



**BEDFORD HILLS –
KATONAH
BUSINESS SEWER
DISTRICT
PHASE II**

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214644.00
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June 2019
Rev. April 2020

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1. PROJECT BACKGROUND

1.1 Purpose

The Town of Bedford, NY currently relies on aging septic systems and cesspools for wastewater disposal, which contributes to water quality challenges in the nearby New York City Department of Environmental Protection (NYCDEP) watershed. In May 2017, Woodard & Curran was retained by the Town of Bedford for a design of a sanitary wastewater collection system to implement the sewer project authorized by actions of the Town Board and the referendum in March 2017 of the property owners in the Bedford Hills-Katonah Business Sewer District. The design includes a system comprised of approximately 12,000 linear feet of force main and nearly 17,000 linear feet of gravity sewer, to be installed in the Bedford Hills and Katonah Commercial Districts. This project will also include four pump stations that will pump the sanitary flow to the Taconic - Bedford Hills Correctional Facility Wastewater Treatment Plant (Bedford Hills WWTP) which is currently owned and operated by the New York State Department of Corrections and Community Supervision (DOCCS). An agreement has been reached for the Town of Bedford to take ownership of the plant, under which DOCCS will become a customer of the sewer district. This existing plant discharges to the Broad Brook, a tributary of the New York City Croton water supply system. This project is referred to as Phase I and is targeted to break ground in Spring 2020 with project completion planned for last quarter 2021. 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 sanitary sewers for the Hamlets of Katonah and Bedford Hills.

The Town is proactively pursuing funds and has retained Woodard & Curran to evaluate options to upgrade or install new sanitary sewer infrastructure to continue to address water quality challenges within Bedford. The limiting factor the Town faces is the existing treatment capacity of the Bedford Hills WWTP. With a permit limit of 500,000 gallons per day, there is no additional capacity of the Bedford Hills WWTP to support additional future sanitary sewer expansion beyond Phase I.

Given the lack of additional capacity of the Bedford Hills WWTP, Woodard & Curran has been asked to consider the feasibility and cost of expansion of the capacity. The Town has also been made aware that NYCDEP is in the design phase of replacing the Bedford Lake WWTP. Bedford Lake is the last of such upgrade sites in Bedford. It may be mutually advantageous for NYCDEP, the Town and the residents (and ownership of the rental units) at Bedford Lake to consider an alternative upgrade for this site, much as the Town and NYCDEP are in the process of implementing under Phase I with respect to Bedford Park Apartments, Katonah Elementary School and property of St. Mary's Church in Katonah. The Phase I project includes up to \$13.3 million in NYCDEP funding toward the project under the alternative upgrade program. The Town has had discussions with NYCDEP about extending the planned collection system under a Phase II to Bedford Lake, however, this would necessitate an increase in the capacity of the Bedford Hills WWTP.

The purpose of the project described in this report is to expand the Bedford Hills WWTP and connect the areas served by the Bedford Lake WWTP, as well as two other environmentally sensitive areas in the Town.

1.2 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 City 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 Hills 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 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. The project will require upgrades to the Bedford Hills WWTP to provide treatment and hydraulic capacity for the additional flow.

1.3 Existing Conditions

The Bedford Lake WWTP is an onsite treatment plant designed for 20,000 gallons per day (GPD) which treats wastewater from the Garden Homes and Lakeside at Bedford Condominium Complexes. Water flows by gravity to a wet well where duplex pumps transport flow to a 20,000 gallon septic tank. Flow exits the septic tank, where it is aerated before entering series of rotating biological contactors for biological oxygen demand (BOD) removal. The effluent then proceeds to a secondary clarifier, followed by one of two rapid sand filters, before ultra-violet (UV) and chlorine disinfection. The treated wastewater is re-aerated prior to discharge at the St. Mary's Lake Brook. Operation and maintenance costs for 2019 are budgeted \$151,663, which averages to \$1,131 per year for each of the 134 units served.

The Bedford Lake WWTP is eligible for DEP funding for upgrades to meet NYCDEP tertiary treatment requirements. As part of Phase I, the Town took on responsibility for connecting existing WWTP discharges from Katonah Elementary School, St. Mary's School and Parish, and Bedford Park Apartments. NYCDEP provided funding in the amount of estimated upgrade costs to allow the Town to decommission the existing WWTPs and connect to the new sanitary sewer system. The Town is currently proposing a similar approach to Bedford Lake WWTP as the basis for Phase II. Alternatives for discharge and ultimate treatment of the wastewater from Bedford Lake were evaluated in the Phase II

report from December 2018, ultimately selecting the option of connecting to the Bedford Hills WWTP to be owned and operated by the Town. A description of this recommended option is described further in Section 2.

2. PHASE II PROJECT DESCRIPTION

The proposed Phase II project includes connection of the Bedford Lake flow to the Town's Sewer District, and an increase of 60,000 gallons per day in the capacity of the Bedford Hills WWTP. The proposed forcemain route for connection to the Sewer District is identified in Figure 1 included as Appendix A. The following describes the project components.

2.1 Bedford Lake

Bedford Lake WWTP is proposed to be converted to a pump station, with the existing WWTP and treatment systems to be decommissioned. Flow would be pumped through a new 4-inch force main in order to connect with the Phase I collection system. The capacity of the force main would be a factor of where and how many future connections are proposed, balanced with design of the Bedford Lake pump station. Wastewater treatment operation and maintenance costs would be consolidated since there would be no need for this plant to remain in operation. Upgrades to the soon-to-be town-owned Bedford Hills WWTP would be necessary in order to treat the additional flow from this option.

The proposed force main route would run along Bedford Road and cross the Saw Mill River Parkway. Upgrades would need to occur at Phase I Pump Station B to accommodate the additional flow and new force main discharge. The flow would then travel through the Phase I system, ultimately being conveyed to the Bedford Hills WWTP. Connection of Bedford Lake to the Bedford Hills WWTP would require 22,000 gallons per day of capacity.

2.2 Katonah Residential Properties

Sewering of parcels located in Katonah is of particular importance due to their proximity to the Muscoot Reservoir which is part of the New York City water supply system. This sanitary sewer area would include an additional 89 properties primarily along Bedford, Edgemont and Valley Road. Approximately 4,000 linear feet of 8-inch gravity sewer would be needed to convey flow and tie into the Phase I system. Laterals to within five feet of each building would be included in the project cost as well. Based on an estimated 330 gpd per property, this addition is expected to contribute roughly 30,000 gallons per day. The Phase I collection system and pump station has adequate capacity for this additional flow.

2.3 Railroad Avenue

Railroad Avenue runs immediately parallel to a tributary of the Stone Hill River, which ultimately flows into the Muscoot Reservoir. The ten parcels along Railroad Avenue proposed to be connected are commercial and light industrial use. Due to the topography, flow from these properties will be conveyed through a 2-inch low pressure sewer system. This force main will tie into the Phase I force main in Adams Street via the Town right-of-way on School Street. Based on current flow data, these properties generate approximately 1,400 gallons per day.

2.4 Bedford Hills WWTP Capacity

The existing wastewater treatment facility that currently serves the Taconic and Bedford Hills Correctional Facilities is permitted to treat 500,000 gallons per day. This capacity is fully committed as detailed in Table 2.1.

Table 2.1: Bedford Hills WWTP Phase I Capacity Commitment

Sewer District Customer	Total Daily Average Committed Capacity (gpd)
Bedford Hills and Taconic Correctional Facilities	300,000
Bedford Park Apartments	19,500
Katonah Elementary School	13,000
St. Mary of the Assumption Church	10,000
Bedford Hills-Katonah Business Sewer District Customers	43,619
Sewer Use Law Committed Capacity	63,881
Reserved Capacity ¹	56,000
Total Committed Capacity	500,000

¹ Recommended to maintain 10% reserve capacity from the permitted capacity

Because the current WWTP capacity is fully committed, an increase in permitted capacity is required to accept flow from Bedford Lake, Katonah Residential properties, and Railroad Avenue. 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 and Community Supervision, 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 and the sand filters will be replaced with disc filters. In addition, new rotating biological contactors (RBCs) will be installed to provide nutrient removal. However, no increase in capacity is anticipated per the *Bedford Hills Correctional Facility Program Report Amendment* prepared for New York State Department of Corrections and Community Supervision, dated April 10, 2019. Therefore, upgrades are needed to provide additional capacity. Based on review of the existing equipment, influent flow measurement, grit removal, primary and secondary clarification, secondary treatment, filters, microfilters, and ultraviolet disinfection have sufficient hydraulic capacity for the additional flow. The following process areas would require upgrades:

- Equalization Tanks – provide additional tank capacity
- Influent Pumps – provide additional pump capacity

- Primary Effluent Pumps – provide additional pump capacity

Review of prior plant evaluations indicates that hydraulic capacity up to 560,000 GPD is available downstream of the equalization tanks without the need to construct additional tanks. Therefore, the Town is proposing that the capacity of the WWTP be increased to 560,000 GPD.

Moving forward, the Town will continue to pursue expansion of sanitary sewers for additional areas of Katonah and Bedford Hills. Ultimately, the Town intends to sewer the more densely developed quarter acre (R-1/4A) and half acre (R-1/2A) residential areas, as well as remaining light industrial (LI) zones. These areas with smaller lot sizes are more likely to experience septic system failure and inability to properly treat wastewater onsite. For that full buildout, further expansion of the WWTP to a capacity of 1.1 MGD would be required.

3. PROJECT COSTS

3.1 Phase II Project Costs

Anticipated project costs include the collection system extensions for each area, as well as construction of pump stations for Bedford Lake and Railroad Avenue and decommissioning of the Bedford Lake WWTP. In addition, upgrades to the Bedford Hills WWTP are required to provide additional capacity. At this stage, it is anticipated that the project would proceed to construction in late 2021. All construction costs presented below for the separate components of the project have been escalated forward to 2021 dollars using an inflation rate of 3%. Contingency on construction costs are carried at 15% and 20% of the collection system and WWTP work, respectively. This difference reflects the more preliminary level of development for the WWTP upgrades needed. Contingency will continue to be refined as the project design and development progresses.

Table 3.1: Bedford Lake Alternative Upgrade Construction Cost Estimate

Item	Estimated Cost (2021 \$)
Mobilization	\$120,000
Force Main	\$873,000
Paving	\$417,000
Pump Station	\$618,000
Decommission WWTP	\$103,000
Upgrade PS B	\$52,000
Saw Mill River Parkway Crossing	\$206,000
Rock Removal	\$196,000
Subtotal	\$2,585,000
Contingency (15%)	\$390,000
Construction Total	\$2,975,000

Table 3.2: Katonah Residential Construction Cost Estimate

Item	Estimated Cost (2021 \$)
Mobilization	\$120,000
Gravity Sewer	\$1,043,000
Laterals	\$1,422,000
Manholes	\$206,000
Pavement	\$450,000
Rock Removal	\$214,000
Subtotal	\$3,448,000
Contingency (15%)	\$518,000
Construction Total	\$3,966,000

Table 3.3: Railroad Avenue Construction Cost Estimate

Item	Estimated Cost (2021 \$)
Mobilization	\$120,000
Low Pressure Sewer	\$309,000
Laterals	\$62,000
Grinder Pumps	\$361,000
Pavement	\$212,000
School Street ROW Directional Drill	\$155,000
Rock Removal	\$126,000
Subtotal	\$1,345,000
Contingency (15%)	\$203,000
Construction Total	\$1,548,000

Table 3.4: Bedford Hills WWTP Upgrade Construction Cost Estimate

Item	Estimated Cost (2021 \$)
Equalization Tank Upgrades	\$1,200,000
Influent Pump Upgrades	\$534,000
Primary Effluent Pump Upgrades	\$534,000
Subtotal	\$2,268,000
Contingency (20%)	\$456,000
Construction Total	\$2,724,000

Total project cost, inclusive of design and construction phase engineering services, as well as a 20% contingency is summarized in Table 3.5.

Table 3.5: Project Cost Summary

Item	Estimated Cost (2021 \$)
Bedford Lake Decommissioning and Connection	\$2,975,000
Katonah Residential	\$3,966,000
Railroad Ave	\$1,548,000
WWTP Upgrades	\$2,724,000
Construction Total	\$11,213,000
Engineering Services	\$1,700,000
Legal/Fiscal/Administrative Services	\$175,000
Project Total	\$13,088,000

3.2 Sources of Funding

The Bedford Hills-Katonah Business Sewer District (Phase I) will be completed utilizing multiple funding sources and Phase II is anticipated to follow a similar approach. Funding will include NYCDEP funds for an alternative upgrade,

unused funds from Phase I, local District bonding, and East of Hudson funds. Funding sources to cover the total anticipated project cost of \$13.1M are summarized in Table 3.6 below.

Table 3.6: Project Funding Summary

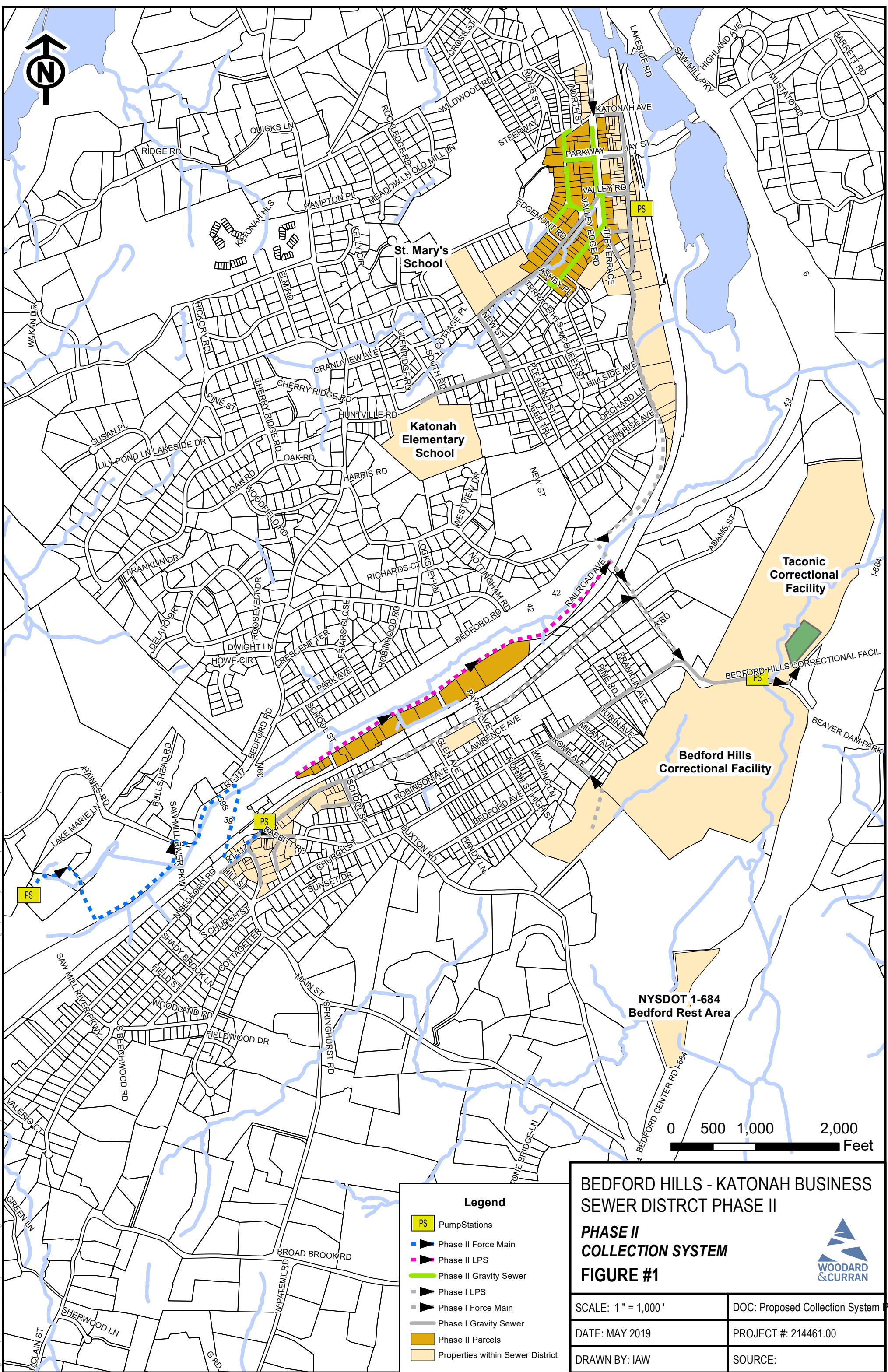
Item	Estimated Amount
NYCDEP Alternative Upgrade	\$7,700,000
Phase I Remaining EOH Funds ¹	\$1,750,000
Phase I Remaining DEP IGA Funds	\$950,000
Bedford Septic Program Funds ²	\$2,513,000
District Bonding	\$175,000
Total	\$13,088,000

¹ Based on bids received and total project costs, \$1.75M is anticipated in unused funding from Phase I. This is a combination of NYCDEP funds and East of Hudson WQIP funds.

² Reallocating \$2.5M from Bedford's Septic Repair Program will preserve sufficient funds for any additional repairs until the program term ends

APPENDIX A: FIGURE 1

Figure Exported: 5/17/2019 By: williams Using: \\woodardcurran.net\shared\Projects\0214644.00_Town of Bedford - Phase II Sewer Planning\wp\GIS\Project Files\Proposed Collection System Phase II.mxd



Legend

- Pump Stations
- Phase II Force Main
- Phase II LPS
- Phase II Gravity Sewer
- Phase I LPS
- Phase I Force Main
- Phase I Gravity Sewer
- Phase II Parcels
- Properties within Sewer District

BEDFORD HILLS - KATONAH BUSINESS SEWER DISTRICT PHASE II

PHASE II COLLECTION SYSTEM

FIGURE #1

SCALE: 1" = 1,000'	DOC: Proposed Collection System Phase II
DATE: MAY 2019	PROJECT #: 214461.00
DRAWN BY: IAW	SOURCE:





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