TOWN OF BEDFORD
OFFICE OF THE SUPERVISOR

Chris Burdick
Supervisor

Lee V. A. Roberts
Deputy Supervisor

Bea Rhodes
Confidential Secretary to the Supervisor

TOWN BOARD
Mary Beth Kass
Don B. Scott
MaryAnn Carr

June 27, 2016

VIA E-MAIL supervisor@somersny.com

The Honorable Rick Morrissey
Chairman
Northern Westchester Watershed Committee
335 Route 202
Somers, New York 10589

Re: Bedford Request for Water Quality Improvement Program Funds for Sewer Project – Business Districts of Katonah and Bedford Hills

Dear Rick,

As advised by the County Planning Department, I hereby submit a request for NWWC support for Bedford's request for $9,250,000 from the WQIP funds. This request is in accordance with the resolution which NWWC adopted on May 31, 2016 with respect to unexpended WQIP funds, which includes this item.

In addition to the engineering studies previously submitted, I am providing an estimated project budget, which is attached and is consistent with the project budget set forth in the Arcadis Design & Consultancy April 22, 2016 "Town of Bedford Sewer District Feasibility Study Update" (copy accompanies this letter). The budget also identifies the source of capital funds for the project.

Kindly include this matter for the July 7 NWWC meeting. Tracey Corbitt will prepare a draft resolution to be adopted by the NWWC. Thanks very much.

Best regards,

Chris Burdick
Supervisor

cc: Tracey Corbitt, Town Board, Town Clerk, Jeff Osterman, Kevin Winn

321 Bedford Road, Bedford Hills, NY 10507
Tel. 914.666.6530 • Fax 914.666.5249
e-mail: supervisor@bedfordny.gov • www.bedfordny.gov

Town of Bedford
Proposed Sewer District (Portions of Bedford Hills and Katonah)
Project Budget

Item	Estimated Cost
Construction of Sewage Collection System (see Note 1)	$11,090,000
Wastewater Treatment Plant Upgrade (see Note 2)	$2,400,000
Construction contingencies	$3,380,000
Subtotal Construction Costs	**$16,870,000**
Land acquisition (see Note 3)	$610,000
Engineering design (includes SEQRA)	$1,350,000
Engineering Construction Administration (see Note 4)	$2,030,000
Legal and Administrative (see Note 5)	$210,000
Interest During Construction (see Note 6)	$410,000
Bonding and other Financial Costs (see Note 6)	$140,000
Total Estimated Cost	**$21,620,000**

Proposed Funding Sources:

NYCDEP Conceptual Upgrade Program Funds	$ 8,000,000
Water Quality Improvement Funds	$ 9,250,000
Environmental Facilities Corp bond/grant and/or Bedford Sewer District Bonds	$ 4,370,000
Total	$ 21,620,000

Notes:

1. Please refer to Table 3, Alternative 3, page 6 of Arcadis "Town of Bedford Sewer District Feasibility Study Update Draft Preliminary Engineering Assessment" (the "Arcadis Report"). The Arcadis Report includes details of the estimated construction costs.

2. Refers to the existing wastewater treatment plant owned and operated by the NYS Department of Corrections and Community Supervision (DOCCs) for the correctional facilities it operates in Bedford Hills

3. Land acquisition for pump stations and other accessory facilities for the collection system

4. Includes bidding administration, on site construction supervision, shop drawing and change order review, and technical guidance during construction

5. Includes, among other things, legal for creation of the sewer district, agreements with Docks, sewer ordinance, IMA with County, agreements with NYC DEP

6. If ineligible for WQIP, these costs will be funded from other sources.

TECHNICAL MEMORANDUM

ARCADIS Design & Consultancy for natural and built assets

To:
Mr. Chris Burdick
Supervisor
Town of Bedford
321 Bedford Road
Bedford Hills, New York 10507

Copies:
J. Osterman, Town of Bedford
K. Winn, Town of Bedford
C. Lowe, Arcadis
A. Brooks, Arcadis

Arcadis of New York, Inc.
855 Route 146
Suite 210
Clifton Park
New York 12065
Tel 518 250 7300
Fax 518 250 7301

From:

Robert Ostapczuk, P.E., BCEE

Date:

April 22, 2016

Arcadis Project No.:

04711005.0000

Subject:

Town of Bedford Sewer District Feasibility Study Update
Preliminary Engineering Assessment

Purpose

Arcadis was retained by the Town of Bedford to prepare a feasibility study for the development of a new sewer district comprised of a subset of the areas zoned central business (CB) districts, based on previous evaluations completed in 2003 and 2011. This technical memorandum preliminarily evaluates three possible sewer district scenarios and updates the opinion of probable costs for construction and operation and maintenance (O&M) for both the collection system and the Bedford Hills Correctional Facility wastewater treatment plant (WWTP).

Background

The hamlets of Bedford Hills and Katonah in the Town of Bedford, Westchester County, New York are densely populated areas consisting of relatively well-defined, commercial and light industrial areas surrounded by single and multiple family homes and apartments. In Bedford Hills and Katonah, as in most of the Town of Bedford, wastewater is disposed of in privately owned, subsurface disposal systems. Numerous failures of these systems have been recorded, and can be expected to remain a problem for the indefinite future as small lot sizes, shallow bedrock, a seasonal high water table and other factors limit the possibilities for replacing old, undersized systems with systems built to current standards and capable of serving for an extended period of time.

The presence of failing septic systems in Bedford Hills and Katonah could constitute a threat to New York City's Croton Reservoir System, which is immediately adjacent to Katonah. Excessively well drained soils underlying the central commercial districts of the hamlets provide poor treatment to the wastewater and

allow it to percolate rapidly to the groundwater table, while shallow bedrock in the higher elevations of the hamlets provides numerous fissures and other pathways for the septic tank effluent wastewaters to reappear on the ground surface as seeps and enter the surrounding reservoirs and streams.

In addition to the subsurface disposal systems that serve most residential, commercial and light industrial properties, there are four, on-site wastewater disposal systems. These systems are located at the Bedford Park Apartments, St. Mary's of the Assumption School, the Katonah Elementary School, and Bedford Lake. Each of these systems have an existing State Pollution Discharge Elimination System (SPDES) Permit. All four WWTPs have plans to be upgraded by the NYC DEP. The construction of public sewers and a single WWTP to serve Bedford Hills and Katonah would eliminate the need for individual treatment systems at these locations, as well as protect and enhance water quality.

Besides the four on-site wastewater disposal systems, there is a WWTP, owned by the New York State Department of Corrections and operated by a private sector contract service provider, which discharges to a small tributary of the Muscoot Reservoir. Arcadis was previously retained to evaluate the WWTP at the Bedford Hills Correctional Facility and develop a map, plan, and report for a proposed sewer district to serve critical areas of the hamlets of Bedford Hills and Katonah. The results of the WWTP evaluation and the development of the proposed sewer district were presented in the report: *Sanitary Sewer Expansion and Plant Capacity Analysis*, dated July 2003. This plan included the transfer of the WWTP from the State of New York to the Town of Bedford. The WWTP SPDES permitted flow limit is 500,000 gallons per day (gpd) and the WWTP discharges an average daily flow of approximately 200,000 to 300,000 gpd (based on three years of discharge monitoring reports from 2007 to 2009). This report estimated that approximately 550,000 gallons per day (gpd) of sanitary sewage would be generated by the previously proposed sewer district, requiring an upgrade for the existing WWTP. In 2011, Arcadis further evaluated the WWTP, estimating the condition and value of the wastewater assets at the WWTP. Our findings were presented in the report: *Wastewater Asset Condition Assessment and Valuation*, dated June 2011.

A listing of the maximum daily flows permitted from these facilities under their existing SPDES Permits is shown in Table 1 below.

Table 1 - Existing Wastewater Discharges and State Pollution Discharge Elimination System Flow Limits

Facility Name	Service Area	Permitted Flow (gpd)
Bedford Park Apartments	Apartments off Rome Avenue	19,500
Katonah Elementary School	Elementary School	13,000
St. Mary of the Assumption School	Parochial School	10,000
Bedford Hills Correctional Facility Wastewater Treatment Plant	Bedford Hills and Taconic Correctional Facilities and Regional Medical Unit; I-684 Rest Area	500,000

Estimated Flows and Loads

The Town of Bedford provided Arcadis with current water usage data for individual parcels that comprise the CB districts and local facilities evaluated under the three new sewer district scenarios. These properties are identified in Figure 1 (attached). This data shows that the parcels that make up the CB

districts and the three local facilities used on average approximately 45,000 gallons of water per day in total.

Based on the water usage data provided, an estimate of the wastewater flow for these areas was calculated. Not all of the water distributed to customers will be collected in the sanitary sewer system. A portion of the water used goes to watering lawns, washing cars, and similar purposes. Typically, an average of 80 to 90 percent of the water used by customers' returns to sewage. In addition to this amount is water entering the sewer system from infiltration. The estimated flows take into account an allowance of 100 to 200 gpd per inch of pipe diameter per mile of pipe for infiltration. The estimated wastewater flows projected for the initial year of operation of the system are presented in Table 2.

Table 2 - Estimated Wastewater Flows

Sewer District Area	Low Estimate			High Estimate		
	80% Water Usage	Infiltration (100 gpd/inch-diam/mile)	Total	90% Water Usage	Infiltration (200 gpd/inch-diam/mile)	Total
CB - Area 1	560	140	700	6,30	270	900
CB - Area 2	24,800	730	25,530	27,900	1,450	29,350
CB - Area 3	6,800	180	6,980	7,650	350	8,000
Schools*	1,440	720	2,160			23,000
Apartments*	2,160	490	2,650			19,500
WWTP			200,000			300,000
Total			238,020			380,750

*The high estimate for the schools and the apartments reflects their permitted flows under their current SPDES permit.

If all three local facilities were to expand to utilize all of their wastewater capacity, the flow would increase by at least 38,500 gpd. In the event that all of these areas are combined to create a new sewer district an estimated flow of 80,750 gpd should be used for future average daily flow from the proposed sewer district. This would result in a total flow of 380,750 gpd at the WWTP.

Alternatives Evaluated

As mentioned previously, three different sewer district scenarios or alternatives were evaluated as part of this technical memorandum. This section details each of these alternatives and provides the estimated construction cost for the alternative. The different sewer district scenarios are:

- Alternative No. 1 – form a new sewer district comprised of three of the six areas zoned central business (CB) within the Town, as shown in Figure 2.
- Alternative No. 2- form a new sewer district comprised of the CB areas and one or both of the two local schools with existing SPDES permits: St. Mary's School and Katonah Elementary School, as shown in Figure 3.

- Alternative No. 3- form a new sewer district comprised of the CB areas and all, or a combination, of the three local facilities with existing SPDES permits: St. Mary's School, Katonah Elementary School and Bedford Park Apartments, as shown in Figure 4.

For each alternative, a revised preliminary collection system layout has been prepared, based on the sewer routing developed in 2003. Arcadis previously prepared an opinion of probable costs for constructing the originally proposed sewage collection system (*Sanitary Sewer Extension and Plant Capacity Analysis, July 2003)*. These costs were updated in the *Wastewater Asset Condition Assessment and Valuation* Report (June 2011). The estimated costs in this technical memorandum have been updated to reflect the current bidding environment as well as the updated quantities required, as a result of the revised preliminary collection system layouts. Costs were primarily adjusted based on the Engineering News Record (ENR) Construction Cost Index (CCI) and now reflect 2016 costs.

Alternative No. 1 – Central Business Districts

The first alternative forms a new sewer district comprised of three of the six CB Districts (shown in Figure 2) via a combination of gravity sewers, pump stations, and force mains. The three CB districts have a combined estimated flow of approximately 33,000 to 39,000 gpd. To be conservative, for the purpose of this technical memorandum, the high estimate of 39,000 gpd was used in the evaluation. This is an addition to the 300,000 gpd already flowing to the WWTP, making the total flow at the plant 339,000 gpd. To convey the flow from the CB districts, a total of 5,050 linear feet (lft) of 8-inch PVC sewer pipe is estimated with 57 manholes. As shown in Figure 2, there are four different pump stations that are required to convey this flow from the different CB districts to the wastewater treatment plant. The opinion of probable construction costs for this alternative is $9,380,000 and the annual O&M costs associated with this collection system is approximately $123,000. A detailed breakdown of these costs is found in Tables A and B in the appendix.

Alternative No. 2 – Central Business Districts and Schools

The second alternative adds the Katonah Elementary School and St. Mary's School to the sewer district described in the first alternative. For the purpose of this technical memorandum, the flows from these schools were estimated based on the permitted flows from the individual SPDES permits, resulting in an additional 23,000 gpd, or a total collection system flow of approximately 62,000 gpd between the CB districts and the schools. The WWTP would see an average daily flow 362,000 gpd. This alternative does not require the addition of another pump station; the flow is conveyed from the two schools to pump station C. This requires approximately 4,200 lft of additional gravity sewer and 16 manholes. The preliminary layout for the collection system is shown in Figure 3. As can be seen, only one additional gravity sewer trunk line would be required to collect flows from both schools. The opinion of probable construction costs for this alternative is $10,418,000 and the annual O&M costs associated with this collection system is approximately $127,000. A detailed breakdown of construction and O&M costs is found in Tables C and D in the appendix.

Alternative No. 3 – Central Business Districts, Schools, and Apartments

The third alternative adds the Bedford Park Apartments to the sewer district described in the second alternative. The Bedford Park Apartments is made up of 144 units and is permitted by their SPDES permit to discharge 19,500 gpd. This flow, in addition to the CB districts and the schools, results in a total flow of approximately 81,500 gpd. Adding the apartments to Alternative No. 2 does not add another pump station; flow is conveyed to pump station D, which is included in Alterative No. 1. In order to convey the

flow from the apartments to pump station D, approximately 2,850 lft of gravity sewer is required and 13 manholes. The preliminary collection system layout is presented in Figure 4. The opinion of probable construction costs for this alternative is $11,081,000 and the annual O&M costs associated with this collection system is approximately $130,000. Tables E and F (attached) provide a detailed breakdown of construction and O&M costs.

Wastewater Treatment Plant Upgrades

The *Wastewater Asset Condition Assessment and Valuation* report (2011) stated that the WWTP had an average daily flow range from 200,000 to 300,00 gpd. The WWTP has a permitted flow of 500,000 gpd, leaving approximately 200,000 gpd that is unused. Based on the 80,750 gpd estimated flow for the CB's, the schools and the apartments, presented in the Estimated Flows and Loads section, the WWTP would still have excess capacity. Since the WWTP can handle the flows from all three alternatives, it is not necessary to do a complete upgrade to the plant. As was identified in the 2003 and 2011 reports prepared by Arcadis, the influent Parshall flume was not operational due to hydraulic problems and needed to be upgraded. The Town of Bedford may wish to make other improvements to the WWTP to increase efficiency and improve operation of the plant, or because of safety or code reasons. It should be noted that without further evaluating the current condition of the WWTP and assessing what improvements should be completed, any estimate of cost is highly variable. However, based on work recommended by Arcadis in the previous two reports, it is estimated that upgrades to the WWTP will amount to approximately $2,400,000 with annual O&M costs estimated at $905.000. A detailed breakdown of these costs is attached at the end of this technical memorandum.

Project Costs

Construction costs are only a part of the total capital expenditures incurred in establishing a new sewer district and building a sewerage system. Other necessary capital expenditures include, but are not limited to the following;

- Engineering design costs, including mapping, conducting a soil boring program, facilities planning, design and permitting, assistance in obtaining bids, and administering the construction contracts, conducting field oversight of the work, preparation of record documents, and operation and maintenance manuals.
- Land acquisition costs including purchase costs for pumping station sites and for easements for sewers that cross privately owned property.
- Legal and financing costs including fees for assisting in the establishment of the sewer district, preparing and filing deeds and easement descriptions, underwriting bonds issued for long term financing, and interest incurred on bond anticipation notes issued to pay for construction.
- Administrative costs incurred by the Town in attending meetings, reviewing State Environmental Review Act documents, negotiating with state agencies, and similar, time and effort consuming activities.

The total cost for a project includes all of the above items plus an allowance for construction contingencies and is traditionally referred to as the "Total Project Cost". A comparison of the opinion of the Total Project Costs for each of the proposed alternatives is presented in Table 3.

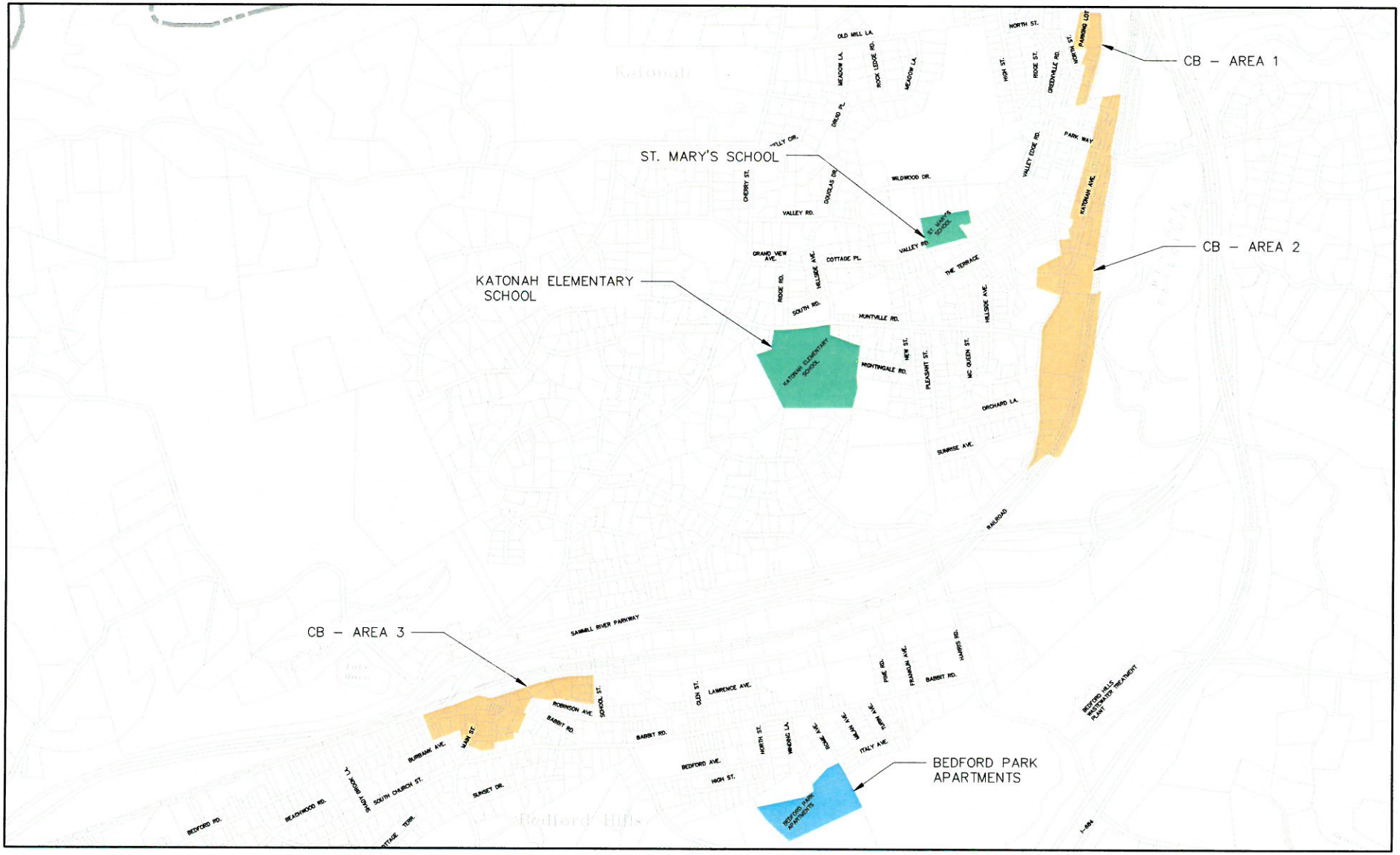
Table 3 - Comparison of Opinion of Probable Project Costs

Item	Probable Cost Alternative 1	Alternative 2	Alternative 3
Construction of Sewage Collection System	$9,380,000	$10,420,000	$11,090,000
Wastewater Treatment Plant Upgrade	$2,400,000	$2,400,000	$2,400,000
Subtotal Construction Costs	**$11,780,000**	**$12,818,000**	**$13,481,000**
Construction Contingencies @ 25%	$2,950,000	$3,210,000	$3,380,000
Land Acquisition	$530,000	$580,000	$610,000
Engineering Design	$1,180,000	$1,290,000	$1,350,000
Engineering Construction Administration	$1,770,000	$1,930,000	$2,030,000
Legal and Administrative	$180,000	$200,000	$210,000
Interest During Construction	$360,000	$390,000	$410,000
Bonding and other Financial Costs	$120,000	$130,000	$140,000
Total Opinion of Probable Project Costs* (Point Estimate)	**$18,880,000**	**$20,550,000**	**$21,620,000**
Total Opinion of Probable Project Costs* (Low Range Estimate -25%)	**$14,160,000**	**$15,412,500**	**$16,215,000**
Total Opinion of Probable Project Costs* (High Range Estimate +50%)	**$28,320,000**	**$30,825,000**	**$32,430,000**

*Exclusive of grants and financial contributions from the Department of Corrections, New York State Environmental Facilities Corporation, and New York City Department of Environmental Protection.

As shown in this table, the probable total project cost for each of the three alternatives. These figures do not take into account any grants or other financial assistance which may be available. The opinion of probable cost is consistent with an Association for the Advancement of Cost Engineering (AACE) Class 5 estimate where project definition and engineering is in the initial concept phases. AACE states that Class 5 estimates have typical accuracy range of -20 to -50 percent on the low side to +30 to +100 percent on the high side. Therefore, the table also presents a low and high range estimate to account for the typical accuracy of the point estimate at the current stage of project definition. These range estimates assume a potential project cost for 20 percent below the point estimate to 50 percent above the point estimate. It is recommended that the Town consider these ranges when developing capital program budgets. As future estimates are developed based on higher levels of project definition and reduced time between estimate development and the likely bid date, the accuracy of the estimate is anticipated to improve and the percentage of the ranges will be reduced. This opinion of probable costs also assumes that there is no cost to the Town to obtain the Bedford Hills Correctional Facility from New York State Department of Corrections.

FIGURES



User: ABROOKS Spec: AUS-NCSMOD File: G:\ACAD\PROJ\047110005.0000\005\FIGURES.DWG Scale: 1:1 SavedDate: 4/25/2016 Time: 12:32
Plot Date: Brooks, A.J.; 4/25/2016; 12:33 ; Layout: FIG. 1

ARCADIS Design & Consultancy for natural and built assets

TOWN OF BEDFORD

SEWER DISTRICT FEASIBILITY STUDY – UPDATE
PRELIMINARY ENGEERING ASSESSMENT

PROPOSED SEWER DISTRICT

SCALE: 1" = 1,000'

APRIL 2016

FIGURE 1

User: ABROOKS Spec: AUS-NCSMOD File:G:\ACAD\PROJ\047110005.0000\005\FIGURES.DWG Scale:1:1 SavedDate:4/25/2016 Time:13:05
Plot Date: Brooks, A.J.; 4/25/2016; 14:42 ; Layout:FIG. 2

ARCADIS Design & Consultancy for natural and built assets

TOWN OF BEDFORD

SEWER DISTRICT FEASIBILITY STUDY – UPDATE
PRELIMINARY ENGEERING ASSESSMENT

PROPOSED SEWER COLLECTION SYSTEM
ALTERNATIVE NO. 1

SCALE: 1" = 1,000'

APRIL 2016

FIGURE 2

ARCADIS Design & Consultancy for natural and built assets

TOWN OF BEDFORD

SEWER DISTRICT FEASIBILITY STUDY – UPDATE
PRELIMINARY ENGEERING ASSESSMENT

PROPOSED SEWER COLLECTION SYSTEM
ALTERNATIVE NO. 2
SCALE: 1" = 1,000'

APRIL 2016

FIGURE 3

User: ABROOKS Spec: AUS-NCSMOD File: G:\ACAD\PROJ\047110005.0000\005\FIGURES.DWG Scale: 1:1 SavedDate: 4/25/2016 Time: 13:05
Plot Date: Brooks, A.J.; 4/25/2016; 14:42 ; Layout: FIG. 3

ARCADIS Design & Consultancy for natural and built assets

TOWN OF BEDFORD

SEWER DISTRICT FEASIBILITY STUDY – UPDATE
PRELIMINARY ENGEERING ASSESSMENT

PROPOSED SEWER COLLECTION SYSTEM
ALTERNATIVE NO. 3
SCALE: 1" = 1,000'

APRIL 2016

FIGURE 4

User: ABROOKS Spec: AUS-NCSMOD File: G:\ACAD\PROJ\047110005.0000\005\FIGURES.DWG Scale: 1:1 SavedDate: 4/25/2016 Time: 13:05
Plot Date: Brooks, A.J.; 4/25/2016; 14:43 ; Layout:FIG. 4

TABLES

Table A - Sewer District Alternative No. 1 – Opinion of Probable Construction Cost

Description	Quantity		Unit Cost		Total
8 and 10 inch PVC Sewer	**5,050**	**lf**	**$153**	**/ lf**	**$774,000**
48-inch Precast Manholes	57		$3,873	ea.	$221,000
6-inch Service Laterals	**150**		**$1,549**	**ea.**	**$233,000**
Pump Sta. B	1		Lump Sum		$465,000
Pump Sta. B, 4-inch Forcemain	**920**	**lf**	**$124**	**/ lf**	**$115,000**
Pump Sta. C	36		Lump Sum		$620,000
Pump Sta. C, 8-inch Forcemain	**8,700**	**lf**	**$206**	**/ lf**	**$1,790,000**
Pump Sta. D	1		Lump Sum		$582,000
Pump Sta. D, 10-inch Forcemain	**1,300**	**lf**	**$201**	**/ lf**	**$262,000**
Pump Sta. E	1		Lump Sum		$427,000
Pump Sta. E, 8-inch Forcemain	**2,450**	**lf**	**$170**	**/ lf**	**$418,000**
RR and Major Highway Crossings	1,000	lf	$775	/ lf	$775,000
Grinder Pump Units	**20**		**$13,944**	**ea.**	**$279,000**
1-1/4 inch Pressure Sewer	1,200	lf	$46	/ lf	$56,000
Air Relief Structures and Valves	**4**		**$4,648**	**ea.**	**$19,000**
Valve Boxes and Valves	4		$49,579	ea.	$199,000
Rock Excavation	**10,000**	**cy**	**$175**	**/cy**	**$1,750,000**
Allowance for Utility Relocation			Lump Sum		$388,000
Probable Construction Cost					**$9,373,000.00**

Table B – Sewer District Alternative No. 1 - Estimated Collection System O&M Cost for Initial Year of Operation

Description	Quantity		Unit Cost		Total
Sewer Maintenance	1	Miles	$930	/mile	$1,000
Pumping Station Power Costs	150,000	kw-hr/yr	$0.19	/kw-hr	$35,000
Pumping Station Labor	1,400	man-hr/yr	$50	/hr	$70,000
Spare Parts and Consumables			Lump Sum		$13,000
Misc. Tools , Truck, etc.			Lump Sum		$4,000
				Total Estimated O&M Cost	**$123,000**

Table C - Sewer District Alternative No. 2 – Opinion of Probable Construction Cost

Description	Quantity		Unit Cost		Total
8 and 10 inch PVC Sewer	9,190	Lf	$153	/ lf	$1,407,000
48-inch Precast Manholes	73		$3,873	ea.	$283,000
6-inch Service Laterals	150		$1,549	ea.	$233,000
Pump Sta. B	1		Lump Sum		$465,000
Pump Sta. B, 4-inch Forcemain	920	lf	$124	/ lf	$115,000
Pump Sta. C	36		Lump Sum		$620,000
Pump Sta. C, 8-inch Forcemain	8,700	lf	$206	/ lf	$1,790,000
Pump Sta. D	1		Lump Sum		$582,000
Pump Sta. D, 10-inch Forcemain	1,300	lf	$201	/ lf	$262,000
Pump Sta. E	1		Lump Sum		$427,000
Pump Sta. E, 8-inch Forcemain	2,450	lf	$170	/ lf	$418,000
RR and Major Highway Crossings	1,000	lf	$775	/ lf	$775,000
Grinder Pump Units	20		$13,944	ea.	$279,000
1-1/4 inch Pressure Sewer	1,200	lf	$46	/ lf	$56,000
Air Relief Structures and Valves	4		$4,648	ea.	$19,000
Valve Boxes and Valves	4		$49,579	ea.	$199,000
Rock Excavation	12,000	cy	$175	/cy	$2,100,000
Allowance for Utility Relocation			Lump Sum		$388,000
				Probable Construction Cost	**$10,418,000**

Table D – Sewer District Alternative No. 2 - Estimated Collection System O&M Cost for Initial Year of Operation

Description	Quantity		Unit Cost		Total
Sewer Maintenance	2	miles	$930	/mile	$2,000
Pumping Station Power Costs	150,000	kw-hr/yr	$0.19	/kw-hr	$38,000
Pumping Station Labor	1,400	man-hr/yr	$50	/hr	$70,000
Spare Parts and Consumables			Lump Sum		$13,000
Misc. Tools , Truck, etc.			Lump Sum		$4,000
				Total Estimated O&M Cost	**$127,000**

Table E: Sewer District Alternative No. 3 – Opinion of Probable Construction Cost

Description	Quantity		Unit Cost		Total
8 and 10 inch PVC Sewer	12,040	lf	$153	/ lf	$1,844,000
48-inch Precast Manholes	86		$3,873	ea.	$334,000
6-inch Service Laterals	150		$1,549	ea.	$233,000
Pump Sta. B	1		Lump Sum		$465,000
Pump Sta. B, 4-inch Forcemain	920	lf	$124	/ lf	$115,000
Pump Sta. C	36		Lump Sum		$620,000
Pump Sta. C, 8-inch Forcemain	8,700	lf	$206	/ lf	$1,790,000
Pump Sta. D	1		Lump Sum		$582,000
Pump Sta. D, 10-inch Forcemain	1,300	lf	$201	/ lf	$262,000
Pump Sta. E	1		Lump Sum		$427,000
Pump Sta. E, 8-inch Forcemain	2,450	lf	$170	/ lf	$418,000
RR and Major Highway Crossings	1,000	lf	$775	/ lf	$775,000
Grinder Pump Units	20		$13,944	ea.	$279,000
1-1/4 inch Pressure Sewer	1,200	lf	$46	/ lf	$56,000
Air Relief Structures and Valves	4		$4,648	ea.	$19,000
Valve Boxes and Valves	4		$49,579	ea.	$199,000
Rock Excavation	13,000	cy	$175	/ cy	$2,275,000
Allowance for Utility Relocation			Lump Sum		$388,000
Total Construction Cost					**$11,081,000**

Table F – Sewer District Alternative No. 3 - Estimated Collection System O&M Cost for Initial Year of Operation

Description	Quantity		Unit Cost		Total
Sewer Maintenance	2.5	miles	$930	/mile	$3,000
Pumping Station Power Costs	170,000	kw-hr/yr	$0.19	/kw-hr	$40,000
Pumping Station Labor	1,400	man-hr/yr	$50	/hr	$70,000
Spare Parts and Consumables			Lump Sum		$13,000
Misc. Tools , Truck, etc.			Lump Sum		$4,000
				Total Estimated O&M Cost	**$130,000**

Table G - Wastewater Treatment Plant Upgrade – Opinion of Probable Construction Cost

Description	Quantity	Unit Cost	Total
General Conditions	Lump Sum		$218,000
Influent Flow Meter	Lump Sum		$86,000
Influent Screens	Lump Sum		$137,000
Primary Clarifiers	Lump Sum		$171,000
Electrical Building	500 sqft	$360 /sqft	$180,000
Demolition Work	Lump Sum		$284,000
Electrical Upgrade	Lump Sum		$852,000
SCADA Upgrade	Lump Sum		$284,000
Control Building Renovation	Lump Sum		$142,000
Maintenance of Flow	Lump Sum		$46,000
		Total Probable Construction Cost	**$2,400,000.00**

Table H - Opinion of Probable Annual Operation and Maintenance Costs for the WWTP

Electrical Costs	Flow (MGD)	Electrical Consumption (1000 kWh/yr)	Unit Cost ($/kWh)	Annual Cost ($/yr)
Influent Pumps	0.38	20	$0.19	**$3,800**
Trickling Filter Feed	0.38	20	$0.19	**$3,800**
Membrane Header	0.38	10	$0.19	**$1,900**
Membrane Feed	0.38	50	$0.19	**$9,500**
RBCs	0.38	261	$0.19	**$49,600**
Misc. Plant Process	0.38	300	$0.19	**$57,000**
			Subtotal	**$125,600**

Chemical Costs	Average Dosage (mg/l)	Average Flow (MGD)	Percent Solution (%)	Unit	Average Usage (unit/day)	Unit Cost ($/unit	Annual Cost ($/yr)
Alum	206	0.38	N/A	lbs.	640	$0.19	**$45,800**
Polymer	5	0.38	N/A	lbs.	16	$4.84	**$27,700**
Sodium Carbonate	10	0.38	N/A	lbs.	31	$0.25	**$2,900**
CIP							
Sodium Hydroxide	N/A	0.38	N/A	lbs.	4	$0.25	**$400**
Sodium	N/A	0.38	12.0%	gal.	0.4	$2.02	**$320**
Citric Acid	N/A	0.38	N/A	lbs.	3	$1.29	**$1,420**
					Subtotal	**$78,500**	

Personnel Costs	No.	Personnel Salary ($/yr)	Benefits ($/yr)	Annual Cost ($/yr)
Chief Operator	1	$75,000	$37,500	**$112,500**
Shift Operator	1	$60,000	$30,000	**$90,000**
Maintenance	1	$50,000	$25,000	**$75,000**
Laborer	1	$45,000	$22,500	**$67,500**
			Subtotal	**$345,000**

Miscellaneous Costs	Basis of Cost	Annual Cost ($/yr)
Equipment Parts	2.5% of Total Equipment Value of $2,000,000	**$50,000**
Service Contracts	10% of Electrical, Chemical and Personnel Costs	**$55,000**
Vehicles	2 Vehicles @ 20,000 miles/yr and $0.50/mile	**$20,000**
Administration	1% of Electrical, Chemical and Personnel Costs	**$5,000**
Sludge Hauling	110,000 gallons per month @ $0.12 per gallon	**$198,000**
Miscellaneous	5% of Electrical, Chemical and Personnel Costs	**$27,0000**
	Subtotal	**$356,000**

Summary	
Annual O&M Budget	**$905,000**