Delaware Engineering, DPC

Memo

To: Mayor Timothy Collopy

From: William Bright

cc: Robert Flores, Ablen Amrod, Village of Millbrook

Date: 9/1/2021

Re: Nine Partners Rd. Watermain Extension

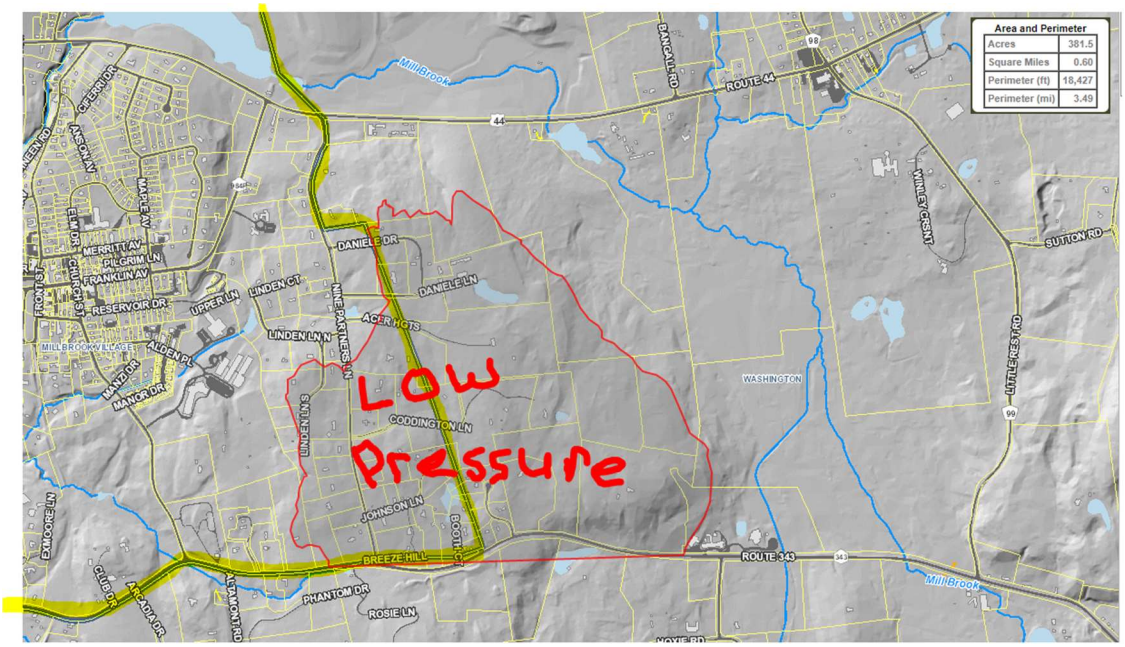
Mayor Collopy

I have reviewed all of the 2011 reports that are posted on the Village web site; because the reports are 10 years old most of the pricing calculations/assumptions in all of the reports are not correct. I believe we should meet to go through the details. Watermain extensions do not qualify for the WIIA grant program, the need would have to be related to a water quality issue for the homes being served.

Below is the Nine Partners Rd. budget from the 2011 report for supplying the additional 6,100' of 8" water main. Using the engineering assumptions of the report and recasting the unit costs to actual construction costs today the price has increased
In the report there is a requirement for a booster station because the elevation at the top of Nine Partners is too high when compared to the Village storage tank to deliver 35 PSI to the second floor as per NYS regulations. The booster station may be required to have an emergency generator to provide water when the power is interrupted.

Analysis of the potential service area high point elevation is 877' worst case; to provide 35 PSI to the second floor the elevation increases the peak head to 968'. Here is a map showing all property adjacent to Nine Partners with elevation >755', these properties will have pressure <35 PSI on the second floor and some of the properties required pumping just to get water to the property. As stated, the pressure required is >35 PSI on the second floor and will have to be included in the pressure zone downstream from a pressure booster station. There is a question about providing fire flow to the higher elevations and sizing the booster station. The report states " **Dual in-line booster pumps will be installed on Nine Partners Lane. The booster pumps have been sized to provide for the design pumping rates at the calculated Total Dynamic Head (TDH) for the pumps. The design pumping rate of 60 GPM for each pump was calculated as meeting the peak demand for the 39 residents in the Nine Partners Lane area that are at an elevation above 675 feet** " The flow rate of 60 GPM does not meet National Fire Protection Agency (NFPA) for detached housing, the minimum recommended fire flow is 700 GPM for 2 hours. The question is does the Village follow NFPA fire code in the 6,100' water main extension, if the Village has adopted NFPA code than it is likely the fire pump will be required.

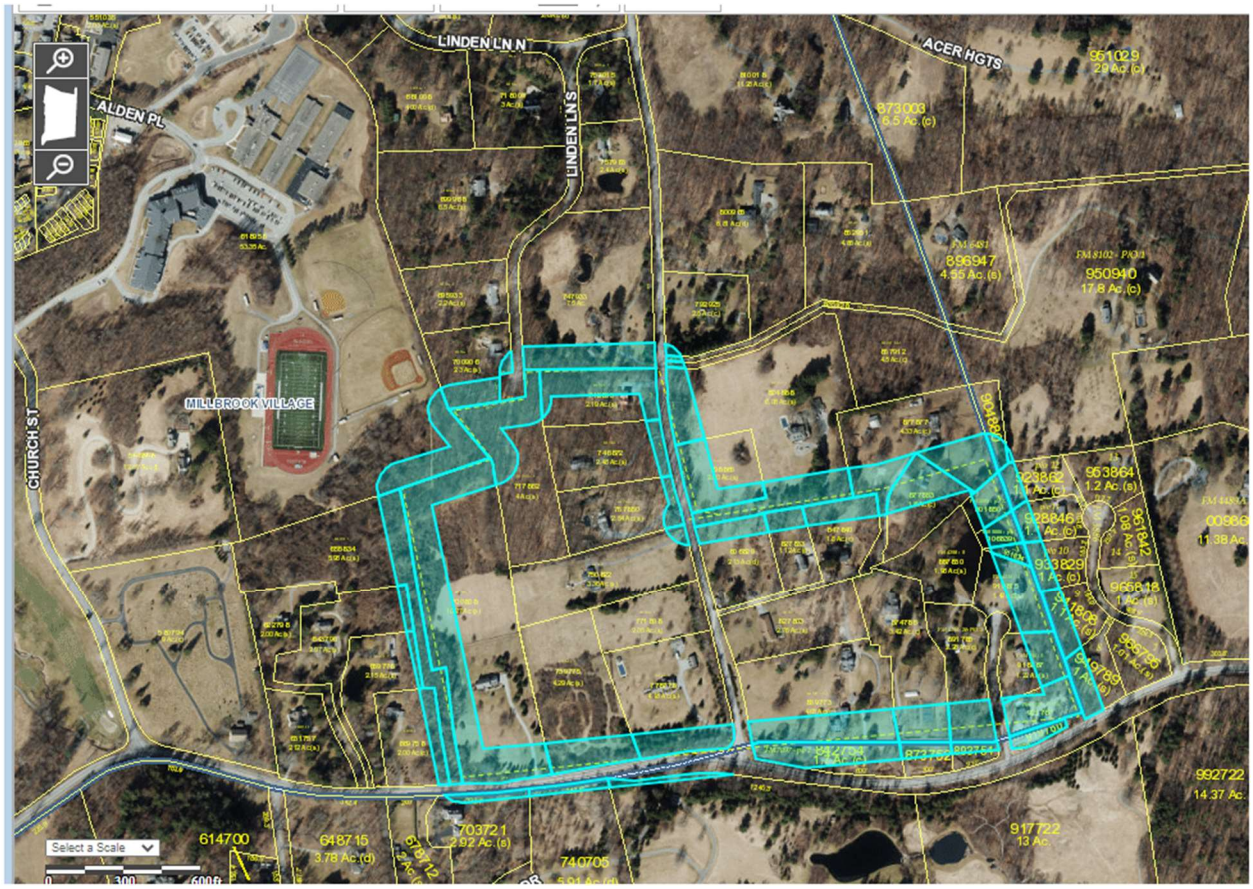
We will have to perform a flow analysis on the watermain at the first fire hydrant from Rt-44 to determine what the flow and pressure capacity is as this will determine the design of the booster station. The use of a hydro-pneumatic tank placed at the high point on Nine Partners Rd. may help to reduce the pump run times and cost of operation. There is a question about the actual water volume needed, the report states 13,650 GPD is required to meet the average day flow, this is based on a mix of 3 & 4 bedroom homes, if they are all 4 bedroom or more the flow increases to >17,000 GPD; these questions will need to be addressed in the engineering/design report.



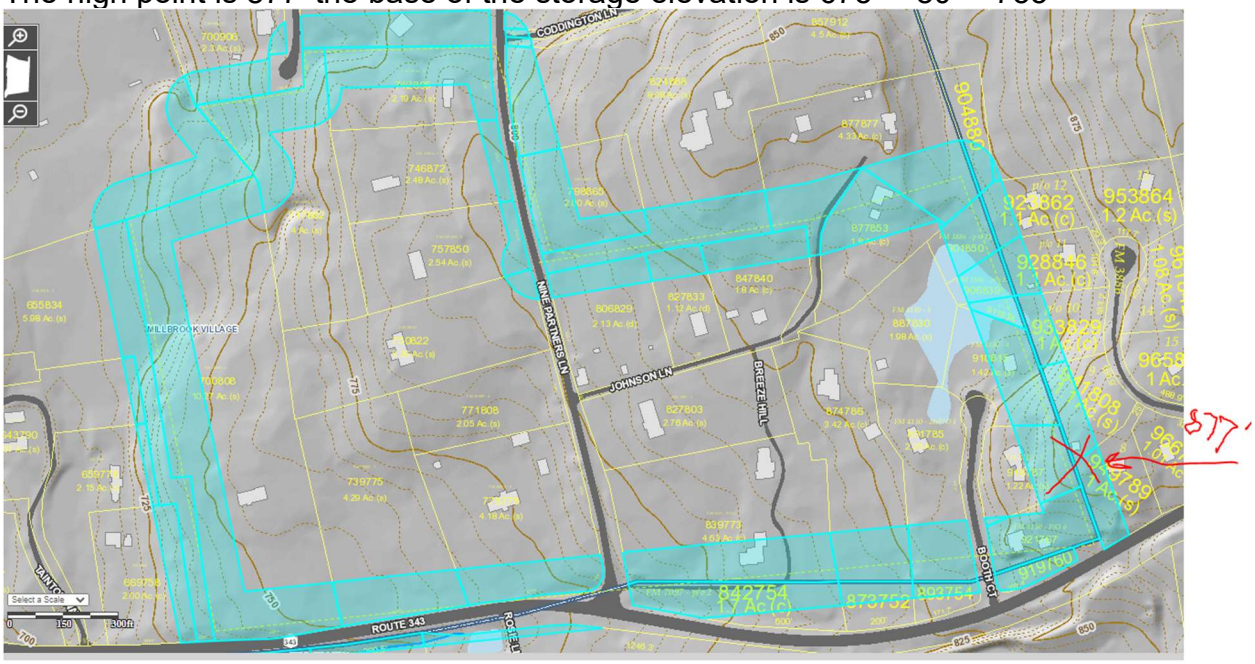
Nine Partners Watermain Extension Budget

Description	Units	$/Units	Quantity	Cost	units	DRAFT Revised Costs
Water Distribution System	L.F.	$ 75.00	6100	$ 457,500.00	$250 per ft.	$ 1,525,000.00
Rock Contingency on Distribution	%		40%	$ 183,200.00		$ 150,000.00
Booster Pump	Each	$ 120,000.00	1	$ 120,000.00		$ 300,000.00
Hydrants	Each	$ 2,500.00	12	$ 30,000.00	included	$ -
Valves	Each	$ 1,000.00	11	$ 11,000.00	included	$ -
Laterals	Each	$ 1,000.00	39	$ 39,000.00	included	$ -
Asphalt	L.F.	$ 50.00	750	$ 37,500.00		$ 50,000.00
Subtotal				**$ 878,200.00**	**subtotal**	$ 2,025,000.00
Construction Contingency	%		15%	$ 133,800.00	15%	$ 303,750.00
Construction Total				**$ 1,012,000.00**	**Total**	$ 2,328,750.00
R.O.W. Acquisition	L.F.	$ 20.00	0	$ -		
Subtotal				**$ 1,012,000.00**		
Egineer Design, Approval &						
Construction Support	%		15%	$ 152,000.00	15%	$ 349,312.50
Legal & Financial	%		5%	$ 51,000.00	7.50%	$ 174,656.25
Maximum Amount to be bonded				**$ 1,215,000.00**	**Preliminary total**	**$ 2,852,718.75**

These appear to be the properties that do not have public water as per parcel access; this needs to be confirmed in the field.



The high point is 877' the base of the storage elevation is 675’ + 80’ = 755’



Nine Partners Rd. expansion report:

Task II of the Local Government Efficiency Grant Program, provided by the New York State Department of State is to develop engineering, capital and operating budgets and procurement documents for the potential extension of water and sewer service to the following areas:

- Nine Partners Lane: Water and Sewer
- Former Bennett College Site: Water and Sewer
- Rodrigo Knolls: Water and Sewer
- Horseshoe: Water and Sewer
- Former County Infirmary Site: Water and Sewer

These areas are shown on the composite map located on page 4 of this document.

The work performed to establish the basis for the following reports are further developed and specified in the preliminary design and procurement documents that have been submitted under separate cover.

Expansion Area	Estimated Total Demand (GPD)	Estimated Maximum Probable Capital Cost
Nine Partners Lane Area: Water	13,650	$1,215,000
Nine Partners Lane Area: Sewer	11,550	$790,000
Former Bennett College Site: Water	30,000	$0
Former Bennett College Site: Sewer	30,000	$1,080,000
Rodrigo Knolls Area: Water	10,850	$648,000
Rodrigo Knolls Area: Sewer	8,050	$675,250
Horseshoe Road Area: Water	48,600	$2,706,000
Horseshoe Road Area: Sewer	25,200	$2,353,400
Former County Infirmary Site: Water	800	$0
Former County Infirmary Site: Sewer	800	$135,000

1.0 INTRODUCTION

The purpose of this report is to present findings and engineering data pertinent to extension of water service to residents in the Nine Partners Lane area that are currently un-served. This report also provides a summary of the basis of design for the extension of water service; technical specifications and preliminary design drawings have also been prepared and are presented separately.

1.1 Project Service Area

The proposed Nine Partners Lane area to be served covers approximately one hundred and forty-nine (149) acres and is located entirely within the Village of Millbrook. The service area is comprised of thirty (39) residential parcels along Nine Partners Lane, Linden Lane, and Linden Court.

The area is currently served by individual water wells and sub-surface sewage disposal systems and therefore these residents currently pay no Village of Millbrook water consumption charge.

The service area is located at an elevation which is unable to be provided adequate pressure from the existing system and is therefore proposed to be served by a boosted pressure zone connected to the existing water main located on Nine Partners Lane.

1.2 Project Description

The existing storage and supply capacity of the Village of Millbrook water system is adequate to provide for the water demands and storage capacity required to serve the Nine Partners Lane area.

The proposed distribution system consists of an in-line booster pump station, approximately 6,100 linear feet of 8-inch cement lined ductile iron (CLDI) water main, and 39 new residential services (see Figure 2). The distribution system will be connected to the existing Village of Millbrook distribution system which terminates on Nine Partners Lane.

2.0 WATER SYSTEM FACILITIES

2.1 Projected Water Demands

The quantity of water required to meet existing and future domestic water usage is based on the following assumed design multipliers:

Flow is calculated at 110 gallons per bedroom.
3 bedroom = 330 GPD
4 bedroom = 440 GPD

Individual houses (3-4 bedroom) = 350 gallons per day (gpd)

The projected average day water demand for the 39 residential properties within the proposed are to be served is as follows:

Projected Single-Family home water demand = 13,650 gpd

The projected maximum day water demand is established at 27,300 gpd using a peaking factor of 2.

4 bedrooms using 39 homes the total flow will be 17,160 GPD x 2= 34,320 GPD. Plus, fire flow if required

2.2 Water Supply and Storage Facilities

The Village of Millbrook's existing water supply and storage facilities have been identified as being adequate to supply the proposed extension area. The Village's permitted water supply is 374,400 gpd. Based on historical usage, the systems average daily usage is 186,000 gpd and the calculated peak usage is 287,500 gpd. The Village's peaking factor between peak usage and average usage is calculated to be 1.5. Using this peaking factor to be applied to the expanded system results in a calculated peak usage of (186,000+13,650) *1.5 = 299,475 gpd which is approximately 75,000 gpd less than the permitted water supply.

To provide water storage capacity equal to the average daily consumption of the proposed Water System, approximately 199,650 gallons of storage capacity is needed. While the existing Village Storage Tank is reported to be a 500,000 gallons storage tank, it is estimated that only 50% of the capacity of the storage tank is usable for operating purposes to provide a minimum of 20 psi under all operating conditions. Therefore the 250,000 gallons of storage capacity exceeds average day demand.

2.3 Water Distribution System

The distribution system consists of approximately 6,100 linear feet of 8-inch cement lined ductile iron water main, with approximately 39 new services. Installation of the water mains will involve standard earthwork, piping, and construction techniques. As part of the water system construction, individual service taps consisting of a minimum ¾ inch curb stop and curb box will be installed and the services will be dead ends at the approximate parcel property line. From there, individual property water service lines are to be installed by the property owner in conformance with the Village of Millbrook requirements.

Throughout the distribution system, hydrants are shown on detail plan sheets at intervals not exceeding 600 feet and at all high points. Valves are shown on plan sheets at intervals not exceeding 800 feet and at all water main intersections. The hydrants will be utilized to periodically flush the water distribution system, and the valves will be used to isolate portions of the system for flushing and maintenance. Based on the available fire flow storage capacity the hydrants within the extension area are anticipated to be fire flow rated. The local Fire Department will be made aware of the available fire flow.

2.4 Water System Booster Pumps

Does not address fire flow

Dual in-line booster pumps will be installed on Nine Partners Lane. The booster pumps have been sized to provide for the design pumping rates at the calculated Total Dynamic Head (TDH) for the pumps. The design pumping rate of 60 GPM for each pump was calculated as meeting the peak demand for the 39 residents in the Nine Partners Lane area that are at an elevation above 675 feet. The Total Head (225 feet) was derived as providing a minimum of 35 psi (80 feet) to the highest house served (elevation 900 feet) and then subtracting the elevation of the storage tank (elevation 760 feet). The appropriate pump curves were then entered for capacity vs. TDH for selection of the appropriate pumps. The pump selected will provide a minimum of 35 psi to the highest house served.

3.0 PROPOSED METHOD OF OPERATION

Operation of the water system facilities described above will involve the distribution of potable water from the Village Water System, individually metered to each user included in the extension area. Required minimum and maximum distribution system operating pressures will be maintained. Water samples will be collected and analyzed, and operating reports will be prepared by the Village Water System operator as required by Part 5 of the New York Codes, Rules and Regulations, New York State and Dutchess County Health Department requirements or other applicable standards and regulations.

4.0 OPINION OF MAXIMUM PROBABLE COST TO CONSTRUCT THE PROPOSED WATER SYSTEM EXTENSION

4.1 Opinion of Maximum Probable Costs

The cost to construct the proposed Water System extension will include costs related to the following: installation of new water mains in newly served areas of the Village; installation of a dual in-line booster pump station, installation of approximately 39 service connections; engineering, survey, legal and financial services. The evaluation of costs is based on the conceptual water main layout that has been developed prior to any regulatory review. The conceptual layout shows the water mains to be within Village Road R.O.W., requiring no easements. These costs are summarized and included in the following table.

Description	Units	$/Units	Quantity	Cost
Water Distribution System	L.F.	$ 75.00	6100	$ 457,500.00
Rock Contingency on Distribution	%		40%	$ 183,200.00
Booster Pump	Each	$ 120,000.00	1	$ 120,000.00
Hydrants	Each	$ 2,500.00	12	$ 30,000.00
Valves	Each	$ 1,000.00	11	$ 11,000.00
Laterals	Each	$ 1,000.00	39	$ 39,000.00
Asphalt	L.F.	$ 50.00	750	$ 37,500.00
Subtotal				**$ 878,200.00**
Construction Contingency	%		15%	$ 133,800.00
Construction Total				**$ 1,012,000.00**
R.O.W. Acquisition	L.F.	$ 20.00	0	$ -
Subtotal				**$ 1,012,000.00**
Egineer Design, Approval &				
Construction Support	%		15%	$ 152,000.00
Legal & Financial	%		5%	$ 51,000.00
Maximum Amount to be bonded				**$ 1,215,000.00**

See Revised cost

4.2 Maximum Probable Cost to Be Bonded

With the above opinion of probable cost, the maximum probable cost to be funded will be $1,215,000.

5.0 PROJECTED REPAYMENT SCHEDULES AND FINANCIAL FEASIBILITY

5.1 Funding Cost and Capital

The Village of Millbrook is investigating various methods of funding which are described in a separate document.

6.0 CONSUMPTION CHARGE

The current Village of Millbrook water consumption charge is $2.99 per 1,000 gallons. Based on NYSDEC design usage multipliers, an average single-family house is conservatively estimated to use 350 gallons per day, which is equal to 31,938 gallons per quarter, or 127,750 gallons per year. This would result in a quarterly water consumption bill of $94.49, which would equate to $381.97 per year.

7.0 TOTAL COST TO AVERAGE SINGLE FAMILY HOUSE

The total yearly cost for an average single family will be equal to the yearly cost of the funding option selected by the Village plus the cost for water estimated to be used in a year. A single-family house is the typical benefited property in the Village.

The funding cost to a typical single family residential parcel is described in a separate document. In Section 6.0, the cost for the use is calculated to be $381.97 per year.

In addition to the above-described costs for capital and usage, each single-family house will be subject to a one-time cost for connecting their home to the service connection to be installed by the Village at their property line. This work is to be contracted directly by each parcel owner. The work for an average single-family house will generally include installation of a ¾ inch meter, yoke and double check valve, and of installation of ¾ inch K-copper water service line from the property line to the house. The opinion of probable cost for purchase of the meter is $250, and for installation of the service line is approximately $25 per linear foot.

Nine Partners Rd. homes are of significant distance from the road, ¾" service lines will not work because of friction loss. A 500' run will require a 1.5" diameter pipe, >800' is 2" pipe. The cost is $50/ft.

8.0 REQUIRED APPROVALS AND OTHER ACTIONS

To extend service, the Village will require the following approvals from the noted agencies:

Village of Millbrook Board of Trustees:

- State Environmental Quality Review
- Borrowing Resolution to construct water system extension
- If required, acquisition of easements through private lands by agreements or eminent domain for distribution system

Dutchess County Department of Health:

- Approval of Engineering Plans and Specifications for Facilities

New York State Department of Environmental Conservation (NYSDEC):

- Storm Water Quality

Office of the State Comptroller

- Financial Approval of Borrowing

Completed or unnecessary - ➡

VILLAGE OF MILLBROOK, NY
Impact of Expansions & Improvements on Cost to Avg. Household
Rate Study: Status Quo Capital Improvements
Prepared By: R.S. Lynch & Company

Water	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Valve Replacement Program	$ 36,557.00	$ 35,000.00	$ 35,000.00	$ 35,000.00	$ 35,000.00
Hydrant Replacement Program	$ 2,500.00		$ 5,000.00	$ 20,000.00	
Hand Held and Software upgrade	$ 15,000.00				
Backup Generator		$ 30,000.00			
Water Meter Replacement			$ 275,000.00		
Water Tank Replacement			$ 725,000.00		
GUIDI Filtration System			$ 200,000.00		
Valve Replacement Program					
Turbine Pump and Motor					$ 50,000.00
Annual Totals	**$ 54,057.00**	**$ 65,000.00**	**$ 1,240,000.00**	**$ 55,000.00**	**$ 85,000.00**

Sewer	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Inflow and Infiltration Abatement	$ 31,000.00	$ 31,414.00	$ 32,412.00	$ 32,885.00	$ 31,000.00
Other	$ 4,700.00				$ 6,885.00
Chlor/Dechlor Project	$ 250,000.00				
Energy Effeciency Study		$ 5,000.00			
Preliminary Plant Improvement Study			$ 5,000.00	$ 5,000.00	
Overflow Retention Basin					$ 1,000,000.00
Annual Totals	**$ 285,700.00**	**$ 36,414.00**	**$ 37,412.00**	**$ 37,885.00**	**$ 1,037,885.00**

Page 29 of 29 6/15/2011 2:29 PM