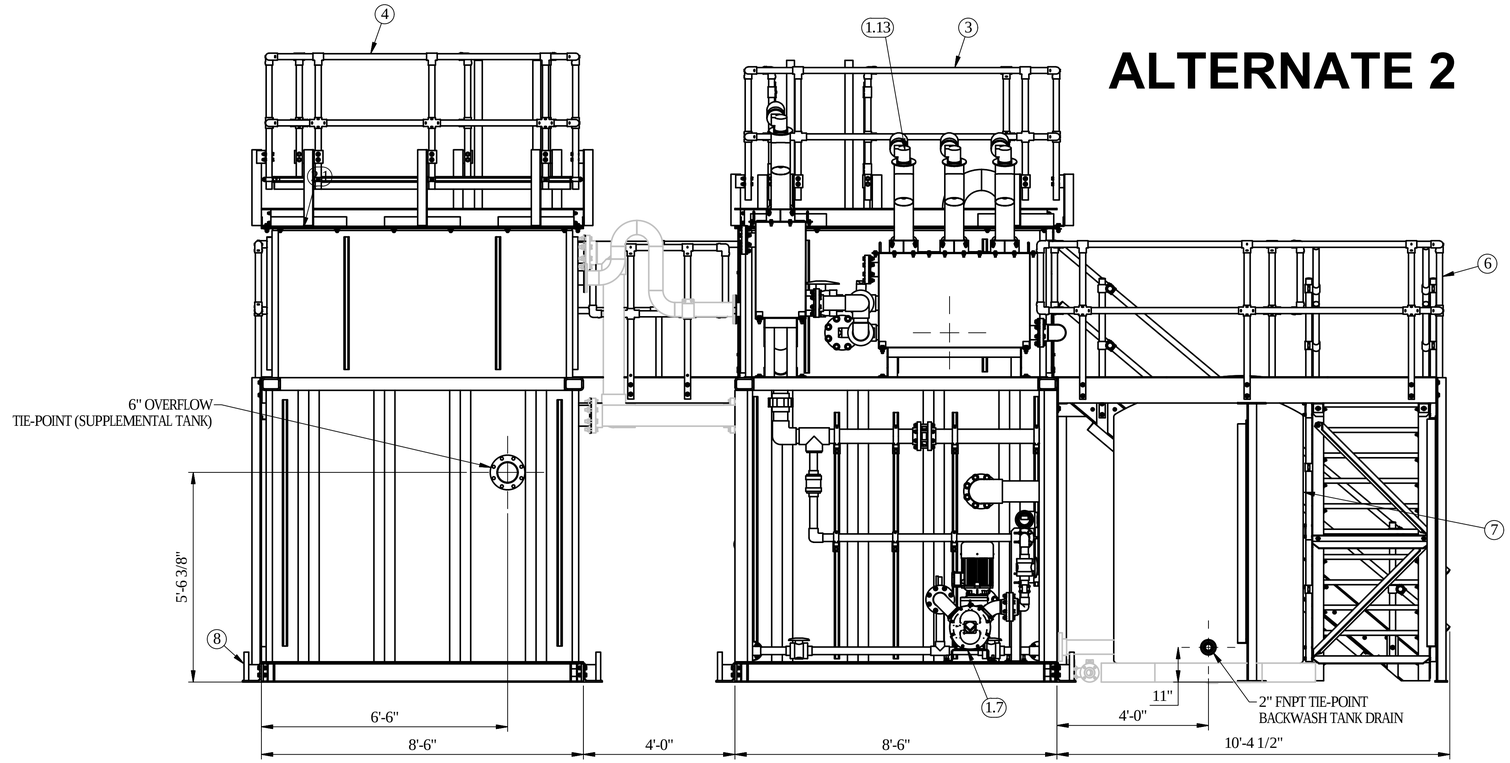
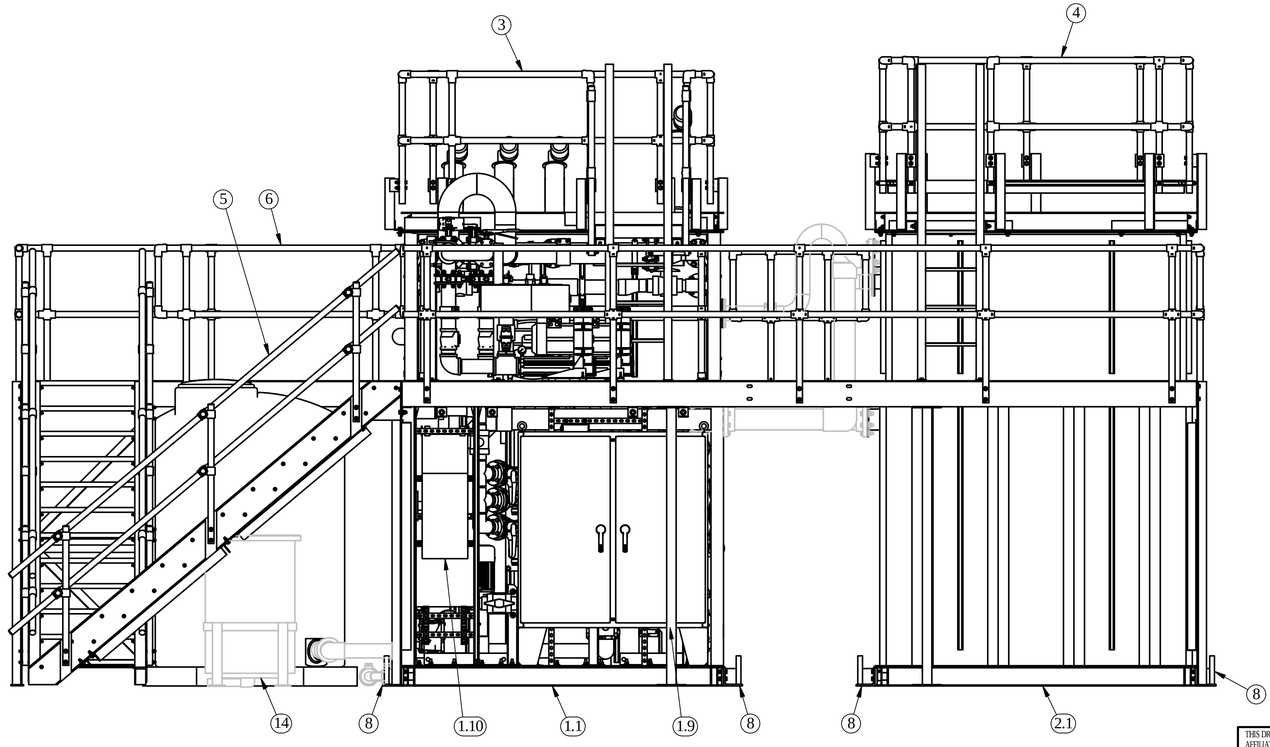
D	DO NOT SCALE PRINTS	DWG. NO.	4ZT microBLOX	SHEET 4 OF 6	REV A

WORKMANSHIP STANDARD ES0001 APPLIES

ALTERNATE 2



VIEW C-C



VIEW D-D
(NO TIE POINT THIS END)

CONCEPTUAL ONLY
NOT FOR CONSTRUCTION

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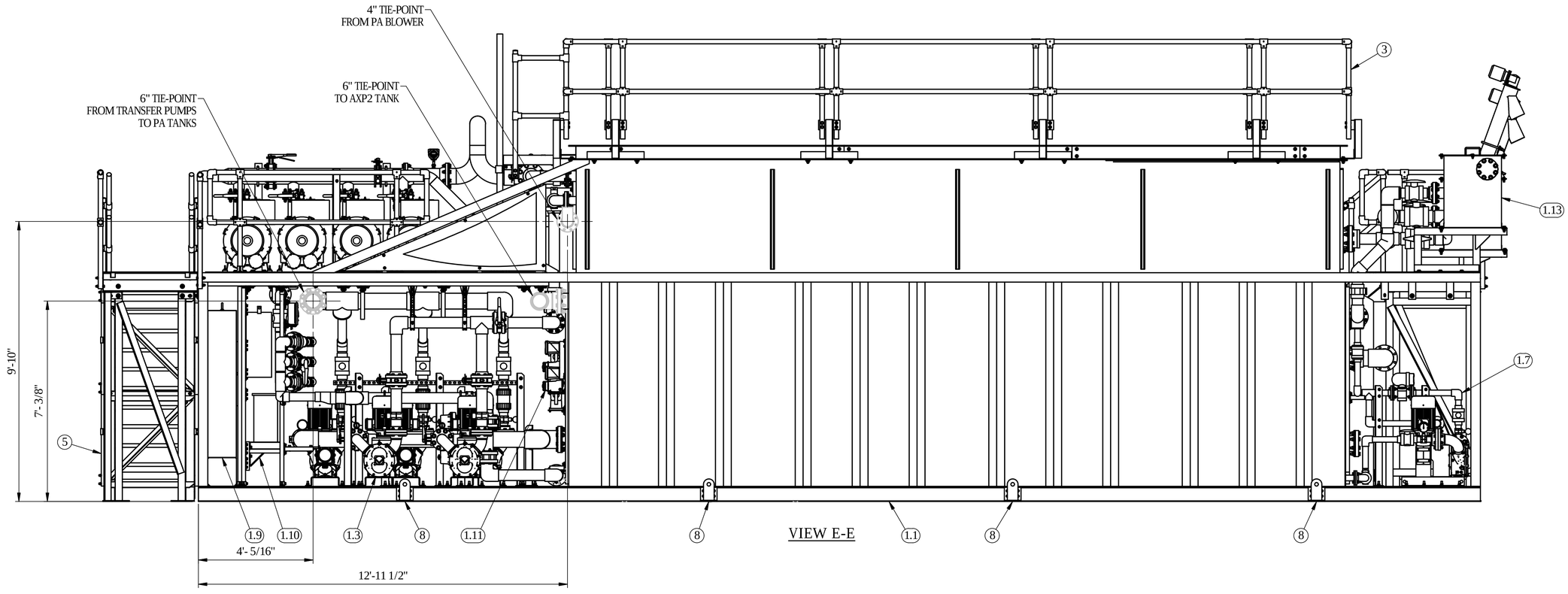
Worldwide Experts in Water Treatment

D		DO NOT SCALE PRINTS	DWG. NO.	4ZT microBLOX	SHEET 5 OF 6	REV A

WORKMANSHIP STANDARD ES0001 APPLIES

ALTERNATE 2



VIEW E-E

CONCEPTUAL ONLY
NOT FOR CONSTRUCTION

OVIVO
Worldwide Experts in Water Treatment

D	DO NOT SCALE PRINTS	DWG. NO.	4ZT microBLOX	SHEET 6 OF 6	REV A

WORKMANSHIP STANDARD ES0001 APPLIES

AquaPoint AquaCELL
Moving Bed Biofilm Reactor System

AQUAPOINT
Advanced Wastewater Treatment Systems & Services


Biofilm Carriers

AQUACELL™ Wastewater Treatment Systems

Features & Benefits

- Treats Flows From 0.001 to 10 MGD
- Fixed-Film Process
- Small Footprint / Compact Design
- Cost Effective Plant Upgrades / Retrofits
- Modular Pre-constructed Systems
- Durable UV Resistant HDPE Biofilm Carriers
- Cold Climate Nitrification / Denitrification
- Minimal Sludge Generation
- Expandable & Flexible Design Arrangements
- Minimal O&M Requirements
- Fully Automated Systems
- Remote Monitoring Control Options

The AquaCELL Advantage

AquaCELL is a state of the art fixed-film moving bed biofilm reactor (MBBR) in which thousands of submerged polyethylene (HDPE) biofilm carriers operate in motion within an aerated or mechanically mixed basin. Each carrier element incorporates multiple protected cells with significant surface area to sustain a dense community of attached growth microorganisms. As the neutrally buoyant carriers move throughout the water column, oxygen and organic/inorganic material is available to the biofilm which absorbs, oxidizes and reduces the pollutants thus providing treatment. The dense population of bacteria provides high-rate productivity, enhanced nitrification/denitrification, process stability, small footprint and ease of operation.

Simple Operation

In attached growth MBBR systems, the bacteria in the biofilm is self-regulating and produces minimal sludge. These characteristics eliminate the need to actively manage mixed liquor suspended solids (MLSS), food to microorganism (F/M) ratios and return activated sludge (RAS). The result is a one pass treatment process that is easy to operate and highly reliable.

New Construction and Upgrades

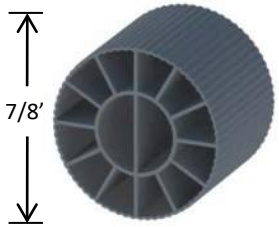
AquaCELL treatment systems are available in a variety of materials and tank geometries. Reactors can be constructed of stainless, epoxy coated carbon steel, fiberglass or concrete and can be installed above ground or below grade.

Aquapoint systems are pre-engineered and pre-constructed or custom designed to fit the specific requirements of your site. Additionally, AquaCELL can be designed to fit within the chambers of an existing plant making it a cost effective solution for capacity and/or performance upgrades.

Applications Include:

Residential, industrial and high strength waste streams - roughing reactors – nitrification & denitrification - retrofits and upgrades - sites with limited space and/or aesthetic concerns - sites requiring little operational oversight.

AQUACELL™

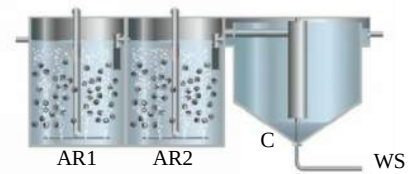


AquaCELL Biofilm Carriers are constructed of UV resistant HDPE plastic giving them durability and a long life span regardless of the application. Their neutral buoyancy is critical to effective mixing within a reactor and ultimately provides an increase in treatment efficiency. Each carrier has a large internal protected surface area for biological growth. The apertures are engineered to allow for adequate scouring velocities and sloughing before biological plugging occurs.

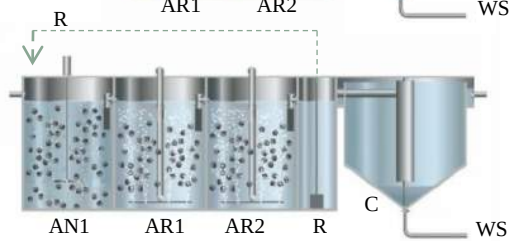
AquaCELL Design Configurations

Legend:

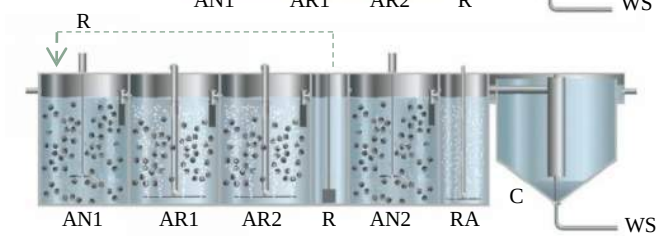
AN1 + AN2 = Anoxic
AR1 + AR2 = Aerobic
R = Recycle
RA = Re-Aeration
C = Clarifier
WS = Waste Sludge



AquaCELL (AER)
< 20 mg/l BOD
< 20 mg/l TSS
< 0.5 mg/l NH_3-N



AquaCELL (MLE)
< 20 mg/l BOD
< 20 mg/l TSS
< 0.5 mg/l NH_3-N
< 10 mg/l TN



AquaCELL (ENR)
< 20 mg/l BOD
< 20 mg/l TSS
< 0.5 mg/l NH_3-N
< 3 mg/l TN



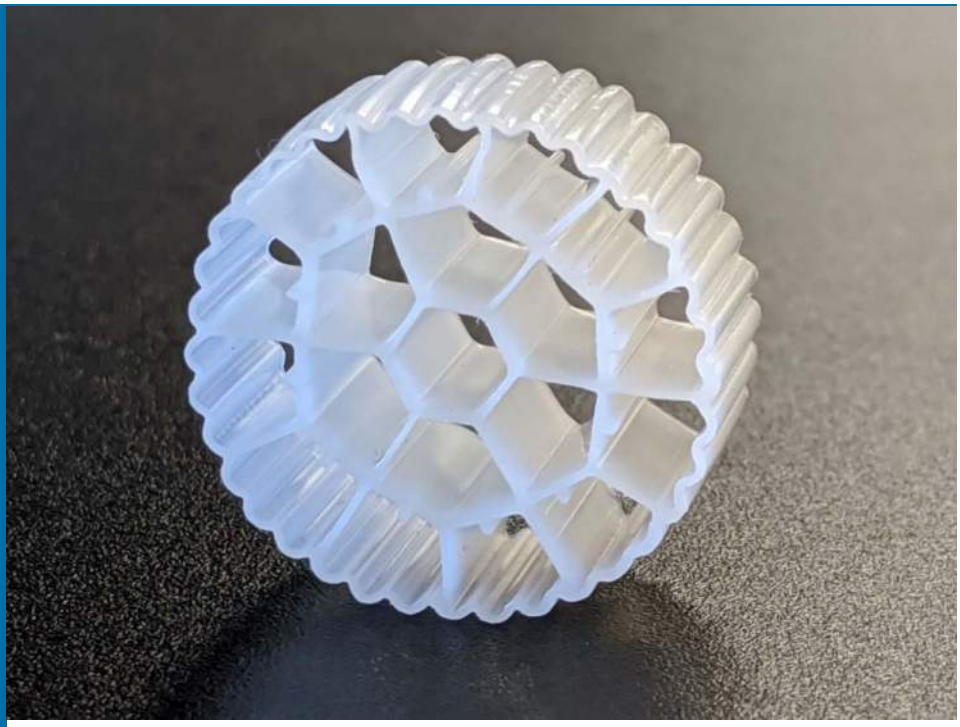



AQUAPOINT
39 Tarkiln Place
New Bedford, Massachusetts 02745
T: 508-985-9050 x105 (Sales) f: 508-985-9072
www.aquapoint.com

AquaCELL™ 500

BIOFILM CARRIER

AquaCELL™ 500 biofilm carriers move freely within an aerated or mechanically mixed wastewater treatment process and provide a high specific surface area for biofilm growth. As the carrier elements migrate throughout the water column, wastewater passes through the protected internal cells allowing contact between organic/inorganic waste and the fixed biofilm thus providing treatment.



FEATURES

- High-Density Biofilm Growth
- Large Surface Area to Volume Ratio
- Robust Structural Integrity
- Optimal Specific Gravity
- UV Inhibitor Capability

BENEFITS

- Excellent Hydrodynamics and Mass Transfer Efficiency
- Dense Fixed-Film Population of Resilient and Adaptive Microorganisms
- Long Life Cycle with Resistance to Corrosion
- Low Mixing Energy Requirements
- Easy to Install
- Cost Effective Treatment Option for New Build and Retrofit Applications

AQUAPOINT
Advanced Wastewater Treatment Systems & Services

SPECIFICATIONS

Diameter	**25 mm**	**1 inch**
Length	**12 mm**	**1/2 inch**
Weight	**95 kg/m^3**	**5.9 lbs/ft^3**
Protected Surface Area	**500 m2/m^3**	**151 ft2/ft^3**
Specific Gravity	**0.94 to 0.96**	
Void Space	**> 80%**	
Material	**High-Density Polyethylene (HDPE)**	

PACKAGING

Packaging	Polypropylene fabric bags with top opening, four top mounted lifting straps (located on corners) and bottom draw string chute with fasterners
Package Size & Weight	Each AquaCELL™ 500 media bag contains 1 m^3 (35.3 ft^3) and weighs approximately 209 lbs (95 kg)
Shipping & Offloading	Bags are stacked two high on standard 4x4 ft pallets. Media is shipped on enclosed or flat bed trailers. Forklift or large lifting machine required for offloading.

AQUACELL™ 500
BIOFILM CARRIER

MATERIALS OF CONSTRUCTION

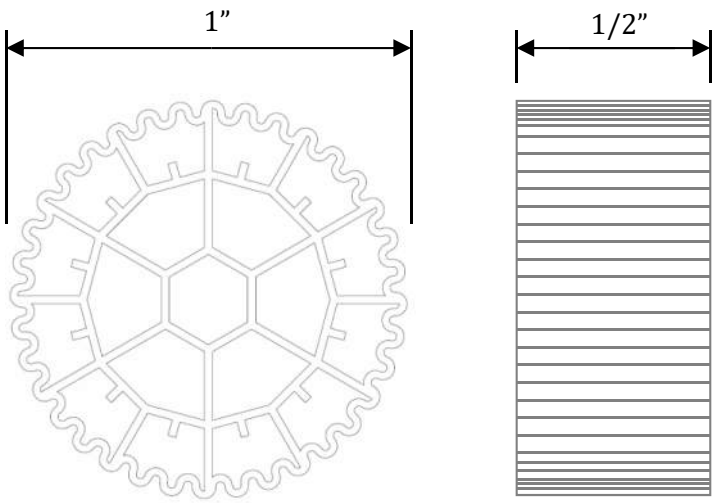
AquaPoint's AquaCELL™ 500 Biofilm Carriers are manufactured from virgin high-density polyethylene (HDPE) and are designed for long life operation with resistance to damage from handling, pH fluctuation, corrosion and a wide temperature range. HDPE is a cost effective, durable non-toxic material which makes it ideal for wastewater treatment applications. UV inhibitors may be compounded with the material during production to provide protection from UV degradation.

CHARACTERISTICS

AquaPoint Biofilm Carriers are designed for the most productive surface area per unit volume by maintaining large internal cells for efficient mass transfer of substrate, oxygen and nutrients. The cell size is designed to allow for adequate scouring and to limit potential for plugging.

Each carrier has a geometric configuration as depicted. The middle and outer cylinders are connected by twelve radial vanes, half of which protrude in towards the central hexagon.

Guidelines for handling and installing AquaPoint Biofilm Carriers are available from AquaPoint and must be followed by the contractor and operator to prevent damage during installation and maintenance.



APPLICATIONS

- Single Pass Moving Bed Biofilm Reactors (MBBRs)
- Integrated Fixed-Film Activated Sludge (IFAS)
- Roughing Reactors
- Multi-Staged Treatment for Enhanced Bio-Kinetics
- BOD / COD / TOC Reduction
- Ammonia Removal / Nitrification
- Denitrification
- Modified Ludzack Ettinger (MLE) Arrangements
- Enhanced Nutrient Removal (ENR) Arrangements

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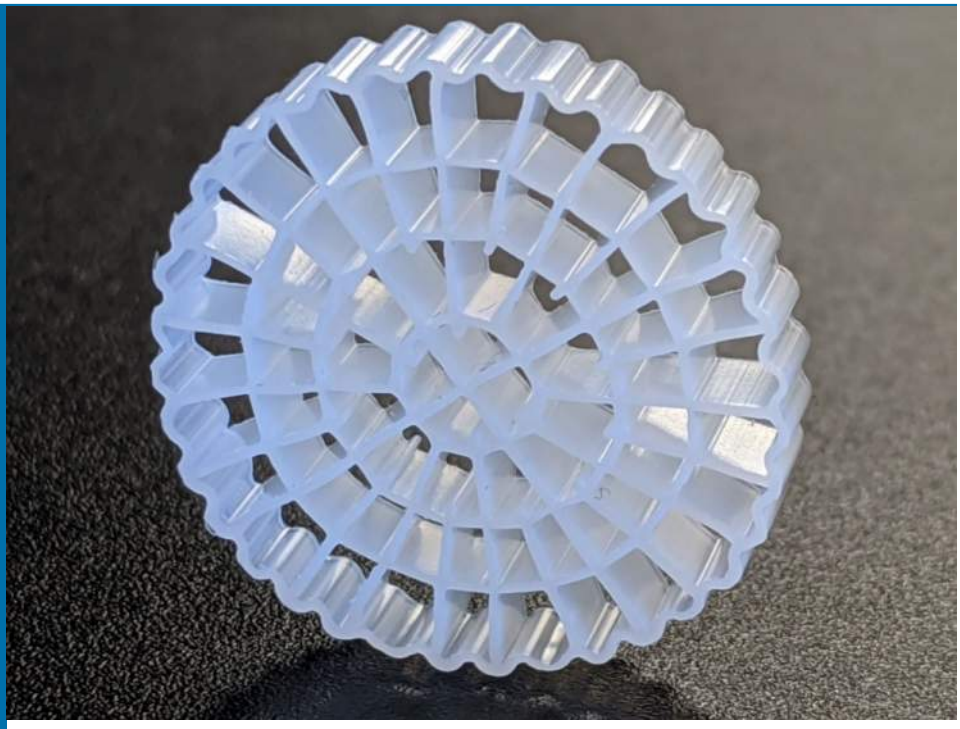
AquaCELL™ 800

BIOFILM CARRIER

AquaCELL™ 800 biofilm carriers move freely within an aerated or mechanically mixed wastewater treatment process and provide a high specific surface area for biofilm growth. As the carrier elements migrate throughout the water column, wastewater passes through the protected internal cells allowing contact between organic/inorganic waste and the fixed biofilm thus providing treatment.



FEATURES

- High-Density Biofilm Growth
- Large Surface Area to Volume Ratio
- Robust Structural Integrity
- Optimal Specific Gravity
- UV Inhibitor Capability

BENEFITS

- Excellent Hydrodynamics and Mass Transfer Efficiency
- Dense Fixed-Film Population of Resilient and Adaptive Microorganisms
- Long Life Cycle with Resistance to Corrosion
- Low Mixing Energy Requirements
- Easy to Install
- Cost Effective Treatment Option for New Build and Retrofit Applications

AQUAPOINT
An OBEH Company

SPECIFICATIONS

Diameter	**25 mm**	**1 inch**
Length	**4 mm**	**11/64 inch**
Weight	**135 kg/m^3**	**8.3 lbs/ft^3**
Protected Surface Area	**800 m2/m^3**	**242 ft2/ft^3**
Specific Gravity	**0.94 to 0.96**	
Void Space	**> 80%**	
Material	**High-Density Polyethylene (HDPE)**	

PACKAGING

Packaging	Polypropylene fabric bags with top opening, four top mounted lifting straps (located on corners) and bottom draw string chute with fasterners
Package Size & Weight	Each AquaCELL™ 800 media bag contains 1 m^3 (35.3 ft^3) and weighs approximately 300 lbs (135 kg)
Shipping & Offloading	Bags are stacked two high on standard 4x4 ft pallets. Media is shipped on enclosed or flat bed trailers. Forklift or large lifting machine required for offloading.

AQUACELL™ 800
BIOFILM CARRIER

MATERIALS OF CONSTRUCTION

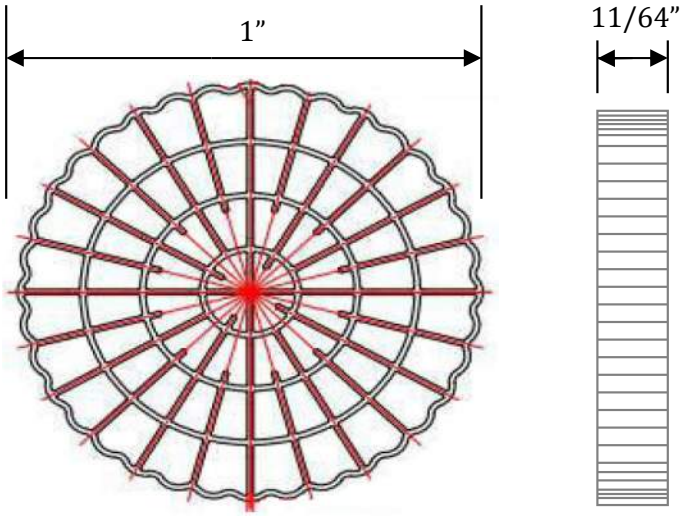
AquaPoint's AquaCELL™ 800 Biofilm Carriers are manufactured from virgin high-density polyethylene (HDPE) and are designed for long life operation with resistance to damage from handling, pH fluctuation, corrosion and a wide temperature range. HDPE is a cost effective, durable non-toxic material which makes it ideal for wastewater treatment applications. UV inhibitors may be compounded with the material during production to provide protection from UV degradation.

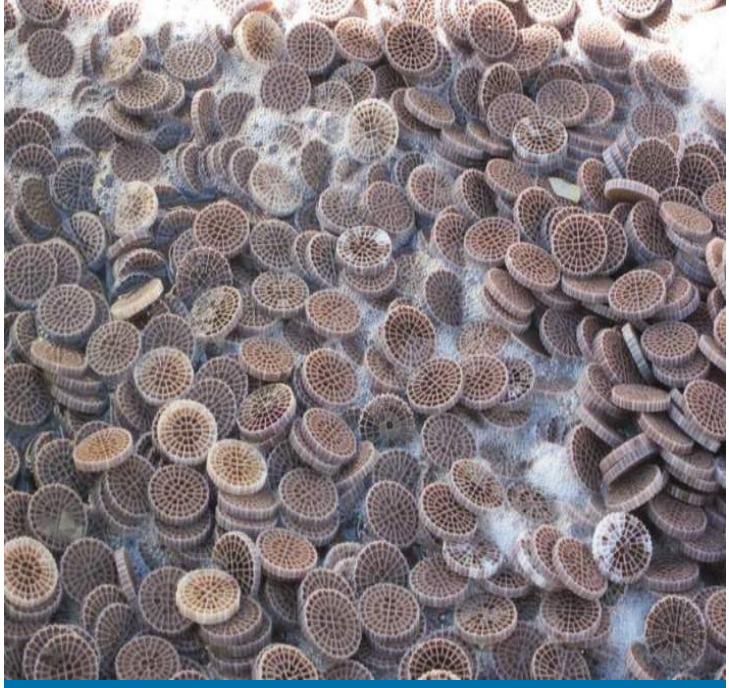
CHARACTERISTICS

AquaPoint Biofilm Carriers are designed for the most productive surface area per unit volume by maintaining large internal cells for efficient mass transfer of substrate, oxygen and nutrients. The cell size is designed to allow for adequate scouring and to limit potential for plugging.

Each carrier has a geometric configuration as depicted. The three outer most cylinders are connected by twenty-four radial vanes, half of which protrude in towards the central cylinder.

Guidelines for handling and installing AquaPoint Biofilm Carriers are available from AquaPoint and must be followed by the contractor and operator to prevent damage during installation and maintenance.





APPLICATIONS

- Single Pass Moving Bed Biofilm Reactors (MBBRs)
- Integrated Fixed-Film Activated Sludge (IFAS)
- Roughing Reactors
- Multi-Staged Treatment for Enhanced Bio-Kinetics
- BOD / COD / TOC Reduction
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MEDIUM BUBBLE AERATION GRID
TECHNICAL SPECIFICATIONS

AquaPoint medium bubble aeration grids are designed specifically for each application to provide the required amount of oxygen for the biological treatment process and to continuously mix the aeration tank(s). The aeration grid diffuser pipes are arranged to create up-welling and down-welling zones ensuring migration of HDPE biofilm carriers throughout the water column.

MATERIALS OF CONSTRUCTION

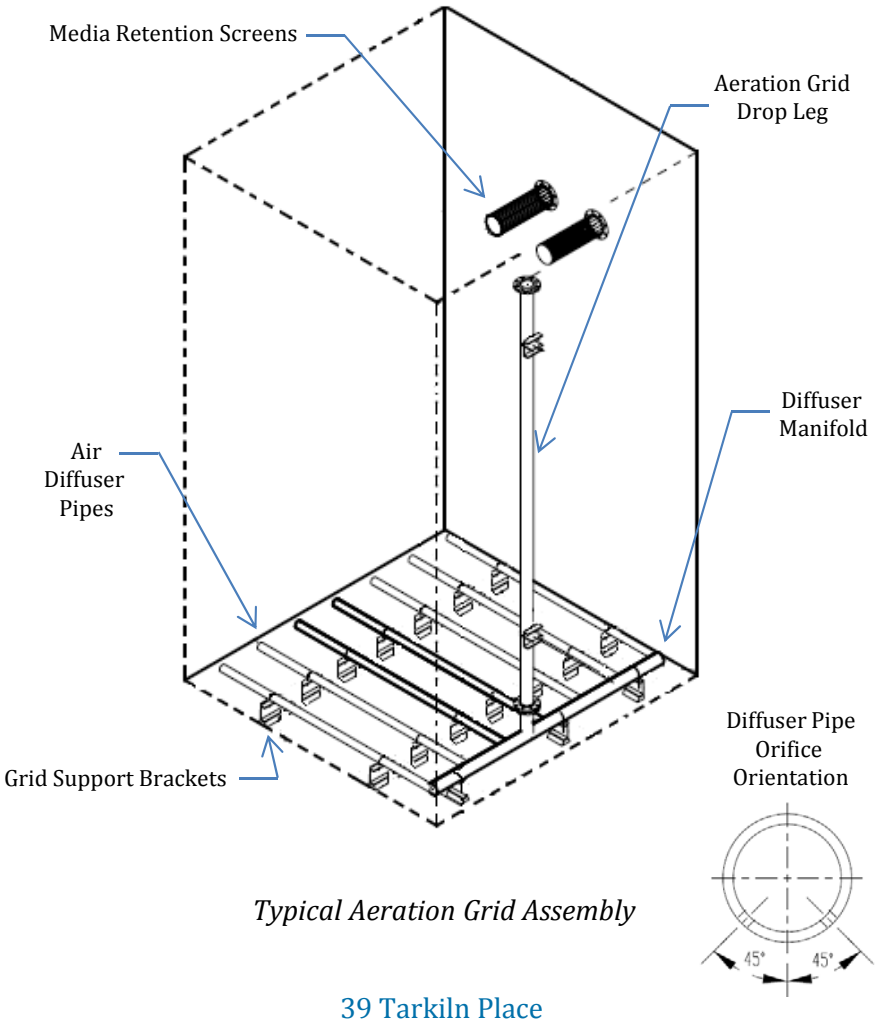
AquaPoint medium bubble aeration grids are manufactured of AISI 304L stainless steel and/or schedule 80 PVC and CPVC. All support brackets, nuts and bolts are manufactured of AISI 304L stainless steel. Gaskets shall be high temperature EPDM.

AERATION GRID CHARACTERISTICS

AquaPoint medium bubble aeration grids shall be designed and fabricated by AquaPoint to meet the following specifications:

- Uniform Full Floor Coverage
- Maximum Line Losses: Site Specific
- Design capacity: Site Specific
- Maximum Diffuser Orifice Size: 3/16” dia
- Minimum Diffuser Orifice Size: 5/64” dia
- Pressure Drop Ranges From 3”–15“ of Water for Uniform Air Distribution.
- Hole Placement: 45 Degrees From Center
- Maximum Air Temperature: 300 Degrees F
- Minimum Distance From Tank Floor: 6”

Stainless Steel Aeration Grid Installation



Typical Aeration Grid Assembly

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MEDIA RETENTION SCREEN
TECHNICAL SPECIFICATIONS

AquaPoint media retention screens are designed to retain AquaCELL™ biofilm carriers in the appropriate reactor basin and allow for the passage of effluent and suspended solids to the next stage of the treatment process. Media screens are cylindrical or flat plate and are provided as flange mounted units or housed in an effluent tee for easy removal.

As biofilm carriers move throughout the water column in an aerated or mixed basin they regularly contact the media retention screen(s) and scour the surface to prevent biomass accumulation in the screen orifices. Thus the screens do not typically require manual cleaning.

MATERIALS OF CONSTRUCTION

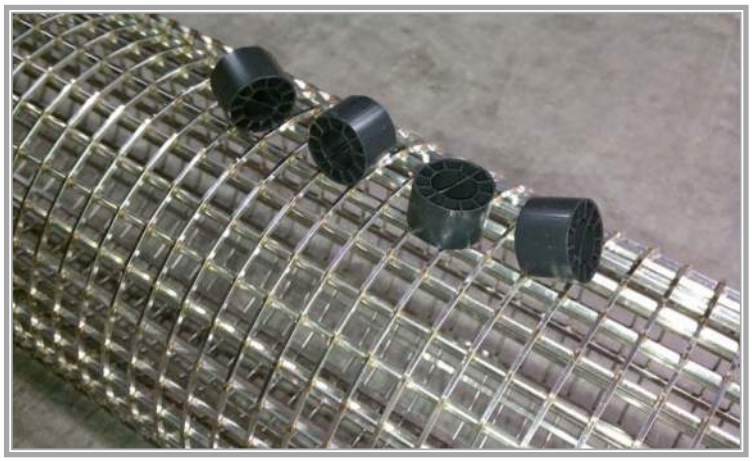
AquaPoint media retention screens and support brackets are manufactured of AISI 304L stainless steel. Removable screens are housed in stainless steel or PVC effluent tees.

SCREEN CHARACTERISTICS

Screens shall be all welded, continuous slot profile 93V wedge wire. Inlet slots shall widen inward from the screen surface so as to minimize the entrapment of debris in the openings.

- Maximum Screen Head Loss: < 1”
- Design Capacity: Site Specific
- Minimum Open Space: > 70%
- Maximum Loading Rate: < 35 gal/min/sqft
- Maximum Screen Slot Opening: 0.375” sq
- Minimum Free Board: 18”
- Maximum Length to Diameter Ratio: 10:1
- Minimum Distance from Tank Wall: 1 dia

Flange Mounted Media Retention Screens



Biofilm Carriers & Media Retention Screen

Removable Media Retention Screen

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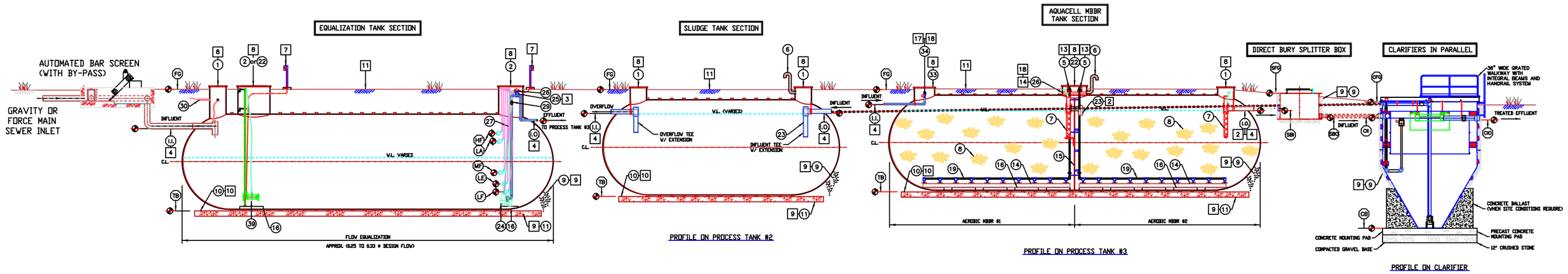


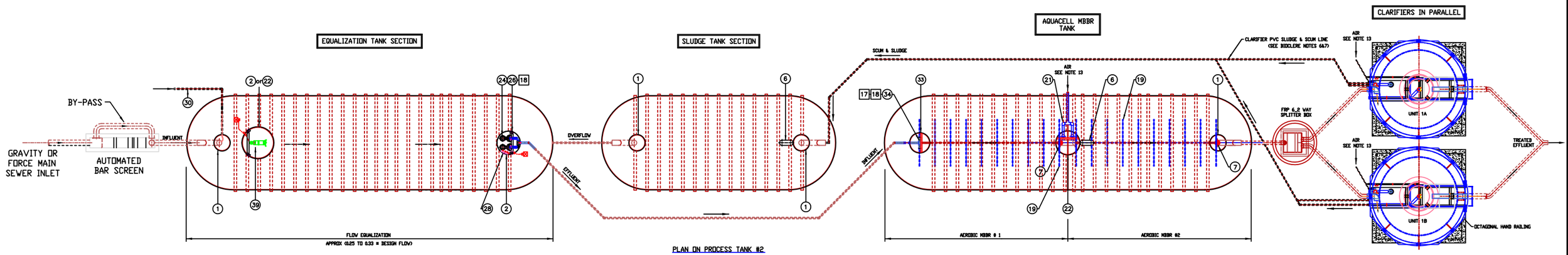
PROFILE ON PROCESS TANK #1

PROFILE ON PROCESS TANK #2

PROFILE ON PROCESS TANK #3

PROFILE ON CLARIFIER

GENERAL PRIMARY SCREEN TROUGH, EQUALIZATION TANK, SLUDGE HOLDING TANK, DUAL STAGE AEROBIC MBBR AND TWO FRP CLARIFIERS IN PARALLEL



PLAN ON PROCESS TANK #1

PLAN ON PROCESS TANK #2

PLAN ON PROCESS TANK #3

PLAN ON CLARIFIERS

DRAWING NOTES:

SEE UNIT PROCESS TANK DRAWINGS FOR:
- SYMBOL LEGENDS
- TANK NOTES AND DETAILS
- EQUIPMENT DETAILS

UNIT PROCESS TANK DRAWING SCHEDULE:

- PRIMARY SCREEN
- PROCESS TANK #1 – DWG FRP-1284-99
- PROCESS TANK #2 – DWG FRP-1284-99
- PROCESS TANK #3 – DWG FRP-1244-11
- FRP CLARIFIER

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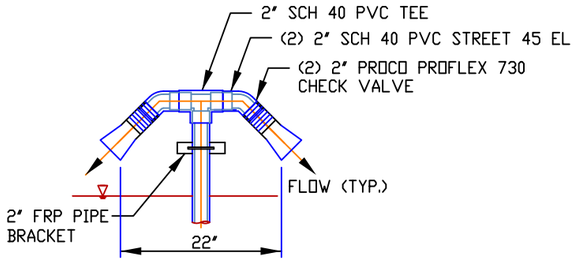
TITLE:	AQUACELL PROCESS PRIMARY SCREEN, EQUALIZATION TANK, SLUDGE HOLDING TANK, DUAL STAGE AEROBIC MBBR TANK & TWO FRP CLARIFIERS IN PARALLEL
DRAWING NO:	FRP-1298-16
REVISION:	NONE
DATE:	FEB. 2017
DWN BY:	KML
SCALE:	NTS SIZE: B / A3
SHEET #:	SHEET 1 OF 1

GENERAL TWO STAGE AEROBIC AQUACELL MBBR TANK

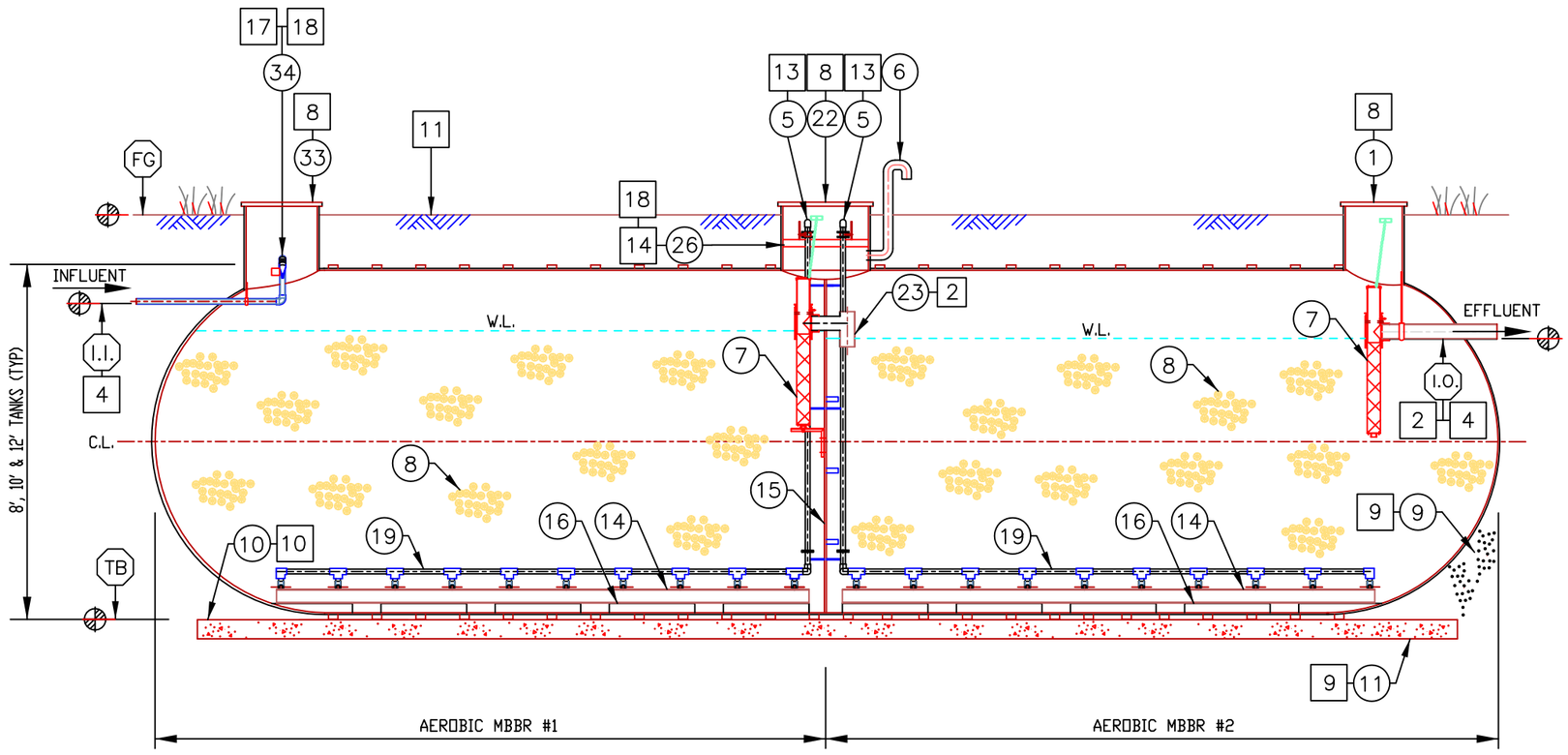


MBBR 2" INLET ASSEMBLY DETAIL

PROCESS TANK ELEVATIONS

- FINISH GRADE (FG): _____
- TANK INVERT IN (I.I.): _____
- TANK INVERT OUT (I.O.): _____
- TANK BASE (TB): _____

AQUACELL MBBR TANK SECTION



SECTION VIEW

SEE SHEET 2 FOR NOTES

SYMBOL LEGEND:

- □ = NOTES (SHEET 2)
- ○ = COMPONENTS USED
- ▨ = COMPONENTS NOT USED
- ○ = FLOAT OR INVERTS
- ⊕ = ELEVATIONS

FRP PROCESS TANK COMPONENTS		
ITEM NO. ITEM DESCRIPTION	ITEM NO. ITEM DESCRIPTION	ITEM NO. ITEM DESCRIPTION
(1) - 24" DIAMETER ACCESS RISER (TYP.)	(16) - FRP PUMP PLATFORM	(31) - SUBMERSIBLE ASPIRATOR
(2) - 36" DIAMETER ACCESS RISER (TYP.)	(17) - NITRATE RECYCLE LINE (IF SPECIFIED)	(32) - ASPIRATOR INTAKE
(3) - 24" OR 36" DIAMETER ACCESS RISER (TYP.)	(18) - ANOXIC SLUDGE PUMP & RAIL ASSEMBLY	(33) - 30" DIAMETER ACCESS RISER (TYP.)
(4) - CARBON FEED CONDUIT (IF SPECIFIED)	(19) - AERATION MANIFOLD & SPARGER LATERALS	(34) - 2" AEROBIC MBBR INLET ASSEMBLY
(5) - DROP LEG & VALVE ASSEMBLY (PNUEMATIC)	(20) - TOP MOUNTED MIXER ON PEDESTAL MOUNT	(35) - FRP BAFFLE WALL
(6) - 4" PVC VENT (STANDARD)	(21) - AERATION HEADER MANIFOLD	(36) - 2" ANOXIC MBBR INLET ASSEMBLY
(7) - STAINLESS STEEL MEDIA RETENTION SCREEN	(22) - 48" DIAMETER ACCESS RISER (TYP.)	(37) - FINAL PUMPS & RAIL ASSEMBLIES
(8) - NEUTRALLY BOUYANT HDPE BIOFILM CARRIER ELEMENTS (MEDIA)	(23) - EFFLUENT ASSEMBLY	(38) - SLUDGE RECYCLE LINE
(9) - BACKFILL	(24) - EQUALIZATION PUMPS & RAIL ASSEMBLIES	(39) - SUBMERSIBLE MIXER
(10) - CONCRETE DEADMEN (IF REQUIRED)	(25) - THROTTLING VALVE (HYDRAULIC)	
(11) - COMPACTED GRANULAR BASE	(26) - FRP SUPPORT BRACKET W/ HARDWARE	
(12) - NITRATE RECYCLE PUMP & RAIL ASSEMBLY	(27) - STAINLESS STEEL LIFTING CHAIN	
(13) - FRP BAFFLE WALL WITH 4 CENTER LINE 4" HOLDES (TYP.)	(28) - STAINLESS STEEL FLOAT BRACKET	
(14) - FRP AERATION GRID SUPPORT PLATFORM	(29) - CHECK VALVE (HYDRAULIC) (BY CONTRACTOR)	
(15) - FRP HYDROSTATIC BAFFLE WALLS	(30) - ALKALINITY FEED CONDUIT (IF SPECIFIED)	

PD BLOWER(S)
MANUFACTURER: _____
MODEL: _____

- ___ V 3 PHASE
- ___ HP
- ___ DIA. DISCHARGE

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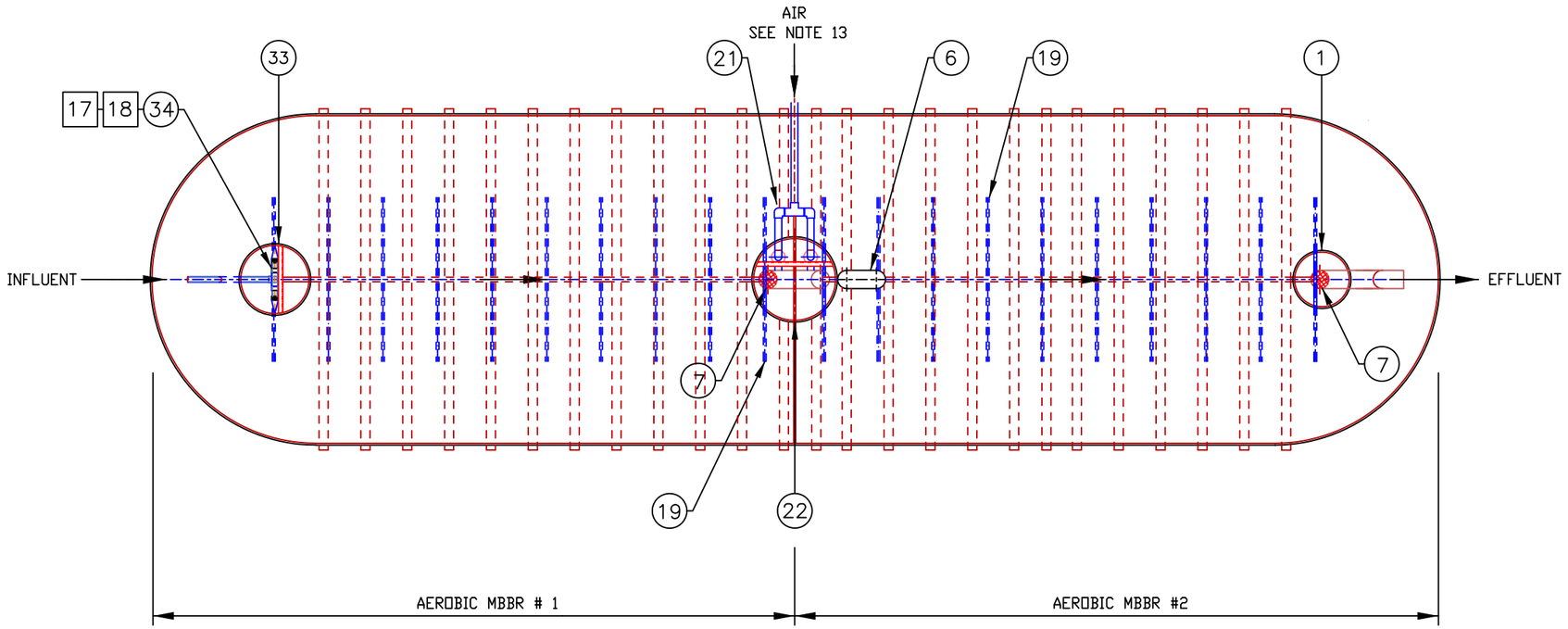
TITLE:
TWO STAGE AEROBIC MBBR
ARRANGEMENT IN HORIZONTAL FRP TANK

DRAWING NO.:	FRP-1244-12
REVISION:	B
DATE:	JUNE 2016
DWN BY:	KML
SCALE:	NTS SIZE: B / A3
SHEET #:	SHEET 1 OF 2

GENERAL TWO STAGE AEROBIC AQUACELL MBBR TANK

PLAN ON AQUACELL MBBR TANK



PLAN ON TANK

GENERAL NOTES:

1. TANK DEPICTED IS MEANT TO BE A GENERAL CONFIGURATION. ACTUAL TANK LENGTH, DIAMETER AND RISER LOCATIONS MAY VARY DEPENDING ON REQUIREMENTS.
2. EFFLUENT ASSEMBLY (FILTERS OR TEE) TO BE SIZED TO ACCOMODATE ALL FORWARD FLOWS AND RECYCLED FLOWS.
3. THROTTLING VALVE(S), LIFTING CHAINS AND PIPING UNIONS (IF APPLICABLE) TO BE LOCATED 16" (MAX) FROM TOP OF RISER.
4. SEE WWTP SYSTEM HYDRAULIC PROFILE FOR INVERT AND FLOAT ELEVATIONS.
5. CHEMICAL FEEDS SHOWN, ARE "IF SPECIFIED".
6. CONSULT AQUAPOINT TECHNICAL MANUAL FOR EQUIPMENT AND ELECTRICAL DETAILS.
7. CONSULT AQUAPOINT CONTROL PANEL'S FIELD WIRING DIAGRAM (SHIPPED IN PANEL) FOR REQUIREMENTS.
8. TANK RISER LENGHTS TO BE DETERMINED AND INSTALLED SEPERATELY. FOLLOW ALL FRP TANK INSTALLATION INSTRUCTIONS.
9. FOR INSTALLATION AND BACKFILLING INSTRUCTIONS CONSULT AND ADHERE TO THE FRP TANK MANUAL.
10. IF INSTALLED IN SEASONAL GROUNDWATER CONTACT ENGINEER TO SPECIFY ANCHORING & CONCRETE DEADMAN REQUIREMENTS.
11. MAXIMUM OVERBURDEN NOT TO EXCEED 6' WITHOUT WRITTEN AUTHORIZATION FROM THE MANUFACTURER.
12. AQUACELL PROCESS REACTOR(S) MUST BE PRECEDED BY PRIMARY SETTLING OR SCREENING AND FOLLOWED BY SECONDARY CLARIFICATION.
13. FIELD AIR PIPING SHALL BE SCHD 80 CPVC GALVANIZED OR STAINLESS STEEL, BY CONTRACTOR. (IF APPLICABLE)
14. FRP SLIDE RAIL SUPPORT, SHIPPED LOOSE WITH HARDWARE, INSTALLED BY CONTRACTOR. (IF APPLICABLE)
15. SIZE AND QUANTITY OF MIXERS WILL DEPEND ON TANK SIZE AND GEOMETRY. (IF APPLICABLE)
16. TANK RISER ABOVE MIXER MUST BE TALL ENOUGH FOR MIXER BASE, MIXER ASSEMBLY AND SUITABLE HEADSPACE. (IF APPLICABLE)
17. STANDARD PUMPED INLET ASSEMBLY CONFIGURATION SHOWN, SEE DETAIL. SEE TECHNICAL MANUAL FOR ANY JOB SPECIFIC REQUIREMENTS. IF FLOW BY GRAVITY, INFLUENT STRUCTURE TO BE A SUITABLE SIZED PIPE & INLET TEE, WITH INVERT 6' (MIN) ABOVE WATER LEVEL.
18. SEE SEPERATE DRAWING(S) FOR DETAILS.

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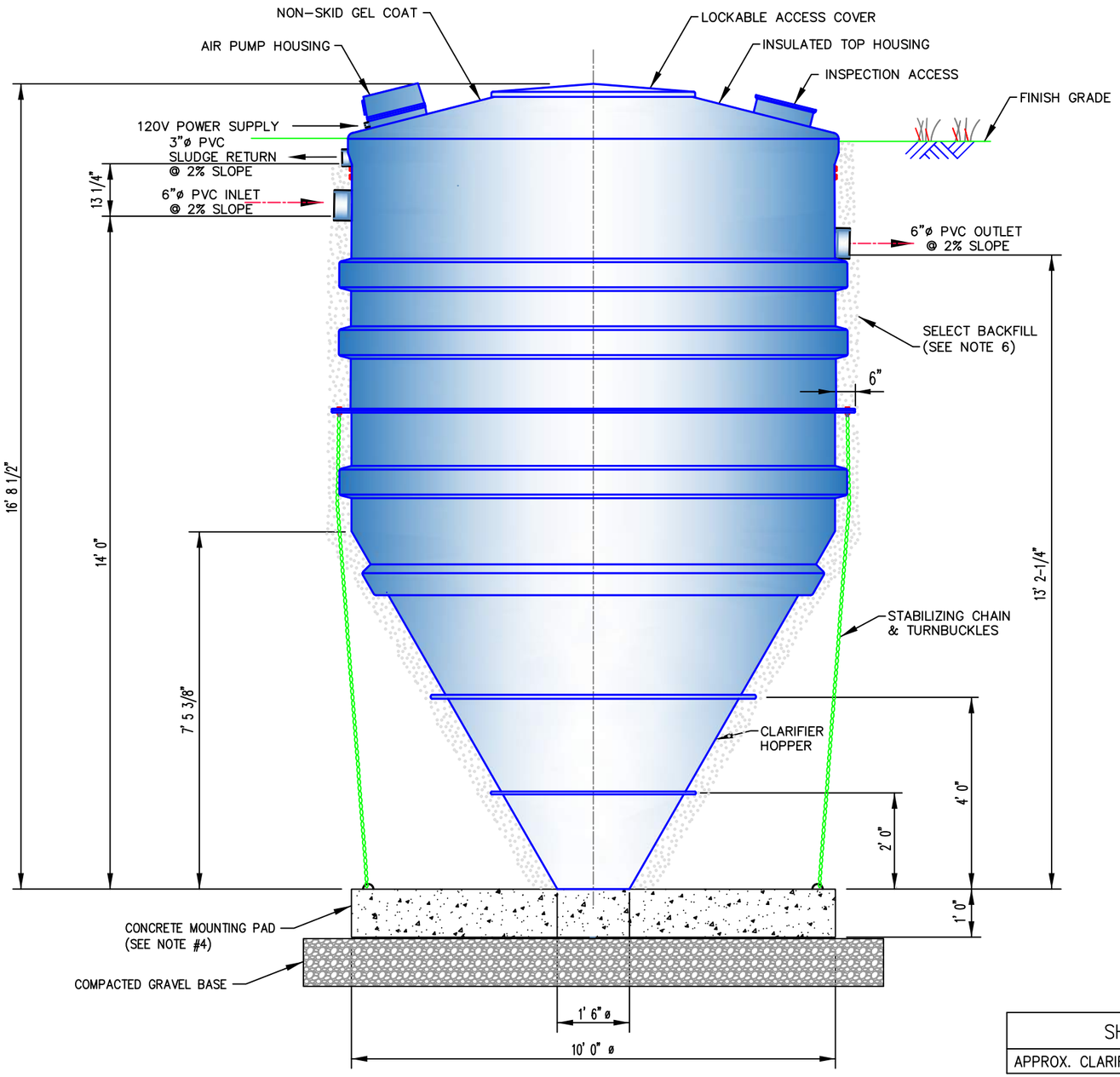
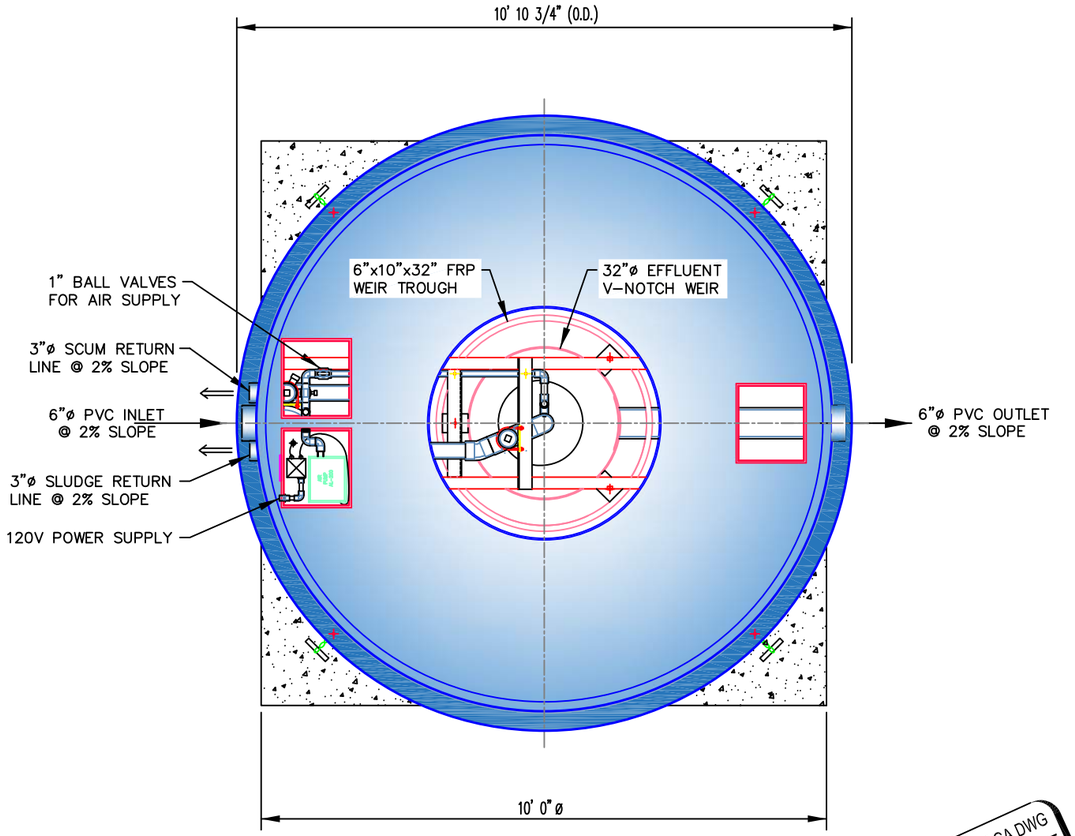
TITLE:
TWO STAGE AEROBIC MBBR
ARRANGEMENT IN HORIZONTAL FRP TANK

DRAWING NO:	FRP-1244-12
REVISION:	B
DATE:	JUNE 2016
DWN BY:	KML
SCALE:	NTS
SIZE:	B / A3
SHEET #:	SHEET 2 OF 2

NOTES:
1. SCUM AND SLUDGE RETURN LINES TO HAVE A VENT TO GRADE AND BE SET ON A 2% SLOPE (MIN) PITCHED TOWARDS THE RETURN/PRIMARY TANK.
2. SCUM AND SLUDGE RETURN LINE FIELD PIPING CHANGE IN DIRECTION TO BE MADE WITH 45° OR LESS ELBOWS UNLESS WRITTEN NOTIFICATION HAS BEEN GRANTED BY AQUAPOINT OR THE ENGINEER OF RECORD.
3. IF A COMMON SLUDGE/SCUM LINE IS REQUIRED, AT THE POINT OF CONNECTION A 4"ø RETURN LINE IS REQUIRED.
4. FOR 10'ø FRP CLARIFIER MOUNTING PAD CONSTRUCTION DETAILS SEE DRAWING 1244-33.
5. IF THE BASE OF THE CLARIFIER IS INSTALLED BELOW THE ESTIMATED HIGH GROUND WATER ELEVATION CONTACT SITE ENGINEER FOR CONCRETE BALLAST REQUIREMENTS.
6. FOR INSTALLATION AND BACKFILLING REQUIREMENTS CONSULT AND ADHERE TO ALL RECOMMENDATIONS IN THE FRP TANK MANUAL.
7. THE BACKFILLING PROCESS TO BE DONE IN UNIFORM LIFTS AROUND THE TANK TO PREVENT DISTORTION.



10'ø COVERED FIBERGLASS CLARIFIER
(5,500 GAL.)



PLAN ON 10'ø COVERED FIBERGLASS CLARIFIER
(LID & COVERS REMOVED)

PRELIM. DRAFT GA.DWG
FOR REVIEW & COMMENT
NOV. 09 2021

SHIPPING WEIGHT
APPROX. CLARIFIER WEIGHT (DRY) = 2700 LBS

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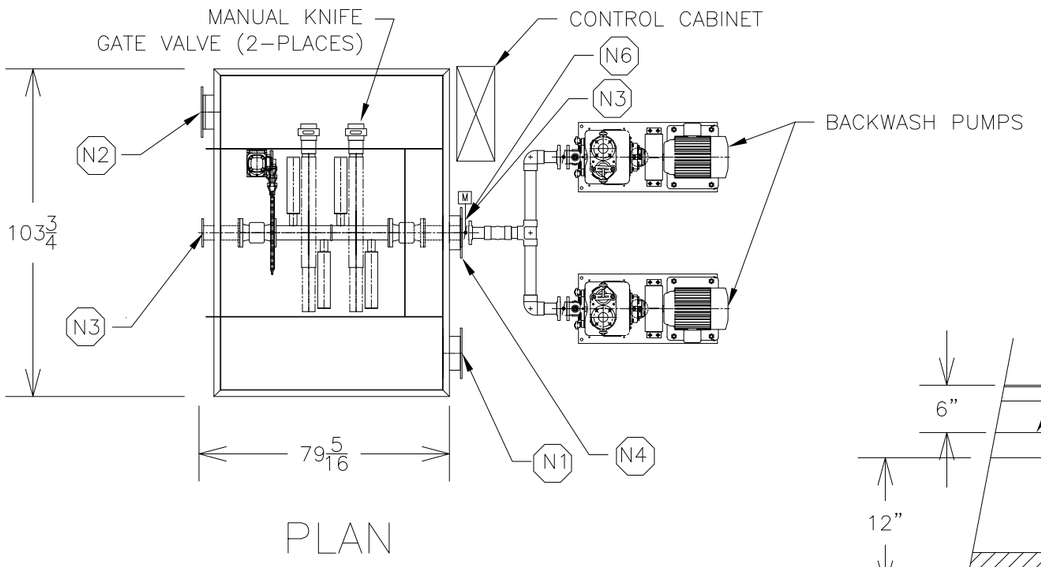
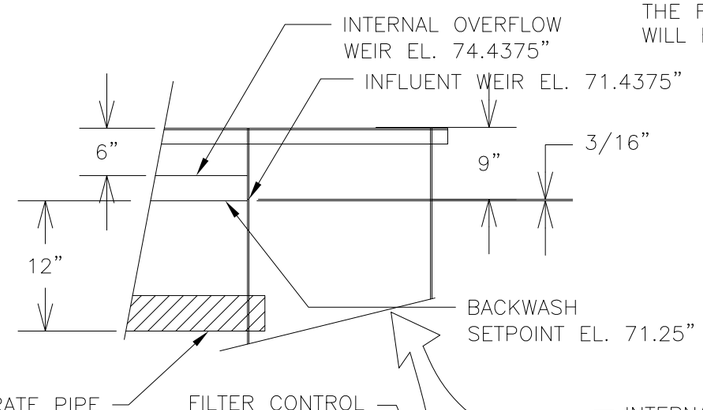
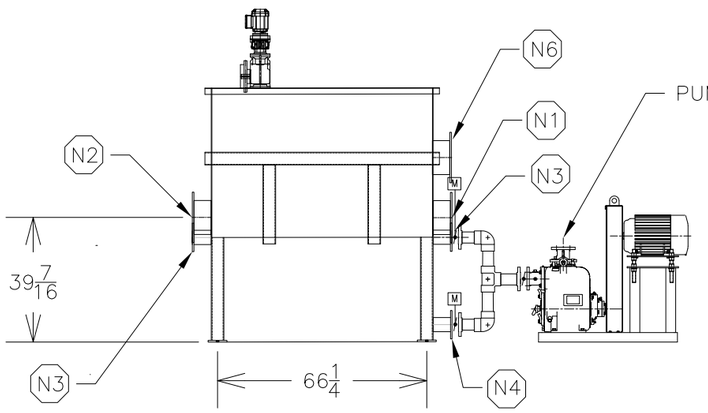
TITLE:
10' FRP COVERED CLARIFIER

DRAWING #: 1257-??
REVISION: NONE
DATE: DECEMBER 01, 2021
DWN BY: KML
SCALE: NTS SIZE: B
SHEET #: 1 OF 1

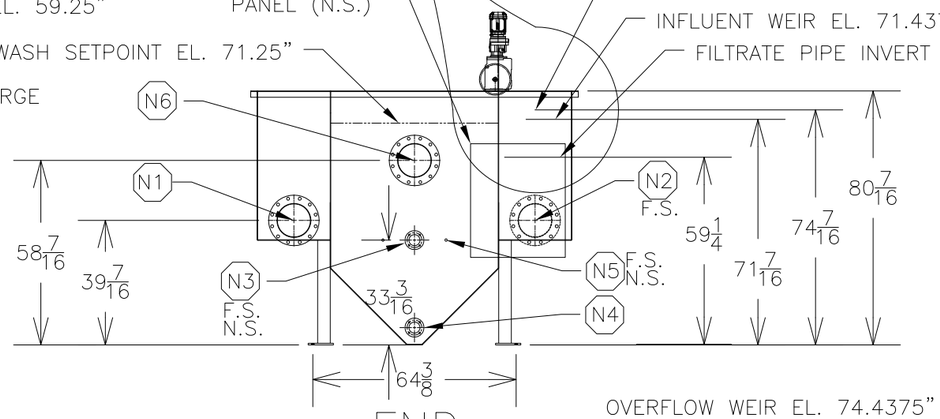


PLAN





ELEVATION



END
(PIPING NOT SHOWN)

OVERFLOW WEIR EL. 74.4375"

NOTES:

1. TANK MATL $\frac{3}{16}$" THK 304SS U.N.
2. FLANGE BOLT PATTERNS CORRESPOND TO STANDARD 150# FLANGES.
3. ALL FLANGES $\frac{1}{2}$"THK. 304SS
4. ALL FLANGE PROJECTIONS 6" U.N.
5. DIMENSIONS IN INCHES.
6. ASSEMBLY INCLUDES ONE CHAIN GUARD.(DWG. FSDF–GG–00,01,02 & 03.
7. PUMPS, CONTROL CABINET & PIPE ROUTING ARE FOR REFERENCE ONLY
8. NOZZLE N6 (OVERFLOW) IS CALLED FOR IN THE SPECIFICATION, BUT CAN BE ELIMINATED IF THE FILTER OVERFLOW IS BEING SENT TO SAME LOCATION AS THE FILTRATE STREAM. IF IT IS BEING RETURNED TO THE PLANT THEN IT WILL BE PROVIDED. PLEASE ADVISE

NOZZLE SCHEDULE

ITEM	QTY.	SIZE/TYPE	DESCRIPTION	NOTE
N1	1	8" FF	INFLUENT	
N2	1	8" FF	EFFLUENT/FILTRATE	
N3	2	3" FF	BACKWASH	
N4	1	3" FF	UNDERDRAIN	
N5	4	$\frac{1}{8}$" NPT CPL.	SWIVEL LUBRICATION	MAT'L – SS
N6	1	8" FF	OVERFLOW	

REV	DATE	BY	APPV'D	DESCRIPTION
1				
2				
3				
4				
5				

Five Star Filtration, LLC
35 Wellington Lane
Conroe, Texas 77304

STANDARD 2D48D SS TANK DISK FILTER

DRAWN BY: BRM	DATE: 4/30/19	FSF–2D48D	
CHK'D BY: JSS	SCALE: 1/4"=1'–0"	SHT 1 OF 1	REV: 0

Orenco AdvanTex AX-Max
Packed Bed Media Filter System

AdvanTex® Treatment Systems

AX-Max™

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

Applications:

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

Orenco® SYSTEMS

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

AdvanTex® AX-Max™ Treatment System

Reliable, Energy-Efficient Wastewater Treatment Everywhere!

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.

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.

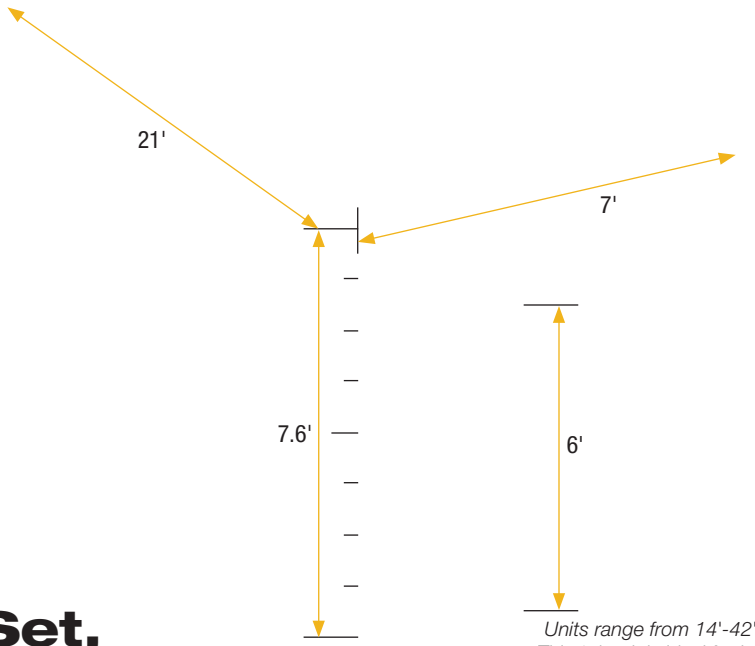
Orenco's newest product in the AdvanTex line is the AX-Max™: a completely-integrated, fully-plumbed, and compact wastewater treatment plant that's ideal for commercial properties and communities. It's also ideal for projects with strict discharge limits, limited budgets, and part-time operators.

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^3). 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^3/day) design flow when receiving primary-treated effluent. Alternately, a similar unit can be configured as a 5,000 gpd (18.9 m^3/day) system capable of processing raw sewage.

AdvanTex® AX-Max™ Treatment System



Units range from 14'-42' in length. This 21' unit is ideal for lower flows.

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^3/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^3)*

  ** 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^2 (2000 L/day/m^2) 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 researching, 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

Orenco SYSTEMS

814 Airway Avenue
Sutherlin, OR 97479 USA

T: 800-348-9843
T: 541-459-4449
F: 541-459-2884

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:

Orenco® SYSTEMS *Technical Data Sheet*

AdvanTex® AX-Max Treatment Systems

Applications

Orenco's AdvanTex® AX-Max is a complete, fully-plumbed, AdvanTex Wastewater Treatment Plant for residential, commercial, municipal, and mobile applications with medium-to-large-flows and permits requiring secondary treatment or better. It can be used as a stand-alone unit or in multi-unit arrays under adverse conditions in a wide range of environments. The AX-Max is ideal for:

- Small sites and poor soils
- At-grade or above-grade installations
- Mobile and temporary installations
- Disaster response sanitation
- Remote locations
- Extreme hot or cold climates

General

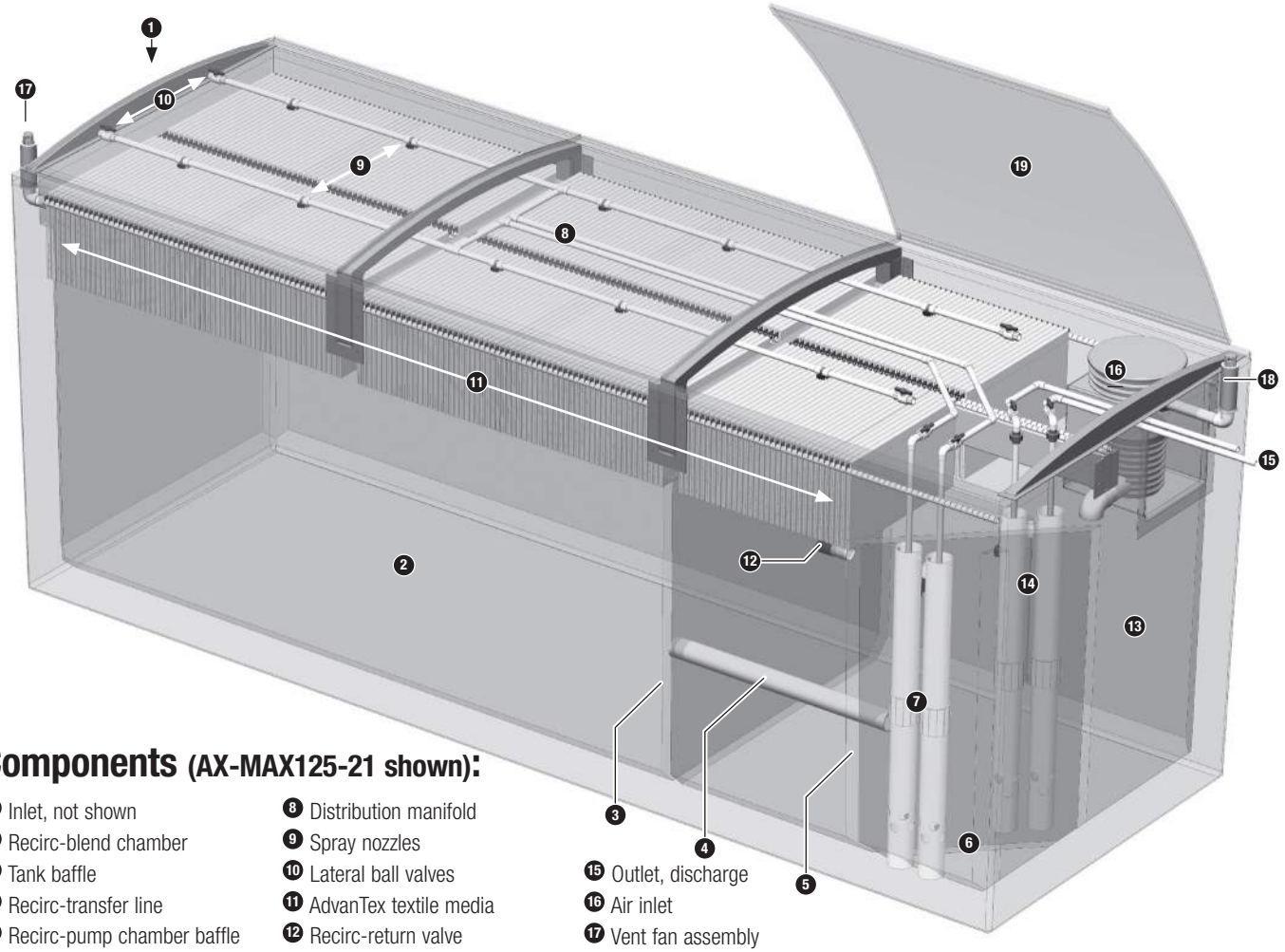
The AX-Max is a modular system that can be preceded by primary treatment or configured to incorporate primary, secondary, and tertiary wastewater treatment before reuse or dispersal.

The heart of the AX-Max system is the AdvanTex Recirculating Treatment Tank, a sturdy, watertight, corrosion-proof fiberglass tank that includes the same dependable, textile treatment media found in all AdvanTex products.

Standard Models

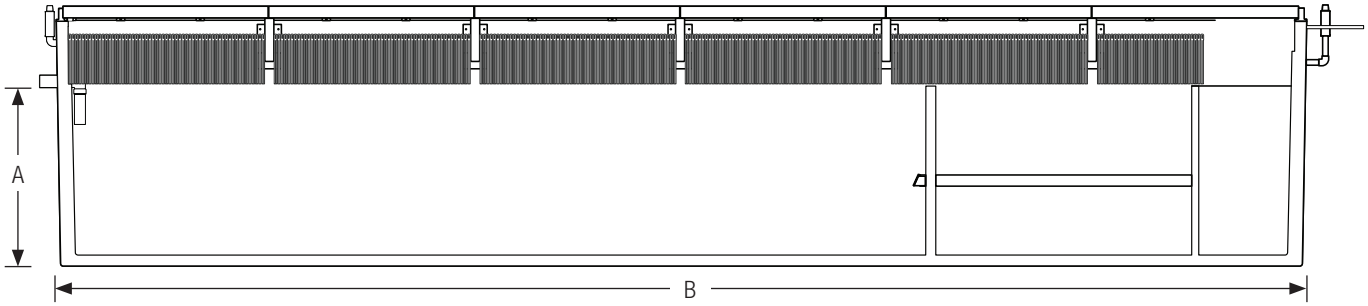
AX-MAX100-14, AX-MAX150-21, AX-MAX200-28, AX-MAX250-35, AX-MAX300-42 (Standard models without pump systems.)

AX-MAX075-14, AX-MAX125-21, AX-MAX175-28, AX-MAX225-35, AX-MAX275-42 (Standard models with pump systems.)

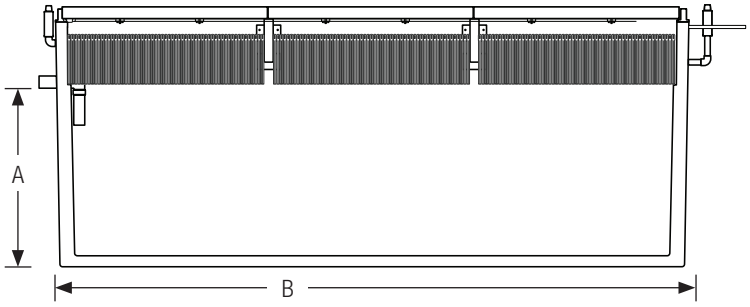


Components (AX-MAX125-21 shown):

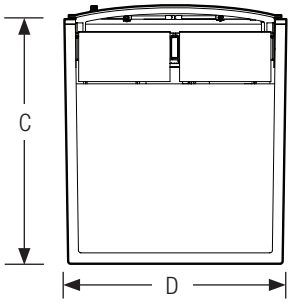
1. Inlet, not shown
2. Recirc-blend chamber
3. Tank baffle
4. Recirc-transfer line
5. Recirc-pump chamber baffle
6. Recirc-pump chamber
7. Recirc pumping assembly
8. Distribution manifold
9. Spray nozzles
10. Lateral ball valves
11. AdvanTex textile media
12. Recirc-return valve
13. Recirc-filtrate chamber
14. Discharge pumping assembly
15. Outlet, discharge
16. Air inlet
17. Vent fan assembly
18. Air outlet
19. Hinged lid, typical



AdvanTex AX-MAX275-42, side view



AdvanTex AX-MAX150-21, side view



AdvanTex AX-MAX, end view (all models)

Specifications

Nominal Dimensions*

Model	AX-MAX100-14	AX-MAX150-21	AX-MAX200-28	AX-MAX250-35	AX-MAX300-42
A, ft (m)	variable	variable	variable	variable	variable
B, ft (m)	14.0 (4.2)	21.0 (6.4)	28.0 (8.5)	35.0 (10.7)	42.0 (12.8)
C, ft (m)	7.6 (2.3)	7.6 (2.3)	7.6 (2.3)	7.6 (2.3)	7.6 (2.3)
D, ft (m)	7.5 (2.3)	7.5 (2.3)	7.5 (2.3)	7.5 (2.3)	7.5 (2.3)
Footprint, ft^2 (m^2)	112.0 (10.4)	168.0 (15.6)	224.0 (20.8)	280.0 (26.0)	336.0 (31.2)
Model	**AX-MAX075-14**	**AX-MAX125-21**	**AX-MAX175-28**	**AX-MAX225-35**	**AX-MAX275-42**
A, ft (m)	5.7 (1.7)	5.7 (1.7)	5.7 (1.7)	5.7 (1.7)	5.7 (1.7)
B, ft (m)	14.0 (4.2)	21.0 (6.4)	28.0 (8.5)	35.0 (10.7)	42.0 (12.8)
C, ft (m)	7.6 (2.3)	7.6 (2.3)	7.6 (2.3)	7.6 (2.3)	7.6 (2.3)
D, ft (m)	7.5 (2.3)	7.5 (2.3)	7.5 (2.3)	7.5 (2.3)	7.5 (2.3)
Footprint, ft^2 (m^2)	112.0 (10.4)	168.0 (15.6)	224.0 (20.8)	280.0 (26.0)	336.0 (31.2)

**See AdvanTex® AX-Max Treatment System drawings for exact dimensions and specific treatment configurations.*

Orenco Systems® Inc. , 814 Airway Ave., Sutherlin, OR 97479 USA • 800-348-9843 • 541-459-4449 • www.orenco.com

KleanTU NitROE
Treatment System

KleanTu Wastewater Treatment Technologies®

NitROE® Waste-Water Treatment System

- Out of Sight / On Site
- Produces Highly Treated Water
- Quiet without Odors
- Enhanced Nutrient Removal
- Affordable with Low Operation & Maintenance Cost

The NitROE® Waste-Water Treatment System (WWTS) combines long-established treatment processes in an innovative way to provide reliable, high efficiency treatment of domestic wastewater. KleanTu® LLC developed the NitROE® WWTS with the design flexibility to be scaled small enough to serve a single residence or large enough for commercial and residential developments and even a small community. The system is underground and out of site. Alternately, it can be integrated into the landscape with vegetated surface. The installation and operating costs are significantly lower than tank-based wastewater treatment plants.

The NitROE® WWTS produces a highly treated water including removal of nutrients such as nitrogen compounds. The feature of nutrient removal makes the NitROE® WWTS especially applicable in areas where nitrogen compounds are causing degradation of groundwater and surface waters, especially in coastal communities such as in New England, the Chesapeake Bay area and Florida.

The highly treated water from the system supports a number of ways for permitted disposition including to an existing or new underground leach field, to a surface water or to reuse such as irrigation, a positive environmental benefit. The NitROE® WWTS is ideal for situations where it is physically or economically impractical to connect to a sewer system conveying wastewater to a conventional wastewater treatment plant.

Case Histories

To date KleanTu® has installed 25 NitROE® WWTSs on the Island of Martha's Vineyard and Cape Cod. Design flows have ranged from 330 gallons per day (GPD) for single residences up to 6,000 GPD for a multi-residential facility with up to 110 residents. All of these installations produce a highly treated water with substantial removal of organic matter, suspended solids and nitrogen compounds. All of these installations have been under permits issued by the Massachusetts Department of Environmental Protection and with approval of local Boards of Health. The case histories below illustrate some of these installations.

Three-Unit Housing Complex, Martha's Vineyard - 1,000 GPD Design Flow

This NitROE® WWTS treats the domestic wastewater from three nearby residences created from a previous family estate. After treatment, effluent goes into a leach field beneath the landscaping. The picture below shows the system during installation and after covering and landscaping.

Six-Unit Townhouse Complex, Martha's Vineyard - 2,000 GPD Design Flow

This NitROE® WWTS treats the domestic wastewater from six residences arrayed in three two-unit townhouses. The treated wastewater goes into a leach field beneath the landscaping and parking areas. The picture below shows the system during installation and after covering and landscaping.

Campus of College Light Opera Company, Cape Cod - 6,000 GPD Design Flow

This multi-tank NitROE® WWTS treats the domestic wastewater from living quarters with up to 110 summer residents, a cafeteria and offices. After treatment, effluent goes into a leach field beneath the parking lot. The picture below shows the system during installation and after covering.

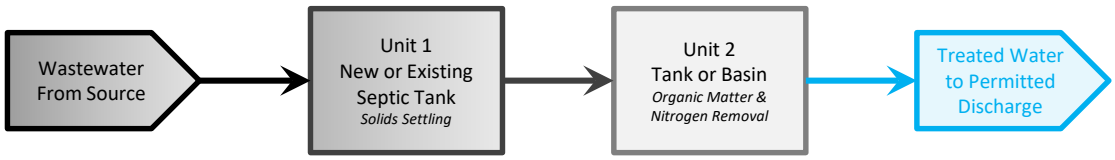
By June 2021, the site work was complete including the landscaping over top of the NitROE® WWTS and ready for the 2021 summer season. The picture below shows the grassed area covering the installation.

The website of the College Light Opera Company highlights the installation of the NitROE® WWTS as a nitrogen reducing septic system:

http://www.collegelightoperacompany.com/septic-project.html

NitROE® WWTS Process

This NitROE® WWTS consists of two or more treatment tanks depending on the design flow of wastewater being treated. For a single family residence with three bedrooms, only two tanks are needed. The first one is a conventional septic tank for settling of suspended matter. The second one is the same-size tank, but it contains the treatment components to remove organic matter and nitrogen. Schematically, a single family residence NitROE® WWTS is as shown in the diagram below:



Gravity moves wastewater through the system so that the only mechanical equipment is an air pump, which quietly operates from under a landscaped enclosure. If one puts an ear to the enclosure, a slight hum can be heard. *The NitROE® upgrades conventional septic systems so that there is always a minimum of septic system treatment even in a power outage.*

For larger installations, multiple, underground larger tanks or basins are more typical still relying on gravity flow. In larger installations, Unit 1 can be configured to provide enhanced removal of the solids. Larger installations also have an option of vegetated habitats on top of Unit 2.

Notable NitROE® WWTS Features

- Permitted by Massachusetts and approved by a number of local boards of health
- High quality effluent with enhanced nutrient removal beneficially reusable
- Allows continued use of existing septic-tank system by upgrading treatment
- Straight-forward construction using local materials, labor and contractors
- Simple, quiet, low-energy operation without odors and low operation and maintenance
- Can be part of the landscaping with a vegetated habitat surface

Contact Information

For more information about the NitROE® WWTS, please contact:

info@kleantu.com or (800) 303-4787

Flush & Forget℠

KleanTu® LLC

As pollution worsens on Cape Cod, some are investing hopes in a new type of septic system

By David Abel Globe Staff, Updated May 17, 2022, 11:28 a.m.

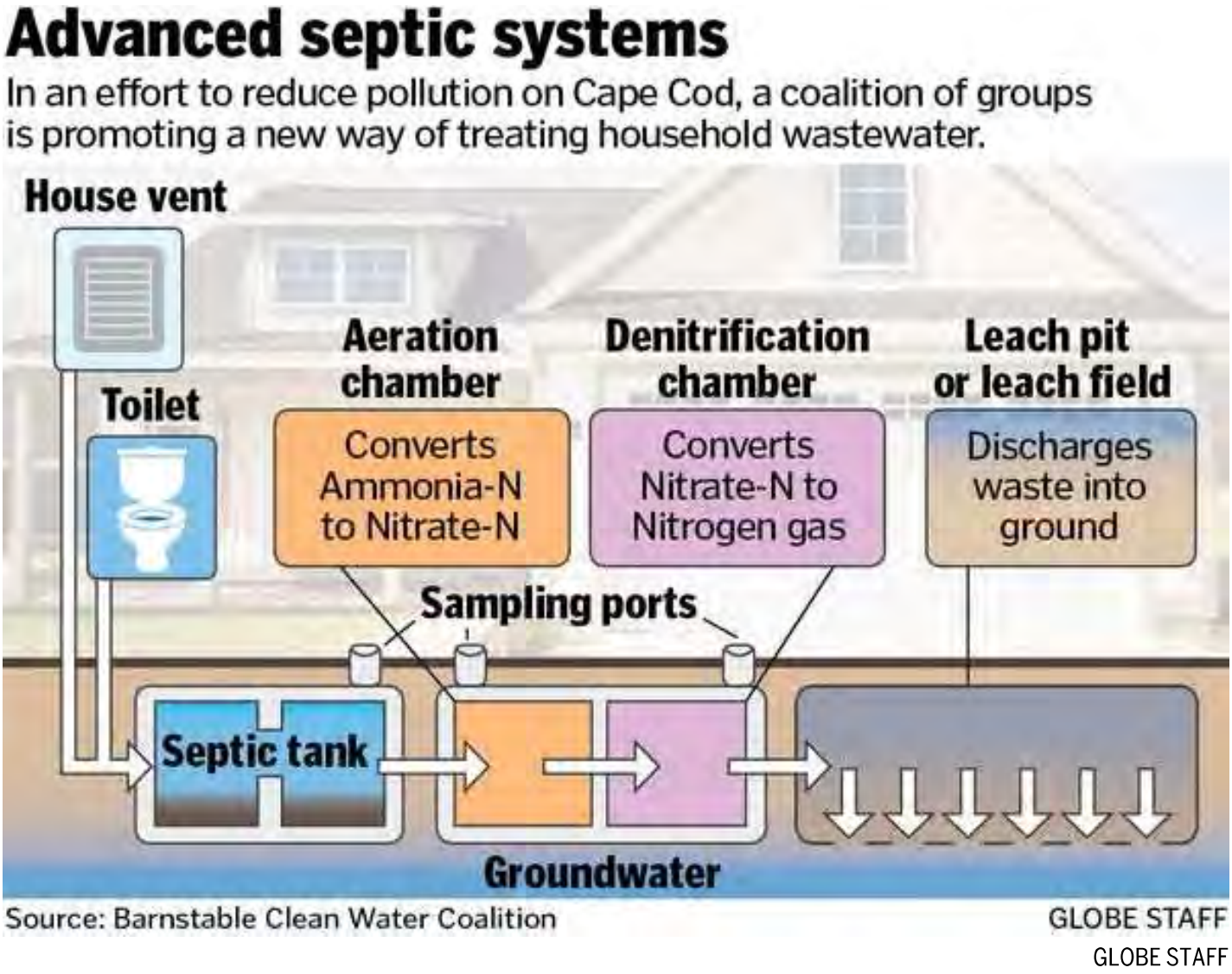
The Barnstable Clean Water Coalition installed a KleanTu septic system in the Sandy Shores neighborhood around Shubael Pond in Marstons Mills. On Cape Cod and in many other places, poorly maintained and aging septic systems are a primary cause of the nitrogen pollution that plagues coastal ecosystems. JONATHAN WIGGS/GLOBE STAFF

BARNSTABLE — For years, pollution from septic systems has spawned algae blooms, toxic bacteria, and a putrid scum coating the waters of Cape Cod, destroying vital ecosystems, contributing to coastal erosion, and harming tourism.

The pollution has also spawned billion-dollar plans to dig up roads and install extensive sewer systems that local officials say is essential to cleaning up bays, estuaries, and ponds from Bourne to Brewster.

Now, as warming from climate change has exacerbated the consequences of the pollution, a coalition of groups here is pressing local and state officials to consider a controversial new approach to addressing the problem, which they say could reduce costs significantly and remove the pollution more rapidly. Their solution relies on a new kind of septic system they say would curb the vast majority of nitrogen — one of the main causes of algae blooms — that leaks from traditional septic systems, which aren't designed to remove that contaminant.

"The water that comes from this system is treated to such a high degree that it's almost potable," said Zenas Crocker, executive director of the Barnstable Clean Water Coalition, which has been overseeing a pilot project here that is installing the new septic systems at no cost to homeowners. "We see this as having an easier runway for expansion than sewers; they can be built more quickly and lower tax bills."



GLOBE STAFF

Critics of the proposal worry that promoting the new technology — which the state has yet to approve for general use — could undercut arduous efforts over recent years to persuade residents to support higher taxes or fees to cover the costs of installing tens of thousands of sewers across the Cape.

They also worry that allowing the widespread installation of new septic systems could hamper efforts to reduce the pollution, which has been blamed for killing large swaths of eelgrass — a vital habitat for shellfish and other marine life — and producing a guacamole-like film of algae blooms on ponds and bays. Unlike sewers, the new septic systems — while significantly more effective than traditional systems — don't eliminate all the pollution.

On Cape Cod, the Barnstable Clean Water Coalition installed a KleanTu septic systems in the Sandy Shores neighborhood around Shubael Pond.. JONATHAN WIGGS/GLOBE STAFF

"My underlying concern is that these systems threaten to undermine the hard-fought public consensus on the need for central treatment and collection of waste water in significant areas that contribute to the degradation of the Cape," said Andrew Gottlieb, executive director of the Association to Preserve Cape Cod, which has spent years advocating for reducing the pollution from septic systems.

His group's annual report last year on the state of the Cape's waters found "continued degradation" and "a consistent pattern of poor water quality" that it attributed mainly to "inadequately treated wastewater" from septic systems. Other sources of the pollution come from fertilizer and stormwater runoff.

Last summer, the group documented 35 ponds that required use restrictions as a result of the pollution, and all but five of them were closed to swimming. All of them contained cyanobacteria, the toxic ingredients of algae blooms that can be harmful to human or pets' health if ingested, inhaled, or touched.

"As responsible public officials, we can only ask people to pay once for a solution," Gottlieb said. "Because we know that central collection and treatment will be sufficient to meet water quality and restore our bays, that's where the lion's share of the public investment should be going."

The efforts to reduce the pollution with new septic systems has attracted the attention of state and federal environmental officials. If the technology proves effective in Barnstable, they said, it could become more widely used around the country, where more than 20 million households rely on septic systems.

State officials did not say whether the new septic systems — which use wood chips and limestone to convert much of the waste water into an innocuous gas — would be approved for general use.

"While there are still some unknowns, we are hopeful advanced septic systems will be a part of the solution," said Nathaniel Keenan, deputy director of the Massachusetts Clean

Water Trust, a state agency that helps finance clean-water projects and has provided more than $200 million in funding to improve water quality on the Cape.

One of the new septic tanks was lowered into the ground. JONATHAN WIGGS/GLOBE STAFF

The Environmental Protection Agency has joined the coalition to help the pilot project, which involves the installation of nearly 50 new septic systems in the Three Bays watershed in Barnstable.

EPA scientists have drilled monitoring wells and plan to spend the next three years observing the impact of the new systems on ground water and on Shubael Pond, which has been repeatedly closed to swimming during recent summers as a result of toxic algae blooms.

The agency has also provided grants to help create "responsible management entities," organizations with sewage experts who will ensure that the new septic systems are

properly operated and maintained. Homeowners eventually will cover the costs of that oversight in fees.

Agency officials said their participation wasn't meant to promote the replacement of sewers, which they noted remains the most effective way of removing waste water, especially in densely populated neighborhoods. Instead, it's "a complementary effort," they said.

How local officials address the pollution has been a source of tension for years.

Last year, the Conservation Law Foundation in Boston sued the towns of Barnstable and Mashpee, as well as the Department of Environmental Protection, arguing they have known for decades about the harm from septic systems but failed to enforce their own regulations by allowing the pollution to continue.

"Ultimately, we can't continue to blindly add more pollution from septic systems that don't remove nitrogen on the hope that sewers will someday, somehow solve the problem decades from now," said Christopher Kilian, director of the foundation's clean water program. "None of the towns or MassDEP have demonstrated a track record supporting trust in such unenforceable multidecade plans."

He sees promise in the new septic systems, especially for the thousands of homes not slated to be connected to sewers and those that aren't scheduled to receive them for decades.

A view of Shubael Pond. TOWN OF BARNSTABLE

"All of this inaction has allowed this problem, and the pollution . . . to become a catastrophe that threatens the Cape's economy," Kilian said.

But others raised concerns that too much emphasis on new septic systems — which don't remove phosphorous and other contaminants that also cause algae blooms — could hamper efforts to carry out plans to install sewers, which do eliminate the contaminants.

They also raised concerns about the durability of new septic systems, and the likelihood they would need to be replaced more frequently than sewers. The new septic systems cost between $25,000 and $35,000 — roughly one-third of the cost per household of sewers — and those costs would likely be borne by homeowners.

“Centralized public sewer systems are the most environmentally sound and cost-effective way to remove and manage nitrogen,” said Paul Niedzwiecki, chief executive of the Cape Cod Chamber of Commerce.

But proponents of the new technology urged their neighbors to keep an open mind.

One of the homes that has had one of the new septic systems installed. JONATHAN WIGGS/GLOBE STAFF

“We’re not looking to unnecessarily divert funding from sewering projects,” said Brian Baumgaertel, director of the Massachusetts Alternative Septic System Test Center, a division of Barnstable County. “We are looking for the most economical and socially equitable solution to help fix what is a slow-moving environmental disaster.”

On a recent morning in the backyard of Juanita Sweet’s home overlooking Shubael Pond, the 69-year-old watched as a crane lowered into a deep hole a 2,000-gallon version of one of the new septic systems.

Sweet, along with several neighbors who also received new septic systems in a neighborhood not slated for sewers, hoped they would enable the pond to be reopened for swimming.

“If the pond is polluted, my house is worthless,” she said. “I’m hoping this helps.”

David Abel can be reached at david.abel@globe.com. Follow him on Twitter @davabel.

Tighe&Bond

APPENDIX I

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
Conventional Collection System - Treatment at Leonard Property
Town of Amenia, NY
Sewer Feasibility Study

Item Description	Unit Cost	Units	Quantity	Cost
Pump out Existing Septic Tanks and Abandon in Place	$750	EA	214	$160,500
Clearing and Grubbing in Easements	$13,600	Acre	2	$27,200
8" PVC Gravity Sewer Main Installation (In Road)	$300	LF	9280	$2,784,000
8" PVC Gravity Sewer Main Installation (Cross Country)	$220	LF	16560	$3,643,200
8" HDPE Forcemain (In Road)	$340	LF	2170	$737,800
Manholes	$8,500	EA	114	$969,000
Forcemain Cleanouts	$5,000	EA	5	$25,000
Pump Station	$750,000	EA	2	$1,500,000
Gravity Service Lateral Installation	$11,500	EA	193	$2,214,900
Grinder Pump and Service Lateral Installation	$16,500	EA	21	$353,100
Primary Treatment Septic Tank	$388,125	EA	1	$388,200
Permits	$10,000	LS	1	$10,000
Traffic Control	3%	%	1	$384,400
Mobilization/Demobilization	5%	%	1	$640,700
Opinion of Probable Construction Cost				**$13,838,000**

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
Conventional Collection System - Treatment at Mechanic Street Property
Town of Amenia, NY
Sewer Feasibility Study

Item Description	Unit Cost	Units	Quantity	Cost
Pump out Existing Septic Tanks and Abandon in Place	$750	EA	214	$160,500
Clearing and Grubbing in Easements	$13,600	Acre	2	$27,200
8" PVC Gravity Sewer Main Installation (In Road)	$300	LF	9480	$2,844,000
8" PVC Gravity Sewer Main Installation (Cross Country)	$220	LF	13950	$3,069,000
8" HDPE Forcemain (In Road)	$340	LF	1550	$527,000
8" HDPE Forcemain (Cross Country)	$260	LF	1220	$317,200
Manholes	$8,500	EA	104	$884,000
Forcemain Cleanouts	$5,000	EA	6	$30,000
Pump Station	$750,000	EA	2	$1,500,000
Gravity Service Lateral Installation	$11,500	EA	193	$2,214,900
Grinder Pump and Service Lateral Installation	$16,500	EA	21	$353,100
Primary Treatment Septic Tank	$388,125	EA	1	$388,200
Permits	$10,000	LS	1	$10,000
Traffic Control	3%	%	1	$369,800
Mobilization/Demobilization	5%	%	1	$616,300
Opinion of Probable Construction Cost				**$13,312,000**

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ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
Septic Tank Effluent Collection System - Treatment at Silo Ridge Property
Town of Amenia, NY
Sewer Feasibility Study

Item Description	Unit Cost	Units	Quantity	Cost
Pump out Existing Septic Tanks and Abandon in Place	$750	EA	214	$160,500
1,000 Gallon STEP Tank Inc. Installation	$13,500	EA	178	$2,403,000
1,500 Gallon STEP Tank Inc. Installation	$15,400	EA	1	$15,400
2,000 Gallon STEP Tank Inc. Installation	$18,300	EA	20	$366,000
2,250 Gallon STEP Tank Inc. Installation	$19,100	EA	1	$19,100
2,500 Gallon STEP Tank Inc. Installation	$20,100	EA	1	$20,100
3,000 Gallon STEP Tank Inc. Installation	$21,900	EA	11	$240,900
7,750 Gallon STEP Tank Inc. Installation	$41,300	EA	1	$41,300
8,000 Gallon STEP Tank Inc. Installation	$42,200	EA	1	$42,200
STEP Service Lateral Installation (1-1/2" HDPE) Inc. Restoration	$7,400	EA	214	$1,583,600
Clearing and Grubbing in Easements	$13,600	Acre	3	$40,800
HDPE Forcemain Material and Installation (Directional Drilling)	$60	LF	24430	$1,465,800
Excavation and Connection at Drill Sites and at Junctions	$5,700	EA	99	$564,300
Directional Drill Restoration	$50	SY	5500	$275,000
Air Releases	$6,000	EA	12	$72,000
Cleanouts	$3,500	EA	49	$171,500
Permits	$10,000	LS	1	$10,000
Traffic Control	3%	%	1	$224,800
Mobilization/Demobilization	5%	%	1	$374,600
Opinion of Probable Construction Cost				**$8,091,000**

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ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
Septic Tank Effluent Collection System - Treatment at Leonard Property
Town of Amenia, NY
Sewer Feasibility Study

Item Description	Unit Cost	Units	Quantity	Cost
Pump out Existing Septic Tanks and Abandon in Place	$750	EA	214	$160,500
1,000 Gallon STEP Tank Inc. Installation	$13,500	EA	178	$2,403,000
1,500 Gallon STEP Tank Inc. Installation	$15,400	EA	1	$15,400
2,000 Gallon STEP Tank Inc. Installation	$18,300	EA	20	$366,000
2,250 Gallon STEP Tank Inc. Installation	$19,100	EA	1	$19,100
2,500 Gallon STEP Tank Inc. Installation	$20,100	EA	1	$20,100
3,000 Gallon STEP Tank Inc. Installation	$21,900	EA	11	$240,900
7,750 Gallon STEP Tank Inc. Installation	$41,300	EA	1	$41,300
8,000 Gallon STEP Tank Inc. Installation	$42,200	EA	1	$42,200
STEP Service Lateral Installation (1-1/2" HDPE) Inc. Restoration	$7,400	EA	214	$1,583,600
Clearing and Grubbing in Easements	$13,600	Acre	3	$40,800
HDPE Forcemain Material and Installation (Directional Drilling)	$60	LF	27170	$1,630,200
Excavation and Connection at Drill Sites and at Junctions	$5,700	EA	105	$598,500
Directional Drill Restoration	$50	SY	5833	$291,700
Air Releases	$6,000	EA	13	$78,000
Cleanouts	$3,500	EA	55	$192,500
Permits	$10,000	LS	1	$10,000
Traffic Control	3%	%	1	$232,100
Mobilization/Demobilization	5%	%	1	$386,700
Opinion of Probable Construction Cost				**$8,353,000**

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ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
Septic Tank Effluent Collection System - Treatment at Mechanic Street Property
Town of Amenia, NY
Sewer Feasibility Study

Item Description	Unit Cost	Units	Quantity	Cost
Pump out Existing Septic Tanks and Abandon in Place	$750	EA	214	$160,500
1,000 Gallon STEG Tank Inc. Installation	$7,500	EA	50	$375,000
1,500 Gallon STEG Tank Inc. Installation	$8,500	EA	1	$8,500
2,000 Gallon STEG Tank Inc. Installation	$10,000	EA	5	$50,000
3,000 Gallon STEG Tank Inc. Installation	$12,100	EA	1	$12,100
1,000 Gallon STEP Tank Inc. Installation	$13,500	EA	128	$1,728,000
2,000 Gallon STEP Tank Inc. Installation	$18,300	EA	15	$274,500
2,250 Gallon STEP Tank Inc. Installation	$19,100	EA	1	$19,100
2,500 Gallon STEP Tank Inc. Installation	$20,100	EA	1	$20,100
3,000 Gallon STEP Tank Inc. Installation	$21,900	EA	10	$219,000
7,750 Gallon STEP Tank Inc. Installation	$41,300	EA	1	$41,300
8,000 Gallon STEP Tank Inc. Installation	$42,200	EA	1	$42,200
STEG Service Lateral Installation (4" PVC) Inc. Restoration	$8,500	EA	57	$484,500
STEP Service Lateral Installation (1-1/2" HDPE) Inc. Restoration	$7,400	EA	157	$1,161,800
Clearing and Grubbing in Easements	$13,600	Acre	3	$40,800
PVC Gravity Main Installation (Cross Country)	$120	LF	5440	$652,800
HDPE Forcemain Material and Installation (Directional Drilling)	$60	LF	19560	$1,173,600
Excavation and Connection at Drill Sites and at Junctions	$5,700	EA	75	$427,500
Directional Drill Restoration	$50	SY	4167	$208,400
Air Releases	$6,000	EA	8	$48,000
Cleanouts	$3,500	EA	50	$175,000
Permits	$10,000	LS	1	$10,000
Traffic Control	3%	%	1	$220,000
Mobilization/Demobilization	5%	%	1	$366,700
Opinion of Probable Construction Cost				**$7,920,000**

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ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
MBR Water Resource Recovery System - Surface Return
Town of Amenia, NY
Sewer Feasibility Study

Item Description	Unit Cost	Units	Quantity	Cost
Excavation for Frost Walls	$3	SF	3500	$10,500
Concrete Frost Walls	$162	LF	240	$38,900
Concrete Slab on Grade for Building	$19	SF	3500	$66,500
Concrete Equipment Pad for MBR Tanks	$350	CY	35	$12,300
Concrete Equipment Pad for Post-Aeration Tank	$350	CY	10	$3,500
Concrete Equipment Pad for Backwash/CIP Tank	$350	CY	10	$3,500
Concrete Equipment Pads for Chemical Totes	$350	CY	5	$1,800
Insulated Metal Building	$50	SF	3500	$175,000
Insulated Garage Overhead Door	$6,500	LS	2	$13,000
Gantry Crane	$20,000	LS	1	$20,000
Building Plumbing	20%	%	1	$35,000
Building HVAC	30%	%	1	$52,500
Backup Generator	$50,000	EA	1	$50,000
Building Electrical	40%	%	1	$90,000
Ovivo MBR Packaged System	$1,795,500	LS	1	$1,795,500
MBR System Installation	30%	LS	1	$538,700
25,000 Gallon FRP Flow Equalization Tank w/ Pumps and Aerator	$132,250	LS	1	$132,300
Installation of Flow Equalization Tank and Equipment	40%	%	1	$53,000
20,000 Gallon FRP Sludge Holding Tank w/ Pumps	$103,500	LS	1	$103,500
Installation of FRP Sludge Holding Tank	40%	%	1	$41,400
5,000 Gallon Polyethylene Post-Aeration Tank	$3,900	LS	1	$3,900
Installation of Polyethylene Post-Aeration Tank	40%	%	1	$1,600
Fine Bubble Post-Aeration Grid in Post-Aeration Tank	$10,800	LS	1	$10,800
100 Gallon Chemical Totes	$800	EA	2	$1,600
Installation of Chemical Totes	40%	%	1	$700
Influent Flow Meter in Vault	$15,000	LS	1	$15,000
Instrumentation/Control	5%	%	1	$89,800
Interior Process Pipe Work	10%	%	1	$179,600
Lab Equipment and Misc Interior Building Supplies	$15,000	LS	1	$15,000
Commissioning and Operator Training	$11,500	LS	1	$11,500
Mobilization/Demobilization	5%	%	1	$178,400
Opinion of Probable Construction Cost				**$3,745,000**

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ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
MBBR Water Resource Recovery System - Subsurface Return
Town of Amenia, NY
Sewer Feasibility Study

Item Description	Unit Cost	Units	Quantity	Cost
Concrete Slab on Grade for Control Building	$19	SF	300	$5,700
Control Building	$85,000	LS	1	$85,000
Control Building Plumbing	20%	%	1	$17,000
Control Building HVAC	30%	%	1	$25,500
Backup Generator	$50,000	EA	1	$50,000
Control Building & Generator Electrical	40%	%	1	$54,000
AquaPoint Packaged MBBR System	$807,300	LS	1	$807,300
MBBR System Installation	40%	LS	1	$323,000
Below Grade PVC Process Piping	$135	LF	300	$40,500
Electrical Work for MBR System	20%	%	1	$64,600
Influent Flow Meter in Vault	$15,000	LS	1	$15,000
Instrumentation/Control	5%	%	1	$40,400
Galvanized Fencing	$65	LF	300	$19,500
Landscape Screening	$35,000	LS	1	$35,000
Lab Equipment and Misc Interior Control Building Supplies	$5,000	LS	1	$5,000
Mobilization/Demobilization	5%	%	1	$79,400
Opinion of Probable Construction Cost				**$1,667,000**

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ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
MBBR Water Resource Recovery System - Surface Return
Town of Amenia, NY
Sewer Feasibility Study

Item Description	Unit Cost	Units	Quantity	Cost
Excavation for Frost Walls	$3	SF	800	$2,400
Concrete Frost Walls	$162	LF	120	$19,500
Concrete Slab on Grade for Building	$19	SF	800	$15,200
Concrete Equipment Pad for Filters	$350	CY	15	$5,100
Concrete Equipment Pads for Chemical Totes	$350	CY	10	$3,500
Insulated Metal Building	$70	SF	800	$56,000
Insulated Garage Overhead Door	$6,500	LS	1	$6,500
Building Plumbing	20%	%	1	$11,200
Building HVAC	30%	%	1	$16,800
Backup Generator	$50,000	EA	1	$50,000
Building Electrical	40%	%	1	$42,400
AquaPoint Packaged MBBR System	$1,702,000	LS	1	$1,702,000
MBBR System Installation	40%	LS	1	$680,800
Below Grade PVC Process Piping	$135	LF	300	$40,500
Interior Process Pipe Work for Filters	$135	LF	200	$27,000
Cast-in-Place Concrete UV Channel Construction	$20,500	LS	1	$20,500
Influent Flow Meter in Vault	$15,000	LS	1	$15,000
Instrumentation/Control	5%	%	1	$85,100
Galvanized Fencing	$65	LF	400	$26,000
Landscape Screening	$35,000	LS	1	$35,000
Lab Equipment and Misc Interior Building Supplies	$15,000	LS	1	$15,000
Mobilization/Demobilization	5%	%	1	$143,800
Opinion of Probable Construction Cost				**$3,020,000**

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ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
PBF Water Resource Recovery System - Subsurface Return
Town of Amenia, NY
Sewer Feasibility Study

Item Description	Unit Cost	Units	Quantity	Cost
Concrete Slab on Grade for Control Building	$19	SF	300	$5,700
Control Building	$85,000	LS	1	$85,000
Control Building Plumbing	20%	%	1	$17,000
Control Building HVAC	30%	%	1	$25,500
Backup Generator	$50,000	EA	1	$50,000
Control Building & Generator Electrical	40%	%	1	$54,000
Orenco Packaged PBF System	$1,735,600	LS	1	$1,735,600
PBF System Installation	40%	LS	1	$694,300
Below Grade PVC Process Piping	$135	LF	300	$40,500
Electrical Work for PBF System	20%	%	1	$138,900
Influent Flow Meter in Vault	$15,000	LS	1	$15,000
Instrumentation/Control	5%	%	1	$86,800
Galvanized Fencing	$65	LF	300	$19,500
Landscape Screening	$35,000	LS	1	$35,000
Lab Equipment and Misc Interior Control Building Supplies	$5,000	LS	1	$5,000
Mobilization/Demobilization	5%	%	1	$150,400
Opinion of Probable Construction Cost				**$3,159,000**

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ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
PBF Water Resource Recovery System - Surface Return
Town of Amenia, 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	$2,479,400	LS	1	$2,479,400
PBF System Installation	40%	LS	1	$991,800
Below Grade PVC Process Piping	$135	LF	300	$40,500
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	$124,000
Galvanized Fencing	$65	LF	400	$26,000
Landscape Screening	$35,000	LS	1	$35,000
Lab Equipment and Misc Interior Building Supplies	$15,000	LS	1	$15,000
Mobilization/Demobilization	5%	%	1	$205,800
Opinion of Probable Construction Cost				**$4,321,000**

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ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
KleanTU NitROE Water Resource Recovery System - Subsurface Return
Town of Amenia, NY
Sewer Feasibility Study

Item Description	Unit Cost	Units	Quantity	Cost
Concrete Slab on Grade for Control Building	$19	SF	300	$5,700
Control Building	$85,000	LS	1	$85,000
Control Building Plumbing	20%	%	1	$17,000
Control Building HVAC	30%	%	1	$25,500
Backup Generator	$50,000	EA	1	$50,000
Control Building & Generator Electrical	40%	%	1	$54,000
25,000 Gallon FRP Flow Equalization Tank w/ Pumps and Aerator	$132,250	LS	1	$132,300
Cast-in-Place Concrete Tank for KleanTU System	$1,650	CY	431	$711,000
KleanTU NitROE System Including Installation	$1,300,000	LS	1	$1,300,000
Below Grade PVC Process Piping	$135	LF	300	$40,500
Electrical Work for KleanTU System	20%	%	1	$156,000
Influent Flow Meter in Vault	$15,000	LS	1	$15,000
Instrumentation/Control	5%	%	1	$65,000
Galvanized Fencing	$65	LF	400	$26,000
Landscape Screening	$35,000	LS	1	$35,000
Lab Equipment and Misc Interior Control Building Supplies	$5,000	LS	1	$5,000
Mobilization/Demobilization	5%	%	1	$136,200
Opinion of Probable Construction Cost				**$2,860,000**

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ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
Surface Return System - Mechanic Street Property
Town of Amenia, NY
Sewer Feasibility Study

Item Description	Unit Cost	Units	Quantity	Cost
8" PVC Gravity Sewer Main Installation (In Road)	$300	LF	730	$219,000
Multiport Fully Submerged Cross Channel Diffuser	$25,000	EA	1	$25,000
Dewatering/Erosion Protection	$7,000	EA	1	$7,000
Permits	$10,000	LS	1	$10,000
Traffic Control	3%	%	1	$7,900
Mobilization/Demobilization	5%	%	1	$13,100
Opinion of Probable Construction Cost				**$282,000**

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ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
Surface Return System - Leonard Property
Town of Amenia, NY
Sewer Feasibility Study

Item Description	Unit Cost	Units	Quantity	Cost
8" PVC Gravity Sewer Main Installation (In Road)	$300	LF	300	$90,000
Multiport Fully Submerged Cross Channel Diffuser	$25,000	EA	1	$25,000
Dewatering/Erosion Protection	$7,000	EA	1	$7,000
Permits	$10,000	LS	1	$10,000
Mobilization/Demobilization	5%	%	1	$6,600
Opinion of Probable Construction Cost				**$139,000**

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ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
GGSF Subsurface Return System - Silo Ridge Property
Town of Amenia, NY
Sewer Feasibility Study

Item Description	Unit Cost	Units	Quantity	Cost
Brush Hogging	$700	Acre	8	$5,600
Effluent Dosing Tank & Distribution	$33,000	LS	1	$33,000
Installation of Effluent Dosing Tank	40%	%	1	$13,200
Rough Grading for Absorption Field	$25,500	LS	1	$25,500
Soil Amendment	$46	CY	3500	$161,000
Absorption Field Trenching and Backfill	$6	LF	9400	$56,400
System Sand Bedding	$52	CY	2924	$152,100
ATL Conduits	$27	LF	9400	$253,800
Schedule 40 PVC Perforated Pipes	$10	LF	9400	$94,000
Vent Piping	$9	LF	940	$8,500
Barrier Fabric	$5	SY	4178	$18,800
Trenching and Backfill for Tight Pipes	$3	LF	1880	$4,700
Schedule 40 PVC Tight Pipes	$10	LF	1880	$18,800
Stormwater Diversion	$10	LF	600	$6,000
Final Grading, Mulch & Seed	$6	SY	14000	$84,000
Groundwater Monitoring Wells	$30,000	EA	2	$60,000
Mobilization/Demobilization	5%	%	1	$46,800
Opinion of Probable Construction Cost				**$1,043,000**

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ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

Alternative No. 1 Site Work

Town of Amenia, NY

Sewer Feasibility Study

Item Description	Unit Cost	Units	Quantity	Cost
Brush Hogging	$700	Acre	1	$700
Rough Grading for Access Road	$4,800	EA	1	$4,800
Prepare and Roll Subbase for Access Road	$3	SY	1111	$3,400
Stabilization Fabric for Access Road	$2	SY	1111	$2,300
Gravel and Compaction for Access Road	$10	SY	1111	$11,200
Driveway Culvert for Access Road	$1,000	EA	1	$1,000
Trenching for Underground Electrical Utilities	$5	LF	850	$4,300
Bedding for Underground Electrical Conduits	$7	LF	850	$6,000
Direct Burial of PVC Conduits	$7	LF	850	$6,000
Utility Fee/Service Entrance	$5,000	LS	1	$5,000
Trenching for Water Service	$6	LF	850	$5,100
Bedding for Water Service	$3	LF	850	$2,600
1" Polyethylene Water Service	$3	LF	850	$2,600
General Fill	$37	CY	741	$27,500
Rough Site Grading for MBBR System and Control Building	$9,000	EA	1	$9,000
Final Grading, Mulch & Seed	$5	SY	2222	$11,200
Mobilization/Demobilization	5%	%	1	$5,200
Opinion of Probable Construction Cost				**$108,000**

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ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

Alternative No. 2 Site Work

Town of Amenia, NY

Sewer Feasibility Study

Item Description	Unit Cost	Units	Quantity	Cost
Clearing and Grubbing	$12,000	Acre	1	$12,000
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
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	$37	CY	2667	$98,700
Rough Site Grading for MBBR System and Control Building	$9,000	EA	1	$9,000
Final Grading, Mulch & Seed	$5	SY	2222	$11,200
Mobilization/Demobilization	5%	%	1	$7,300
Opinion of Probable Construction Cost				**$153,000**

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

Alternative No. 3 Site Work

Town of Amenia, NY

Sewer Feasibility Study

Item Description	Unit Cost	Units	Quantity	Cost
Clearing and Grubbing	$12,000	Acre	0.25	$3,000
Demolition of Existing Structures	$10,000	LS	1	$10,000
Rough Grading for Access Road	$2,200	EA	1	$2,200
Prepare and Roll Subbase for Access Road	$3	SY	400	$1,200
Stabilization Fabric for Access Road	$2	SY	400	$800
Gravel and Compaction for Access Road	$10	SY	400	$4,000
Driveway Culvert for Access Road	$1,000	EA	1	$1,000
Trenching for Underground Electrical Utilities	$5	LF	300	$1,500
Bedding for Underground Electrical Conduits	$7	LF	300	$2,100
Direct Burial of PVC Conduits	$7	LF	300	$2,100
Trenching for Water Service	$6	LF	300	$1,800
Bedding for Water Service	$3	LF	300	$900
1" Polyethylene Water Service	$3	LF	300	$900
General Fill	$37	CY	1111	$41,200
Rough Site Grading for MBBR System and Control Building	$9,000	EA	1	$9,000
Final Grading, Mulch & Seed	$5	SY	2222	$11,200
Mobilization/Demobilization	5%	%	1	$4,700
Opinion of Probable Construction Cost				**$98,000**

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. 1

Town of Amenia, NY

Sewer Feasibility Study

Item Description	Unit Cost	Units	Quantity	Cost
Septic Tank Effluent Collection System				
Proactive System Maintenance	$75	Hour	104	$7,800
Reactive System Maintenance	$75	Hour	24	$1,800
Septic Tank Pumping (1,000 gal)	$600	EA	36	$21,600
Septic Tank Pumping (1,500 gal)	$750	EA	1	$800
Septic Tank Pumping (> 1,500 gal)	$2,000	EA	7	$14,000
Equipment Repair and Replacement	$8,500	Year	1	$8,500
MBBR System				
Proactive System Maintenance	$75	Hour	156	$11,700
Reactive System Maintenance	$75	Hour	26	$2,000
Energy Consumption	$0.10	kWh	160042	$16,100
Cellular Service for Communication	$50	Month	12	$600
Sludge Tank Pumping	$7,200	Year	1	$7,200
Media Replacement	$600	Year	1	$600
Pump Maintenance	$500	Year	1	$500
Blower Maintenance	$500	Year	1	$500
Flow Meter Calibration	$300	Year	1	$300
Sampling Supplies	$1,000	Year	1	$1,000
Misc. Maintenance Supplies	$500	Year	1	$500
Mowing around MBBR System	$75	Hour	12	$900
Misc. Site/Access Road Maintenance	$500	Year	1	$500
Subsurface Return				
Mowing Absorption Field	$75	Hour	6	$ 500
Dosing System Maintenance	$500	Year	1	$ 500
			Subtotal Annual O&M Costs	$ 98,000
			Contingency (30%)	$ 30,000
			Administrative, Billing, & Accounting	$ 15,000
			Opinion of Probable Annual O&M Cost	**$143,000**

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 annula O&M costs will not vary from this estimate of the Probable Annual O&M Cost.

ENGINEER'S OPINION OF PROBABLE ANNUAL O&M COST
Alternative No. 2
Town of Amenia, NY
Sewer Feasibility Study

Item Description	Unit Cost	Units	Quantity	Cost
Septic Tank Effluent Collection System				
Proactive System Maintenance	$75	Hour	104	$7,800
Reactive System Maintenance	$75	Hour	24	$1,800
Septic Tank Pumping (1,000 gal)	$600	EA	36	$21,600
Septic Tank Pumping (1,500 gal)	$750	EA	1	$800
Septic Tank Pumping (> 1,500 gal)	$2,000	EA	7	$14,000
Equipment Repair and Replacement	$8,500	Year	1	$8,500
MBBR System				
Proactive System Maintenance	$75	Hour	364	$27,300
Reactive System Maintenance	$75	Hour	26	$2,000
Energy Consumption	$0.10	kWh	226512	$22,700
Cellular Service for Communication	$50	Month	12	$600
Sludge Tank Pumping	$7,200	Year	1	$7,200
Media Replacement	$600	Year	1	$600
Pump Maintenance	$500	Year	1	$500
Blower Maintenance	$500	Year	1	$500
Disc Filter Maintenance	$1,500	Year	1	$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 MBBR System	$75	Hour	12	$900
Misc. Site/Access Road Maintenance	$500	Year	1	$500
Surface Return				
Cleaning/Maintenance of Surface Return	$1,000	Year	1	$ 1,000
			Subtotal Annual O&M Costs	$ 127,000
			Contingency (30%)	$ 39,000
			Administrative, Billing, & Accounting	$ 15,000
			Opinion of Probable Annual O&M Cost	**$181,000**

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 annula O&M costs will not vary from this estimate of the Probable Annual O&M Cost.

ENGINEER'S OPINION OF PROBABLE ANNUAL O&M COST

Alternative No. 3

Town of Amenia, NY

Sewer Feasibility Study

Item Description	Unit Cost	Units	Quantity	Cost
Septic Tank Effluent Collection System				
Proactive System Maintenance	$75	Hour	104	$7,800
Reactive System Maintenance	$75	Hour	24	$1,800
Septic Tank Pumping (1,000 gal)	$600	EA	36	$21,600
Septic Tank Pumping (1,500 gal)	$750	EA	1	$800
Septic Tank Pumping (> 1,500 gal)	$2,000	EA	7	$14,000
Equipment Repair and Replacement	$8,500	Year	1	$8,500
MBBR System				
Proactive System Maintenance	$75	Hour	364	$27,300
Reactive System Maintenance	$75	Hour	26	$2,000
Energy Consumption	$0.10	kWh	226512	$22,700
Cellular Service for Communication	$50	Month	12	$600
Sludge Tank Pumping	$7,200	Year	1	$7,200
Media Replacement	$600	Year	1	$600
Pump Maintenance	$500	Year	1	$500
Blower Maintenance	$500	Year	1	$500
Disc Filter Maintenance	$1,500	Year	1	$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 MBBR System	$75	Hour	12	$900
Misc. Site/Access Road Maintenance	$500	Year	1	$500
Surface Return				
Cleaning/Maintenance of Surface Return	$1,000	Year	1	$ 1,000
			Subtotal Annual O&M Costs	$ 127,000
			Contingency (30%)	$ 39,000
			Administrative, Billing, & Accounting	$ 15,000
			Opinion of Probable Annual O&M Cost	**$181,000**

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 annula O&M costs will not vary from this estimate of the Probable Annual O&M Cost.

Tighe&Bond

APPENDIX J

NEW YORK STATE OF OPPORTUNITY. | Department of Health | Environmental Facilities Corporation

Smart Growth Assessment Form

This form should be completed by an authorized representative of the applicant, preferably the project engineer or other design professional.[1]

Section 1 – General Applicant and Project Information

Applicant: Town of Amenia Project No.:

Project Name: Town of Amenia Sewer System

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:

The proposed project includes construction of a new septic tank effluent collection system, MBBR wastewater treatment system, and surface return to Amenia Stream. The new sewer system will serve portions of the Hamlet of Amenia.

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

[1] 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 will 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: As part of the proposed project, existing septic tanks, tight tanks, and leach fields (some of which are failing or constrained due to inadequate site conditions) will be cleaned, abandoned, and replaced with new septic tank effluent pump systems. The septic tank effluent will be treated before being returned to Amenia Stream.

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* for more information), downtown areas of local waterfront revitalization program areas (see *www.dos.ny.gov* for more information), areas of transit-oriented development, environmental justice areas (see *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:

   The project and the proposed sewer district will serve portions of the Hamlet of Amenia including the business core area in the center of the hamlet and some surrounding residential areas in the Hamlet. Approximately 50% of the proposed sewer district will serve an environmental justice area (the portion of the district north of Route 343). The proposed sewer district is shown in Figure A.9 in the 2022 Sewer Feasibility Study Report.

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:

The project is located in a developed area. The Hamlet of Amenia is developed and includes a mix of commercial, small businesses, and residential uses.

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:

As part of the proposed project, existing septic tanks, tight tanks, and leach fields (some of which are failing or constrained due to inadequate site conditions) will be cleaned, abandoned, and replaced with new septic tank effluent pump systems.

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:

Implementation of a sewer system is expected to encourage compact development within the district, which primarily serves the hamlet. This will help preserve the rural nature elsewhere in the Town which is a goal of the Town of Amenia Comprehensive Plan.

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

☐Yes ☐No ☑N/A

Explain your response:

This project is not expected to impact transportation choices.

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:

The project will involve coordination between the Town of Amenia and several regulatory agencies including the New York State Department of Environmental Conservation, Dutchess County Department of Behavioral and Community Health, and the New York State Department of Health. Coordination will also be required during construction between the New York State Department of Transportation and the Dutchess County Department of Public Works.

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

   ☑Yes ☐No

   Explain your response and reference any applicable plans:

   The project will involve input, planning, and collaboration with the stakeholders in the proposed sewer district.

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

   ☑Yes ☐No ☐N/A

   Explain your response:

   Implementation of a sewer system is expected to encourage compact development within the district, which primarily serves the hamlet. A sewer system is expected to encourage more businesses or expansion of existing businesses. This is consistent with the current zoning codes for much of the district.

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:

    The project has the potential to implement green infrastructure techniques such as solar. The adoption of green infrastructure measures will be considered during the final design phase of the project.

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:

    The project is not expected to directly mitigate future physical climate risk.

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: Town of Amenia	Phone Number: 845-516-5835
Name and Title of Signatory: Erin K. Moore, PE, BCEE	
Signature: 	Date: 6/10/2022

Tighe&Bond

APPENDIX K

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: Sewer Feasibility Study – Town of Amenia

Date of Report: June 2022

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

Signature:

Date: June 10, 2022