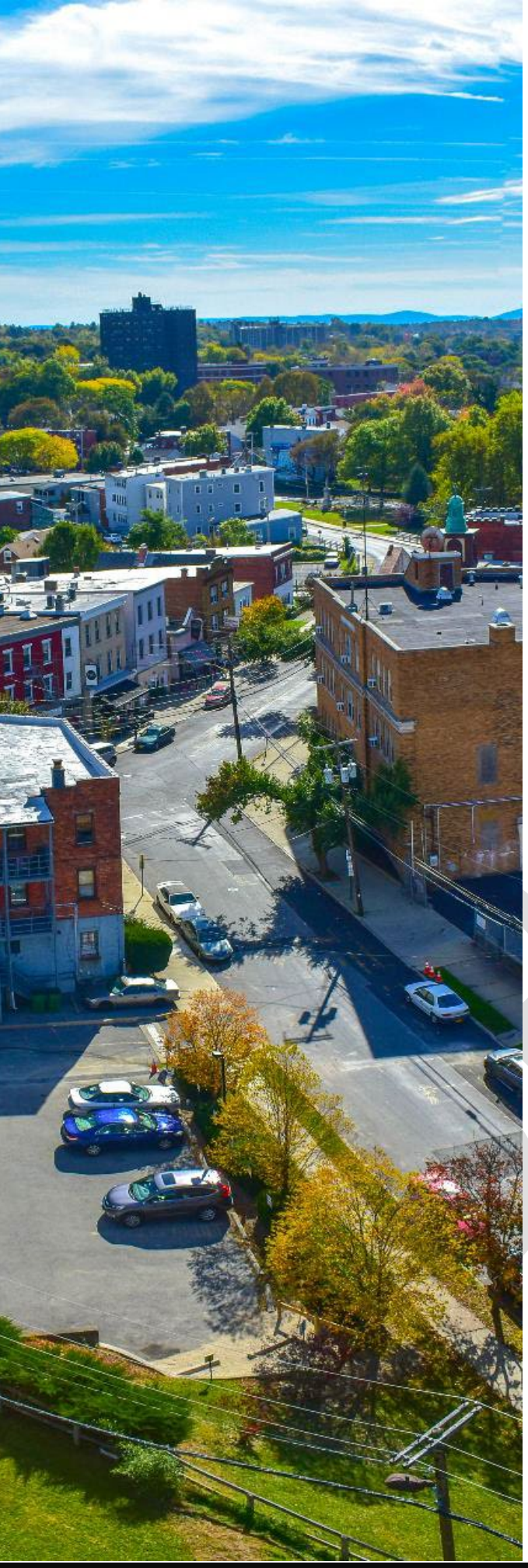

Economic Development Infrastructure Capacity Planning Study

Prepared For:

TOWN AND VILLAGE OF LIBERTY

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Liberty, NY 12754

JUNE 2024

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Table of Contents

Town and village of liberty 0

Table of Contents i

1.0 Executive Summary 2

2.0 Introduction and Background 4

3.0 Overview of Economic Development Sites and Study Area 5

TOWN AND VILLAGE OF LIBERTY 7

Old Route 17 Corridor Study 7

STUDY AREA 7

4.0 Existing Infrastructure Conditions, Needs, and Challenges 8

4.1 WATER SUPPLY AND DISTRIBUTION 8

Lily Pond Reservoir and Water Treatment Plant 8

Elm Street Well 12

Town Water Sources 14

Service Areas and Distribution Systems 17

Summary of Needs and Challenges 22

4.2 SANITARY SEWER CONVEYANCE AND TREATMENT 27

Conveyance System 27

Village of Liberty Wastewater Treatment Plant 30

Town of Liberty Swan Lake Wastewater Treatment Plant 32

Summary of Needs and Challenges 32

4.3 STORM WATER MANAGEMENT 33

5.0 Infrastructure Needs, Projects, and Opportunities 35

EXISTING INFRASTRUCTURE NEEDS 35

ECONOMIC DEVELOPMENT INFRASTRUCTURE DEMAND AND NEEDS 36

INFRASTRUCTURE OPPORTUNITIES 37

Water Supply and Distribution 37

Wastewater Conveyance and Treatment 37

POTENTIAL INFRASTRUCTURE PROJECTS 38

6.0 Analysis and Recommendations 38

WATER SUPPLY AND DISTRIBUTION **38**
WASTEWATER CONVEYANCE AND TREATMENT **40**
STORMWATER MANAGEMENT **44**
HIGH-PRIORITY PROJECTS SUMMARY TABLE **45**

7.0 Financial Analysis and Governance **45**
BUDGETING **46**
Village of Liberty 46
Town of Liberty 46
RATE STRUCTURE AND USERS **48**
Village of Liberty 48
Town of Liberty 48
ANALYSIS AND RECOMMENDATIONS **49**

8.0 Next Steps **52**
WATER SUPPLY PROJECTS A, B, AND C **52**
D – CONVEYANCE SYSTEM INVENTORY, CONDITION ASSESSMENT, AND FLOW METERING OF AREAS TRIBUTARY TO THE VILLAGE WWTP **53**
E – GREEN LANE GRAVITY LINE REPLACEMENT **53**
F – PLAN FOR DAYS INN PS UPGRADES **54**
G – INVENTORY (MAP) AND PERFORM CONDITION ASSESSMENT OF VILLAGE STORM SEWER SYSTEM **55**
H – CONDUCT PRELIMINARY ENGINEERING STUDY ADDRESSING FLOODING ALONG EASTERLY PORTION OF MAIN STREET **55**

List of Tables

Table 1. Capacities, water withdrawal reporting information, and permitting for Town and Village water supply systems (sources: NYSDEC annual water withdrawal reports; DRBC docket information) 16
Table 2. Town of Liberty water system assets and capacities 18
Table 3. Daily Average flows for 2019 for Ferndale & Rt 55 (Rt55 includes Loomis) 19
Table 4. Village water storage and distribution capacities 21
Table 5. List of sanitary sewer pump stations, capacities, and operational statues 29
Table 6. Baseline water, sewer, and stormwater infrastructure needs 35
Table 7. Potential future system development-related demands 36

Table 8. Potential infrastructure projects 41
Table 9. High-Priority Projects Summary 45
Table 10. 2023/2024 Village of Liberty Budget Extract 46
Table 11. Town water and sewer budget comparison 47
Table 12. Town of Liberty water and sewer reserve fund adopted budget allocations summary 48
Table 13. Town of Liberty service connections by water district 49

List of Figures

Figure 1. Development sites 6
Figure 2. Study area map 9
Figure 3. Water supply system serving the Study Area 11
Figure 4. New Route 55 water storage tank 20
Figure 5. Location of max. capacity for various locations within the water distribution system 26
Figure 6. Map of sanitary sewer system serving the Study Area 28
Figure 7. Drainage pattern along Main Street in the Village of Liberty 34

Appendices

APPENDIX 1 – Town and Village Water Withdrawal Reporting Summary
APPENDIX 2 – Land Development Site Water/Sewer Loading Estimates
APPENDIX 3 – Budget Information
APPENDIX 4 – Task 2 Technical Memorandum: Parksville Sewer Services Alternatives Study Update

List of Acronyms

BTEX	benzene, toluene, ethylbenzene and xylene
CBOD	Carbonaceous biochemical oxygen demand
DBP	Disinfection byproduct
DRBC	Delaware River Basin Commission
gal.	Gallons
gpd	Gallons per day
gpm	Gallons per minute
HAAs	Haloacetic acids
I/I	Inflow and infiltration
lf	Linear feet
mg	Million gallons
mgm	Million gallons per minute
Mgd	Millon gallons per day
MTBE	Methyl tert-butyl ether
NYSDEC	New York State Dept. of Environmental Conservation
NYSDOH	New York State Dept. of Health
O&M	Operation and maintenance
PS	Pump station
PSI	Pounds per square inch
RPM	Revolutions per minute
SCADA	Supervisory Control and Data Acquisition
SPDES	State pollutant discharge elimination system
TDH	Total dynamic head
THM	Trihalomethanes
UST	Underground storage tank
VFD	Variable frequency drive
w/d	Withdrawal
WSS	White Sulphur Springs
WST	Water storage tank
WTB	Water treatment building
WTP	Water treatment plant
WWTP	Wastewater treatment plant

1.0 Executive Summary

The Town of Liberty and the Village of Liberty collaborated to prepare this planning study of public infrastructure serving existing developed portions of both municipalities as well as in anticipation of demands placed on these systems as a result of economic development activities and other investments in their communities. Sources of information underlying this report include interviews with Town and Village leadership and staff, recommendations from prior planning efforts, review of land development project proposals, previous engineering efforts, and regulatory filings.

This study is focused on an identified Study Area that comprises most of the Village and extending north along Parksville Road and south to Loomis-Ferndale Road. A range of potential economic development activity within and related to the Study Area, from Main Street redevelopment in the Village, to mixed use projects in the Town and residential projects in both Town and the Village, is analyzed for potential infrastructure needs. Business Park recommendations set forth in the Old Route 17 Corridor Study prepared by the Sullivan County Partnership are also incorporated and updated, as appropriate. This analysis shows that additional demands upwards of 1.5 million gallons per day (mgd) could be placed on the water and sewer systems serving the area.

Water supply, sanitary sewer, and stormwater management systems were analyzed with respect to current operating conditions, known needs and potential demands placed by economic development activities. At a high level, the water supply system serving the Study area is constrained on both the supply and distribution sides. The Town's system operates near capacity in July and August of each year, and the Village system, which operates at less than design and permitted capacity, needs investment to increase water supply in the Study Area. That said, review of water withdrawal reporting and permitting information shows that between the Town and Village water supply systems, total permitted water withdrawal for the Town and Village systems is roughly 2.8 mgd, but maximum source capacity on the order of 4.6 million gallons per day (2.6 mgd from the Village system and 2.0 mgd from the Town system), 1.8 mgd in source capacity may be available.

The Village's wastewater treatment plant serves the Study Area, has spare capacity, and would likely continue to serve as the primary treatment plant, given this spare capacity and Village investment in the long term in the plant. The conveyance system is owned by both the Town and Village, and would require investments in certain pump stations and new gravity sewers to increase capacity. Many of the pump stations serving the Study Area

appear to have spare capacity, but critical stations either situated to accept substantial additional flows or, in the case of the Days Inn station, through which significant amounts of the Study Area do or would discharge, will need upgrades to create additional capacity. The Village system is aging, and the Green Lane corridor, which has a history of requiring major emergency repairs to sanitary lines and manholes, remains a challenge that if addressed would also facilitate economic development.

Storm sewer in the Study Area is largely owned by the Village and other entities, and the Village system, given its age, will require ongoing investment to replace aging infrastructure. An area east of and adjacent to Main Street in the Village experiences recurring flooding, due to its location in the watershed at a low elevation and historical confluence of streams, portions of which have been placed in underground conveyances or moved for highway construction.

A list of potential infrastructure projects, drawn from prior efforts, discussions with Town and Village officials, and generated by the process of preparing this study, is included in order to assist the Town and Village in planning for investment in continuing operations as well as growth in service needs.

An analysis supporting priority recommendations for each infrastructure system reviewed is presented and recommendations are developed along two lines. First, inventorying and modeling these systems in order to establish baseline information that then can be used to optimize system operations, identify constraints, and facilitate project and capital planning. Developing a hydraulic model of the water supply system, in particular, is recommended in order to target booster stations, water mains, and storage facilities in order to take advantage of additional capacity – whether in existing sources or new sources developed in the future. Second, safe-yield analysis of existing sources is also recommended, as are major projects to replace the Village's Lily Pond Water Treatment Plant and upgrade a water main to allow Village water to be delivered to easterly portions of the Study Area.

Sanitary sewer recommendations include asset inventorying and capacity modeling as well as planning for replacement of the Green Lane sanitary sewer and upgrades of the Days Inn pump station. For the Days Inn pump station, a phased approach is recommended to facilitate fair-share contributions made during land development project planning. Storm sewer inventorying and preliminary engineering to address recurring flooding are also recommended.

The Town and Village water and sewer systems are interlinked, and the Village also supplies several areas in the Town with water and sewer service directly. This history of collaboration can form the basis for a framework to expand the service areas of each system in order to increase the user base and rate payers. The Study compares scenarios under which priority recommended projects, including the Lily Pond Water Treatment Plant upgrade and Green Lane sewer line rehabilitation or replacement projects, are funded under current conditions or funded under an expanded user base scenario. Finally, this study presents a list of next steps for each priority project, which includes a discussion of available funding opportunities. As part of this effort, a prior feasibility study addressing providing sewer service to Hamlet of Parksville was also updated (see Appendix 4).

2.0 Introduction and Background

The Town of Liberty is positioned to be the beneficiary of economic investment that will improve the tax base, resulting in economic stability with respect to the cost of government and the provision of public services for local property owners. However, the economic investment envisioned will not occur if the Town, in partnership with the Village of Liberty. are unable to provide necessary public water and sewer services.

The Town of Liberty owns and operates numerous public water and sewer districts for the benefit of the property owners within these special districts. There are four sewer districts and seven water districts in the Town of Liberty. In addition, the Village of Liberty owns and operates water and wastewater systems to service properties in the Village as well as certain properties in adjacent areas of the Town.

There is significant complexity attached to owning and operating public water and sewer systems including the infrastructure associated with providing service, the regulatory burdens, and the need to invest to provide quality services while also ensuring that costs to end users are reasonable and sustainable. In addition, the ever-present demands to invest in aging infrastructure, achieve regulatory requirements and meet the needs of property owners within the various service areas can be challenging to budget, prioritize and implement. Moreover, the accommodation of new users adds intricacies with respect to how to ensure that capacity exists when it is needed yet does not burden the rate payer of today with infrastructure intended for a future user that may or may not materialize.

In 2018, the Sullivan County Partnership for Economic Development, prepared by Delaware Engineering, D.P.C., issued a report identifying opportunities and constraints to economic

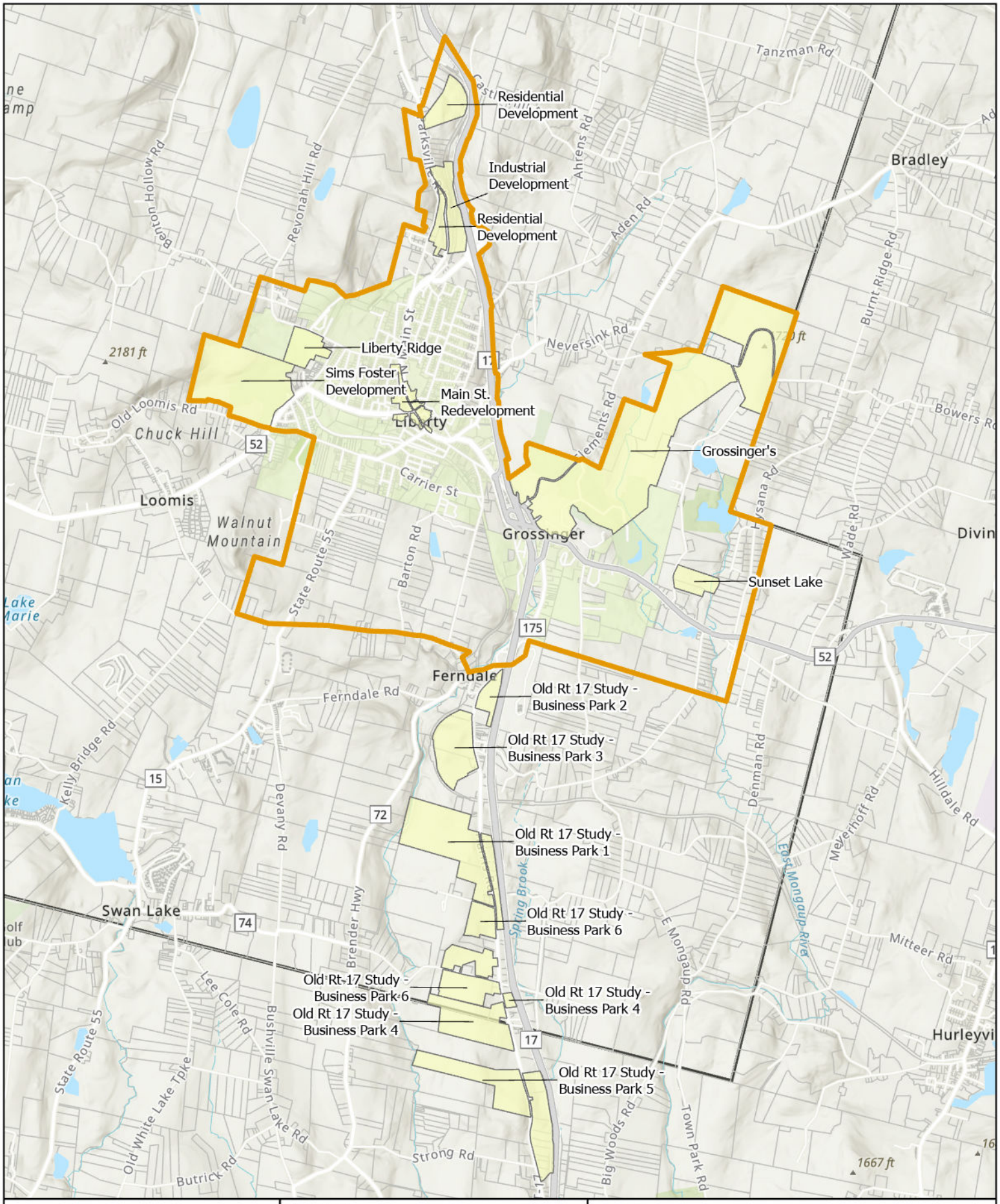
development along the Old Route 17 Corridor to determine priority sites for shovel-ready investment. The study looked at portions of the Town of Liberty and the Town of Thompson, with the study area in Liberty extending to just south of the Village of Liberty. In the years since the Partnership issued this study, the private sector has expressed interest in pursuing projects in the Town. For example, the Town of Liberty Planning Board issued approval for a 1 million square foot warehouse to be constructed on the highest priority site outlined in this study.

This Study extends these prior investigations and recommendations with a focus on public infrastructure needs and opportunities. In addition to interest from the commercial sector, there is also presently demand for an array of housing options in the region that are not accommodated in the existing low-density residential zoning districts. As outlined in subsequent sections of this Study, the Town and Village have seen an uptick in interest by the private sector for residential and mixed-use development but also industrial projects in the areas including and adjacent to the Village.

In consideration of these conditions, the Town of Liberty in cooperation with the Village of Liberty seeks a Study and Plan to provide the Town and Village boards and the public with a one-stop-shop that identifies current conditions, challenges, needs, costs, priorities and implementation steps towards sustainable public water and sewer systems that meet the needs of existing, as well as potential future users. The Town also sought to update a feasibility study addressing providing sewer service to the Hamlet of Parksville, completed in 2021.

3.0 Overview of Economic Development Sites and Study Area

This section summarizes the locations of opportunities for development and redevelopment sites. Building from the Old Route 17 Corridor Study ("Route 17 Corridor Study"), the initial focus was areas in and surrounding the Village. This focus was further refined during development of this Study. This section first presents potential development and investment areas. The information presented is derived primarily from interviews with Town and Village officials with respect to private sector interest; it is supplemented with a desktop review of environmental characteristics, proximity to water and/or sewer infrastructure, transportation, and zoning. This section next presents the Study Area boundaries, derived from this process.



Liberty Infrastructure Master Plan

Development Sites

Legend

- Study Area Boundary
- Tax Parcels
- Village of Liberty Parcels
- Town Bndry
- Development Sites

Prepared by: Delaware Engineering, DPC
Date: June 5, 2023
Source: ESRI, Sullivan Cnty., NYS OITS GPO

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TOWN AND VILLAGE OF LIBERTY

Taken together, interest in this portion of the Town has been primarily in residential, hospitality, or mixed-use development. A total of 13 sites was identified and are depicted on Figure 1. Other development proposals have included a cannabis cultivation facility, bioscience industry facilities, and resorts. These sites represent either greenfield development or redevelopment into higher-intensity uses. For example, both the Grossingers and former Sullivan County Golf and Country Club developments would involve new development on lands occupied by existing or former golf courses and resort facilities. With certain exceptions (i.e., outside the Study Area) the Town did not identify any major land use or zoning changes.

By contrast, the Village has comparatively fewer opportunities for greenfield or substantial redevelopment, owing mainly to the fact that lands within the Village are largely built upon. Opportunities for development and investment in the Village, therefore, are primarily related to infill or redevelopment of its existing built environment. As well, opportunities in the Village are conceptual, with the land development community involved concretely or preliminarily in only a small proportion of opportunities listed below. Village officials expressed openness to evaluating changes to its land use policies and zoning in support of various objectives, including economic development.

Old Route 17 Corridor Study

In addition, included in the Development Sites in the Town are five (5) potential developments from the Old Route 17 Corridor Study. While these sites lie outside of the Study Area, they are included in this analysis, as that study recommended public water and sewer connections to the Town and/or Village systems, and the findings and recommendations with respect to water and sewer infrastructure outlined in the Old Route 17 Corridor Study generally remain valid. These sites are shown on Figure 1, above.

STUDY AREA

A roughly 7.1 square mile area was identified to form the boundaries of the Study Area. The Study Area contains the majority of the Village and extending to cover adjacent portions of the Town as follows: about 1.2 miles to the north, along Parksville Road and Youngs Hill Road; to the east along Route 52 to its intersection with Hysana Road and north about 1.3 miles, along Infirmary Road; to the south to Ferndale-Loomis Road bounded by the easterly Town boundary, Ferndale-Loomis Road, and including Route 55 south of the Village; and a

smaller portion west of the Village to include the former Sullivan County Golf and Country Club property and Revonah Hill Reservoir. A map of the Study Area is included as Figure 2. Although outside of the Study Area, sewer service to Parksville is addressed in Appendix 4.

4.0 Existing Infrastructure Conditions, Needs, and Challenges

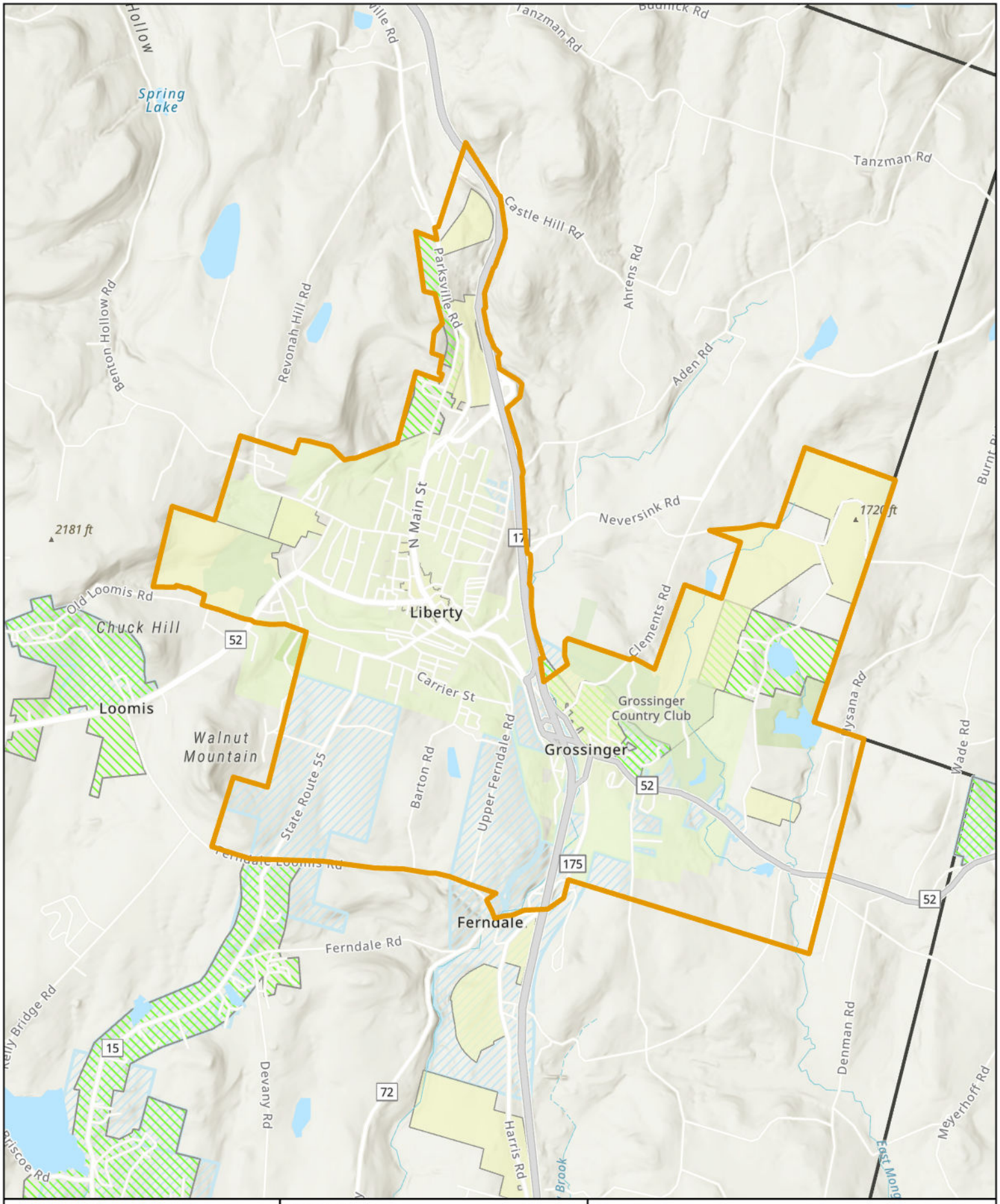
This section presents an overview of the water and sanitary sewer systems within and serving the Study Area. Within the Village, stormwater management was also identified as presenting certain challenges and is also discussed. For these major infrastructure systems, existing conditions (e.g., capacity, operating and design parameters, life-cycle, status, etc.) are summarized. Challenges, like capacity constraints or inflow/infiltration issues, are noted, and identified needs, such as known capital investment requirements or regulatory issues, are included.

4.1 WATER SUPPLY AND DISTRIBUTION

The principal water sources serving the Study Area are the Lily Pond Reservoir and Elm Street Well, both of which are owned and operated by the Village. In addition, the Town supplies water to areas along Route 55 and Upper Ferndale Road in the southerly portion of the Study Area from two wells in Stevensville (Swan Lake). The Town's system is also fed by the two White Sulphur Springs wells. The Study Area water distribution system is owned, variously, by the Town and the Village. A map of the water supply and distribution system serving the Study Area is included as Figure 3.

Lily Pond Reservoir and Water Treatment Plant

Lily Pond and the Lily Pond Water Treatment Plant (WTP) are located in the Town of Liberty. Lily Pond is an impoundment located on an unnamed tributary to the Little Beaver Kill approximately 7 miles north of the Village of Liberty. Lily Pond is a 90-acre reservoir that consists of a larger upper reservoir and a smaller lower impoundment separated by 200 foot long, 7 feet high earthen dam with concrete spillway constructed in 1923. Water is pumped, using a system of three lift pumps, from the upper reservoir through an intake and a 12-inch diameter pipe to the WTP. The intake is positioned so that only the upper four feet (approximately 109 mg) of the reservoir's total volume is used for water supply. No water is withdrawn from the lower impoundment for water supply purposes. The lower impoundment contains an earthen dam and concrete spillway and valves that can release water from the lower impoundment in the event flooding from the upper impoundment is expected.



Liberty Infrastructure Master Plan

Study Area

Legend

- Study Area Boundary
- Village of Liberty Parcels
- Sewer_Districts
- Water_Districts
- Town Bndry
- Development Sites

Prepared by: Delaware Engineering, DPC
Date: June 5, 2023
Source: ESRI, Sullivan Cnty., NYS OITS GPO

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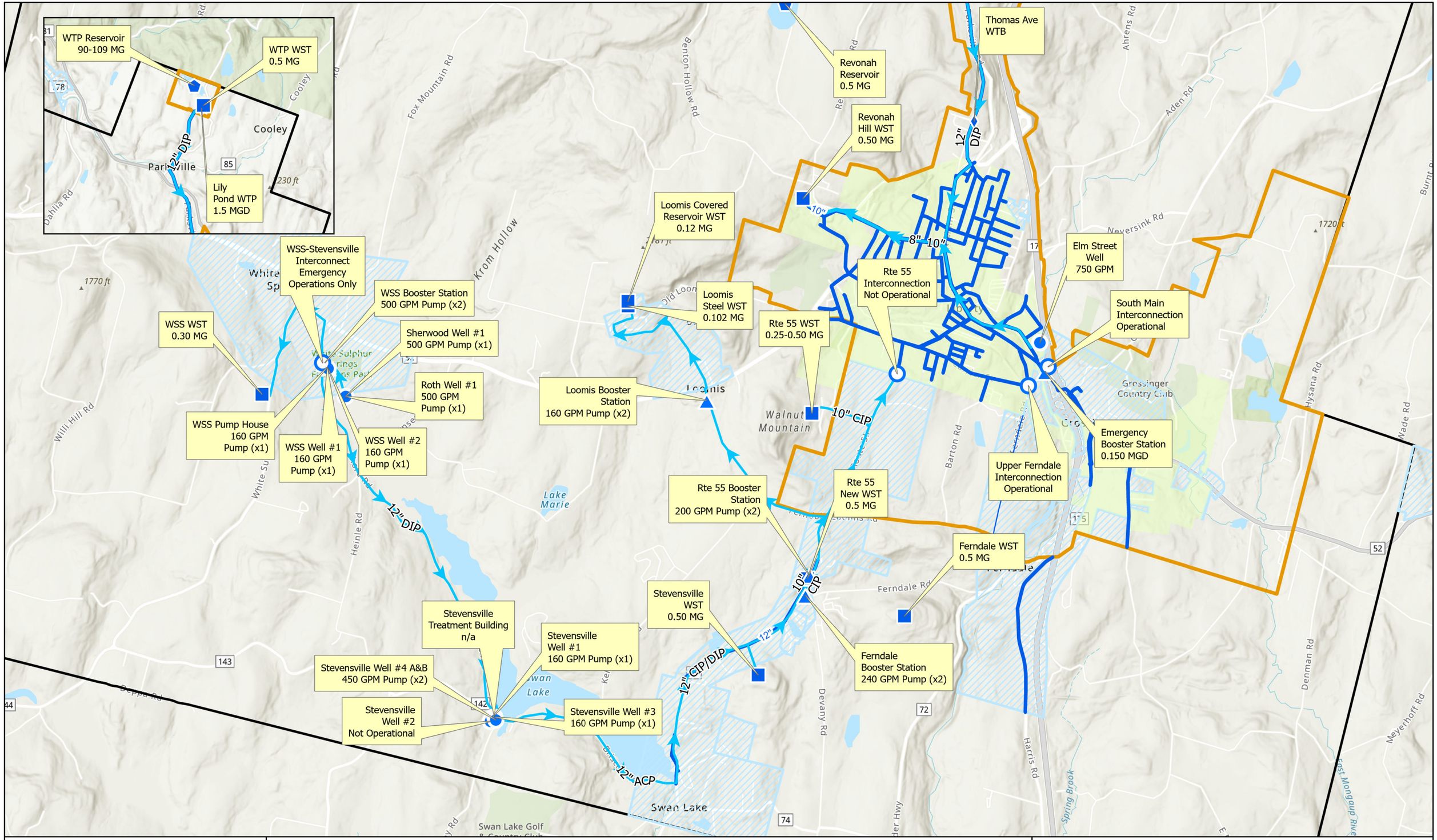
The Lily Pond WTP was constructed in 1998 and has been in service for 24 years. At the time of purchase, it had been reconditioned. The WTP has a design capacity of 1.5 mgd but operates under a permit (originally approved in 1923) limiting withdrawal amounts to 750,000 gallons per day (gpd). The approval appears to be based on a determination of the Village engineer at the time that 750,000 gpd is the safe yield of Lily Pond reservoir, based on the upper four feet of storage available for withdrawal determined at the time to be 90 mg. Ultimately, maximum capacity of the Lily Pond WTP may be limited by existing sludge drying processes.

The Lily Pond WTP intake system consists of an intake structure and pipe, strainer building, and raw water lift station that leads to the treatment equipment and process. The intake pipe was last cleaned ("pigged") in the 1990s and likely will require cleaning in the short term. The intake structure and pipe as well as the lift pumps are in need of evaluation and likely will need replacement. The main building housing the treatment processes was built to be expanded to accommodate additional treatment units.

To address surface water treatment requirements, the Lily Pond WTP uses flocculation, sedimentation, and filtration processes to produce potable water. There are three single-media filters using crushed anthracite coal. Each treatment train is rated at 0.5 mgd. The equipment at the plant consists of a package system (an AQ-180 Aquarius modular system manufactured by U.S. Filter), whereby the system components are procured and assembled off-site that are then delivered and installed at the site. At the time of its installation the WTP components had been previously used. From the WTP, treated water is pumped to the distribution system, which includes two (2) storage reservoirs with a total capacity of 1.0 mg. Periodic testing conducted by NYSDOH (the most recent being in September 2023) has found elevated levels of treatment byproducts (HAA5).

At the Lily Pond Filtration plant, the flow of each individual filter is set via the Village's SCADA system. With this flow pacing, one of the three lift pumps run to accommodate those three filters. The lift pumps are on a 9 hour rotation so one is always running. When a filter is backwashed the flow pacing will accommodate the two or one filter that is still operating depending on the season and if maintenance is being performed on one of the filters. The static mixer and chemical feed systems are original to the installation in Liberty and should be evaluated for replacement. Only one filter is backwashed at a time. As part of this Study, Delaware Engineering representatives conducted a visit to the WTP with the vendor of the package system (formerly U.S. Filter, now WesTech) to evaluate the condition of the treatment trains. The vendor recommended a full refurbishment of all three units in



Liberty Infrastructure Master Plan

Water Supply System

Legend

- Study Area Boundary
- Village of Liberty Parcels
- Water_Districts
- Town Bndry
- High-Level Water Lines

Type

- Booster Station
- Groundwater Source
- Surface Water Storage
- Water Storage Tank
- Water Treatment Plant
- Interconnections

Prepared by: Delaware Engineering, DPC
Date: November 29, 2023
Source: ESRI, Sullivan Cnty., NYS OITS GPO

0 1,250 2,500 5,000 7,500 Feet

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order to increase the plant's lifespan by 15 to 20 years. The building itself will also need maintenance performed, such as replacement of the exposed fastener metal roof and various other minor items.

The generator, SCADA system, and 0.5 mg storage tank at the Lily Pond WTP were installed in the mid-2000's. The storage tank, installed at the same time as the new 12" transmission main leading to the Village, was dived and cleaned in 2015. The Lily Pond WTP building itself is reported to be in good condition, with metal roof (exposed fastener-type), gutter, and metal door replacement the main areas of need. Finally, in accordance with the NYS sanitary code, operating the Lily Pond WTP requires a class IIA license from NYSDOH, making finding qualified personnel a key component of WTP operation.

Elm Street Well

The Elm Street Well is located in the valley of the Middle Mongaup River adjacent to the southerly side of the New York State Highway (Route 17/Future Interstate 86) and separated from the river by the right-of-way of the said highway. The system consists of two wells (caisson type) approximately 6-8 feet in diameter with a total depth of 40 feet installed in 1960 and connected by a siphon pipe. According to information from Village staff, the wells may access water from rock fissures.[1] The siphon well is currently inactive. The Elm Street Well is used to supplement the Village's primary water supply source (Lily Pond), and to maintain adequate pressure in the water distribution system. The Elm Street Well is located within the 100-year floodplain; the wellhead and associated infrastructure have been elevated above the 100-year flood elevation.

Currently, the Elm Street Well is equipped with two (2) 125-horsepower vertical turbine pumps. According to information from DRBC, the well has a maximum capacity of 700 gpm. Operationally, at the Elm St. well the VFD RPM for the pump that is running is manually set to the desired gpm and runs 24/7. The two pumps are rotated at least once a year. Having evaluated the infrastructure and upon discussion with Village officials, near-term investments in the Elm Street Well electrical system, pumps, building, and chemical feed system are likely required in order to sustain operations.

[1] Information in various permitting and regulatory documents reviewed as part of this study indicates that the Elm St. well was completed in unconsolidated sand and gravel, apparently associated with the Middle Mongaup River.

In December 1992, an Elm Street Well was found to contain methyl tert-butyl ether (MTBE), a gasoline additive. The permitted pumping rate was reduced to decrease the possibility of capturing additional MTBE impacted groundwater. In the interim, in order for the Village to continue to supply water, a pumping station was constructed to mix the well water with water purchased from the Town of Liberty. The Revonah Hill Reservoir was also used to replace and supplement water provided by the Elm Street Well until the Lily Pond WTP was placed into service in 1998. As of July 1997, water was no longer purchased from the Town of Liberty as MTBE concentrations decreased and remained below drinking water standards in the Elm Street Well. There have been no detections of MTBE since December 1998. The Village continues to utilize the Elm Street Well at a reduced permitted rate of up to approximately 250,000 gpd, but in practice, production averages between 100,000 gpd and 150,000 gpd. Prior to MTBE being detected and pumping capacity reduced, the Elm Street Well operated under a permit for 700 gpm withdrawal, with this permit being increased to 1,000 gpm (1.4 mgd) in 1975. According to information from Village staff, the Elm Street well historically could be operated at yields in excess of 3 mgd.

The Elm Street Well lies on Village-owned property on which the Village's highway department garage is also located. After MTBE was detected in the well, investigations found nearby petroleum product leaks from underground storage tanks (USTs). Remediation efforts have included removal of underground storage tanks serving the garage that were situated north of the building. Petroleum product tanks were removed, recovery wells and a series of monitoring wells were installed, and 954 tons of petroleum impacted soil was removed. As of the most recent report available (quarterly sampling is conducted annually, and the most report reviewed was dated September 2022), elevated contaminants were present in two monitoring wells immediately adjacent to the garage but absent from other monitoring wells closer to the Village well. That report concluded that, "When compared to historic values, the groundwater contaminant concentrations have been steadily decreasing." Presently, elevated contaminants in samples from the garage area include benzene, toluene, ethylbenzene and xylene (BTEX), and other petroleum related volatile organic compounds. There may be options for further work at the garage site for the protection of water quality at the Village well and/or infrastructure improvements.

Southeast of the Village well, a former gas station USTs were removed and over 7,500 tons of petroleum impacted soils removed. Monitoring wells on this site and closer to the Village well are monitored quarterly. Detections of BTEX, and petroleum-related volatile organic compounds are found in monitoring wells nearest the gas station site, with concentrations

of these substances decreasing over time. These contaminants are not detected in monitoring wells between the site and the Village well.

Town Water Sources

The Town operates two groundwater well complexes. The Stevensville well complex, located off of Briscoe Road (CR-142), consists of five separate wells ranging from 54 to 58 in depth and range in reported capacity from 135 gpm to 500 gpm. According to annual water withdrawal reporting for 2021, permitted capacity is 1,085,000 gpd while the maximum single day withdrawal was 859,000 gpd. With one of the maximum rated wells excluded (i.e., regulatory requirements require measurement with one unit out of service), maximum capacity should be on the order of 2,205,000 gpd. However, Well 1 is operated by a gasoline-powered motor and is not regularly used. Well 2 has not been used in at least the last fifteen years – potentially more. A significant project was undertaken in the mid-2010's to upgrade/replacement of the pumps serving Well #4A and #4B, pipe replacement, install a new auxiliary power system, electrical system upgrades, and meter pit upgrades. With one of the 450 gpm Well #4 pumps out of service and with the emergency backup Well #1 online, maximum capacity would be 1,072,800 gpd.

The second well complex, White Sulphur Springs (WSS), located off of Shore Rd, and infrastructure located there supplies both the WSS water district area and the remaining Town-served water districts elsewhere in the Town. Physically, there are four wells located at WSS. WSS Well #1 and Well #2 each have 160 gpm pumps and feed a 300,000 gallon water storage tank. The two other wells at WSS, the Sherwood and Roth wells, each have 500 gpm pumps installed and supply water to the Town's other water districts not served by Village water.

WSS maximum capacity from Well # and Well #2 is 230,400 gpd. According to annual water withdrawal reporting for 2021, permitted capacity is 250,000 gpd while the maximum day withdrawal was 123,000 gpd. WSS purchases water from the Stevensville district when needed. The Town made investments in Well #1 in the past five years that included investments in the pumps and a new screen.

The Roth Well and the Sherwood Well, together with the Stevensville well complex, serve the remainder of the Town's water service area. There is an interconnection between these two systems that can allow WSS to provide supply to the south under emergency situations.

Pressures from the Sherwood-Roth-Stevensville system are on the order of 140 psi, while 100 psi is developed by the WSS complex.

In accordance with NYSDOH regulations, total developed source capacity of groundwater sources is, in part, defined by measuring production with the largest producing well out of service. Regulatory information provides maximum well production capacities, and maximum capacity can be defined as the sum of reported well capacities, minus the largest well.

To obtain maximum source capacity of the Town's system, information reported to regulatory agencies and permit information developed by those agencies was obtained (see Table 1). The Town's system consists of three sources, WSS, Sherwood-Roth, and Stevensville. Based on regulatory information, maximum source capacities are shown in [INSERT TABLE]. When these three sources are taken together, this system should be able to provide a maximum source capacity of 2,059,200 gpd. With Stevensville Well #1 (it is currently used only for emergency supply only), maximum source capacity of the Town's system would fall to 1,828,800 gpd.

Water demand placed on the Town's system exhibits a high degree of seasonality. Annual average daily flow is on the order of 270,000 gpd while the maximum daily peak flow, which over the past five years has been approximately 859,000 gpd, occurs during the summer season (June, July, and August peak daily flows are typically double peak flows for the remainder of the year).

System Capacities, Reported Withdrawals, and Permitted Withdrawals

Table 1 presents a summary of key design, operational, and regulatory parameters governing the water sources supplying the Study Area. Maximum source capacity in the Village system is 2,580,000 gpd, and maximum permitted withdrawal is 1,002,000 gpd. Maximum source capacity in the Town's system is 2,059,200 gpd and maximum permitted withdrawal is 1,445,589 gpd. Therefore, according to the information in Table 1, there may be up to a total maximum source capacity of 4.6 mgd available.

Table 1. Capacities, water withdrawal reporting information, and permitting for Town and Village water supply systems (sources: NYSDEC annual water withdrawal reports; DRBC docket information)

Juris-diction	System	Component	Max. Production Capacity	Avg. Daily w/d*	Peak Day w/d *	Permitted w/d	
						NYSDEC	DRBC
Town	WSS Well Complex	WSS Well #1	230,400	35,178	126,000	250,000	360,000
		WSS Well #2	230,400				
		Max. Source Capacity	230,400				11.160 mgm
	Stevensville Well Complex***	Well #1	230,400	273,600	859,000	1,085,000	698,400 (21.650 mgm)
		Well #2	n/a				
		Well #3	230,400				
		Well #4	648,000				
		Well #4B	648,000				
		Max. Source Capacity**	1,108,800				
	Sherwood-Roth***	Sherwood Well	720,000				720,000 (22.320 mgm)
		Roth Well	720,000				
		Max. Source Capacity**	720,000				
Village	Lily Pond WTP		1,500,000	517,000	702,800	1,450,000	750,000
	Elm Street Well		1,080,000				252,000
	Max. Source Capacity **		2,580,000				1,002,000

*Average of prior five years as reported to NYSDEC (see Appendix 2 for data)

**With largest component out of service

*** Combined, the Stevensville Well Complex and Sherwood-Roth field are limited to 43.970 mgm, or

The Village's most recent DRBC docket approval indicates that the Elm Street Well was approved for limited water withdrawal (as compared to historical withdrawal permits) due to operational constraints relating to the potential for petroleum product contamination. According to DRBC, since remediation at nearby sites, the Village may apply to DRBC to increase the maximum instantaneous rate to 700 gpm, or 1,008,000 gpd, provided concurrence from NYSDEC and NYSDOH is obtained. Village staff recently approached NYSDOH for an informal evaluation of whether an increase in pumping could be permitted, and due to chlorine contact time concerns, the proposal would require additional study.

Other Sources

The Town has sought to develop additional sources of water. In 2018, the Town hired a hydrogeological consultant to search two areas of the Town, both of which are underlain by the South Fallsburgh-Woodbourne unconsolidated aquifer. The northeast search area consisted of two subareas: the northwesterly area was centered on Pauls Lake and the southeasterly area was centered on the stretch of Leslie Road between Route 52 and Mc Intosh Road. The southerly search area centered on a portion of the Middle Mongaup River south of Swan Lake Road. The search yielded no viable additional water sources.

Other potential sources have been investigated. Hanofee Park, adjacent to the 2018 northeast water search area and also underlain by the South Fallsburgh-Woodbourne aquifer, is thought to be a potential source and could be subject to further investigation. The Grossingers Resort property has historically supplied its own water, and its source potentially could be developed for additional supply. The Village's Revonah Reservoir is another potential source. Revonah was used briefly to replace the Elm St. well in order to continue supply to the Village when contamination was detected. Liberty discontinued use of Revonah Lake as a water supply in August 1993, due to new filtration standards for surface water. According to information, in the 1950's the average plant output from the Revonah Reservoir system was 1.95 mgd.[2] However, production capacity concerns in the early 1990s meant that the Village ultimately chose Lily Pond as its second source; an updated safe yield analysis would need to be performed. Finally, the Town also has sought to partner with land developers to develop additional water sources as part of their projects.

Service Areas and Distribution Systems

This section provides a summary of the major components of the water distribution system serving the Study Area.

Town of Liberty

The Town's infrastructure serving the Study Area is served by a combination of booster pump stations, water storage tanks, and distribution mains. Water is supplied by the Stevensville and Sherwood well complexes (described above) and is delivered to the southerly portion of the Study Area via two main branches.

[2] "Inventory of Municipal Water Facilities," Volumes 1-4, United States. Division of Water Supply and Pollution Control, Jan. 1, 1958.

Along Route 55 north of Ferndale Rd, there is a 12" main that runs north to the Village boundary. Along this westerly branch are situated the Route 55 booster station and co-located Stevensville Concrete Reservoir. The Route 55 Storage Tank lies in the Town's Walnut Mountain Park. There is no interconnection point at the Village boundary.

The easterly branch is served by a 12" main running east along Ferndale Road. Before reaching the southerly Study Area boundary in Ferndale along this branch lie both the Ferndale booster station and storage tank. In Ferndale, the main branches to the west along Upper Ferndale Road, becoming an 8" line from Ferndale Loomis Rd to an interconnection point at the Village boundary. The easterly branch remains a 12" main north along Sullivan Ave to Route 52 at which point the 12" heads approximately 1 mile east to Infirmary Road. An 8" main branches south 3,500 feet along Old Monticello Road. To the west, from Sullivan Ave and Route 52, a 12" main runs along Triangle Rd, becoming an 8" main for most of its distance, crosses under Route 17 to an interconnection point just south of the Main St. It is important to note that condition of the Village side of these interconnection points is uncertain, as periodic maintenance, such as regular exercising valves, may historically not have been sufficient to ensure continued operational viability.

The easterly portion of the Study Area lies within both Town and Village, with some Town parcels interspersed within areas largely within the Village, especially along Old Monticello Road and along Route 52 east of the Old Monticello Road intersection. The Town is the exclusive water supplier in this area, which lies west of I-86.

The existing water distribution system, much of it installed in the 1960's, is comprised mostly of 8" diameter watermain, which is made up partially of asbestos-cement pipe with the remainder unlined ductile iron pipe. Where breaks have occurred and as a result of recent investments, there are newer sections built with cast iron and HDPE pipe.

Table 2. Town of Liberty water system assets and capacities

	Facility Name	Capacity	Pump Capacity (gpd)
Stevensville/Fer	Stevensville WST (Water Tower Rd)	500,000 gal.	n/a
	Ferndale Booster Pumping Station	2 X 240 gpm Pumps	345,600
	Ferndale Storage Tank	500,000 gal.	n/a
	Route 55 Booster Pumping Station	2 X 200 gpm Pumps	288,000
	Stevensville WST (Route 55)	500,000 gal.	n/a

	Facility Name	Capacity	Pump Capacity (gpd)
	Route 55 WST (Walnut Park)	250,000 gal.	n/a
	Loomis Booster Station	2 X 160 gpm Pumps	230,400
	Loomis Covered Reservoir	120,000 gal.	n/a
	Loomis Steel WST	102,000 gal.	n/a
WSS	WSS Booster Station	2 X 500 gpm Pumps	720,000
WSS	WSS Water Storage Tank	300,000 gal.	n/a

Average daily flow data for the Route 55 and Ferndale booster stations is presented below. The data show that, for most of the year, the two stations operate, on average, with greater than 50% spare capacity. However, July and August place peak demands and reduce spare capacity to as little as 20% at the Ferndale Booster Station.

Table 3. Daily Average flows for 2019 for Ferndale & Rt 55 (Rt55 includes Loomis)

Month	Ferndale Booster Station		Rt. 55 Booster Station	
	Average Daily Flow (g)	Remaining Capacity	Average Daily Flow (g)	Remaining Capacity
January	91,000	254,600	31,200	256,800
February	93,600	252,000	39,400	248,600
March	94,100	251,500	34,700	253,300
April	75,300	270,300	30,200	257,800
May	97,500	248,100	35,100	252,900
June	133,000	212,600	47,600	240,400
July	275,400	70,200	122,400	165,600
August	231,600	114,000	110,600	177,400
September	85,700	259,900	41,400	246,600
October	68,900	276,700	32,600	255,400
November	74,700	270,900	38,800	249,200
December	75,900	269,700	42,800	245,200

Starting in 2016, the Town made substantial investments in infrastructure supporting the Stevensville WD that included a new water tank (i.e., the Stevensville Storage Tank included in the above table), wellfield improvements, and distribution system work. The project addressed several needs, including: seasonally heavy demands, Stevensville wellfield capacity and operational issues, aging water mains susceptible to breakage, and replacement of obsolete asbestos cement pipe. In addition, approximately 1,500 lf of 12" water line along Upper Ferndale Road was upgraded to cement-lined ductile iron pipe in 2020. At the aforementioned Route 55 WST location, the old 250,000 g tank removed from service was abandoned in place and remains on the site. In addition, the motors at the

Figure 4. New Route 55 water storage tank

Ferndale and Route 55 booster stations have recently been upgraded and increased in size, though capacity of the pumps may not have increased.

Village of Liberty

The Village is located entirely within the Study Area and its distribution system feeds roughly half of the Study Area. The system obtains pressure from two locations: At the Lily Pond WTP, there is a storage tank, and at the Revonah Hill Rd facility there is another storage tank. Both tanks are needed in order to maintain pressure in the Village's system. There is a third location capable of increasing pressure, a booster station owned and operated by the Village located in the Town at the Main Street interconnection with the Town's system. This emergency interconnection can supply 150,000 gpd. This booster station was installed during the early 1990's in order to provide another source of supply when MTBE contamination at the Elm Street well was discovered; it is not currently in use. At present, this interconnection permits unidirectional flow, i.e., from the Town's system to the Village's system. However, there remains installed in this location a bypass (which currently is not in service) that allows water to flow from the Village to Town. As well, in order to maintain chlorine residuals in the system, there is a water treatment building located on Thomas Ave ("Thomas Ave WTB") approximately 7 miles from the Lily Pond WTP. The Thomas Ave WTB was installed with the Lily Pond WTP, and while it may have been needed to boost chlorine at one time, system operations have improved and it's currently not in service.

From the Lily Pond Storage tank, about 37,000 lf (approx. 7 miles) of 12" water main runs south along Lily Pond Road to Parksville Rd where it continues along Parksville Road to Young Hill Rd where it enters the Thomas Ave WTB. This 12" transmission main was installed in the in the mid-2000s and it, together with air release valves and other appurtenances, is reported to be in good condition. Historically, according to mapping dating to the 1960s, about 2,000 lf of this trunk line was 12"; 1,000 lf, 10"; and the balance, 8".

The 12" main supplies portions of the hamlet of Parksville (outside the Study Area), crosses into the northern Study Area boundary at roughly Weiss Rd, and departs Parksville Rd at

Youngs Hill Rd. There are approximately 165 service connections between Lily Pond WTP and the Thomas Ave WTB. From the Thomas Ave WTB, the main supply line continues as a 12" to Buckley St and then transitions to a combination of 8" and 6" size pipes, traverses through the Village to join the 8" main coming from the Revonah Hill Rd storage tank and ultimately to the intersection of Route 52 and South Main Street. Within the Village, distribution lines are mostly 6" and 4" in size. The main running from Revonah Hill along Lewis St. is 8" and allows the Revonah Hill water tank to recharge other portions of the system in this area.

Table 4. Village water storage and distribution capacities

Facility Name	**Capacity**
Lily Pond Storage Tank	500,000 gal.
Revonah Storage Tank	500,000 gal.
Village Water Pump Station	0.2 mgd

To control water throughput in the system, the Village adjusts a manual valve located near the Thomas Ave treatment building. There is also an effluent meter at Lily Pond, a meter and pressure gauges at Thomas Ave., an effluent meter at Elm St. Well, and a meter for the overflow from the Revonah Reservoir tank. Adjustments to this manual valve are made depending on various operational scenarios, such as when there is a need to add or take water away from the overflow at Revonah/Village Distribution System or after a switch to pumps at Elm St. is made, due to small pumping rate differences between the different motors.

With the meter at the Thomas Ave WTB, the amount of water passing through can be calculated and goes to the village each day and how much is used in Parksville. Most of the year the Town uses about 5,000-10,000 gpd but in the summer, usage can be up to 100,000-120,000 gpd in Parksville with the summer camps online. Over the winter the Village was sending on average 300,000 gallons per day through the Thomas Ave WTB at 108 PSI. The Village operates the valve in order to obtain sufficient pressures and flow volumes to overflow more from Revonah WST to keep the tank fresh with increasing water temperatures over the summer. The Thomas Ave WTB currently lacks an isolation valve to facilitate maintenance, nor is the equipment, such as the pressure gauge valves, that can be operated remotely, via SCADA. The building itself, however, is reported to be in good condition.

The Village owns the water meters installed at the point of end use, and the Village reports a need to complete a program, already underway, to replace 100% of the meter heads serving the Village's roughly 1,700 metered customers. In addition, the computer hardware supporting these meters also dates to the installation of the existing meters and likely will also need to be upgraded in order to interface with the new meter replacement heads.

Summary of Needs and Challenges

Water Production and Treatment – Village System

Identified needs and challenges associated with the Village system are twofold: operational and growth-related. At the Lily Pond WTP, among the issues identified with the Lily Pond water source is that Lily Pond is shallow and has a high level of natural organic matter. Organic matter can react with chlorine and potassium permanganate during disinfection to form disinfection byproducts (DBPs) which include two chemical classes; trihalomethanes (THMs) and haloacetic acids (HAAs). Recent water quality reporting and discussion with Village water operators have indicated that while a concern, these DBPs do not exceed regulatory limits. In addition, the Village has progressively reduced use of potassium permanganate, which is an oxidizing agent and used in the first treatment step to address odors, iron and manganese, and reduce disinfection byproducts.

The Lily Pond Filtration Plant itself, constructed from used equipment and placed into service in 1998, is now over 25 years old and, according to Village water operators, currently needs about $50,000 per year over the next 10 to 15 years to remain in service, after which time it would need major will likely need investments to continue operation as well as to support any increase in supply. This may be due to issues with the filter #2's underdrain system. Other regular repair activities include painting and welding on the structure itself.

With respect to potential growth in supply at Lily Pond WTP, disinfection byproducts at the Lily Pond WTP are exacerbated by natural lake turnover processes during the summertime, making additional, post-treatment filtration, such as with the use of an activated carbon system, a likely requirement to increase capacity. Village water operators also expressed a concern that, by increasing capacity at the Lily Pond WTP, the resulting higher flows through the plant would create water quality issues by stirring up sediments in both the WTP and downstream distribution system.

As indicated above, the Elm Street Well has a history of vulnerability to contamination that presents challenges and needs, both in terms of operation and developing additional capacity to support growth. The Village conducts routine (quarterly) monitoring of the well, and MTBE has not been detected since December 1998.. While the well historically was permitted to withdraw of 1.0 mgd, reduced pumping rates have been implemented (and codified in the current DRBC water withdrawal permit) since 1997, and there is uncertainty with respect to whether the system can achieve its installed and permitted capacities without drawing historic petroleum contaminants toward it. Also, among the challenges is that the equipment is aging and the facility lacks a back-up power source. Short-term needs likely involving new pumps, electrical upgrades, and auxiliary power. In addition, the wells are shallow and in sand and gravel, making it more susceptible to contamination.

Water withdrawals by the Village water supply system are regulated by NYSDEC and DRBC. Any increase above existing permitted capacities would require DRBC approval and concurrence from NYSDEC and NYSDOH. In December 2013, DRBC issued approval for the Village for maximum instantaneous withdrawals of 175 gpm (or roughly 252,000 gpd) from the Elm Street well and 750,000 gpd from Lily Pond, yielding a total of about 1,002,000 gpd.

Water Production and Treatment – Town System

Capacity of the Town's existing sources is an important challenge. At the Stevensville Well Complex, the existing wellfield appears to be at the maximum capacity of the pumps installed. There is an existing well out of service (Well #2), and Well #1 serves as a lower-capacity backup and is also in need of modernization. While the capacity of the Town's system appears to be nearly twice its permitted withdrawal, it is not clear that the seven wells – including those in service and those out-of-service or serving as backup – could safely yield additional flow.

Water Distribution – Village System

In the Village-owned system, several bottlenecks potentially impacting the ability to increase flow in the system were identified, including the relatively smaller 6" and 8" mains running from Buckley St. to the South Main-Route 52 intersection; the downtown area appears to be served by a combination of 4" and 6" pipes. At the Thomas Ave WTB, valving, monitoring equipment, and SCADA upgrades to link it to the Lily Pond WTP are in need of upgrades, and to permit remote valve actuation as part of Revnonah Hill tank level management. As well, it is thought that the new Revonah Hill Tank would create a

hydraulic restriction in the system preventing increase in flow from the Lily Pond WTP beyond the current 750,000 gpd.

Even if the Village is able to increase water produced from the Elm St. well (e.g., increasing to the roughly 1 mgd referenced in the DRBC docket), the existing distribution system crossing under I-86 begins as an 8" main and ultimately decreases to 6", limiting quantities able to be supplied. Also, the various interconnection points between the Village and Town systems are of uncertain functionality on the Village side. In addition to potentially providing additional water supply to the southern parts of the Study Area, these interconnections also are required for system resiliency. Due to water pressure differences in the two systems, the South Main interconnection is unidirectional and includes above-mentioned 0.150 MGD pump station; this pump station, if upgraded, might serve as a foundation for future investments aimed at supplying water bidirectionally.

To comply with Lead and Copper Rule Revisions regulatory requirements, the Village will need to inventory and likely take future measures to address potential lead service lines. According to NYSDOH, homes built before 1986, when the state and federal governments banned lead pipes and solders from supplying drinking water, are more likely to contain lead-containing pipes. A review of recent tax parcel data show that, where year of construction is included in the assessment data, the average year built is 1942 and that about 1,100 parcels, or 89% of all parcels for which data are available, were built in 1986 or before. Finally, Village staff also indicated that water meters throughout the Village system are in need of replacement, as is the back-end computer hardware used in the reading and billing process.

Water Distribution – Town System

In the Town-owned system, there are a variety of needs and challenges. Lifecycle issues are presented by both the Stevensville WST, which is in need of repair and/or major capital investments. The approximately 7,500 lf of aging 10" cast iron water main along Route 55 between the bridge on Briscoe Rd and the Stevensville WST has seen frequent breaks. Portions of this line have been replaced as part of recent projects and during watermain break fixes.

The Town's booster stations serving the southern portion of the Study Area may limit the ability to provide additional capacity to the Study Area from the Town's existing water supply sources. The Ferndale Booster Station is limited to 345,600 gpd. According to Town

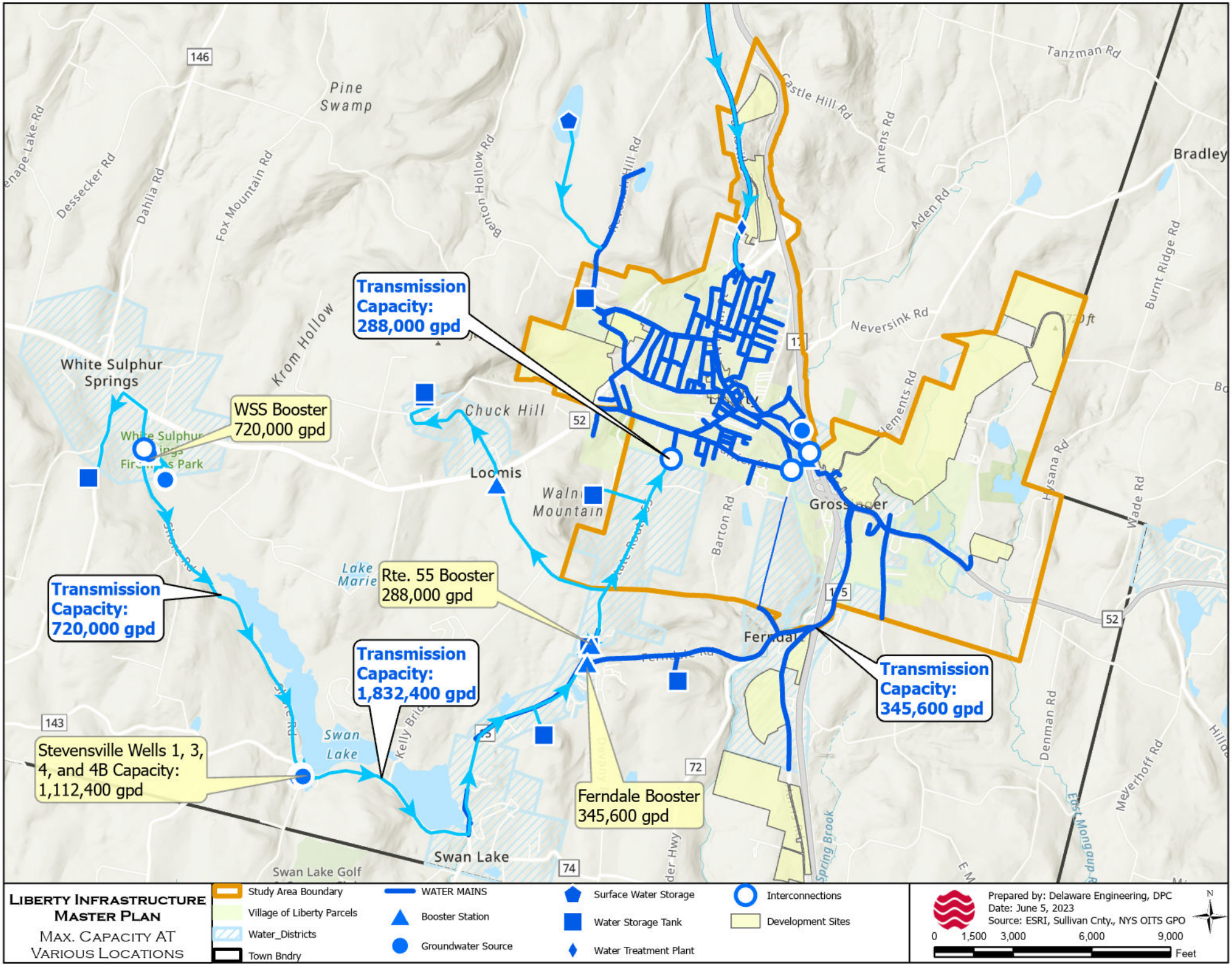
staff, this station runs nearly continuously, and 2019 flow data (see Table 3, above) suggest that as little as 70,000 gpd spare capacity would be available during peak summer months of July and August. The Route 55 Booster Station has a maximum capacity of 288,000 gpd. Similarly, the WSS Booster Station has a maximum capacity of 720,000 gpd, which would limit the quantity of water able to be supplied from the Sherwood-Roth well field to the remainder of the Town's system. Even if the Town were to increase withdrawals from the WSS and Stevensville sources, the Ferndale and Route 55 booster stations, as currently constructed, would limit the quantity of water able to be supplied to the southern portions of the Study Area, as shown in Figure 5.

Lead service lines are also an emerging challenge in the Town's system. According to a review of parcel data, for those parcels with year of construction information, the average year of construction is 1962, with 541 of 842 parcels, or 64%, of those having both year of construction information and being labeled as on public water supply were built in or before 1986.

Seasonality of Demand

Seasonality of demand is also an important challenge. It is an established trend that the Town's system experiences a nearly 100% increase in peak usage between June and August, and according to Town staff, it is not unprecedented for the Town's system to see peak days of between 0.9 mgd to 1.0 mgd. Flow data from the Ferndale booster station bear this out (see Table 3, above). Developments approved by the Town's Planning Board as well as potential developments known to the Town carry the potential to place an upwards of 300,000 gpd in additional demand on the system are primarily residential and likely would mirror existing trends.

Seasonal variation is smaller in the Village system. Most of the year, the service connections between the Lily Pond WTP and the Thomas Ave WTB (mainly in the Parksville area) draw between 5,000 gpd and 10,000 gpd. However, during the summer 100,000 gpd to 120,000


Transmission Capacity: 288,000 gpd
WSS Booster 720,000 gpd
Transmission Capacity: 720,000 gpd
Rte. 55 Booster 288,000 gpd
Transmission Capacity: 1,832,400 gpd
Transmission Capacity: 345,600 gpd
Stevensville Wells 1, 3, 4, and 4B Capacity: 1,112,400 gpd
Ferndale Booster 345,600 gpd
White Sulphur Springs
Chuck Hill
Loomis
Walnut Mountain
Grosscup
Ferndale
Swan Lake
Lake Marie
Swan Lake Golf
Pine Swamp
Bradley
146
52
143
74
72
LIBERTY INFRASTRUCTURE MASTER PLAN
MAX. CAPACITY AT VARIOUS LOCATIONS
Study Area Boundary
Village of Liberty Parcels
Water_Districts
Town Bndry
WATER MAINS
Booster Station
Groundwater Source
Surface Water Storage
Water Storage Tank
Water Treatment Plant
Interconnections
Development Sites
Prepared by: Delaware Engineering, DPC
Date: June 5, 2023
Source: ESRI, Sullivan Cnty., NYS OITS GPO
0 1,500 3,000 6,000 9,000
Feet
N

gpd is common, due to the operation of seasonal facilities served off this line. This accounts for the majority of seasonal fluctuations of 150,000 gpd as reported by Village staff.

4.2 SANITARY SEWER CONVEYANCE AND TREATMENT

Public sewer is available in a majority of the Study Area. The main exceptions are areas along Route 55 and Upper Ferndale Rd., and along Hysana Rd., to the east. The Village wastewater treatment plan (WWTP) serves the entire Study Area and conveyed wastewater by both Village- and Town-owned infrastructure. A map of the wastewater treatment and conveyance system serving the Study Area is included as Figure 6. Outside of the Study Area, Parksville, which is currently not served by sanitary sewers, is addressed in a separate technical memo attached to this study (see Appendix 4).

Conveyance System

In the Study Area, wastewater is conveyed to the Village's WWTP by a combination of gravity mains and forcemains portions of which are owned and operated by both the Town and the Village.

Service Area

As shown in Figure 6, public sewer is available in the portions of the Study Area in the Village. Outside the Village, public sewer generally exists in the northern part of the Study Area along Parksville Road; along and to the north of Route 52 to roughly Old Monticello Road; and the northern portion of Infirmary Road (i.e., the Sullivan County Social Services Department complex). The Town's Swan Lake Sewer District terminates at the southwestern Study Area boundary, at the intersection of Ferndale-Loomis Rd and Route 55. Lying just outside the Study Area is the Loomis sewer district.

Pump Stations

The easterly portion of the Study Area is served by pump stations (PS) inventoried in Table 5, below. As the above figure demonstrates, there are two main branches of this part of the system: In one branch, flow from the NYSP PS, Triangle Auto PS, and Elm St. PS discharge to gravity mains which are tributary to the WWTP. In the second branch, the Days Inn PS accepts flow from the Infirmary Road Pump Station, Lannings PS, Millers PS, and Ferndale PS discharge ultimately to the Days Inn PS, which in turn discharges to the WWTP.

Liberty Infrastructure Master Plan

Sanitary Sewer System

Legend

SanSewElements
- PS
- WWTP

Type
- FM
- Gravity

- Study Area Boundary
- Development Sites
- Village of Liberty Parcels
- Sewer_Districts
- Town Bndry

Prepared by: Delaware Engineering, DPC
Date: June 5, 2023
Source: ESRI, Sullivan Cnty., NYS OITS GPO

N

0 1,000 2,000 3,000 4,000 5,000 6,000 Feet

Table 5. List of sanitary sewer pump stations, capacities, and operational statues

Facility Name	Owner	Capacity	Operational Status
NYSP PS	Village	Gould WS151203 / 1.5 HP / / 230V / 6.5 inch / 13 MA	N/A
Triangle Auto PS	Village	230V1P60Hz 1.5 HP /14.7 FLA / Model 21-1-1/2D4X	N/A
Elm St. PS	Village	M904022.60 / 230/460V / 1.2HP / 946 gpm	N/A
Infirmary Road Pump Station	Town	125 GPM (@76' TDH) / 180,000 gpd)	12,000 GPD (avg)
Lannings PS	Village	Little Giant / V3-IGP Power /	N/A
Millers PS	Village	330 GPM (@78' TDH) / 475,200 gpd)	195,200 GPD (pump curve) / 100,000 GPD (run time)
Ferndale PS	Town	N/A	N/A
Days Inn PS	Village	550-600 gpm	70% of capacity (dry weather)

The Days Inn PS conveys a substantial amount of flow from the Village and Town systems. A package system installed in the 1970s, new pumps capable of handling rags were recently (in the 2010s) installed. This station has no flow meter or pressure gauge and electrical upgrades are needed. This pump station operates at or near capacity during wet weather events. In addition, recent testing with both pumps running suggests the 6" forcemain, which is between 1,500 lf and 2,000 lf in length and traverses both the Middle Mongaup River and the Route 17 corridor, may be limiting this pump station's capacity.

Sewer Mains

The gravity mains serving the Study Area are primarily owned and operated by the Village, with Town-owned mains serving portions of the northern and eastern portions of the Study Area. The Village system, much of which installed at the turn of the last century or earlier, is comprised mainly of 8" mains. GIS data shows that the Village system serving the Study Area may have at least 250 manholes and 111,000 lf of pipe ranging from 6" to 30".

There have been prior efforts to investigate and address I/I, which have focused on grouting mains, repair of laterals, disconnection of sump pumps and roof leaders, and addressing surface and subsurface inflow and infiltration into manholes. There is an approximately 3,600 lf section of the Village's system, known as the Green Lane/Chestnut Street/West Street section, that, due to the age of the infrastructure and its location along an unnamed tributary of the Middle Mongaup River, has been identified as a capacity constraint. An emergency project in 2011 to replace a portion of this line was undertaken after a leak was detected and subsequent regulatory action was initiated by NYSDEC. The project involved 390 lineal feet of new PVC sanitary sewer pipe and installation of four (4) new precast concrete manholes. There remains limited capacity in this section due to wet weather events and obstructions clogging sewer mains due to, e.g., offset pipes, intrusion of tree roots, and other blockages. These conditions currently cause recurring overflows.

Gravity mains owned and operated by the Town are found in two places within the Study Area. In the northerly portion, approximately 4,500 lf of 8" cast iron main installed in the 1970s serves about 30 parcels along Youngs Hill and Parksville Rd. This main connect to the Village system at the Town-Village line on Youngs Hill Rd. In the easterly portion of the Study Area, about 2,500 lf of 8" PVC gravity sewer was constructed along Infirmary Rd (along with the above-mentioned Infirmary Rd PS) and connects to the Village system, ultimately discharging through the Village's Millers PS.

Finally, lying just outside the Study Area to the southwest, at the intersection of Ferndale-Loomis Rd and Route 55, lies the Town's Swan Lake sewer district. There is an 8" PVC main that ultimately discharges to the Swan Lake WWTP to the south.

Village of Liberty Wastewater Treatment Plant

The Village owns and operates the WWTP serving the Study Area. The facility has a permitted capacity of 2.0 mgd and discharges treated effluent to an unnamed

tributary (UNT) of the East Branch Mongaup River. The WWTP is an extended aeration, oxidation ditch style, activated sludge treatment plant that achieves biological ammonia removal through nitrification. The treatment process uses two clarification tanks and ultraviolet (UV) disinfection to meet discharge permits. The WWTP consists of a trash rack, a parshall flume, mechanical bar screens, an aerated grit chamber, a fine screen with compactor, a splitter box, two (2) oxidation ditches, two (2) clarifiers, three (3) sludge holding tanks, a belt press, an ultraviolet (UV) disinfection unit, and a post aeration tank. Sludge is currently hauled off site and landfilled.

Current average daily flow is 0.9 mgd – roughly half of the plant's permitted capacity. However, the plant does see substantial increases in wet-weather flows, which have been on the order of 7.0 mgd, or roughly seven times average daily flows. The WWTP dates to the 1980's, and since the 2010's, the Village has undertaken a multi-phase program of upgrades to address life-cycle issues and improve efficiency and performance.
Some improvements to the original plant have included:

- 2012 – Phase I Emergency Repairs – Installation of a new submersible mixer in Oxidation Ditch No. 1 to replace an existing surface aerator and to supplement the second
- existing surface aerator.
- 2013 – Phase II Emergency Repairs – Upgrade of one oxidation ditch, including two new submersible mixers, blower system air distribution headers, and fine bubble diffusers to replace the existing surface aerators.
- 2014 – Influent Screening and Oxidation Ditch Upgrade – Upgrade of the existing influent channel including new manual bar racks, new headworks building, and a mechanical fine screen, and upgrade of the remaining oxidation ditch including a new submersible mixer and fine bubble diffusers.
- 2016 – UV Disinfection System Improvements – Upgrade of the existing UV disinfection
- system, with a new, open channel UV disinfection system.
- 2017 – Clarifier No. 1 Reconstruction – Reconstruction of existing clarifier components.
- Ongoing - The Village moving forward with a comprehensive WWTP Upgrade, involving upgrade the existing facility with new facilities, various process improvements, but no major process changes.

In addition, planned upgrades in the short term include upgrades to replace aged sludge dewatering and sludge handling equipment to ensure compliance with SPEDES permit. I/I can periodically affect the performance of the WWTP. Reducing I/I could mitigate hydraulic fluctuations and could improve the quality of the WWTP effluent. A comprehensive review of the WWTP conducted in 2017 identified various improvements that would be needed should the plant experience a significant increase in flow or load.

These additional upgrades include: a mechanical bar screen, new loader, and backup power.

In January 2022, NYSDEC initiated a process to conduct a comprehensive review of the Village's SPDES permit, which became effective in 1995. As part of the review process, the Village may be required to implement new procedures as part of the water treatment process and to reduce carbonaceous biochemical oxygen demand in order to adhere to new SPDES permit limits for the WWTP. The proposed daily maximum limit of 15 mg/L CBOD can be challenging for a secondary treatment plant like the WWTP, and additional upgrades may be necessary in the future to maintain permit flow of 2.0 mgd if increased flow is contributed to the WWTP as part of new development in or expansion of the sewershed.

Town of Liberty Swan Lake Wastewater Treatment Plant

The Town owns and operates the Swan Lake WWTP, located about 2.3 miles to the south of the Study Area. Since the Old Route 17 Corridor Study was written, the Town has initiated an upgrade and expansion project, which has received funding and is currently in design, which would implement various improvements to the plant, including increasing capacity from 0.425 mgd to 0.686 mgd. Additionally, improvements to the conveyance system (see next section) would be needed in order for the Swan Lake WWTP to receive flow from the Study Area. The Old Route 17 Corridor Study included a potential project to connect Business Parks 1 through 4 to the Swan Lake system, requiring about 4.0 miles of new sanitary sewer conveyance facilities. Since that study, the project to add capacity to the Swan Lake WWTP potentially could accommodate these new flows. However, given the existing approved and potential development in the Stevensville area in the Town, which could add upwards of 300,000 gpd, in practice, the availability of these capacity increases to any developments along the Old Route 17 Corridor is uncertain.

Summary of Needs and Challenges

This section presents an overview of needs and challenges, drawn from the foregoing discussion:

- Green Lane/Chestnut Street/West Street gravity main: In 2012, a portion of this line failed, and the Village, pursuant to a regulatory action, constructed about 325 lf of replacement 8" sewer main and four manholes. This project involved a portion of this 8" main, which over its length, is about 3,600 lf. Given its age, location along a

watercourse, history of failure, recurrent overflows (i.e., due to wet weather and blockages), and regulatory action, the Green Lane 8" main is a priority project for the Village. This portion of the system serves a large proportion of the southwestern portion of the Village, including West St.

- Days Inn PS Capacity: Although this pump station had new pumps installed recently, other aspects of the station may limit capacity. It is likely that the 6" forcemain is undersized, and wetwell capacity may also need to be evaluated. In addition, wet weather events cause a significant increase in flow through this station.

- Inflow and Infiltration: As noted above, the Village system does experience flow increases during wet weather events – most likely due to inflow and infiltration (I/I). Prior efforts have identified nearly 12,500 lf of sewer mains within the Village system in need of rehabilitation (grouting or slip lining), along with other issues.

- Seasonality of Demand and Permit Changes: While the Village WWTP does not appear to experience significant recurrent seasonal shifts in flow, the Swan Lake WWTP, which is currently being upgraded, does see double peak flows in the summer months (June to August) compared to other times of the year. In addition, once the Village WWTP is issued a new SPDES permit, additional investments are likely necessary to comply with new effluent limits, should flows increase.

4.3 STORM WATER MANAGEMENT

Portions of the Village experience issues with stormwater management and drainage. Village officials expressed that, while there are isolated issues with storm infrastructure in various locations (e.g., undersized culverts and other conveyances), the more substantial issues occur along and to the east of North Main St in an area generally extending from the Elementary School south to Church St. Some of these issues likely can be traced to the undergrounding of and subsequent development over the unnamed tributary to the Middle Mongaup River that flows through the area in the vicinity of Route 52 and Main Street and returns to daylight near the intersection of Church St and Darbee Ln.

As depicted on Figure 7, the area east of Main Street is the location of a mapped (National Hydrography Dataset, or NHD) stream, and in the Darbee Ln area shows its confluence with another tributary joining it from the west. These data indicate that both watercourses are classified as "C" under NYS law. While the NHD data are kept up-to-date on a daily basis,

Liberty Infrastructure Master Plan

Main Street Drainage Ways

Legend

- Study Area Boundary
- Water_Districts
- Town Bndry
- NYSDEC Streams

Prepared by: Delaware Engineering, DPC
Date: June 5, 2023
Source: ESRI, Sullivan Cnty., NYS OITS GPO

N

0 170 340 680 1,020 Feet

the information shown for this location in the Village most likely has not been updated to reflect current stream locations and related conveyances. However, the map is included here to provide an indication of the likely historical flow paths of these two watercourses in this location, to highlight the area's importance to the watershed, and to illustrate the changes that have occurred as the Village developed.

5.0 Infrastructure Needs, Projects, and Opportunities

EXISTING INFRASTRUCTURE NEEDS

The following table (Table 6) summarizes baseline water, sewer, and stormwater infrastructure needs and presents rough order of magnitude costs, based on the previous section. This table identifies needed investments and/or costs in the absence of growth and, as such, provides a baseline scenario.

Table 6. Baseline water, sewer, and stormwater infrastructure needs

Facility	Need(s)	Jurisdiction
Lily Pond WTP	Additional expenditures required each year to keep running; Refurbishment needed in next 5 years	Village
Village of Liberty WWTP	Complete Phase 1 upgrades; Initiate Phase 2 upgrades; address SPDES permit changes	Village
Elm Street Well	Electrical upgrades, pump replacement	Village
Green Ln 8" sanitary sewer main	Replace approx. 2,600 lf of existing sanitary sewer and manholes	Village
Inflow/Infiltration	Continue to address various sources of I/I	Village
Maintenance Costs and Debt Service	Continue operation and maintenance of water and sewer systems; Continue payment of existing debt service from prior capital projects	Village & Town

Facility	Need(s)	Jurisdiction
Water meters	Develop and implement a program to replace all meter heads over five (5) years	Village

ECONOMIC DEVELOPMENT INFRASTRUCTURE DEMAND AND NEEDS

Based on the land development projects identified in Section 3, above, the following table summarizes potential future system demands. Assumptions underlying the projected demands shown below are included as Appendix 2.

Table 7. Potential future system development-related demands

Project Proposal	Demands	Infrastructure Involved
Liberty Ridge	43,000 gpd	West St sanitary sewer main; Green Ln sanitary sewer main; West St 8" waterline
Sims Foster	55,000 gpd	West St sanitary sewer main; Green Ln sanitary sewer main; Route 52 and nearby 6" waterlines
Grossingers Redevelopment	25,000 gpd	Triangle Auto PS; Route 52 waterlines (8" to 12")
Youngs Hill Rd Residential Development	82,500 gpd	8" DIP sanitary sewer; 10" waterline
Keystone (Parksville Rd) Residential development	16,500 gpd	8" DIP sanitary sewer; 10" waterline
Sunset Lake Rd Development (Community Ln parcel)	99,000 gpd	Millers PS, Days Inn PS; 12" watermain,
Approved Town of Liberty Developments in Swan Lake area	290,000 gpd	Swan Lake WWTP
Old Route 17 Corridor Full Buildout Scenario	500,000 gpd	Various
Main Street Redevelopment	455,000 gpd	8" sanitary sewer; Village water sources; 4", 6" and 8" waterlines
Total	1,566,000 gpd	

INFRASTRUCTURE OPPORTUNITIES

This section provides an overview of various opportunities supporting the identified potential future development in the Town and Village.

Water Supply and Distribution

The following list illustrates existing opportunities within the Town and Village water supply system serving the Study Area:

- Elm Street Well and Lily Pond design capacity. The Lily Pond WTP water supply system has a design capacity of 1.5 mgd and is permitted to withdraw 750,000 gpd. The Elm Street Well has a design capacity of around 1,008,000 gpd and is permitted to withdraw 252,000 gpd. From a design standpoint, there is a potential 1,506,000 gpd additional capacity between these two sources. In addition, upon application to DRBC, and with concurrence of NYSDEC and NYSDOH, permitted capacity at the Elm Street Well can be increased to 1,008,000 gpd.
- Town Water System Capacity. A review of maximum capacity of existing pumps installed at the WSS and Stevensville Well complexes against reported average and max. day withdrawals suggests that it may be possible for the Town to increase withdrawals from these sources.
- Town-Village Interconnection points. The Town and Village water systems are connected in three locations, with one location having a booster pump (currently not operational and only allows one-way flow). These existing interconnection points provide system resiliency and potential to increase supply within the southern portions of the Study Area. In addition, the 8" "recharge main" extending from Revonah along Lewis St. presents an opportunity to connect the two systems in order to supply additional water to the southern portion of the Study Area, facilitated by its comparatively larger diameter.
- Distribution system coverage. The potential development sites are all located either within existing water districts or are in reasonably close proximity to existing distribution mains, making the level of service (e.g., flow and pressure), as opposed to service provision, to many sites a key consideration.

Wastewater Conveyance and Treatment

The following list illustrates existing opportunities within the Town and Village sanitary sewer system serving the Study Area:

- Village WWTP available capacity. The WWTP currently operates under dry weather conditions at about 50% of its permitted capacity of 2.0 mgd and does not experience significant seasonality of flow. Keeping in mind potential issues associated with I/I, the wastewater treatment does not appear to be a constraint to the level of development contemplated in this report.
- Existing interconnections. The Village WWTP receives flow from portions of the Study Area within the Town with these discharges occurring pursuant to existing intermunicipal agreements, resulting in existing frameworks for cooperation with respect to these connections.
- Swan Lake WWTP Upgrades. Planned improvements currently in the design phase will increase the plant's capacity from 425,000 gpd to 686,000 gpd. Current average monthly maximum daily flow is 365,000 gpd. While approved development will consume about 103,000 gpd of the upgraded plant's design capacity, there would remain about 186,000 gpd for future development.

POTENTIAL INFRASTRUCTURE PROJECTS

Table 8, below, presents a list of potential projects identified to address infrastructure needs. These projects address existing needs, needs identified as necessary to support economic development activity in the Study Area, and also capital and long-term planning for the water supply, wastewater disposal, and stormwater management systems in the Study Area. Also included are planning-level cost estimates. The intent of this list is to present a comprehensive picture of investments that will be or, in the case of economic development and land development projects, could be needed; the next section presents recommended next steps.

6.0 Analysis and Recommendations

On the basis of the foregoing, this section advances a series of recommended water, sewer, and stormwater projects.

WATER SUPPLY AND DISTRIBUTION

The ability to supply larger amounts of water to the Study Area (as well as existing approved developments) is a key issue facing the Town and Village. The Study Area is currently supplied by multiple sources (i.e., Lily Pond, Elm Street Well, and the Stevensville-Sherwood-Roth wells system), but increasing the quantity of water available is hampered by several issues. The Town's attempts to develop new sources so far have not yielded

additional water. Concerns about historic petroleum leaks near the Elm Street Well has prevented additional production from that source, and Lily Pond, the area's only active surface water source, has been limited by both reservoir capacity (i.e., the historical determination that its safe yield is 750,000 gpd) and by the water treatment plant infrastructure. Moreover, it is unclear the extent to which the existing system of transmission and distribution mains have capacity to convey additional water even if additional production were to occur. Finally, by several measures, seasonal demand peaks mean on the Town's system operates near capacity for two months during the year.

Therefore, the following projects, in priority order, are recommended to be undertaken in the near term:

A. Hydraulic Modeling of Town and Village Water Systems – Building a model of the water supply and distribution system is a high priority to help understand how the system currently operates, identify the location of constraints, and plan for capital improvements. The Town's water sources, including the two WSS wells and the Stevensville-Sherwood-Roth wells, appear capable of producing upwards of 1.8 mgd; however, the Ferndale booster station maximum capacity limits what can be supplied to a large part of the Study Area to about 350,000 gpd. Likewise, it is not clear the extent to which any additional water produced at Lily Pond could be delivered throughout the Study Area (or other portions of the Town). A hydraulic model will enable a much more precise understanding of system operating parameters and carries many other benefits, such as: optimization of tank and pump operations, scenario modeling and emergency preparedness, design and sizing of new water infrastructure, and potentially water quality modeling. This project should be a joint effort between the Town and Village, given the existing interconnections and potential for service expansion.

   Cost Estimate: $25,000 to $40,000

B. Evaluate production of existing water sources, incl. WSS and Stevensville well fields, Lily Pond reservoir, Elm Street Well. This recommendation is a high priority item, as it is oriented toward maximization of existing water sources. This project would either update or develop, where no such analysis currently exists, the safe yield for each of the wells and reservoirs serving the Study Area. At the Stevensville Well Complex, it would help the Town understand the interaction of the five existing wells. At the Elm Street Well, it would help the Village determine how much additional production

could be expected from this source. At the Lily Pond Reservoir, it would serve to update the century-old safe yield analysis referenced in the Village's 1923 water supply permit. Like system hydraulic modeling, conducting a safe-yield analysis in a systematic and comprehensive way will help optimize existing assets and provide an input into capital project planning oriented toward increasing water production from existing sources. Careful design of the tests is important, given Elm Street Well contamination, potential sediment and contaminants disturbance at Lily Pond WTP and the 12" transmission line, and seasonality of demand in the Town's system. To determine yields, NYSDEC guidance[3] would be followed, which involves a 72-hour pump test representative of operating conditions (e.g., multiple wells in a given field in service) and would be accompanied with a report in NYSDEC's recommended format.

Cost Estimate: $10,000 to $25,000 per well

Elm Street Well Production – Phase 1. Permitted withdrawal at the Elm Street Well is 250,000 gpd, and production in practice is further reduced to as low as 100,000 gpd. However, maximum capacity, given the 700 gpm pumping capacity, is around 1,000,000 gpd. This project is likely a five-year effort. A several-year stepwise increase in pumping rates and monitoring effort would be needed to confirm the ability of the well to produce water at higher rates without drawing contaminants from nearby historic petroleum sites. Infrastructure may be needed, such as physical in-ground barriers or re-implementation of pump and treat systems at the garage and gas station sites to further remove petroleum remnants.
Cost estimate: $25,000 to $50,000

The remaining projects listed in Table 8 are included so as to be able to track and implement, and would depend on the results of recommendations one and two, above.

WASTEWATER CONVEYANCE AND TREATMENT

The sanitary sewer systems serving the Study Area have been the subject of substantial historical and ongoing investments, by both the Town and Village. The Village's system operates at about 50% capacity, with about 1.0 mgd available for future connections. The Town's Swan Lake WWTP will be upgraded to about 0.65 mgd, but approved and planned

[3] See NYSDEC, "Pumping Test Procedures for Water Withdrawal Permit Applications," available from https://www.dec.ny.gov/lands/86950.html.

Table 7. Potential infrastructure projects

Project	Description	Need(s) Addressed			Outcome(s)	Priority	Comments
		Operations & Maintenance	Future Development	Captial Project Planning			
Water							
Hydraulic Modeling of Town and Village Water Systems	• Collect system data (e.g., pipes, storage tanks, pumps, pump curves, sources, elevations, etc.) • Build model of Town and Village systems in software (e.g., EPANET)				• Obtain more precise understanding of system hydraulics • Guide capital project development and programming • Provide guidance to land development project sponsors and designers	High	
Remediation of Elm Street Well Contamination - Phase 1	• Conduct additional investigation to determine precise location(s) of remaining contamination • Obtain recommendations and agreed-upon path to develop capital project				• Capital project involving remediation of remaining contamination • Additional between 950,000 gpd (max. capacity of existing equipment) to 1,008,000 gpd (permit limit)	High	
Elm Street Well equipment upgrades	• New backup power generator • Electrical upgrades • Replace pumps • SCADA upgrades linking motors to Revonah WST flowmeter • Building and chemical feed system upgrades				• Address life-cycle issues of older existing equipment • Improve operations and reduce maintenance costs • Opportunity to coordinate replacement equipment with increased production to meet future demands	Medium	
Evaluate production of existing water sources, incl. WSS and Stevensville well fields, Lily Pond reservoir, Elm Street Well	• Conduct pump tests at water supply wells to determine safe yield • Update Lily Pond reservoir safe yield analysis to include modeling of hydrologic conditions, storage volume, operational logic, surface water flow data, etc.				• Increase water supply capacity • Develop information to input into capital project development oriented toward increasing capacity in distribution system	High	Costs per well are roughly $15,000 to $20,000; Assume $100,000 for Lily Pond reservoir safe yield analysis
Triangle road water line upgrades	• Replace approximately 2,400 lf of 8" water line with 12" water line • Replace 315 lf of 4" water line with 6" water line • Install pressure-reducing valve and related metering and appurtenances				• Accommodate existing approved developments and seasonal demand • Increase overall system redundancy and reliability • Provide increased water supply to northeastern portions of Study Area	High	
Lily Pond WTP rehabilitation	• Rehabilitate all three treatment trains • Remove strainer building and clean and rehabilitate intake pipe • Building roof and other rehabilitation items • Replace static mixers and chemical feed system				• Address life-cycle issues at over 25-year old WTP • Reduce operation and maintenance costs • Potential to increase water supply	High	
New sourcewater development (Town)	• Continue to partner with private developers doing due dilligence with respect to water supply on projects • Evaluate development of new water supply well along Middle Mongaup River • Evaluate recommissiong of Revonah Hill Reservoir				• Increase water supply capacity in water supply systems • Provide water source redundancy	Low	Costs will depend in part on partnerships with private entities

Table 7. Potential infrastructure projects

Project	Description	Need(s) Addressed			Outcome(s)	Priority	Comments
		Operations & Maintenance	Future Development	Captial Project Planning			
Upgrade Ferndale and Route 55 booster stations/storage capacities	• Upgrade and/or replace pumps, motors, and/or controls				• Provide increased water supply to southern half of Study Area	Low	
Replace Stevensville WST	• Rehabilitate or replace existing WST • Evaluate need to increase size of WST to accommodate future growth				• Address life-cycle issues • Potential to coordinate increased storage capacity serving future development	Medium	
Address hydraulic bottlenecks in Village by upgrade existing 4” and 6” mains as needed and revealed by hydraulic analysis	• Upgrade approximately 2,500 lf of 4"between Buckley St. and N End Ave • Upgrade approximately 1,700 lf of 8" between Thomas Ave WTB and N Main St				• Increased flow and pressure to portions of Main Street supporting potential redevelopment activities • Allow distribution of higher volumes of water from Lily Pond WTP	Low	Assume $400/lf
Continue to replace aging water main along Route 55	• Replace approximately 7,500 lf of 10" CIP with new DIP between the bridge on Briscoe Rd and the Stevensville WST • Evaluate need for increased size of replacement water line				• Address life-cycle issues • Reduce operation and maintenance costs • Improve system reliability • Potential to coordinate increased supply to Study Area	Medium	Assume $400/lf
Address lead service lines	• Inventory existing LSL • Develop and implement plan for replacement • Coordinate replacement with other capital projects				• Address life-cycle issues • Address regulatory requirements	Medium	
Facilitate new connections to 12" DIP between Lily Pond WTP and Thomas Ave WTB	• Address chlorine residual requirements, including by using results of hydraulic model				• Facilitate additional water supply provided to the northern Study Area	Medium	
Village Water Meter Upgrades	• Replace approx. 1,700 customer water meter heads • Back-end software and hardware upgrades				• Address life-cycle issues • Address regulatory requirements	Medium	Assume $750/head and $25,000 in computer equipment
Lily Pond WTP 0.5 MG storage tank maintenance	• Inspect and clean tank				• Basic maintenance	Medium	
Maintain and upgrade existing interconnections	• Inspect and as needed replace equipment at Route 55 and Upper Ferndale Rd interconnections • Evaluate South Main interconnect and install bi-directional valving and refit booster station				• Basic maintenance • Address regulatory requirements • Potential to increase water supply to southerly portion of Study Area	Medium	
Wastewater							
Conveyance system inventory, condition assessment, and flow metering of areas tributary to the Village WWTP	• Collect system data (e.g., pipes, manholes, pipe invert elevations, pumps, pump curves, etc.) • Assess condition of conveyances, manholes, pump stations • Perform flow metering at key points in the system • Perform smoke testing to identify cross-connections				• Obtain more precise understanding of system operating condition • Guide capital project development and programming • Provide guidance to land development project sponsors and designers	$120,000	
Perform Days Inn PS upgrades in phases	• Upgrade/replace forcemain • New wetwell • New pumps/motors				• Maintain current capacity • Provide additional capacity for future development	Medium	Cost includes upgrading approximately 2,000 lf of forcemain between the station and discharge point upstream of WWTP

Table 7. Potential infrastructure projects

Project	Description	Need(s) Addressed			Outcome(s)	Priority	Comments
		Operations & Maintenance	Future Development	Captial Project Planning			
Lannings PS upgrades	• Increase capacity at Lanning's PS • Upgrade the Existing Gravity Collection System on Sullivan Avenue to Days Inn Pump Station				• Provide additional capacity for future development	Low	
New PS along Route 52 in Village	• Install new pump station and forcemain				• Provide additional capacity for future development	Low	
Green Lane gravity line replacement	• Replace approx. 2,600 lf of existing sanitary sewer and manholes				• Reduce I/I into system • Provide increased wastewater conveyance capacity for development in eastern portion of Study Area	High	Assume $400/lf
Village WWTP capacity	• Mechanical bar screen • New loader • New emergency generator				• Provide additional capacity for future development	Low	
Address inflow/infiltration in Village and Town systems	• Develop capital program targeted consisting of, e.g., slip lining of mains, laterals, and manholes; disconnection of sump pumps and downspouts; and installation of new storm sewer as appropriate • Allocate budget for projects annually (e.g., X lf of pipe to slip line, X number of manholes to rehabilitate/line/replace) • Seek funding for more expensive captial projects, such as installation of new storm sewers to facilitate roof leader and sump pump disconnection				• Reduce I/I into system • Address regulatory compliance	Medium	Assume 1,000 lf per year at between $100 and $250 per lf
Stormwater							
Inventory (map) and perform condition assessment of Village system	• Asset reconnaisance and condition evaluation • GIS mapping				• Be prepared to seek grant funding sources • Develop asset management plan	High	
Conduct preliminary engineering study addressing flooding along easterly portion of Main Street	• For study area, evaluate hydraulic and watershed conditions • Assess stream daylighting potential • Develop preliminary project recommendations, design parameters, and fudning sources				• Be prepared to seek grant funding sources • Identify priority projects and obtain preliminary design parameters	Medium	

development, as well as the expense of extending sewer service to new areas, mean that this capacity may not be available for future growth. The following recommendations, therefore, are driven by the need to continue to operate and maintain the conveyance system as well as plan to address potential bottlenecks to future growth:

D. Conveyance system inventory, condition assessment, and flow metering of areas tributary to the Village WWTP. As with water supply, the development of a fine-grained understanding of current operating parameters would achieve multiple objectives. This high-priority project would involve 1) mapping and inventorying of the conveyance system discharging ultimately to the Village WWTP; 2) a condition assessment of system elements; and 3) inflow and infiltration investigation and documentation. There is some existing system mapping to serve as a basis for additional fieldwork and data collection. For each manhole a detailed condition assessment of the structure would be carried out. Runs of pipe and laterals would be TV'ed and the results analyzed for condition as well as inflow/infiltration issues. Basic inventory information would be collected for pump stations, which could include pump drawdown tests. Flow monitoring could be added to assess existing flows under a variety of conditions (e.g., wet and dry seasons). And a systematic effort to identify cross-connections, such as from roof leaders, sump pumps, and storm sewers, using local knowledge, smoke testing, and other methods would be involved. The results of this project would also give the Town and Village a roadmap to upgrades needed, facilitating capital planning, efforts to seek grant funding, and fair-share contributions from developers.

   Cost Estimate: $135,000[4]

E. Green Lane gravity line replacement. This project is a high priority because of the recent history of failure as well as its potential to support growth and investment in the western portion of the Study Area. As outlined above, the section requiring rehabilitation or replacement is about 3,600 lf in length. Given the potential cost, planning for replacement now will allow the Village to establish a reserve fund, and as discussed in the next section, expansion of the Village WWTP service area in the Town would provide a way to offset costs by increasing the user base. The next section discusses funding options.

[4] This cost estimate assumes that one third of the system, which as discussed above is comprised of at least 250 manholes and 111,000 lf of pipe ranging from 6" to 30", would be evaluated at a cost of $40/manhole and $3.60/lf for jetting and TVing.

Cost Estimate: $1.5 M[5]

F. Plan for Days Inn PS upgrades. A recent cost estimate for upgrades is included as Appendix 5. Upgrades would include both the pump station itself and the forcemain, which is thought to be limiting capacity. This project would involve a preparing a preliminary design report, building from information developed in project #1, above, which will help establish design parameters and capacities. The report may present a phased or modular design and approach to allow capacity to be added in phases, perhaps as part of developer fair-share contributions. Estimates presented in this report suggest that development of Grossingers, Sunset Ridge, and Business Parks 1, 2, 3, 4, and 6 could generate an additional 0.5 mgd of flow through this station, which currently operates at 70% capacity (about 0.55 mgd) under dry flow conditions. As described above, one of the primary issues with this station is that the existing 6" forcemain may be undersized. Among other aspects, this project would evaluate the cost to upgrade or add an additional forcemain in parallel to increase capacity.

Cost Estimate: $15,000 to $30,000

Although indicated as a medium priority project, development and implementation of a plan to address inflow and infiltration in the system tributary to the Village WWTP is an important follow-up program to be developed and implemented using the information provided as part of Project #1, above. Using the results of the condition assessment and I/I investigations, a follow-up effort would involve Using condition information from priority project #1, above, leaking manhole covers, manhole structures, and pipes in poor condition and/or susceptible to failure given their age, material of construction, and/or location should also be inventoried, mapped, and prioritized (e.g., due to flow contributions, potential failure, etc.). Preliminary recommendations to systematically address the issues uncovered can then be advanced. It is likely that this effort would be a "program" of projects in the sense that it would involve multiple different activities, including slip lining of poor condition pipes, rehabilitation and/or replacement of poor condition manholes, property owner outreach, construction of new storm sewers as may be

[5] This estimate assumes a cost per lf of $400.

needed to facilitate rooftop and sump pump disconnection, and similar projects, each with varying levels of effort, cost, complexity, and capital programming requirements.

STORMWATER MANAGEMENT

As outlined above, stormwater drainage needs are primarily in the Village and relate to aging infrastructure, recurring flooded areas, and changing climate patterns. The following two recommendations are intended to facilitate documentation of problem storm sewers, catch basins, and outfalls as well as to seek funding to address recurring flooding along the Main Street area:

G. Inventory (map) and perform condition assessment of Village storm sewer system. Village officials expressed that aging stormwater infrastructure is an issue whose magnitude is not precisely known. As outlined above for the water and sewer systems, this project would provide basic asset inventory and condition information that can be used for several purposes, including asset management programming, capital planning, and support for operations and maintenance. Having this information and a capital plan would also facilitate land development application review and partnering to address known issues.

Cost Estimate: $50,000 to $75,000

H. Conduct preliminary engineering study addressing flooding along easterly portion of Main Street. As illustrated above, the low-lying area east of Main Street is an important part of larger drainage areas. Streams likely existing as surface waters in the past were placed into underground conveyances as the Village was settled and developed. This project would lead to a detailed understanding of the causes of recurring flood events in these locations and also identify potential solutions. It should also make grant funding, especially programs relating to stream daylighting, available, and it could form the basis of establishment of other funding mechanisms, such as drainage districts established under NYS town law.

Cost Estimate: $25,000

HIGH-PRIORITY PROJECTS SUMMARY TABLE

The following is a summary table outlining the eight (8) high-priority projects, their cost estimates, and potential project sponsors. As discussed in the next section, there are various funding, partnering, and collaboration options to advance the projects listed below.

Table 9. High-Priority Projects Summary

ID	Project	Sponsor(s)	Cost Estimate
A	Hydraulic Modeling of Town and Village Water Systems	Town & Village	$100,000
B	Evaluate production of existing water sources, incl. WSS and Stevensville well fields, Lily Pond reservoir, Elm Street Well – Phase 1	Town & Village	$30,000 to $50,000
C	Elm Street Well Production - Phase 1	Town & Village	$25,000 to $50,000
D	Conveyance system inventory, condition assessment, and flow metering of areas tributary to the Village WWTP.	Town & Village	$135,000
E	Green Lane gravity line replacement.	Village	$1.5 M
F	Plan for Days Inn PS upgrades.	Town & Village	$15,000 to $30,000
G	Inventory (map) and perform condition assessment of Village storm sewer system.	Village	$50,000 to $75,000
H	Conduct preliminary engineering study addressing flooding along easterly portion of Main Street.	Village	$25,000

7.0 Financial Analysis and Governance

A solid financial foundation is important to the long-term sustainability and resiliency of public infrastructure. In addition, it can facilitate system expansion, such as to new areas being developed, by increasing transparency and reducing risk for the land development community. This section provides a high-level overview of key fiscal metrics and provides related recommendations.

This section primarily focuses on the Village of Liberty water and sewer systems, as the Village infrastructure is presently, and will likely remain, fundamental to providing water and sewer in the Study Area. That said, adopted 2023 and 2024 Town of Liberty budgets were reviewed for this plan and an overview and recommendations area presented alongside those of the Village. Relevant financial information is included as Appendix 3, and

references in this section to budget documents and other financial information are found in Appendix 3 unless otherwise noted.

BUDGETING

Village of Liberty

Relevant excerpts of the Village 2023/2024 budget are provided in the table, below. For both the Village's water and sewer funds, user fees provide the bulk of revenues, with fund balance comprising the next largest share. On the expenditures side, debt service accounts for between 17% and 20% for sewer and water, respectively. The water fund balance is about 66% of annual expenditures; the sewer fund balance, about 20%. A shortfall in the sewer fund of $75,075 is apparent from the information obtained for this report.

Table 10. 2023/2024 Village of Liberty Budget Extract

	Water	Sewer
Revenue		
User fees	$ 998,831.71	$ 1,276,810.82
Inside	$ 772,549.53	$ 1,139,415.62
Outside	$ 226,282.18	$ 137,395.21
Other	$ 47,500.29	$ 55,349.18
Appropriated fund balance	$ 107,490.00	$ 150,572.00
Total	$ 1,153,822.00	$ 1,482,732.00
Expenditures		
Debt service	$ 236,012.50	$ 265,560.82
Other	$ 917,809.50	$ 1,292,246.18
Total	$ 1,153,822.00	$ 1,557,807.00
Remaining Fund balance	$ 759,155.00	$ 303,797.00

Town of Liberty

The Town's budgets carry funding for the Town's seven (7) water districts and four (4) sewer districts in separate funds. In general, the Town's water and sewer funds experienced few shortfalls in these funds over the past two years, the most significant being a 34% shortfall in 2021 in the Loomis Sewer District fund.

Table 11. Town water and sewer budget comparison

	2021 (actual)			2022 (actual)		
	App	Rev	Delta	App	Rev	Delta
LOOMIS SEWER DISTRICT	$ 96,173	$ 63,265	$ (32,909)	$ 96,100	$ 93,792	$ (2,307)
S. L. / BRISCOE CONSOLIDATED SEWER	$ 478,581	$ 624,719	$ 146,138	$ 452,947	$ 482,311	$ 29,363
YOUNGSHILL SEWER DISTRICT	$ 26,012	$ 22,684	$ (3,328)	$ 25,496	$ 25,654	$ 158
INFIRMARY ROAD SEWER DISTRICT	$ 111,726	$ 96,633	$ (15,093)	$ 112,661	$ 152,690	$ 40,028
LOOMIS WATER DISTRICT	$ 75,028	$ 92,282	$ 17,254	$ 71,337	$ 91,294	$ 19,957
FERNDALE WATER DISTRICT	$ 511,136	$ 566,826	$ 55,690	$ 499,318	$ 550,943	$ 51,626
STEVENSVILLE WATER DISTRICT	$ 510,060	$ 570,281	$ 60,221	$ 557,826	$ 593,142	$ 35,316
W.S.S. WATER DISTRICT	$ 71,139	$ 95,152	$ 24,013	$ 55,108	$ 97,895	$ 42,788
INDIAN LAKE WATER DISTRICT	$ 9,885	$ 17,978	$ 8,092	$ 11,664	$ 17,871	$ 6,207
COLD SPRING ROAD WATER DISTRICT	$ 21,482	$ 25,425	$ 3,942	$ 43,497	$ 53,690	$ 10,193
ROUTE 55 WATER DISTRICT	$ 101,837	$ 122,345	$ 20,508	$ 116,597	$ 132,479	$ 15,882

In general, across the Town's water and sewer districts, revenues have exceeded expenditures, and this appears to be largely due to the Town underestimating revenues and overestimating expenses. With regard to revenues, the Town's budgets for both water and sewer user fees, which can vary in time, are typically conservative. With regard to the latter, some expenses appear to have been project-related or one-time reductions. But the contractual costs line frequently comes in smaller than budgeted.

The Town has a single budget line for the Water and Sewer Department, which had a 2023 budget of $971,719.00 and consisted mainly of human resources costs. This line is then allocated to each of the eleven (11) districts in rough proportion to each district's share of appropriations. Given that only two (2) of the Town's water districts produce water, the Town accounts for water delivered to non-producing districts within the Town as interfund transfers in the budget. (The Cold Spring Rd District receives water directly from the Village of Liberty.)

According to the adopted 2024 budget, the balance owed on the Town's debt is $2,743,612, of which 90% is related to water and sewer costs. Finally, the Town also maintains water and sewer reserve funds, as set forth in Table 12.

Table 12. Town of Liberty water and sewer reserve fund adopted budget allocations summary

Reserve Fund	2023	2024
W.S.S. Water District	$ 2,100.00	$ 2,100.00
Water and Sewer Major Equipment	$ 30,150.00	$ 50,150.00
Capital Water Lines Fund	$ 129,000.00	$ 129,000.00
Infirmary Rd Sewer Capital Fund	$ 15,150.00	$ 15,150.00
Loomis Sewer Capital Fund	$ 170,170.00	$ 17,017.00
Route 55 Water	$ 15,050.00	$ 15,050.00
Stevensville Water Capital	$ 5,100.00	$ 5,100.00
Loomis Water Capital	$ 12,100.00	$ 12,100.00
Swan Lake Sewer	$ 136,300.00	$ 136,000.00

RATE STRUCTURE AND USERS

Village of Liberty

Rates for water for the current fiscal year are $7.45 and $13.10 per 1,000 gallons of metered use for inside-the-Village and outside-the-Village customers, respectively. Outside user rates are about 75% higher for water supplied by the Village than for inside users. Rates for sewer use the current fiscal year are $8.58 and $13.38 per 1,000 gallons of metered use for inside-the-Village and outside-the-Village customers, respectively. Outside user rates are about 56% higher for use of the Village sewer system. There are 1,700 water connections and 1,593 sewer connections, with about 75% of these connections to both systems being residential users.

Town of Liberty

The Town of Liberty's sewer charges are based on Chapter 121 of the Town code, which authorizes charges for service (O&M) and capital costs. The O&M fee for sewer service is calculated based on estimated total effluent received at the plan and then allocated to users based on their total annual water use in the district and then transformed into units equivalent to 75,000 gallons per day of effluent. In those districts carrying debt, sewer unit shares for debt service are calculated in accordance with the Schedule of rates found in the Liberty Town Code Article XIII Sewer District Capital Charge - §121-60 Schedule of Rates. Sewer Units are computed based on land road frontage and property improvements

separately, and are totaled for each parcel. Vacant land is assigned the same road frontage units as improved land. In addition, users in the Youngs Hill sewer district, for which the Village provides treatment, are charged a separate user fee by the Village.

In the Town's water districts, O&M costs are charged based on water consumption, and there is an additional fee collected based on a flat monthly charge per user (presumably for capital costs). Table 13, below, shows the number of service connections by water district in the Town. The Town also maintains a summer surcharge fee of $4.25 per 1,000 gal. over 100,000 gal. applicable to the quarterly billing period including June, July and August. Fees are charged by individual districts and transferred to Stevensville for debt service in connection with the Sherwood Wells project.

Table 13. Town of Liberty service connections by water district

District(s)	Number of Connections
Cold Spring Rd	19
Stevensville (incl. Ferndale, Loomis, and Route 55 districts)	345
White Sulphur Springs	160
Total	524

Source: 2021 annual drinking water quality reports, Town of Liberty

ANALYSIS AND RECOMMENDATIONS

Based on the information provided in this section, the following findings and recommendations are developed:

- Expenditures detail (Village of Liberty). Debt service accounts for roughly one-quarter of each of the water and sewer budgets, but it is not clear from the information reviewed how the remaining roughly three quarters of appropriations was determined. Staffing costs, equipment, contractual services, etc. very likely form a portion of the Village water and sewer appropriations and are directly linked to the cost of providing public water and sewer services. To capture these costs and incorporate them into an itemized budget, historical invoices and work order tracking systems can be reviewed and updated to reflect current or projected costs (e.g., cost of diesel fuel and asphalt).

- Fund balance target (Village of Liberty). Fund balance is the total accumulation of operating surpluses and deficits since the beginning of a local government's existence. Low fund balance is an issue that can lead to borrowing and deficit financing while excessive fund balance is presents financial management issues created by overaccumulation of surplus funds and also represents a potentially unnecessary transfer of money from taxpayers to a local government. Fiscal requirements, guidance, best practices, and local conditions are involved in determining what is a "reasonable" amount of fund balance in a budget, including a water or sewer fund.

  The Village's sewer fund balance, at about 20% of fund expenditures, does not appear excessive, but water fund balance is about 60% of expenditures and may be higher than optimal in view of the foregoing discussion. It is worth noting that elevated fund balance in the water fund can aid in the implementation of priority projects (as discussed in the next section of this document). A written policy governing unreserved fund balance accumulation that is adopted by the Village Board is a best practice in local finance.

- Rate restructuring (Village of Liberty). Review of the Village's rates and user base suggests that there may be an opportunity to re-examine water and sewer rates in order to achieve multiple goals, including increased transparency, equity, effective budgeting, fiscal resiliency, and addressing long-term capital needs.

  Like many communities, both the Town and Village of Liberty charge higher rates to customers not located within their geographic boundaries and/or outside of improvement or service districts for water and sewer service. It is not uncommon for outside user rates to differ substantially, with outside users paying 25%, 50%, or 75% more than inside users. However, from a good governance perspective, these rates should be tied to the costs of providing the service.

  In addition, a rate restructuring process could also involve evaluating applying a benefit-based framework to fees for debt service. For example, taking the baseline user as the average single family residential unit, commercial users could be assessed a higher portion of the service cost that is commensurate with the greater benefit associated with their ability to operate a business using Village-provided services. A benefit-based framework would also distribute costs to those owners of vacant land who benefit from the existence of the utility even when not connected.

- District consolidation (Town of Liberty). The Town of Liberty operates four (4) sewer districts and seven (7) water districts. Especially on the water supply side, the water supply infrastructure is interconnected (except for the Cold Spring Rd district, to which the Village supplies water), and certain infrastructure, like the Sherwood Wells, are owned jointly by WSS, Stevensville, Ferndale, and Loomis water districts. Sewer operations are, however, also interconnected with the Swan Lake WWTP providing sludge processing services to the Loomis Sewer district. Finally, the Town resources involved, from administration to field personnel and equipment, are also shared across both the water and sewer systems. It is important to note that physical interconnection of district infrastructure or services is not necessary for administrative consolidation. However, the separate districts currently share infrastructure and personnel, creating conditions to leverage administrative efficiencies and decreasing administrative complexities that consolidation can make possible, such as when budgeting or allocating costs of capital improvements. (It is also important to note that Town districts cannot, under NYS law, be consolidated with the Village.)

  Consolidated districts in general offer several benefits, including reduced administrative costs, greater equity, and a larger user base over which to spread costs. For example, The Stevensville system supplies five (5) separate districts, which according to Table 13, have a combined user base of 345 connections but that user base would grow by almost 50% with the addition of the WSS district, allowing debt service costs (e.g., for the Stevensville Wells) to be spread over a larger user base.

- Shared Services. Given the overlap in resources, knowledge, and operational demands involved when a municipality provides public service, and the potential efficiencies in service delivery possible, shared services arrangements between the Town and the Village can be part of creating sustainable water, sewer, and stormwater infrastructure systems. In the context of water and sewer service, options range from consolidation of operational resources and functions to creating water or sewer authorities to manage this infrastructure on behalf of users. Consolidation can be implemented simply through contracts for services among the Town's districts and the Village that could, for example, provide for an increased role of the Town in providing operation and maintenance support to parts of the Village system (or vice versa). Consolidation of facilities other than water and sewer may also be a benefit to both the Town and Village, both in providing services and sharing costs. Finally, supporting existing mutual aid and shared service relationships, which are

frequently found in the case of emergency services and public works, and searching for new or more efficient means of mutual aid are other ways to obtain benefits of consolidation.

8.0 Next Steps

This section is intended to present a roadmap to aid in project development and facilitate implementation. For each of the identified high-priority projects, funding, administrative mechanisms, and related considerations are outlined. For analysis, recommendations, and next steps relating to providing sanitary sewer service to the Hamlet of Parksville, see Appendix 4.

WATER SUPPLY PROJECTS A, B, AND C

In terms of implementation, priority projects A, B, and C can be combined, given the nature of the projects (i.e., existing system and facilities review), to reflect the interrelationship of the outcomes, and in order to seek funding opportunities.

The public water supply system serving the Study Area is comprised of a combination of Town- and Village-owned infrastructure. Accordingly, an important first step in the process is for the Town Board and Village Board to enter into a memorandum of agreement for advancement, funding, and implementation.

Funding opportunities include the following:

- *USDA Water & Waste Disposal Predevelopment Planning Grants in New York* – This program provides support to plan and develop applications for proposed USDA Rural Development water (or waste disposal) projects. Award is limited to $30,000 or 75% of the planning effort cost, and a 25% match to come from either the applicant or third-party sources. Given the grant requirements (i.e., population less than 10,000), it is recommended that the Village be the applicant.

- *Empire State Development (ESD) Strategic Planning and Feasibility Studies Program* – Funding is available for working capital grants of up to $100,000 each to support feasibility studies for site(s) or facility(ies) assessment and planning. Projects should focus on economic development purposes, and preference shall be given to projects located in highly distressed communities.

D – CONVEYANCE SYSTEM INVENTORY, CONDITION ASSESSMENT, AND FLOW METERING OF AREAS TRIBUTARY TO THE VILLAGE WWTP

The next steps involve scoping and identifying funding. As outlined herein, this project would result in information to support a series of follow-on capital projects.

Beyond own-source revenues, funding sources for this project include:

- *Engineering Planning Grants (EPG), NYS Environmental Facilities Corporation* – A municipality must use EPG funding for the preparation of an engineering report for an eligible Clean Water State Revolving Fund (CWSRF) project. This includes planning activities to determine the scope of water quality issues, evaluation of alternatives, and the recommendation of a capital improvement project. Funding is provided for projects costing $50,000, with a 10% cash or in-kind services match.

- *Empire State Development (ESD) Strategic Planning and Feasibility Studies Program* – Provided there is a link to facilities planning related to economic development, it should be possible to fund a planning and design effort that incorporates this project. Given the importance of maintaining capacity at the Village WWTP, this project could be included in a larger, comprehensive effort aimed at upgrading multiple systems.

- *USDA Water & Waste Disposal Predevelopment Planning Grants in New York* – This program, as described above, can also be used to implement this project.

E – GREEN LANE GRAVITY LINE REPLACEMENT

This is a significant capital project, and the next steps are driven by opportunities to fund it. A recommended capital funding source is the Community Development Block Grant (CDBG) program, which provides grants of up to $1.0 M for, inter alia, sanitary sewer projects. Among the requirements are that the project be ready for construction, so the planning phase should include development of plans and specifications suitable for bid advertising, as well as addressing funding and environmental review requirements.

- *Own-Source Revenues, including Bonding* – In order to design the project and access CDBG funding, one option to fund the predevelopment planning and design effort is through the bond market. Planning- and engineering-related costs would

likely range between 10% and 18%, including environmental review, final design, permitting, and construction-phase services.

- *Future Sewer District Extensions* – Given private sector interest in investing in this part of the Study Area, it should be possible, in connection with either extending or creating a sewer district or by using service agreements, to spread costs of debt service to these new users benefitting from the capital project.

- *Engineering Planning Grants (EPG), NYS Environmental Facilities Corporation* – As outlined above, EPG funding may also be used for this project. However, EPG funds support preparation of an engineering report and not final design plans.

F – PLAN FOR DAYS INN PS UPGRADES

Although owned by the Village, the Days Inn PS is important to the entire eastern portion of the Study Area, which includes the Town, and several Town-owned pump stations flow through this facility. As outlined above, an arrangement between the two municipalities, whether an MOA or board resolutions, should underlie this project and establish it as a collaborative effort.

This project is aimed at setting the stage for future capital projects that would be implemented in phases, and as such, part of project development planning should include assessment of potential future capital funding scenarios, including fair-share contributions made as part of land development projects that require increases in capacity.

- *Engineering Planning Grants (EPG), NYS Environmental Facilities Corporation* – This funding source could be used to prepare an engineering report if CWSRF or Water Infrastructure Improvement (WIIA) program capital funding will be sought.

- *Empire State Development (ESD) Strategic Planning and Feasibility Studies Program* – Provided there is a link to facilities planning related to economic development, it should be possible to fund a planning and design effort that incorporates this project. Given the importance of the Days Inn PS to planned or potential economic development sites, this project could be included in a larger, comprehensive effort aimed at upgrading multiple systems.

G – INVENTORY (MAP) AND PERFORM CONDITION ASSESSMENT OF VILLAGE STORM SEWER SYSTEM

The next step in this project is to identify a project lead and develop a scope and budget. It is likely that a project of this nature would require use of own-source revenues. However, if the sanitary sewer and water supply inventorying and modeling efforts are coordinated, it should be possible to create an integrated GIS platform designed to accommodate storm sewer-related elements, creating efficiencies across similar projects involving collecting information about infrastructure assets with a physical location.

Another option, depending the current status of the Village's inventory data, is to integrate inventory and assessment information into existing public works workflows and tasks. For example, during routine catch basin maintenance, inventory and condition data can be recorded on a basic form by department personnel. With technical assistance and training, including creating a form, standard operating procedures, and conducting training, existing staff may be able to create a basic inventory tool, similar to a "windshield" pavement condition assessment, for stormwater assets to facilitate, e.g., maintenance activities, budgeting, capital project planning, and seeking grants.

H – CONDUCT PRELIMINARY ENGINEERING STUDY ADDRESSING FLOODING ALONG EASTERLY PORTION OF MAIN STREET

The next steps in project implementation is scoping the project and seeking grant funding. This report provides a high level of information describing a general location and nature of the problem. Additional information and documentation about the specific problem area, potential sources, and nature of the flooding should be assembled and/or developed to facilitate seeking grant funding and developing a project scope. The extend of municipal and private land and infrastructure ownership patterns should be assessed. Among the sources of capital funding are the NYSDEC's Water Quality Improvement Program (WQIP).

The *NYSDEC's Nonpoint Source Planning Reports Program* is a potential source of funding for this project. The program aims to prepare nonpoint source projects for construction and application for implementation funding. Grants of up to $30,000 are available to finance planning services to produce project planning reports aimed at seeking capital project grant funding. Categories of applications that may be applicable include:

- Green Infrastructure An engineering feasibility study report for projects that: construct green infrastructure to reduce a pollutant impacting a receiving

waterbody, address a regional water quality issue, or install green infrastructure retrofits designed to capture and remove the pollutant contributing to a water quality impairment. Green Infrastructure practices are limited to bioretention, rain gardens, constructed wetlands, porous pavement, green roofs, downspout disconnection, stormwater street trees, stormwater harvesting and reuse, and stream daylighting.

- Comprehensive Stream Corridor Assessment -- A comprehensive stream corridor assessment study to identify areas of erosion across a watershed area. The comprehensive stream corridor study must be completed for a minimum of a HUC 12 size watershed area and must identify and/or prioritize opportunities for streambank stabilization, riparian buffer restoration, floodplain reconnection and/or culvert replacement and repair. Flood risk assessment and modeling may be included as part of the comprehensive study.

APPENDIX 1 – Town and Village Water Withdrawal Reporting Summary

		2021	2020	2019	2018	2017	2016
WSS	Avg Day	35,000	35,000	35,000	36,392	n/a	34,500
	Max Day	123,000	123,000	128,000	128,000	n/a	128,000
	Permitted	250,000	250,000	250,000	250,000	n/a	250,000
	Permitted - Max Day	127,000	127,000	122,000	122,000		122,000
	% of Permitted Capacity	72%	72%	73%	72%		73%
Stevensville	Avg Day	270,000	270,000	270,000	279,000	279,000	
	Max Day	859,000	859,000	859,000	859,000	859,000	
	Permitted	1,085,000	1,085,000	1,085,000	1,085,000	1,085,000	
	Permitted - Max Day	226,000	226,000	226,000	226,000	226,000	
	% of Permitted Capacity	21%	21%	21%	21%	21%	
Lily Pond/Elm St	Avg Day	566,000	484,000	520,000	516,000	499,000	
	Max Day	621,000	665,000	750,000	746,000	732,000	
	Permitted	1,450,000	750,000	1,450,000	1,450,000	1,450,000	
	Permitted - Max Day	829,000	85,000	700,000	704,000	718,000	-
	% of Permitted Capacity	57%	11%	48%	49%	50%	

APPENDIX 2 – Land Development Site Water/Sewer Loading Estimates

	Project	Location	Use Type	Qty	Projected Water Demand		Notes
					Basis	Estimate	
Study Area	Liberty Ridge	West St	Single family residential (duplex	129 units at 3 bedrooms each	110 gpd/bedroom	42,570	
	Sims Foster Development	2514 Route 52	Hotel	150 rooms	110 gpd/unit	16,500	
			Single family	12 at 3 bedrooms each	110 gpd/room	3,960	
			Apartments	88 at 2 bedrooms each	110 gpd/room	19,360	
			Event Space	400 seats	10 gpd/seat	4,000	
			Restaurant	250 seats	35 gpd/seat	8,750	
			Swimming Pool	100 users	10 gpd/user	1,000	
	Sunset Lake Rd	Community Ln	Single family residential	300 units at 3 bedrooms each	110 gpd/bedroom	99,000	assume 97 acres, w/ 70 developable
	Grossingers		Hotel	75 rooms	110 gpd/unit	8,250	
			Cabins	75 bedrooms	110 gpd/room	8,250	
			Restaurant	75 seats	35 gpd/seat	2,625	
			Café	20 seats	25 gpd/seat	500	
			Event Space	200 seats	10 gpd/seat	2,000	
			Bath House	100 users	10 gpd/user	1,000	
			Swimming Pool	100 users	10 gpd/user	1,000	
	Main Street Redevelopment		Restaurant	6,300 seats	35 gpd/seat	220,000	see assumptions document
			Shopping Center	265,000 sf	0.1 gpd/sf	26,500	
			Apartments	936 at 2 bedrooms	110 gpd/bedroom	206,000	
	Potential Residential Development	Youngs Hill Rd/Parksville Rd	Single family residential	250 units at 3 bedrooms each	110 gpd/bedroom	82,500	assume 50 acres, w/ 40 developable
	Keystone Assoc. Inquiry	Parksville Rd	Single family residential	50 units at 3 bedrooms each	110 gpd/bedroom	16,500	assume 40 acres, w/ 30 developable

	Project	Location	Use Type	Qty	Projected Water Demand		Notes
					Basis	Estimate	
Old Route 17 Corridor Study Sites	Potential Commercial/Industrial Development	Business Park Priority #1			Town Planning Board Approval	15,000	
	Potential Commercial/Industrial Development	Business Park Priority #'s 2, 3, 4, 5, 6			Old Route 17 Corridor Study*	485,000	Assume upper end total estimate of 500,000 gpd minus Buisiness Park Priority #1
Tributary to Swan Lake WWTP	Town of Liberty Approved Developments	(various)**	(various)**	(various)**	Swant Lake WWTP Engineering Report	103,000	
	Town of Liberty Potential Developments	(various)**	(various)**	(various)**	Swant Lake WWTP Engineering Report	186,000	
					Total	**1,559,265**	

Zoning

Existing

Downtown Commercial Core (DCC)

Height: 4 stories/44 ft

Lot coverage: 100%

Floor area per DU: 800 sf

Future: Assume mixed use development, incl. 2-bed apartments

Development Parameters

Include only 200 (residential), 300 (vacant land), and 400 (commercial) parcels

3-story maximum

1st story commercial

25% restaurant – assume assembly group A-2 (IBC 303.3)

75% retail/office – assume business group b (IBC 304.1)

2nd & 3rd story residential

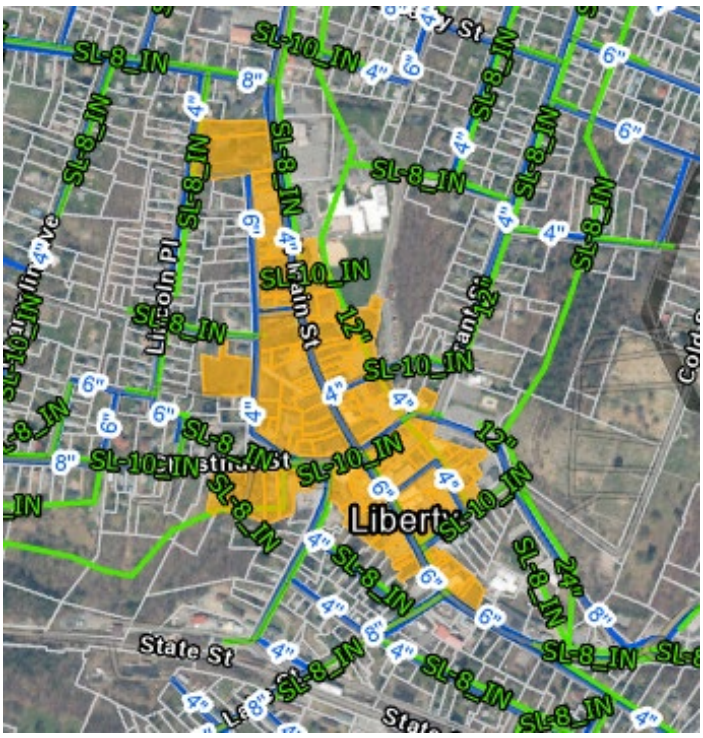
Apartments – assume residential group R-2 (IBC 310.3)

800 sf minimum

Assume Type III: Ordinary Construction

Assume 1/3 land consumed for parking

Assume 15 sf per seat (restaurant)



Example Calculations for Main Street Redevelopment Area

Gross statistics

85 parcels

15.6 acres

5474 feet of frontage

Calculations

Net land area: 15.6 - 5.2 = 10.4

10.4 acres = 453,024 sf

1st story: 453,024 sf

113,256 sf restaurant space

339,768 sf retail/office

2nd & 3rd stories: 906,048 sf

IBC max area

93,645	SAY 94,000 sf 1st story restaurant
264,935	SAY 265,000 sf 1st story commercial/retail
374,580	SAY 375,000 sf 2nd story apts
374,580	SAY 375,000 sf 2nd story apts

936 apts

Water/sewer

Uses

Ordinary Restaurant Per Seat 35

Single Family Residence Per Bedroom 110

Shopping Center / Grocery Store / Department Store Per 0.1 sf

GPD

94,000 sf 1st story restaurant / 15 sf * 35 = 220,000 gpd

265,000 sf 1st story commercial/retail * 0.1 = 26,500 gpd

936 apts X 2 X 110 = 206,000 gpd

APPENDIX 3 Budget Information

VILLAGE OF LIBERTY

• WATER FUND •

	2023/24	2022/23	2021/2022	2020/2021
•WATER SALES INSIDE GALLONS	103,697,923	106,145,328	103,122,340	95,650,160
•WATER SALES OUTSIDE GALLONS	17,273,449	13,570,201	13,275,760	16,340,700
•REVENUES	$ 1,046,332.00	$ 999,003.00	$ 972,473.00	$ 952,158.00
•APP. FUND BALANCE	$ 107,490.00	$ 74,561.00	$ 99,395.00	$ 91,254.00
•RESERVED FUND BALANCE		$ 150,000.00	$ 150,000.00	$ 100,000.00
				(BRIDGE/DEC)
•TOTAL	$ 1,153,822.00	$ 1,223,564.00	$ 1,071,868.00	$ 1,143,412.00
•EXPENDITURES	$ 1,153,822.00	$ 1,223,564.00	$ 1,071,868.00	$ 1,143,412.00
•PERCENT CHANGE		14.15%	6.25%	6.16%
•RATES				
INSIDE	$ 7.45	$ 7.45	$ 7.45	$ 7.30
OUTSIDE	$ 13.10	$ 13.10	$ 13.10	$ 12.95
•PERCENT CHANGE				
INSIDE	0	0	2.05%	0
OUTSIDE	0	0	1.16%	7.92%

Fund Balance = $ 759,155.00

VILLAGE OF LIBERTY

• SEWER FUND •

	2023/24	2022/23	2021/2022	2020/2021
•SEWER SALES INSIDE GALLONS	132,799,023	136,447,928	127,260,040	120,353,360
•SEWER SALES OUTSIDE GALLONS	10,268,700	10,091,501	6,715,700	11,205,900
•APP. FUND BALANCE	$ 150,572.00	$ 81,217.00	$ 118,509.00	$ 83,289.00
•REVENUES	$ 1,332,160.00	$ 1,319,542.00	$ 1,198,004.00	$ 1,205,555.00
•TOTAL	$ 1,482,732.00	$ 1,400,759.00	$ 1,316,513.00	$ 1,288,844.00
•EXPENDITURES	$ 1,557,807.00	$ 1,400,759.00	$ 1,316,513.00	$ 1,288,844.00
•PERCENT CHANGE	14.85%	6.40%	2.15%	5.99%
•TOTAL	$ 1,557,807.00	$ 1,418,286.00	$ 1,316,513.00	$ 1,288,844.00
•RATES				
INSIDE	$ 8.58	8.37	$ 8.37	$ 8.22
OUTSIDE	$ 13.38	12.99	$ 12.99	$ 12.84
•PERCENT CHANGE				
INSIDE	2.5%	0	1.82%	0
OUTSIDE	3.00%	0	1.17%	0

FUND BALANCE: **$303,797**

· BOND SCHEDULE ·

2023/24

DEBT SERVICE/BOND **FUND**

DUE DATE	PURPOSE	TOTAL PRINCIPAL	TOTAL INTEREST	TOTAL	SEWER	WATER
6/1/2023	DWSRF	$ 95,000.00	$ -	$ 95,000.00		$ 95,000.00
8/1/2023	LILY POND/98	$ 65,000.00	$ 25,650.00	$ 90,650.00		$ 90,650.00
10/1/2023	WATER STORAGE	$ 15,000.00	$ 5,587.50	$ 20,587.50		$ 20,587.50
10/1/2023	2015 SEWER BOND	$ 65,000.00	$ 29,859.38	$ 94,859.38	$ 94,859.38	
10/15/2023	89 REF BOND	$ 15,000.00	$ 375.00	$ 15,375.00	$ 15,375.00	
10/27/2023	COLUMBIA ST SEWER	$ 85,000.00	$ 41,767.06	$ 126,767.06	$ 126,767.06	
2/1/2024	LILY POND/98		$ 24,187.50	$ 24,187.50		$ 24,187.50
4//1/2024	WATER STORAGE		$ 3,037.50	$ 3,037.50		$ 3,037.50
4/1/2024	WATER STORAGE		$ 2,550.00	$ 2,550.00		$ 2,550.00
4/1/2024	2015 SEWER BOND		$ 28,559.38	$ 28,559.38	$ 28,559.38	
TOTALS:		**$ 340,000.00**	**$ 161,573.32**	**$ 501,573.32**	**$ 265,560.82**	**$ 236,012.50**

Village of Liberty

Water Connections	-	**1700**
Sewer Connections	-	**1593**

Residential

Water Customers	-	**1371**
Sewer Customers	-	**1371**

Commercial

Water Customers	-	**329**
Sewer Customers	-	**329**

Residential

Sewer Only	-	**37**

Commercial

Sewer Only	-	**64**

Per Year

Amount of Water Produced	-	**201,286,000**
Amount of Water Sold	-	**120,971,372**
Amount of Waste Treated	-	**143,067,723**

APPENDIX 4 – Task 2 Technical Memorandum: Parksville Sewer Services Alternatives Study Update

MEMO

DATE: May 17, 2024

TO: Hon. Frank DeMayo, Town Supervisor

FROM: Adam Yagelski, Senior Planner

SUBJECT: Task 2 Technical Memorandum: Parksville Sewer Services Alternatives Study Update

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SUMMARY

As part of a larger infrastructure planning effort, the Town of Liberty has engaged Delaware Engineering, D.P.C., to explore providing sanitary sewer service to the Hamlet of Parksville. Working from a previous study completed by Will Illing, PE, in November of 2021, Delaware updated the potential service areas, review of the feasibility of several alternatives involving centralized treatment at a wastewater treatment plant (Alternatives 1 through 3), and with this memorandum, proposes two new alternatives involving subsurface treatment and discharge via a "Community Septic System" (Alternatives 4 & 5).

Having reviewed Alternatives 1-3 in light of our experience with similar wastewater systems, we conclude that the anticipated costs associated with centralized treatment would be too high relative to the number of connections served. The decentralized community septic system alternatives, while less costly, would involve property acquisition and may still be unaffordable for the average single-family household, unless grants and low-interest financing can be obtained.

If the Town wishes to pursue the community septic system alternatives further, Delaware recommends that the Town Board proceed along two avenues. One is to conduct some preliminary outreach to the owner of the property identified as "Site A" in this report, as it is large enough and in relatively close proximity to the proposed service area and is a viable option. If the property owner is not willing to sell, costs associated with pursuing either of the two subsurface alternatives would involve additional site search effort – and most likely increase due to the need to increase the size of the wastewater conveyance system to reach other suitable sites that may be identified.

And the other avenue is that the Town Board consider holding one or more public informational meetings in Parksville to inform the public about the conclusions and recommendations presented in this report. In order to be ready for the next round of grant and financing applications in 2025, the Town would need to decide if they would like to proceed with the project by the end of this year.

PURPOSE AND BACKGROUND

As part of a larger infrastructure planning effort undertaken by the Town, in September 2022, the Town of Liberty (the "Town") engaged Delaware Engineering, D.P.C., to update a report addressing provision of centralized sanitary sewer service to the Hamlet of Parksville. This report was a feasibility study, entitled "Central Sanitary Sewer System for the Hamlet of Parksville," dated November 21, 2021, prepared by Illing Engineering Services ("IES") (hereinafter, the "Feasibility Study"). Working from that study, and in consideration of the current investment trend on Main Street as well as state programs targeted at small scale sewer infrastructure and economic development, this technical memorandum is intended to provide an updated evaluation of options for sewer services for Main Street in Parksville.

STUDY AREA

This section discusses existing environmental and settlement conditions found broadly in Parksville today, summarizes characteristics of the sewer service areas delineated in the Feasibility Study, and develops an Updated Service Area.

Updated Service Area

The area comprises about 60 parcels covering about 65 acres. Public rights of way include: Town of Liberty roadways Cooley Rd, Long Ave, Main Street, O'Keefe Hill Rd, and Cooley Rd; Parksville Rd (Old Route 17), owned by NYS, bisects the area, and Interstate 86 lies immediately adjacent to the west. Given the historical presence of both NYS roadways, there is significant NYS-owned land within and adjacent to the area. The Updated Study Area includes 60 parcels, of which the majority are residential with the balance a mixture of commercial and other uses; according to the data, 16 parcels are vacant. Figure 1 illustrates the Updated Study Area boundaries.

Summary information and estimated sewer loading information for the existing tax parcels are provided in Attachment A. When vacant properties are excluded, and based on property class codes, other tax assessment data, internet searches, and the NYSDEC design criteria, we estimate Updated Service Area flows to be about 28,500 GPD.

This technical memorandum is aimed at ascertaining feasibility of providing public sewer service to existing parcels, and we do not assume any level of additional development in the following evaluation. The Updated Service Area does not

Figure 1.
Updated Service Area
Town of Liberty

Legend

- Tax Parcels
- Updated Service Area
- Parksville Area 10 ft contours.

Prepared by: Delaware Engineering, DPC
Date: February 6, 2024
Source: ESRI, Sullivan Cnty., NYS OITS GPO

0 155 310 620 930 Feet

N

include areas within and adjacent to the hamlet lacking existing parcels. Therefore, portions of Parksville Rd east of Cooley Rd and Short Ave are not included, nor are areas extending to the west, beyond roughly the intersection of Main Street and Parksville Rd.

Existing Conditions

This section discusses relevant land use and environmental conditions within the Updated Service Area. The relevant environmental constraints, which are discussed in more detail in this section, are shown on Figure 2.

Land Use

The Parksville hamlet is a mixture of residential and commercial uses oriented toward its main thoroughfare, Main St. In addition to the major NYS roadways, Route 17 and Interstate 86 running through and immediately adjacent to the west, respectively, the hamlet is also defined by the Little Beaver Kill valley and the steep slopes that rise out of it. Based on tax parcel information, the most common land use is single family residential, at about 30% of parcels. The second most common use is commercial, with various types of eating and drinking establishments making up about 40% of commercial uses. Vacant land comprises another third of parcels. Remaining parcels are categorized as community services. More detailed land use information is presented in Table 1, which is included as Attachment A.

Topography and Slopes

Out of the Little Beaver Kill valley, the area in the valley slopes generally from higher elevations in the southeast to those lower in the northwest; elevations in the valley range from about 1,700 ft to about 1,600 ft, where the western portion of Taylor Rd joins Parksville Rd. Elevations rise along Cooley Rd. to 1,690 ft; west of Interstate 86, to 1,800 ft and higher; and to 1,700 ft along Taylor Rd., to the west. The East Main Street area (i.e., east of Short Ave) is relatively flat. As shown on Figure 2, slopes increase as the terrain rises out of the valley, with much of the surrounding area having slopes of 15% or greater.

Soils

We obtained a soils data report from the USDA's Web Soil Survey (WSS), which is included as Attachment B. The report was prepared using WSS's native septic system suitability functionality. The report demonstrates that much of the Parksville hamlet and surrounding areas have soils generally deemed unsuitable for septic systems due to low permeability, depth to groundwater, depth to bedrock, and slope. We eliminated those areas with soils indicated as "very limited" from consideration for siting of the subsurface treatment system.

Surface Waters and Wetlands

FIGURE 3

COMMUNITY SEPTIC SYSTEM EVALUATION

The Little Beaver Kill traverses the area generally from east to west, and it is joined by an unnamed tributary in the northwest portion. The Little Beaver Kill and its tributary are class B(T) streams under NYS law. Another unnamed tributary, classified B, flows from a freshwater pond located generally to the north of the area, between Lily Pond Rd and Breezy Hill Rd, crossing Breezy Hill Rd, Taylor Rd, and Parksville Rd to join the Little Beaver Kill about 2,200 ft to the west of the hamlet. As shown on Figure 2, coincident with these streams are mapped floodway and floodplains; a 100 ft buffer – required under Public Health Law Part 5 – from the Little Beaver Kill and tributaries is also shown on Figure 2.

Portions of the hamlet lie within mapped floodplain areas. The relatively flatter stream corridor along Main Street, south and east of Cooley Ave, contains some mapped 100-year floodplains. Throughout most of the remainder of the hamlet are mapped floodway zones, though topographic conditions means that these are largely defined by stream banks along the stream corridors. The aforementioned stream corridors comprise the majority of wetlands in the area, and there are no state-regulated wetlands as of this writing. There is, however, a small area of federal mapped wetlands on a property adjacent and to the south and west of Interstate 86.

Existing Water and Sewer Infrastructure

Most of the Parksville area is served by public water, supplied by the Village of Liberty. The Village's Lily Pond water treatment facility currently provides the majority of water to areas served by the Village, and the distribution system serving Parksville is fed from the Village's main transmission line connecting the WTP to the Village itself. According to tax parcel data, only four (4) of the sixty (60) parcels in the Updated Service Area are supplied by private water – presumably via on-site wells.

There is presently no centralized sewer collection and treatment system in the area. All sewer treatment is provided by individual septic systems. As the Feasibility Study notes, many of these systems are older and in less suitable soils or are vulnerable to flood waters.

Regulatory Considerations

Discharge from wastewater treatment works is can either be to surface waters or groundwater, and each type of discharge is regulated as to amount of flow and the constituent elements of that flow. The design of any treatment works must demonstrate compliance with these standards and, once in operation, be monitored for ongoing compliance.

Surface water discharges in Parksville will be to the Little Beaver Kill, which is a Class B(T) stream, which, as noted in the Feasibility Study, carries specific standards for discharges. In addition, Parksville lies within the Delaware River Basin and discharges

to surface waters are regulated by the Delaware River Basin Commission (DRBC). DRBC water quality standards include, among other requirements, that effluent be disinfected prior to discharge.

Discharges to groundwater in Parksville must adhere to standards for Class GA fresh groundwaters set forth at 6 CRR-NY 703.6.[1] Under 6 CRR-NY 702.21, discharges of less than 30,000 gallons per day to groundwater are exempt from effluent standards, provided that facility design meets NYSDEC standards and monitoring facilities are installed. Part 5 of the NYS sanitary code sets forth additional requirements, including for setbacks from various features and other specifications.

FEASIBILITY STUDY ALTERNATIVES SUMMARY

This section summarized the prior alternatives analysis and presents updated cost estimates.

Feasibility Study Service Areas

The Feasibility Study analyzed seven (7) different service areas in the Parksville area. These are shown on Figure 3 and relevant are characteristics summarized in Table 1, below. Note that the Feasibility Study assumes creation of about 30 new lots in the Park Avenue East, Park Avenue West, and Parksville Road areas.

Table 1. Feasibility Study Service Area statistics

Service Area Name	LF of Sewer Line	Connections		Est. Flow
		Existing	Proposed	
Main Street West	1,295	15	0	11,000
Main Street East	640	4	0	1,670
Short Avenue	502	7	0	2,825
Park Avenue East	965	2	18	18,800
Park Avenue West	1,010	2	4	3,240
Cooley Road	793	12	0	6,950
Parksville Road	1,142	1	8	4,450
Study Total	6,347	43	30	48,935

No Action Alternative

Under this alternative, no centralized wastewater collection and treatment service would be provided. This will not alleviate issues with the high permeability of the coarse sand and gravel in the hamlet that can result in groundwater impacts. Also, economic activity will remain constrained by a lack of sufficient infrastructure. Existing businesses, such as restaurants, generating greater amounts of wastewater

[1] https://govt.westlaw.com/nycrr/Document/I4ed9041bcd1711dda432a117e6e0f345?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default)

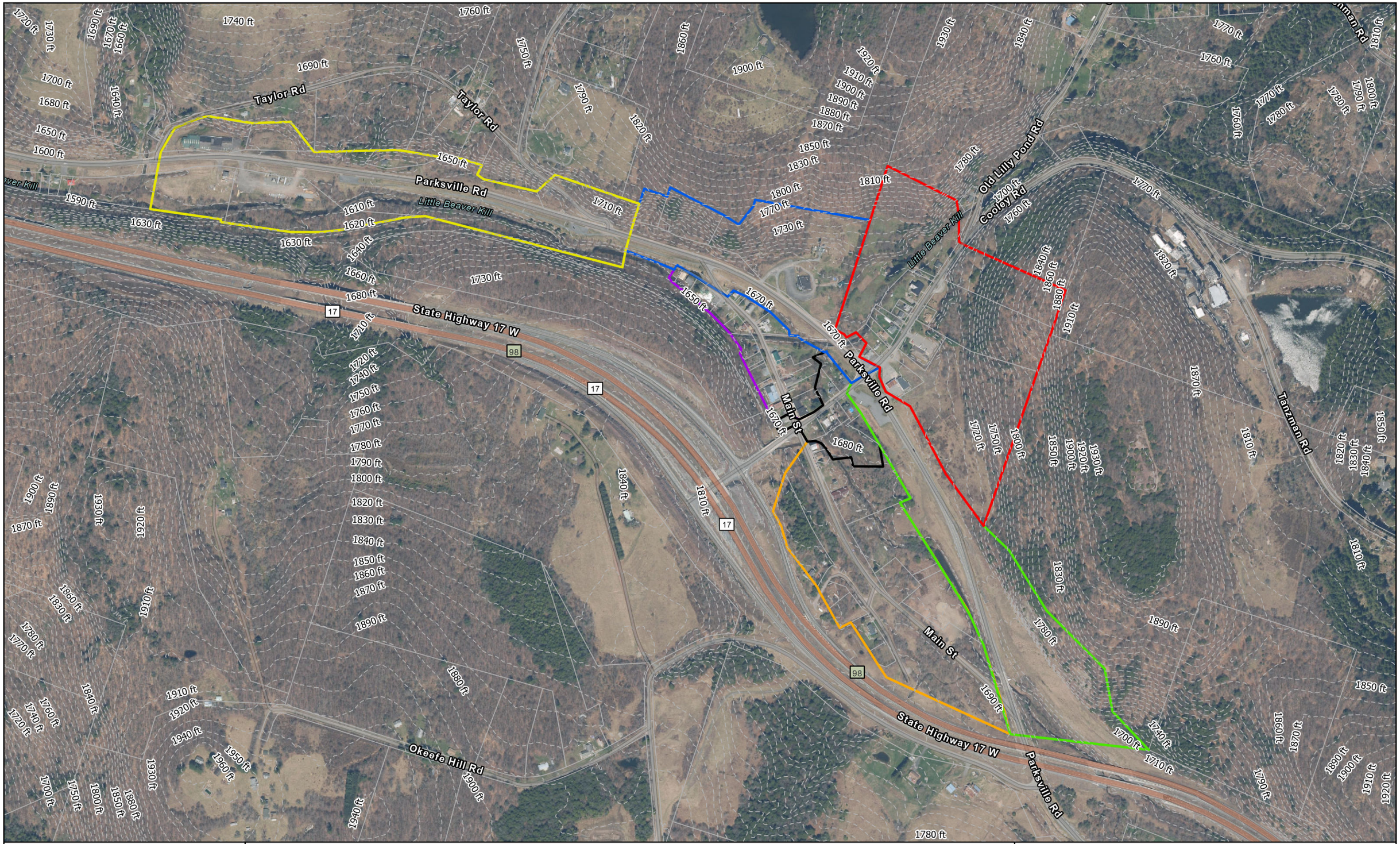

Figure 3
Feasibility Study
Service Areas
Town of Liberty

Legend

- Cooley Road
- Main Street East
- Main Street West
- Park Avenue East
- Parke Avenue West
- Parksville Road
- Short Avenue
- Tax Parcels
- Parksville Area 10 ft contours.

Prepared by: Delaware Engineering, DPC
Date: February 6, 2024
Source: ESRI, Sullivan Cnty., NYS OITS GPO

0 225 450 900 1,350 Feet

N

would continue to be limited by existing on-site sanitary waste management. New development patterns will most likely revolve around space and site suitability for on-site wastewater management, leading to lower density.

Alternative 1

This alternative involves installing a new conveyance and collection system along with a wastewater treatment plant (WWTP) serving the Main Street West, Short Avenue, Park Avenue East, Park Avenue West, and Cooley Road service areas. It would be built in two phases, which are summarized below. The WWTP would be constructed to the north of the hamlet and discharge to the Little Beaver Kill just west of the west end of Main Street. on land currently owned by NYS. It would have an initial design flow of 20,000 gallons per day (GPD) and ability to increase capacity to 40,000 GPD.

The conveyance system would be designed to capture solids in a septic tank at each connection and convey the resulting effluent to mains that would convey it by gravity to the WWTP. There would be 58 connections in total, of which 22 are connections anticipated to occur as part of future development (hereinafter, "anticipated connections"). There would be about 4,600 lf of 8" gravity sewer main installed to convey effluent by gravity to the WWTP. As part of a second phase, additional conveyance infrastructure would be installed to serve the Parksville West service area, including one (1) pump station and about 923 lf of 4" forcemain. Phase 2 involves service to the roughly nine (9) parcels – one (1) existing and eight (8) anticipated future connections – in the Parksville service area.

Alternative 2

This alternative involves installing a new conveyance and collection system along with a wastewater treatment plant (WWTP) serving the Main Street West, Short Avenue, Park Avenue East, Park Avenue West, and Cooley Road service areas. This alternative involves installation of the WWTP at a different location approximately 2,000 ft to the west along Old Route 17 (Parksville Road). The WWTP specification remains the same as in Alternative 1.

A pump station would be installed roughly at the Alternative 1 WWTP location. A pump station is needed because it is cost-prohibitive to maintain grade along the flat expanse of roughly 500 feet along Old Route 17 roughly between Main St. and Taylor Rd. All flows from West Main Street, Short Avenue, Park Avenue East, and Cooley Road can flow by gravity into the lift station. In addition, this Alternative adds the Park Avenue West service area. There would be about sixty-nine (69) connections in total, of which about thirty (30) are anticipated connections. There would be about 5,736 lf of 8" gravity sewer main installed, a pump station, and about 1,000 ft of 4" forcemain connecting the pump station to the gravity system within the Parksville Rd service area and, ultimately, the WWTP.

Alternative 3

Three (3) pump stations would be installed along with gravity mains to convey wastewater to the Village of Liberty WWTP. A connection to the Village system would be made an existing Manhole in the Village on Wawanda Avenue via a now-disused railroad bed. Wastewater would be conveyed from the Main Street West, Short Avenue, Park Avenue East, Park Avenue West, and Cooley Road service areas to a pump station located roughly at the location of the Alternative 1 WWTP. This alternative would not involve connecting the Parksville Road service area. This alternative involves installation of approximately 13,365 lf of gravity main, 11,741 lf of 4" forcemain, three (3) pump stations (including two washer/compactors). About sixty (60) service connections would be made, of which 22 (twenty-two) are anticipated future connections.

Discussion

We reviewed these alternatives and find the expected capital costs and, as it relates to alternatives 1 and 2, ongoing operation and maintenance (O&M) costs, to be high relative to the number of connections served. The remainder of this memo discusses two additional alternatives to provide Parksville with centralized wastewater collection and treatment.

UPDATED TREATMENT AND CONVEYANCE ALTERNATIVES

Another method to dispose of sanitary wastewater involves subsurface treatment and discharge. Sometimes called "community septic systems," the following additional alternatives involve construction of a centralized leach field. This section updates the proposed service area in Parksville. Parameters for and proposed location of a community septic system are detailed. We provide updated collection and conveyance considerations. Finally, cost estimates for the proposed two alternatives are provided.

Treatment

As indicated above, design and performance standards for subsurface treatment and discharge are found in regulation, specifically 6 CRR-NY 702.21, and the NYSDEC Design Standards for Intermediate-Sized Wastewater Treatment Systems (the "Design Manual").[2] Because the system will need to treat less than 30,000 gpd, the effluent limitations (e.g., for nitrogen) will not apply to the system serving the Updated Service Area in Parksville, but the system will require monitoring and conformance to the Design Manual.

Like other forms of wastewater treatment, discharges to groundwater involve two stages of treatment. Primary treatment allows solids to settle out of and be removed

[2] https://extapps.dec.ny.gov/docs/water_pdf/2014designstd.pdf

from the wastewater stream. And secondary treatment uses biological processes to purify flow received from primary treatment, with the nature of means of purification at this stage determined largely by regulatory standards.

For subsurface discharges, primary treatment typically involves a septic tank designed to remove solids from the inflow. The sizing of this tank is determined by the anticipated flow to be received by the system. Conventionally, secondary treatment is carried out using a leach field, which allows influent from the first stage to be treated by a combination of microorganisms in the soil and the soil media itself. In general, the greater the anticipated flow to these systems, the larger the size of the leach field must be. A septic tank of roughly 25% larger than the anticipated design flow will be required.

In addition, the size and design of the leach field is highly dependent on soil conditions present at the site. As detailed above, the combination of unsuitable soils, surface waters, and land use patterns existing in Parksville makes size of the treatment system a key consideration, and there are treatment technologies and methods that can be applied to reduce the resulting size of the system.

Given the existing conditions and applicable system and regulatory requirements, we recommend the treatment system be designed with the following two (2) elements. First, secondary treatment of inflow from the septic tank should be augmented with an additional process situated between the tank and the leach field. Depending the process selected, augmentation in this way increases the design application rate of effluent to the leach field by as much as 50%, ultimately decreasing field size. There are various options, including packaged plants (e.g., Bio-Clear) and proprietary treatment units (e.g., Orenco AdvanTex). For the purposes of this memorandum a recirculating sand filter-type system was selected for evaluation.

To ensure redundancy and long-term viability of the system, a reserve area meeting design criteria is required. One option is to provide a reserve area that equals 100% of the required leach field area. Another option is constructing the absorption area in three sections, with each section capable of handling 50% of the design flow. This second option results in an overall system (leach field plus reserve area) size that is 25% smaller as compared to employing a 100% reserve area. In addition, because flow to each section (or bed) is rotated periodically, this type also can have better operational characteristics, as the flow is spread over the multiple sections.

Key variables for the treatment system include cost (capital and O&M), footprint (system size), and existing conditions (land use, suitable soils, and other environmental constraints). Based on these constraints, Figure 4 depicts several potential sites. Site C was dismissed due to its small area. Site D was dismissed due to its proximity to the hamlet, which makes redevelopment possible. Site B was

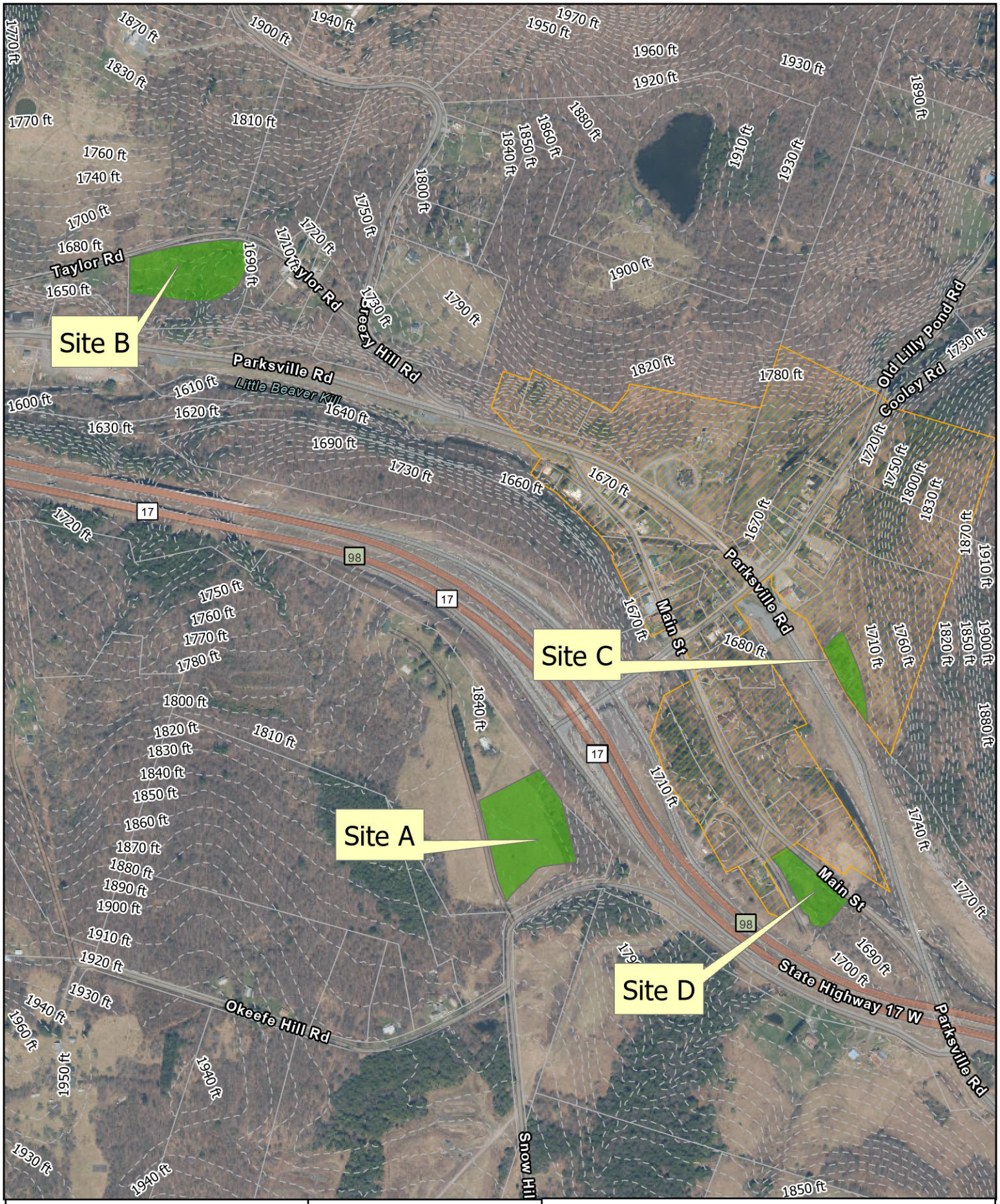

FIGURE 4
POTENTIAL SUBSURFACE TREATMENT SITES
TOWN OF LIBERTY

LEGEND
- Tax Parcels
- Parksville Area 10 ft contours.
- Potential Sites
- Updated Service Area

Prepared by: Delaware Engineering, DPC
Date: February 6, 2024
Source: ESRI, Sullivan Cnty., NYS OITS GPO

0 285 570 1,140 1,710 Feet

N

dismissed due to its comparatively less permeable soils, smaller size, and distance from the hamlet. Of these sites, Site A provides suitable soils, slopes, and unconstrained land area, and is also situated in relatively close proximity to the Updated Service Area and, therefore, was selected for further analysis.[3]

Calculations for sizing of the leach field, using soils likely to be found at Site A and applicable design standards, were performed and the results summarized in Table 2. For the purposes of these calculations, we have assumed that leach field size is about 3 times the wetted area to account for trench separation, bed separation, and limits on lateral length. Figure 5 depicts approximate treatment system size. The resulting system would occupy about 4.5 acres, including tankage and enhanced secondary treatment.

Table 2. Leach field design summary

Total Design Flow	28,500 gpd
Number of Absorption Beds	3
Absorption bed design flow	14,250 gpd
Septic tank size	35,625 g
Secondary treatment	Recirculating Sand Filter/Leach Field
Approximate system size	4.5 acres

It is important to note that we have not performed soils investigations (including percolation test and deep test pits) to determine the precise characteristics of the various possible sites identified in Figure 4; the results of these investigations are an important next step and will determine critical parameters, like site suitability and system size.

Conveyance System

To collect wastewater from connections within most portions of the Updated Service Area, the Feasibility Study specified gravity sewers that would ultimately discharge to a pump station located just west of the intersection of Main Street and Parksville Road. There would be about 3,600 lf of 8" gravity main installed, in addition to the pump station. For the purposes of this memorandum, we have retained this estimated length of pipe, where appropriate.

As outlined in the Feasibility Study, existing topographic conditions along East Main Street are such that a pressure system would be needed to serve the approximately

[3] We limited our site investigation based on these criteria, choosing Site A as the basis for this analysis as a result. However, should acquisition of Site A for purposes of constructing the required improvements prove inviable, it is possible to broaden the search for suitable sites, and to update the analysis and recommendations accordingly. It is important to note that other sites more distant from the area served may also have increased costs, including those costs associated with a larger conveyance system footprint.

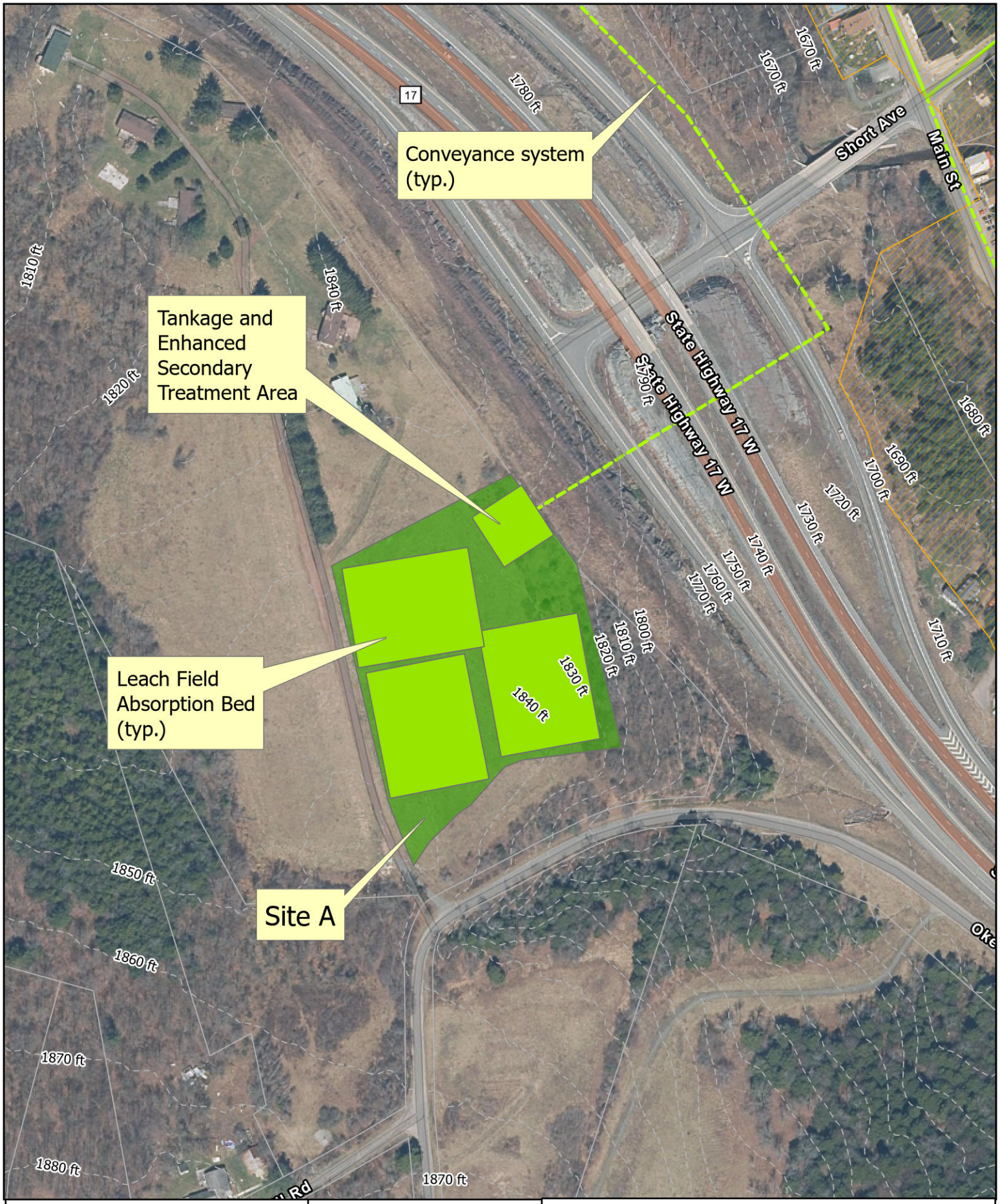

FIGURE 5
SITE A SUBSURFACE TREATMENT SYSTEM
TOWN OF LIBERTY

LEGEND
- Tax Parcels
- Parksville Area 10 ft contours.
- Potential Sites
- Updated Service Area

Prepared by: Delaware Engineering, DPC
Date: February 6, 2024
Source: ESRI, Sullivan Cnty., NYS OITS GPO

0 95 190 380 570 Feet

N

eight (8) connections along East Main Street. The following two (2) sections outline discuss the various options to convey wastewater from the connections to the treatment system at Site A.

Gravity System

As outlined in the Feasibility Study, a conventional gravity collection system would be used to collect wastewater (whether effluent from individual tanks under Alternatives 1 and 2, or untreated flow from each connection identified in Alternative 3) from the majority of the Hamlet (i.e., Main Street West, Short Avenue, Park Avenue West, and Cooley Road). We retain this design as part of the following alternatives developed for the Updated Service Area. Gravity sewer must be installed to maintain minimum flow velocities. A pipe diameter of 8 inches would be sufficient for the anticipated flow volumes. The gravity portions of the system would discharge to a centralized pump station, which is necessary to convey wastewater to the treatment system at Site A.

Low Pressure System with Individual Grinder Pumps

A second alternative design option involves use of individual grinder pumps and a low pressure forcemain. These pumps would be located between each building drain and the common low-pressure sewer (LPS) system, and would convey both liquids and solids. The system would be pressurized by the pumps connected to it. An advantage as compared to gravity pipes is that the common LPS forcemain can follow existing topography and does not require specific gradients to function. Given that Site A is situated approximately 1,300 feet from the center of the intersection of Main Street and Short Ave and at an elevation of 1,675 ft, which is about 165 feet lower than Site A, a centralized pump station would be necessary in order to convey flows from the LPS to the treatment system.

As it relates to the Main Street East subarea, an LPS would be required to serve connections situated there in order to overcome relatively flat topography found in this portion of Parksville. Therefore, LPS is specified for each alternative we discuss in this memo, below.

Septic Tank Effluent Pumping (STEP) System

For Alternatives 1 and 2 presented in the Feasibility Study, septic tanks were specified for each connection. Septic tanks could be specified as part of the collection and conveyance system for a subsurface treatment system. However, septic tanks are unnecessary as part of the gravity system discussed above; centralized tankage at the treatment system would still be necessary, and the capital cost and maintenance associated with tanks at each connection would exceed the limited benefits of reducing tankage at the treatment system. Individual

septic tanks are unnecessary as part of a low pressure system involving individual grinder pumps.

Grease Traps

Some connections to the system would require on-site equipment in order to remove certain constituents presumed to be in their discharges in order to prevent these substances from entering the treatment system. Facilities such as restaurants and motor vehicle garages typically are required remove grease, grit, and hydrocarbons from their discharges. Section 121-27: Grease interceptors of the Town code authorizes the Town to require grease traps where deemed "necessary for the proper handling of liquid wastes containing grease in excessive amounts or any flammable wastes, sand or other harmful ingredients."

Centralized Pump Station and Forcemain

As described in this section, above, a centralized pump station is necessary in order to convey flow from the Updated Service Area to the treatment system at Site A due to distance and elevation differences. Equipment and elements of the pump station, such as wetwell, pumps, standby emergency power, etc., would be designed in accordance with applicable regulatory requirements and anticipated flows. It could be specified to share components and design aspects (such as above-ground suction pumps) with the Town's other pump stations. There are a variety of complete package stations available from various manufacturers; site preparation, including wetwell installation, electrical service, piping, grading, etc., would also be involved in installation. Finally, the pump station would connect to the treatment system at Site A via a forcemain (likely 4" in diameter).

Alternatives Discussion

Building from the foregoing discussion, this section advances two alternatives, developing details for each. The flow and number of parcels to be sewered are the same for both alternatives, and are summarized in Table 3.

Table 3. Number of parcels and estimated flow

Total # of Parcels	60
# of Vacant Parcels	16
# of Proposed Sewered Parcels	44
Estimated Flow	28,500

Alternative 4 – Subsurface Disposal at a Combined Off-site Leach Field with Gravity Sewers and Centralized Pump Station

This alternative is depicted by Figure 6 and involves a conveyance system consisting of gravity sewers, an LPS system with grinders serving East Main St., a centralized pump station, a 4" forcemain, and the subsurface treatment system at Site A.

The rights to use the lands involved in installation of the pump station, forcemain, and treatment system would need to be secured. The pump station and about 2,000 ft of forcemain would be located on lands owned by NYSDOT as part of Parksville Rd, requiring coordination with NYSDOT and likely requiring a use and occupancy permit. About 350 ft of the forcemain lies on private property situated between Interstate 86 and the Little Beaver Kill. Site A would involve about 4.5 acres of private lands acquisition.

Major O&M cost items include: periodic operation of valving to switch flow among two of the three absorption beds (about once a year); regular septic tank pumping; monitoring of effluent at leach fields; servicing of enhanced secondary treatment unit; regular (one a year) pump station maintenance; and repair and replacement of eight grinder pumps. These items will most likely require services of a licensed wastewater treatment plant operator but would not likely require full-time staffing.

Alternative 5 – Subsurface Disposal at a Combined Off-site Leach Field with Centralized Pump Station with Individual Grinder Pumps

This alternative is depicted by Figure 7 and involves a conveyance system consisting an LPS system with grinders serving, a centralized pump station, a 4" forcemain, and the subsurface treatment system at Site A.

The rights to use the lands involved in installation of the pump station, forcemain, and treatment system would need to be secured. The pump station and the entire length of forcemain could be located within what appear to be public rights-of-way. Main St and Okeefe Hill Rd (both sides of the Interstate 86) appear to be owned by the Town of Liberty. The forcemain, which also passes under Interstate 86, involves lands owned by NYSDOT, requiring coordination with NYSDOT and likely requiring a use and occupancy permit. Finally, Site A would involve about 4.5 acres of private lands acquisition for the treatment system.

In addition to the O&M cost items identified for Alternative 4, this alternative will involve 36 additional grinder pump units to be maintained.

Alternatives Summary and Cost Estimates

Table 4, below, provides a cost estimate for capital construction of each alternative.

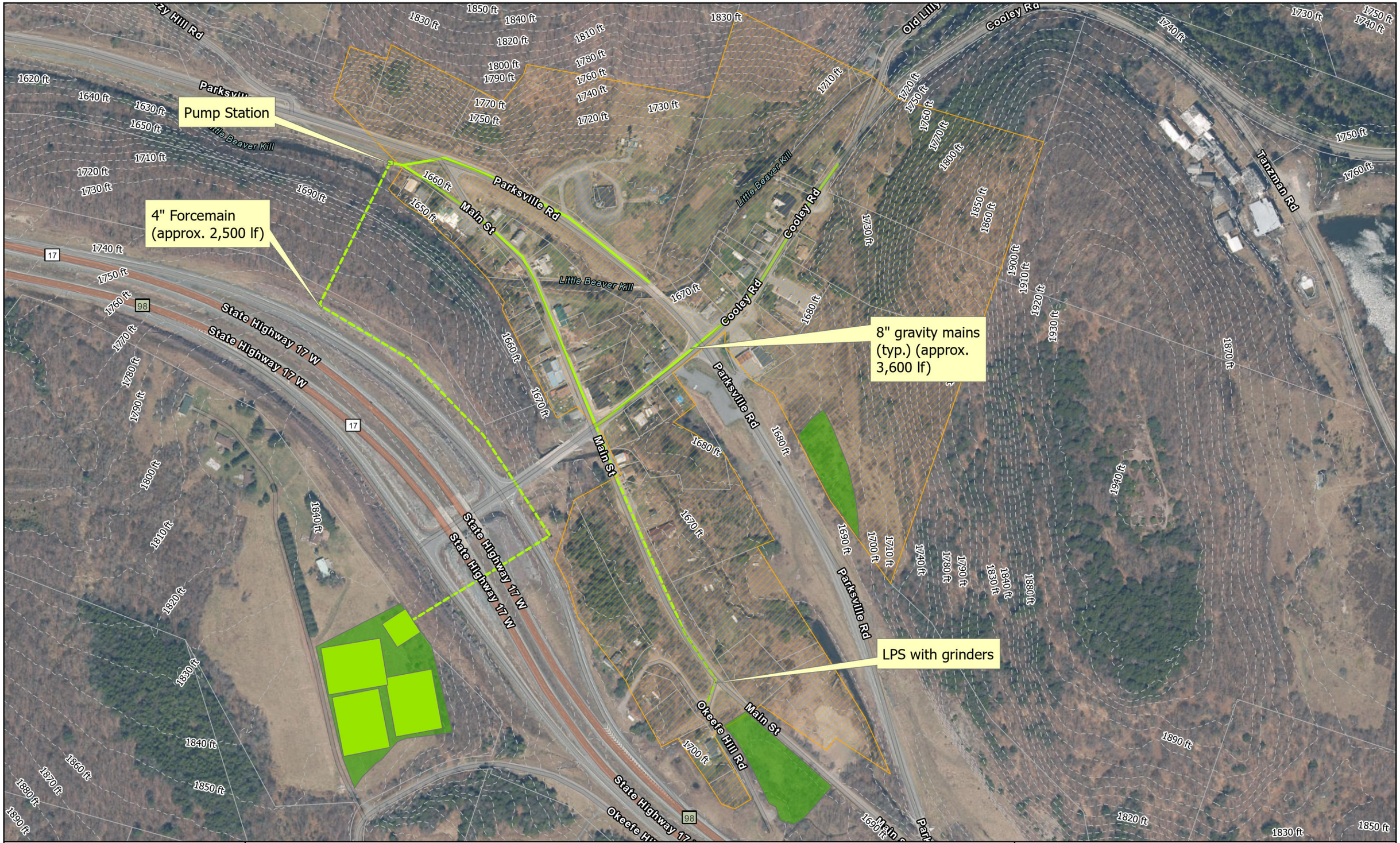

FIGURE 6
ALTERNATIVE 4
TOWN OF LIBERTY

LEGEND

- Tax Parcels
- Parksville Area 10 ft contours.
- Potential Sites
- Leach Field
- Pump Station
- Tankage/Treatment
- 4" FM (Site A)
- 4" FM (Site B)
- 8" Gravity
- LPS
- LPS (Main St. East)
- Updated Service Area

Prepared by: Delaware Engineering, DPC
Date: February 6, 2024
Source: ESRI, Sullivan Cnty., NYS OITS GPO

0 140 280 560 840 Feet

N

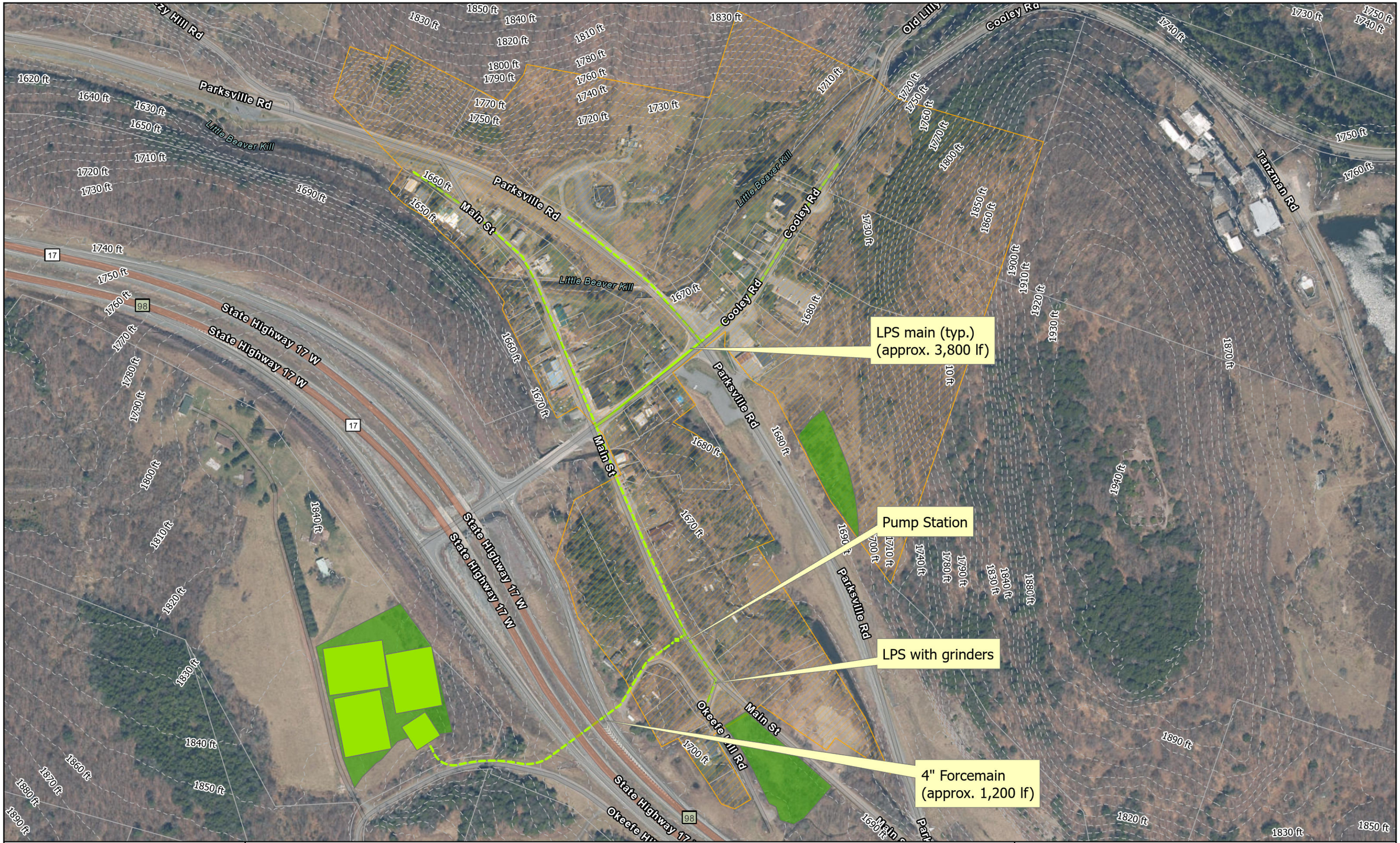

Figure 7
Alternative 5
Town of Liberty

Legend

- Tax Parcels
- Parksville Area 10 ft contours.
- Potential Sites
- Leach Field
- Pump Station
- Tankage/Treatment
- 4" FM (Site A)
- 4" FM (Site B)
- 8" Gravity
- LPS
- LPS (Main St. East)
- Updated Service Area

Prepared by: Delaware Engineering, DPC
Date: February 6, 2024
Source: ESRI, Sullivan Cnty., NYS OITS GPO

0 140 280 560 840 Feet

N

Table 4. Alt.'s 4 & 5 summary and cost estimates

	Basis	Item Cost	Alt. 4		Alt. 5	
			Qty	Subtotal	Qty	Subtotal
Treatment						
Pretreatment	$5,000 per 1,000 gpd	$5,000	28,500	$142,500	28,500	$142,500
Leach field	$140 per lf of trench	$140	900	$126,000	900	$126,000
Septic Tankage	$42,000 per 10,000 gallons	$42,000	35,625	$149,625	35,625	$149,625
Land cost	$10,000 per acre	$10,000	4.5	$45,000	4.5	$45,000
Conveyance						
Connections						
Grinder pumps	Ea	$10,000	8	$80,000	60	$600,000
LPS FM	Lf	$200	2,534	$506,800	3,804	$760,800
Gravity	Lf	$350	3,600	$1,260,000		$0
Collection and conveyance						
Pump station(s)	Ea	$500,000	1	$500,000	1	$500,000
FM	Lf	$200	2,534	$506,800	1,217	$243,400
	Estimated Construction Cost		$3,316,725		$2,567,325	
	Construction Contingency (15%)		$497,509		$385,099	
	Engineering, Legal, Admin (20%)		$663,345		$513,465	
	Total Estimated Project Cost		$4,477,579		$3,465,889	

RECOMMENDATIONS, IMPLEMENTATION, AND NEXT STEPS

Alternatives 4 & 5 are similar in scope and would both involve a sub-surface treatment system installed at Site A. Site A is the focus of this analysis, as it provides suitable soils, slopes, and unconstrained land area, all located in relatively close proximity to the proposed service area.

Therefore, determining whether the property owner is willing to sell, and at what price, would be an important next step. If it is determined that the seller is willing, the next step would be to perform soils investigations (including percolation tests and deep test pits) to confirm that the site is actually suitable for sub-surface treatment. If those tests yield positive results, the property should then be appraised to determine the fair market value.

On a parallel track, the Town should begin outreach to the Parksville community to obtain public input. It is important to note that formation of a new sewer district

would be subject to a mandatory referendum vote of the property owners within the proposed district, so engaging those property owners at an early stage is very important.

Regardless of which alternative is ultimately chosen, the potential annual costs will likely be substantial, due to the small size of the user base. The estimated cost per user will be dependent on any grants or financing received. The worst-case scenario is financing the whole project with a market rate loan. This would result in an annual user rate of $3,309 annually for the least costly alternative (#5).

Based on the income of the families residing in the service area, the Town may qualify for hardship financing (0%) or Bipartisan Infrastructure Legislation (BIL) grants of up to 50% of the total project cost. That would reduce the estimated annual cost per user to only $993 per year, which would be slightly higher than the recommended affordability level of $713. For reference, annual sewer rates in excess of 1.5% of the area's median household income (MHI) are considered unaffordable, and Parksville's MHI is currently estimated at $47,552.

It is important to note that every parcel in the proposed service area would pay their share of the debt service estimated above. Occupied parcels connected to the new treatment system would also pay a share of the annual operations and maintenance (O&M) costs. While those costs have yet to be determined, absorption beds typically require minimum maintenance consisting of lawn mowing, mechanical screen cleaning, inspections, and septic tank solids pumping. If the sewer district would own the individual grinder pumps, these costs would also need to be factored into O&M costs.

Grants and financing cannot be finalized until an engineering report is prepared, the sewer district is formed and a bond resolution is passed. Once these steps are complete, the final engineering design can be completed, and the project will then undergo regulatory review and approval.

Table 5, below, summarizes next steps and an aggressive schedule for completion assuming the Town would like the project to be ready for the 2025 funding round.

Table 5. Proposed Timeline

TASK	DATE/RANGE
Owner Outreach (Site A)	June – Aug 2024
Public Meetings and Outreach	June - Aug 2024
Authorization to Proceed & Selection of preferred alternative	September 2024
Preparation of Engineering Report	Oct – Dec 2024
District Formation & Bond Resolution	Jan – Mar 2025
List Project on FY2026 CWSRF IUP	June 2025
Submit Grant Applications (WIIA/WQIP)	June/July 2025
FY2026 CWSRF IUP Released	Fall 2025
Submit SRF Financing Application	Spring 2026
Design, Permitting, Bidding, Construction	2026-2027

ATTACHMENT A: Sewer loading estimates for Updated Service Area

	Tax Assessment Data			Estimated GPD			
	Row Labels	Number of Parcels	Number of Bedrooms	Basis	Qty	Basis (GPD)	Total
One family year-round residence	210	17	55	Bedroom	55	110	6,050
Two family year-round residence	220	5	32	Bedroom	32	110	3,520
Residential vacant land over 10 acres	322	1	0				-
Vacant land located in commercial areas	330	12	0				-
Commercial vacant land with minor improvements	331	2	0				-
Living accommodations	411	1	0	Bedroom	2	110	220
Camps, cottages, bungalows	417	1	0	Bedroom	4	110	440
Restaurants	421	2	5	35 GPD/seat* + bedrooms	145.7333	35	5,651
Diners and luncheonettes	422	2	2	35 GPD/seat + bedrooms	164	35	5,960
Snack bars, drive-ins, ice cream bar	423	1	0	50 GPD/car space	18	50	900
Bar	425	1	0	20 GPD/seat	81.06667	20	1,621
Service and gas stations	432	1	0	Per Toilet	2	400	800
Parking lot	438	1	0				-
Other storage, warehouse and distribution facilities	449	1	0	5 GPD/patron (New Memories)	100	5	500
Office building	464	1	0	15 GPD/Employee	5	15	75
Downtown row type (with common wall)	481	2	0	Bedroom	4	110	960
Downtown row type (detached)	482	4	0	Bedroom	8	110	880
Religious	620	2	0	3 GPD/seat	280	3	840
Office building	652	1	0	15 GPD/Employee	5	15	75
Cemeteries	695	2	0				-
	Grand Total	60	94				28,492

*718 Parksville Rd = 140 seats

ATTACHMENT B: USDA Web Soil Survey Septic System Suitability Report

Septic Tank Absorption Fields (NY)—Sullivan County, New York
(PARKSVILLE ABSORPTION FIELD SUITABILITY)

74° 46' 35" W
74° 44' 22" W
41° 51' 46" N
41° 50' 51" N
518600 518800 519000 519200 519400 519600 519800 520000 520200 520400 520600 520800 521000 521200 521400 521600
4634500 4634300 4634100 4633900 4633700 4633500 4633300 4633100 4632900

Little Beaver Kill
17
Ramp
Old Railroad Grade
Okeefe Hill Rd
Cooley Rd
Tanzman Rd

WmC OaB W OaB OaB EID
WmB WmB LaD WmC EIE EIC
WmB Pg
SrC
ToF SrD Fu ToE EID
CsE CsF
TkB TkD ToF EIF
CsF RhC EIC
TkA So
Fu W
MnD Ud WmC HaC EID
MnC MnB PmB HeF WmB WmB
Ud RhC Fu
EID PmA WmC
HaE EIE
WmB Fu TaB TkC OaB Pg
MnC HaE
MnC LeB WIC Bb
OaA EID HeF EIB
TkB EIF EIE WmC
EID Ud
CsC EIC
LeC EIF
PmA
EIC WmC WmB Ce HaE HaC
WmC TkB
LeB EID
EIC EIB Bs
OaA So WoC TkA Fu HeF
LeC EID EIDEIE EIB

Map Scale: 1:8,270 if printed on B landscape (17" x 11") sheet.
N
Meters 0 100 200 400 600
Feet 0 400 800 1600 2400
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 Rating Polygons
- Very limited
- Somewhat limited
- Not limited
- Not rated or not available

Soil Rating Lines
- Very limited
- Somewhat limited
- Not limited
- Not rated or not available

Soil Rating Points
- Very limited
- Somewhat limited
- Not limited
- Not rated or not available

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

Soil Survey Area: Sullivan County, New York
Survey Area Data: Version 17, Sep 3, 2018

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

Date(s) aerial images were photographed: Feb 5, 2014—Sep 15, 2016

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.

Septic Tank Absorption Fields (NY)

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
Bb	Barbour loam	Somewhat limited	Barbour (85%)	Seepage (0.90)	7.2	1.1%
				Flooding (0.40)		
				Depth to saturated zone (0.17)		
Bs	Bash silt loam	Very limited	Bash (85%)	Flooding (1.00)	2.7	0.4%
				Depth to saturated zone (1.00)		
				Restricted permeability (0.31)		
Ce	Carlisle, Palms, and Alden soils, ponded	Very limited	Carlisle, ponded (25%)	Ponding (1.00)	0.7	0.1%
				Depth to saturated zone (1.00)		
			Palms, ponded (25%)	Ponding (1.00)		
				Depth to saturated zone (1.00)		
				Restricted permeability (0.35)		
			Alden, ponded (25%)	Ponding (1.00)		
				Depth to saturated zone (1.00)		
				Restricted permeability (0.94)		
CsC	Cheshire channery loam, 8 to 15 percent slopes, stony	Somewhat limited	Cheshire, stony (85%)	Slope (0.20)	3.8	0.6%
CsE	Cheshire channery loam, 25 to 35 percent slopes, stony	Very limited	Cheshire, stony (85%)	Slope (1.00)	21.9	3.4%

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
CsF	Cheshire channery loam, 35 to 60 percent slopes, stony	Very limited	Cheshire, stony (85%)	Slope (1.00)	29.7	4.6%
ElB	Elka loam, 3 to 8 percent slopes, bouldery	Somewhat limited	Elka, bouldery (85%)	Restricted permeability (0.31)	10.0	1.5%
ElC	Elka loam, 8 to 15 percent slopes, bouldery	Somewhat limited	Elka, bouldery (85%)	Restricted permeability (0.31)	25.0	3.9%
				Slope (0.20)		
ElD	Elka loam, 15 to 25 percent slopes, bouldery	Very limited	Elka, bouldery (85%)	Slope (1.00)	50.0	7.7%
				Restricted permeability (0.31)		
ElE	Elka loam, 25 to 35 percent slopes, bouldery	Very limited	Elka, bouldery (85%)	Slope (1.00)	10.0	1.5%
				Restricted permeability (0.31)		
ElF	Elka loam, 35 to 50 percent slopes, bouldery	Very limited	Elka, bouldery (85%)	Slope (1.00)	4.4	0.7%
				Restricted permeability (0.31)		
Fu	Fluvaquents-Udifluvents complex, frequently flooded	Very limited	Fluvaquents (45%)	Flooding (1.00)	31.9	4.9%
				Depth to saturated zone (1.00)		
				Ponding (1.00)		
				Restricted permeability (0.31)		
			Udifluvents, frequently flooded (40%)	Flooding (1.00)		
				Seepage (1.00)		
				Filtering capacity (1.00)		
				Depth to saturated zone (0.33)		
HaC	Hawksnest-Mongaup loams, strongly sloping, very rocky	Very limited	Hawksnest (40%)	Depth to bedrock (1.00)	21.9	3.4%
				Slope (0.20)		
HaE	Hawksnest-Mongaup	Very limited	Hawksnest (40%)	Depth to bedrock (1.00)	38.1	5.9%

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
	loams, steep, very rocky			Slope (1.00)		
			Mongaup (40%)	Slope (1.00)		
				Depth to bedrock (0.75)		
				Restricted permeability (0.31)		
HeF	Hawksnest-Mongaup-Rock outcrop complex, very steep	Very limited	Hawksnest (30%)	Depth to bedrock (1.00)	14.7	2.3%
				Slope (1.00)		
			Mongaup (30%)	Slope (1.00)		
				Depth to bedrock (0.75)		
				Restricted permeability (0.31)		
LaD	Lackawanna channery loam, 15 to 25 percent slopes	Very limited	Lackawanna (90%)	Slope (1.00)	0.9	0.1%
				Depth to saturated zone (0.85)		
				Depth to dense material (0.83)		
				Restricted permeability (0.20)		
			Oquaga (5%)	Slope (1.00)		
				Depth to bedrock (0.75)		
				Restricted permeability (0.20)		
				Content of large stones (0.04)		
LeB	Lewbeach silt loam, 3 to 8 percent slopes	Somewhat limited	Lewbeach (85%)	Restricted permeability (0.49)	13.4	2.1%
				Depth to saturated zone (0.33)		
				Depth to dense material (0.27)		
LeC	Lewbeach silt loam, 8 to 15 percent slopes	Somewhat limited	Lewbeach (85%)	Restricted permeability (0.49)	4.7	0.7%
				Depth to saturated zone (0.33)		

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
				Depth to dense material (0.27)		
				Slope (0.20)		
MnB	Mongaup loam, 3 to 8 percent slopes, very stony	Somewhat limited	Mongaup, very stony (85%)	Depth to bedrock (0.75)	6.5	1.0%
				Surface rock fragments (0.60)		
				Restricted permeability (0.31)		
MnC	Mongaup loam, 8 to 15 percent slopes, very stony	Somewhat limited	Mongaup, very stony (85%)	Depth to bedrock (0.75)	13.9	2.1%
				Surface rock fragments (0.60)		
				Restricted permeability (0.31)		
				Slope (0.20)		
MnD	Mongaup loam, 15 to 25 percent slopes, very stony	Very limited	Mongaup, very stony (85%)	Slope (1.00)	4.1	0.6%
				Depth to bedrock (0.75)		
				Surface rock fragments (0.60)		
				Restricted permeability (0.31)		
OaA	Onteora loam, 0 to 3 percent slopes	Very limited	Onteora (80%)	Depth to dense material (1.00)	17.4	2.7%
				Depth to saturated zone (1.00)		
				Restricted permeability (0.31)		
OaB	Onteora loam, 3 to 8 percent slopes	Very limited	Onteora (80%)	Depth to dense material (1.00)	6.7	1.0%
				Depth to saturated zone (1.00)		
				Restricted permeability (0.31)		
Pg	Pits, gravel	Not rated	Pits, gravel (80%)		6.2	1.0%
			Otisville (8%)			

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
			Udorthents (5%)			
			Tunkhannock (5%)			
			Unnamed soils (2%)			
PmA	Pompton gravelly fine sandy loam, 0 to 3 percent slopes	Very limited	Pompton (85%)	Depth to saturated zone (1.00)	3.3	0.5%
				Seepage (0.90)		
PmB	Pompton gravelly fine sandy loam, 3 to 8 percent slopes	Very limited	Pompton (85%)	Depth to saturated zone (1.00)	1.7	0.3%
				Seepage (0.90)		
RhC	Riverhead sandy loam, 8 to 15 percent slopes	Somewhat limited	Riverhead (85%)	Seepage (0.90)	4.8	0.7%
				Slope (0.20)		
So	Suny fine sandy loam	Very limited	Suny (85%)	Depth to saturated zone (1.00)	5.4	0.8%
				Restricted permeability (1.00)		
				Ponding (1.00)		
SrC	Swartswood gravelly loam, 8 to 15 percent slopes, stony	Somewhat limited	Swartswood (85%)	Depth to saturated zone (0.80)	11.8	1.8%
				Depth to dense material (0.71)		
				Restricted permeability (0.31)		
				Slope (0.20)		
SrD	Swartswood gravelly loam, 15 to 25 percent slopes, stony	Very limited	Swartswood (85%)	Slope (1.00)	15.6	2.4%
				Depth to saturated zone (0.80)		
				Depth to dense material (0.71)		
				Restricted permeability (0.31)		
TaB	Torull-Rock outcrop complex, 1 to 5 percent slopes	Very limited	Torull, somewhat poorly drained (40%)	Depth to bedrock (1.00)	3.2	0.5%
				Depth to saturated zone (1.00)		

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
				Restricted permeability (0.99)		
			Torull, poorly drained (20%)	Depth to bedrock (1.00)		
				Depth to saturated zone (1.00)		
				Restricted permeability (0.99)		
TkA	Tunkhannock gravelly loam, 0 to 3 percent slopes	Somewhat limited	Tunkhannock (85%)	Seepage (0.90)	30.0	4.6%
TkB	Tunkhannock gravelly loam, 3 to 8 percent slopes	Somewhat limited	Tunkhannock (85%)	Seepage (0.90)	26.8	4.1%
TkC	Tunkhannock gravelly loam, 8 to 15 percent slopes	Somewhat limited	Tunkhannock (85%)	Seepage (0.90)	2.8	0.4%
				Slope (0.20)		
TkD	Tunkhannock gravelly loam, 15 to 25 percent slopes	Very limited	Tunkhannock (85%)	Slope (1.00)	2.5	0.4%
				Seepage (0.90)		
ToE	Tunkhannock and Otisville soils, steep	Very limited	Tunkhannock (45%)	Slope (1.00)	8.2	1.3%
				Seepage (0.90)		
			Otisville (40%)	Seepage (1.00)		
				Filtering capacity (1.00)		
				Slope (1.00)		
ToF	Tunkhannock and Otisville soils, very steep	Very limited	Tunkhannock (45%)	Slope (1.00)	5.6	0.9%
				Seepage (0.90)		
			Otisville (40%)	Seepage (1.00)		
				Filtering capacity (1.00)		
				Slope (1.00)		
Ud	Udorthents, smoothed	Not rated	Udorthents (75%)		20.2	3.1%
			Chenango (5%)			
			Alden (5%)			
			Lackawanna (5%)			
			Onteora (5%)			

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
			Pits, gravel (5%)			
W	Water	Not rated	Water (100%)		4.5	0.7%
WlC	Wellsboro and Wurtsboro soils, strongly sloping, extremely stony	Very limited	Wellsboro, extremely stony (40%)	Depth to saturated zone (1.00)	8.7	1.3%
				Depth to dense material (0.95)		
				Surface rock fragments (0.80)		
				Restricted permeability (0.31)		
				Slope (0.20)		
			Wurtsboro, extremely stony (40%)	Depth to saturated zone (1.00)		
				Surface rock fragments (0.80)		
				Depth to dense material (0.76)		
				Restricted permeability (0.31)		
				Slope (0.20)		
WmB	Willowemoc silt loam, 3 to 8 percent slopes	Somewhat limited	Willowemoc (80%)	Depth to saturated zone (0.88)	110.4	17.0%
				Depth to dense material (0.82)		
				Restricted permeability (0.31)		
WmC	Willowemoc silt loam, 8 to 15 percent slopes	Somewhat limited	Willowemoc (80%)	Depth to saturated zone (0.88)	36.5	5.6%
				Depth to dense material (0.82)		
				Restricted permeability (0.31)		
				Slope (0.20)		
WoC	Willowemoc silt loam, strongly sloping, very stony	Somewhat limited	Willowemoc, very stony (80%)	Depth to saturated zone (0.88)	2.7	0.4%
				Depth to dense material (0.82)		

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
				Surface rock fragments (0.60)		
				Restricted permeability (0.31)		
				Slope (0.20)		
Totals for Area of Interest					**650.4**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Somewhat limited	310.3	47.7%
Very limited	309.2	47.5%
Null or Not Rated	30.9	4.7%
Totals for Area of Interest	**650.4**	**100.0%**

Description

Septic tank absorption fields are subsurface systems of perforated pipe or similar devices that distribute effluent from a septic tank into the soil. New York State Department of Health regulations allow installation of septic system absorption fields of varying designs, depending upon the depth of suitable soil material above any limitation in the natural soil at a site (New York State Department of Health, 1990). Where necessary, imported fill material may be used to elevate absorption trenches to at least the minimum distance of 24 inches above limiting soil horizons. The depth ranges of suitable material and corresponding types of absorption systems allowed are as follows:

Less than 12 inches-no system allowed

12 to 24 inches-alternative raised trench

24 to 48 inches-conventional shallow trench

More than 48 inches-conventional system

The ratings in this interpretation are based on evaluation of the soil between depths of 12 and 48 inches. In addition, the bottom layer of the soil is evaluated for risk of seepage. This interpretation does not evaluate bedrock below the soil. The soil properties and site features considered are those that affect absorption of the effluent, construction and maintenance of the system, and public health.

The soil properties and qualities that affect the absorption and effective treatment of wastewater effluent are saturated hydraulic conductivity (Ksat), depth to a seasonal high water table, depth to bedrock, depth to dense material, and susceptibility to flooding. Stones and boulders and a shallow depth to bedrock or dense material interfere with installation. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas. In addition, the hazards of erosion and sedimentation increase as slope increases.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 2 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, ground water may be contaminated.

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified use. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. "Somewhat limited" indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen, which is displayed on the report. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the Selected Soil Interpretations report with this interpretation included from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

The information in this interpretation is based on criteria developed specifically for soils in New York. The information is not site specific and does not eliminate the need for onsite investigation of the soils.

Reference:

New York State Department of Health. 1990. Appendix 75-A of Part 75, Section 201(1)(1) of New York Public Health Law. Nassau and Suffolk Counties have a waiver from this portion of New York State Department of Health regulations.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher