



PRELIMINARY ENGINEER'S REPORT

Bedford Hills-Katonah
Sewer District
Expansion/Completion

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COMMITMENT & INTEGRITY DRIVE RESULTS

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Town of Bedford
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1.1 Project Background

The Hamlets of Bedford Hills and Katonah, within the Town of Bedford, are comprised of primarily residential parcels with some light commercial and industrial areas. The area has been nearly fully developed, with few remaining undeveloped parcels. Sanitary wastewater disposal in the hamlets is provided by individual septic systems for each property, with the exception of four sites with existing wastewater treatment plants with discharge permits administered by New York State Department of Environmental Conservation (NYSDEC) and New York State Department of Environmental Protection (NYCDEP). The presence of these septic systems within New York City's Croton watershed system, and the nearby Muscoot Reservoir, adjacent to Katonah, present a potential pollution source impacting water quality in the watershed.

The topography is varied, with areas of high bedrock and groundwater that are not conducive to wastewater disposal through individual septic systems. Limited property sizes, of $\frac{1}{4}$ and $\frac{1}{2}$ acre, limits the size and therefore treatment capacity of these septic systems, contributing to water quality pollution. Prior studies have identified more than 140 reports of septic system failure reported to Westchester County Department of Health (WCDOH), with many more troubled and failing systems likely unreported and undocumented. In addition, there are more than 370 known cesspools located within the Town of Bedford that do not meet current septic system design and treatment guidelines. Remediating or eliminating these septic systems as a potential source of water quality pollution within the New York City watershed has long been a focus area for the Town.

Multiple prior studies dating back to the 1970s have been conducted to evaluate potential solutions to this challenge, including:

- *208 Northern Westchester Study* completed in 1977 proposed a comprehensive plan within the Environmental Protection Agency (EPA) framework for sanitary wastewater collection and treatment for northern Westchester County, including portions of Mt. Kisco, Bedford Hills, Katonah, and Croton Falls. The plan was never implemented.
- *Part Town Sewer District No. 1 Map, Plan and Report* completed by Hudson Engineering Associates in January 1990. This report proposed formation of a sewer district to serve portions of Katonah and Bedford Hills, discharging to a new WWTP located on Town property. The project did not proceed.
- *Sanitary Sewer Extension and Plant Capacity Analysis* completed by Malcolm Pirnie (Arcadis) in July 2003. This report evaluated capacity at the Bedford Hill-Taconic Correctional Facility Wastewater Treatment Plant (WWTP) and made recommendations for improvements to the WWTP and initial layout for formation of a sewer district to serve the Hamlets of Katonah and Bedford Hills. The 2003 study, included as Appendix A, is an extensive and detailed analysis of the wastewater needs of the Bedford Hills and Katonah Hamlets, and is the basis of the plan provided in this report.

The 2003 study included the entire Hamlet areas of Bedford Hills and Katonah. Ultimately, the commercial business districts in each Hamlet were selected to move forward with an initial sewer district, which became the Bedford Hills-Katonah Business Sewer District. The Map, Plan, and Report was completed in 2016, and Woodard & Curran is moving forward with completion of design of the proposed collection system, with construction anticipated to begin in mid-2019. The project proposes the construction of a gravity sewer collection system to three new pump stations to serve the commercial business districts, as well as three of the existing permitted WWTPs within the Town. The existing septic systems and WWTPs will be decommissioned and flow will be conveyed to the Bedford Hills-Taconic Correctional Facility WWTP. As part of the project, ownership of the Bedford Hills-Taconic Correctional Facility WWTP will be conveyed to the Town of Bedford. This project will serve 124 properties within Bedford Hills and Katonah.

With construction of the Bedford Hills-Katonah Business Sewer District moving forward, the Town is now evaluating options for additional sanitary sewer extensions and is pursuing full buildout of the sewerage of the Hamlets of Katonah

and Bedford Hills. An evaluation of initial options for extension was completed in December 2018 (included as Appendix B) and considered connecting the Bedford Lake WWTP to the Bedford Hills-Katonah Business Sewer District. The Bedford Lake WWTP is the last remaining WWTP due for upgrades under the NYCDEP Upgrade Program to provide tertiary treatment for plants within the watershed (it should be noted that the Khal Adas Kasho WWTP in the Town recently completed an upgrade under the program and is not considered for connection). The connection of Bedford Lake represents an initial portion of the full system expansion described in this report. The project will also require upgrades to the Bedford Hills-Taconic Correctional Facility WWTP to provide treatment and hydraulic capacity for the additional flow.

1.2 Project Description

The proposed Bedford Hills-Katonah Sewer District will extend the Bedford Hills-Katonah Business Sewer District to serve additional properties in the Hamlets of Bedford Hills and Katonah. These properties are primarily residential, within the Town's residential one-quarter-acre (R-1/4A) and one-half-acre (R-1/2A) zones. The central business district (CB) and light industrial (LI) zones in Bedford Hills and Katonah are included in the Business Sewer District. The extension will also serve the LI and CB zones along Route 117 south from Bedford Hills toward Mt. Kisco and the residential two-family (TF) zones and village apartment zones (VA). Refer to attached Figure 2-3, excerpted from the 2003 study showing the Planning Area Zoning for the study area. The district is proposed to serve 1,397 individual parcels. Of those, 1,305 are developed, with the balance listed as vacant. The properties proposed to be served as part of this project are separate from the properties connected as part of the Bedford Hills-Katonah Business Sewer District. Based on the estimated project costs described in Section 1.3, the cost for providing sanitary sewer service to the 1,305 additional developed parcels is \$42,222 per parcel, which is very efficient for this type of project in northern Westchester County.

1.2.1 Collection System

The proposed collection system will primarily be gravity sewer mains to submersible pump stations conveying flow through force mains, ultimately to the Bedford Hills-Taconic Correctional Facility WWTP, ownership of which is to be transferred from New York State to the Town per legislation passed in 2018. The sewers and pump stations will be design in accordance with the *Recommended Standards for Wastewater Facilities* by the Great Lakes – Upper Mississippi River Board (Ten State Standards), *New York State Design Standards for Intermediate Sized Wastewater Treatment Systems* by NYSDEC, and *TR-16: Guides for the Design of Wastewater Treatment Works* by the New England Interstate Water Pollution Control Commission (NEIWPCC).

Flow will be conveyed through gravity sewer mains to centralized pump stations. Sewer main sizes will be confirmed during final design, but will be minimum 8-inch diameter. Precast concrete manholes will be located a minimum 300-feet along each sewer run and at changes in direction. Preliminary estimates anticipate nearly 94,000 linear feet of gravity sewer main and nearly 400 manholes. Refer to attached Figure 1, excerpted from the 2003 study, showing a proposed preliminary layout of the extent of the sanitary sewer collection system for Bedford Hills and Katonah. Note that pump station locations and force main layouts are not identified at this time.

A total of six pump stations are anticipated for the collection system. Of these, three are proposed to be installed for the Bedford Hills-Katonah Business Sewer District and will be able to be utilized for the proposed extension, requiring three new pump stations. Sizing and location of these pump stations will be determined during final design. The pump stations will consist of duplex submersible pumps with associated controls and alarm functions, as well as dedicated emergency standby generators for continued operation during loss of power.

1.2.2 WWTP Upgrades

Previous studies estimated sanitary wastewater flow from the Hamlets of Bedford Hills and Katonah to be approximately 410,000 gallons per day average daily flow (excluding flow from the Bedford Hills-Katonah Business Sewer District). The Bedford Hills-Taconic Correctional Facility WWTP currently has a permitted capacity of 500,000 gallons per day. Of that, nearly 440,000 gallons per day is accounted for between existing and proposed customers, including the proposed Bedford Hills-Katonah Business Sewer District. The projected additional flow and the committed flows at the WWTP totals 850,000 gallons per day, requiring an upgrade at the WWTP to provide additional capacity. In order to provide capacity to treat wastewater from the full collection system building, upgrading the existing WWTP capacity to 1.1 million gallons per day is recommended, providing a buffer of 140,000 gallons per day in addition to an industry-recommended factor of safety of 10% of permitted capacity.

The existing WWTP consists of the following processes:

- Parshall Flume Influent Flow Metering
- Vortex Grit Chamber
- Equalization Basins and Influent Pumps
- Fine Screens
- Primary Clarifiers
- Trickling Filters and Feed Pumps
- Secondary Clarifiers
- Rapid Sand Filters
- Membrane Microfiltration
- Ultraviolet Disinfection
- Post Aeration

The New York State Department of Corrections, the current wastewater treatment plant owner, is currently undertaking design of upgrades to the WWTP to address more stringent treatment limits imposed by NYSDEC due to reclassification of the stream to which the plant discharges. As part of this process, the existing fine screens will be demolished, the sand filters will be replaced, and trickling filter media and system be replaced. In addition, new rotating biological contactors (RBCs) will be installed to provide nutrient removal. However, no increase in capacity is anticipated. Therefore, significant upgrades are needed to the following processes to provide the required 1.1 million gallon per day average daily flow capacity:

- Equalization Tanks and Influent Pumps – provide additional tank and pump capacity
- Primary Clarifier – install a third primary clarifier
- Secondary Clarifier – install a third secondary clarifier
- Rapid Sand Filters – increase filter and feed pump capacity
- Trickling Filters – increase filter feed pump capacity

The other existing equipment, including influent flow measurement, grit removal, and trickling filters have the required hydraulic capacity. The existing membrane microfiltration system would also need to be upgraded as there are currently three units, each with a capacity of 500,000 gallons per day, so the microfilters can process 1 million gallons per day

with one unit out of service. However, the additional capacity required at the microfilters may be achieved through rerating the filters for a higher flux, pending NYCDEP approval of pilot testing and demonstrated performance to be determined during detailed design. The existing ultraviolet disinfection would not require upgrades as it is adequately sized to treat up to 1.5 MGD with one unit out of service.

1.3 Project Costs

An opinion of probable construction costs is presented below in Table 1. This cost represents updated estimates from the 2003 study, considering the base infrastructure that is proposed to be installed as part of the Bedford Hills-Katonah Business Sewer District and will be utilized in the extension. Specifically, the 2003 costs were escalated forward to 2022, and then an appropriate amount representing the project cost of the Bedford Hills-Katonah Business Sewer District construction cost was deducted. All costs have been escalated forward to 2022, based on an assumed construction start date in that timeframe. Inflation was estimated at 3% per year, based on available construction cost indices. Land acquisition costs are carried if needed for pump station locations and easements. Listed engineering, legal, fiscal, and administrative costs are estimated to be able to complete the project through design and construction phase.

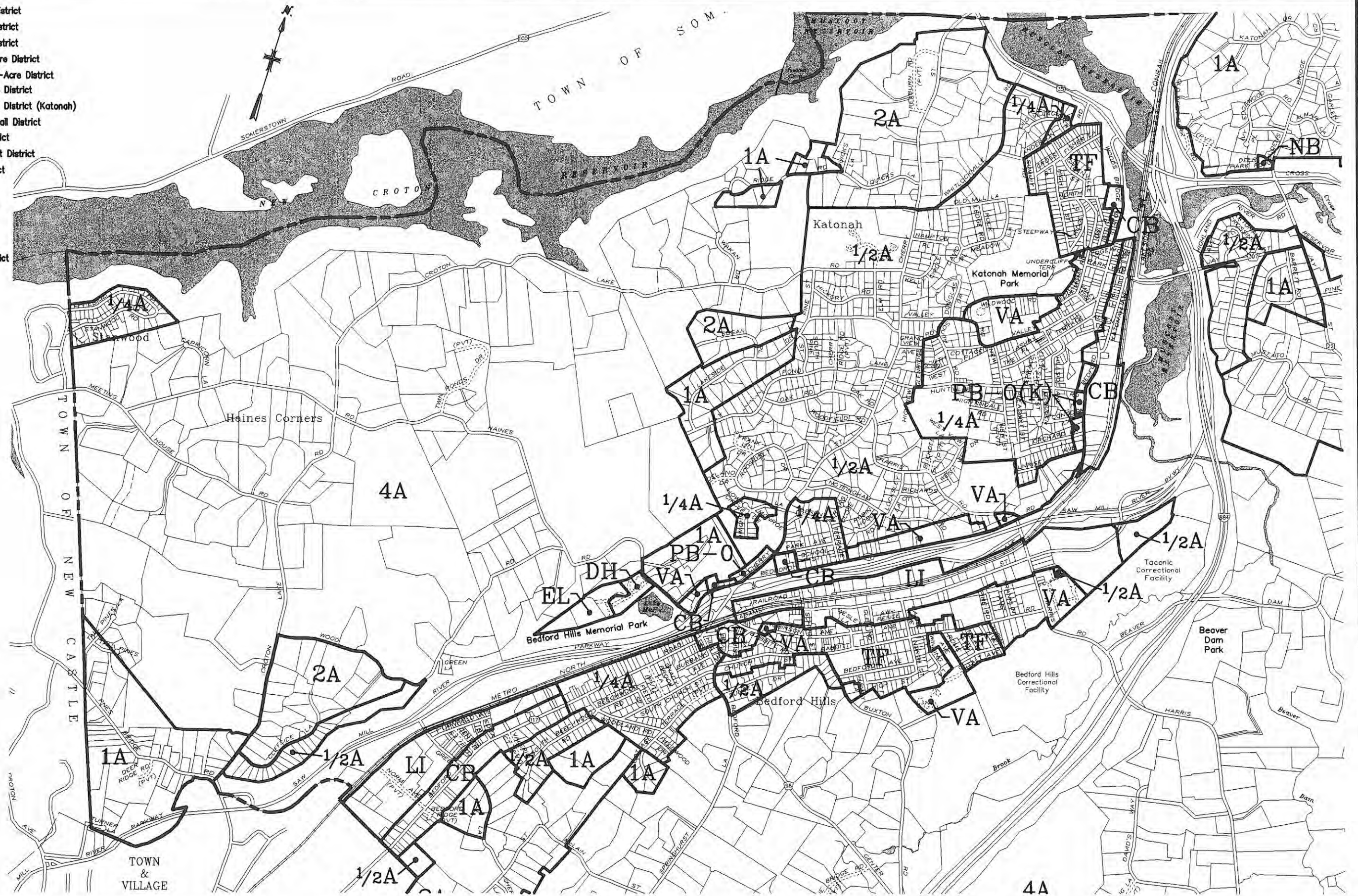
Table 1: Opinion of Probable Project Cost

Item	Probable Cost
Sanitary Sewer Collection System	\$22,800,000
WWTP Upgrades	\$12,400,000
Subtotal, Construction Cost	\$35,200,000
Construction Contingency (30%)	\$10,500,000
Land Acquisition	\$1,100,000
Engineering	\$7,700,000
Legal, Fiscal, and Administrative	\$600,000
Total Estimated Project Cost	\$55,100,000

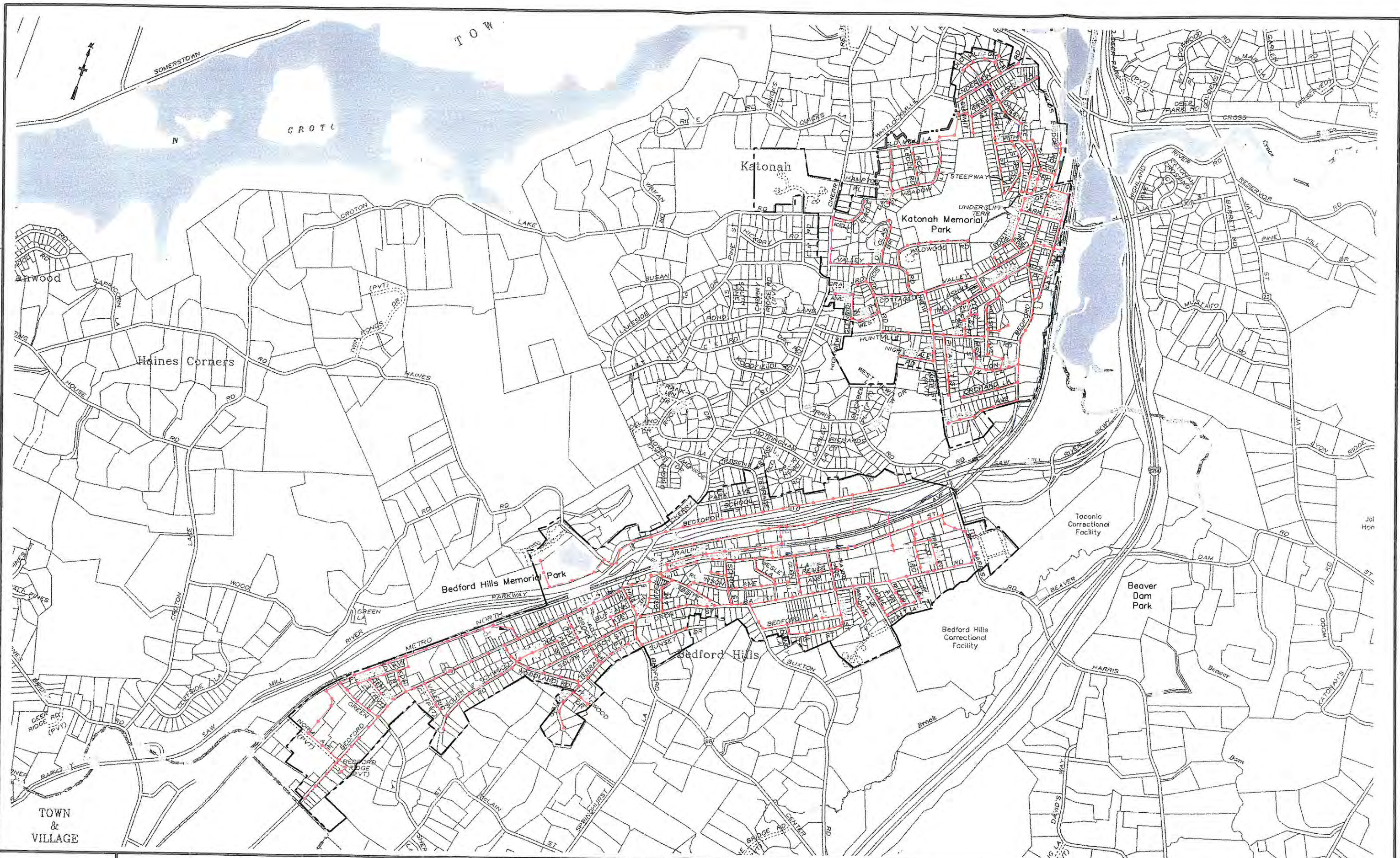
Funding sources for the project have not yet been fully identified, but are anticipated to include a combination of the following:

- NYCDEP East of Hudson (EOH) funds administered by Northern Westchester Watershed Committee (NWWC)
- NYCDEP Upgrade Site funding for decommissioning Bedford Lake WWTP and conveying flow to the Town sewer district

- R-4A Residence Four-Acre District
- R-2A Residence Two-Acre District
- R-1A Residence One-Acre District
- R-1/2A Residence One-Half-Acre District
- R-1/4A Residence One-Quarter-Acre District
- PB-O Planned Business-Office District
- PB-O(K) Planned Business-Office District (Katonah)
- PB-R Planned Business - Retail District
- TF Residence Two-Family District
- VA Residence Village Apartment District
- MF Residence Multifamily District
- EL Housing for Elderly District
- DH Diverseified Housing District
- RO Research Office District
- RB Roadside Business District
- NB Neighborhood Business District
- CB Central Business District
- LI Light Industrial District



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**MALCOLM
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TOWN OF BEDFORD
SEWER DISTRICT FORMATION REPORT
PROPOSED SEWAGE COLLECTION SYSTEM

750 0 750 1500



SCALE: 1" = 1500'

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FIGURE 1

**APPENDIX A: 2003 SANITARY SEWER EXTENSION AND PLANT CAPACITY
ANALYSIS**

**APPENDIX B: BEDFORD HILLS-KATONAH BUSINESS SEWER DISTRICT
 PHASE II EXTENSION**



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