VOLUME I OF I

PRELIMINARY ENGINEER'S REPORT

COMMUNITY WASTEWATER MANAGEMENT PROGRAM
FOR THE

HAMLET OF SHANDAKEN

TOWN OF SHANDAKEN
ULSTER COUNTY, NEW YORK

New York City Watershed Memorandum of Agreement (MOA)
Identified Community No. 18

DRAFT ISSUED December 31, 2015
FINAL ISSUED JUNE 2017

A Program of the Catskill Watershed Corporation

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AMENDMENT #1

to the
PRELIMINARY ENGINEER'S REPORT
COMMUNITY WASTEWATER MANAGEMENT PROGRAM
for the
Hamlet of Shandaken
Town of Shandaken
Ulster County, New York

December 2, 2016

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PRELIMINARY ENGINEER'S REPORT
COMMUNITY WASTEWATER MANAGEMENT PROGRAM
for the
Hamlet of Shandaken
Town of Shandaken
Ulster County, New York

December 2, 2016

Septic Maintenance District (SMD) – Option 1 – On-Site Septics and Remotes

The Draft Preliminary Engineer's Report (Draft PER) of December 31, 2015 concluded that a Septic Maintenance District (SMD) would work for the Hamlet of Shandaken because all occupied (fifty-five (55)) and available potentially buildable vacant (five (5)) properties could be served by various types of on-site systems, including on-site systems with individual remote leach fields for nineteen (19) properties of the total sixty (60) properties. Vacant sites were identified within and adjacent to the proposed service area that could host remote individual leach fields (see Draft PER pages 18-20, 24-27, and 29-30).

The Draft PER therefore concluded that an SMD was the recommended option with a proposed endowment of $6.770M. The proposed endowment was based on constructing twenty (20) systems in the first year and constructing one (1) system per year every year after to replace all 60 systems once. The endowment included a 3.33% inflation of estimated capital and annual O&M costs over 41 years with investment returns at 2%.

SMD – Option 1 – On-Site Septics and Remotes Summary of Wastewater Treatment with Total Project Costs and O&M Costs	
TOTAL CONSTRUCTION* =	$ 4,970,000
LAND ACQUISITION =	$ 500,000
O&M ENDOWMENT* =	$ 1,300,000
TOTAL COST	**$ 6,770,000**
O&M Cost (Yearly) for Remote and On-Site Septic Systems	$ 24,000

** Equals 3.33% inflation of estimated capital and annual O&M costs over 41 years with investment returns at 2%, based on building 20 systems in year one (1) and then one (1) system per year to replace all 60 systems once.*

Regulatory Input

The Draft PER was submitted to the Catskill Watershed Corporation (CWC) and the New York City Department of Environmental Protection (NYCDEP) for review and discussion. Subsequent meetings focused on attempting to further evaluate and assess the details of a Septic Maintenance District for the Hamlet of Shandaken.

Subsequent to the initial discussions, CWC, NYCDEP, and Lamont Engineers were unable to agree to a final conclusion for the Hamlet of Shandaken. As a result, a meeting was held on September 27, 2016 at CWC with the NYCDEP Deputy Commissioner, CWC, and Lamont Engineers to try and work out a solution. After review and discussion of the Draft PER, there was a consensus that a simpler solution was available for the nineteen (19) properties that required individual remote leach fields. Rather than having multiple separate individual sewage force mains to individual remote leach fields, there was the potential for treating wastewater from groups of properties by means of cluster septic systems. The grouped properties could be served by a single sewage force main rather than individual sewage force mains for each property. It was agreed by all that a solution would be worked out to find a way to have cluster septic systems for the nineteen (19) properties and still utilize an endowed O&M and capital fund with no initial user fee (The Town of Shandaken insists on an SMD type solution with no initial user fee for any property located within the Shandaken CWMP proposed service area).

SMD – Option 2 – On-Site Septics and Clusters

As a result of the September 27th meeting, Lamont Engineers further evaluated options for the nineteen (19) properties. It was determined that the wastewater from the nineteen (19) properties could be collected and conveyed via a Septic Tank Effluent Pump (STEP) system and treated on Sites A, B, and C by means of shallow cut-and-fill absorption beds (cluster system). With a STEP system, preliminary treatment of the wastewater will occur in the septic tanks located at each property. Each septic tank would be equipped with an effluent filter to minimize the solids entering into the STEP collection system. Because of the minimal solids in the influent to the cluster systems, additional primary settling tanks are not required. The STEP pump and controls for each residence would be powered by the existing private residential power supply.

At the cluster systems, final treatment and disposal will occur through shallow cut-and-fill absorption beds. As described in Section 8 of the Draft PER, preliminary soil testing has been performed on Site A. The results of the three (3) percolation tests on Site A ranged from 3 to 6 minutes per inch. More soil testing will be needed for the final design. The NRCS soil survey indicates that the soils on each site are the same. The soils on Sites A, B, and C are typical of soils found and used for subsurface systems in other CWMP communities, where cut-and-fill systems have generally been required. Although the soil testing performed on Site A is favorable to a septic system, more testing is required, and for that reason and for the purposes of this study, it will be assumed that the cluster systems will need to be constructed with shallow cut-and-fill absorption beds.

The cluster systems on each site will consist of an absorption bed dosing pump station, valve/meter vault, and shallow cut-and-fill absorption beds. As required on other CWMP

project subsurface treatment systems, the subsurface system will be constructed in 3 sections each capable of handling 50% of the design flow and will be dosed with a pressure distribution system allowing for long periods of rest for each section. A reserve area will also be provided capable of accepting 50% design flow. The application rate of the absorption beds will be 0.5625 gpd/sf (0.6 gpd/sf for a fill with a 30 minute percolation rate, reduced by 25% for using absorption beds and then increased by 25% for constructing 150% of the required absorption area). Also, a single 200 sqft building will be provided for the SMD to store equipment and spare parts and to provide a space for the operator to do paperwork and perform maintenance duties. Odor control will also be provided where necessary.

Please see attached drawing labeled Preliminary STEP Layout to Cluster Septic System. This drawing depicts the preliminary layout of the STEP system and the preliminary layout and design information for the cluster septic systems. Design of each of the cluster septic system sites are as follows:

Site A – Serves 11 properties with an average daily flow of 5,225 gallons.
Site B – Serves 5 properties with an average daily flow of 2,375 gallons.
Site C – Serves 3 properties with an average daily flow of 1,425 gallons.

The project will require land acquisition and easements necessary to operate and maintain the STEP and Cluster Systems for the nineteen (19) properties.

The wastewater solution for the other forty-one (41) properties with on-site septic systems remains the same as outlined in the Draft PER.

It is assumed that the initial project for the Hamlet of Shandaken will include a capital project for constructing the STEP and cluster systems for the nineteen (19) identified properties. After the initial project, it is estimated that the on-site septic systems for the other forty-one (41) properties will be replaced at a rate of one (1) per year until all septic systems have been replaced.

Please see attached Opinion of Probable Cost Estimate Breakdown – On-Site Systems and Cluster Systems in a Septic Maintenance District.

SMD – Option 2 – On-Site Septics and Clusters Summary of Wastewater Treatment with Total Project Costs and O&M Costs	
TOTAL CONSTRUCTION* =	$ 5,669,000
LAND ACQUISITION =	$ 500,000
O&M ENDOWMENT* =	$ 2,410,000
TOTAL COST	**$ 8,579,000**
O&M Cost (Yearly) for Cluster and On-Site Septic Systems	$ 45,000

** Equals 3.33% inflation of estimated capital and annual O&M costs over 41 years with investment returns at 2%, based on building cluster systems for nineteen (19) properties in year one (1) and then one (1) on-site septic system per year to replace all 60 systems over a 41 year period.*

The O&M Cost (yearly) includes the cost of the operator to administer and manage the system, monitor the systems, keep the books, pump out the septic tanks on a regular basis, check and clean the effluent filters on the septic tanks, pay for utility charges associated with the cluster systems, complete minor repairs to the systems and required maintenance on the pretreatment systems, including servicing pumps as necessary. Any needed major repairs to the systems would come out of the capital fund.

The operation and maintenance of the septic systems will be capitalized as part of the Septic Maintenance District capital fund. The money allotted to the O&M fund will be invested by the Town at an assumed average return of 2%. The income gained each year from this fund will be used for operation and maintenance of the systems within the Septic Maintenance District. Since the operation and maintenance will be subsidized by the return on the investment of the O&M fund, it will be the decision of the community to determine if individual properties will be charged an annual fee.

Conclusion

Based on our experience with community septic systems in the watershed we have subsequently reviewed the design details that have been required for such facilities by the applicable regulations and by NYCDEP engineering staff.

While the change from remote leach fields to clustered septic systems reduces the number of force mains, clustered septic systems will likely include the following additional requirements:

1. 100% reserve area
2. Construction of 150% of the cut and fill absorption beds so that 50% of them can be in rest mode at all times.
3. Three (3) absorption bed dosing pump stations and appurtenances.
4. A part time operator to oversee the more complicated pumping distribution and dosing systems.
5. Utility shed for storage of equipment and spare parts.
6. Additional $1.1M in endowment for the cluster system O&M.

These requirements will add significant costs to the project as indicated in the attached cost estimates.

At the time of the meeting with the Deputy Commissioner, the proposal for the remote leach fields was thought primarily to address the community and the city preference for an SMD, and the assumption that clusters would require a sewer district with annual O&M charges to residents and subsidy from NYCDEP. Through a more detailed review of the probable requirements for cluster systems for the problematic lots, it was discovered that the idea of remote leach fields also reduces substantially the facilities required to serve those lots, compared to cluster systems, despite the multiple force mains. The cost of clusters is substantial, $8.58M vs $6.77M.

There are some advantages to the clustered systems despite the increased cost. The clustered systems, especially with the reserve area and resting beds, are a more robust solution. And in the future there is a potential that if metering reveals much lower actual sewage flows as compared with design flows, it may be possible for the community to allow growth on the lots served and even to serve more lots with the clusters.

Unless NYCDEP engineering and NYSDEC Region 3 would agree to substantial relaxation of the usual requirements for community septic systems, it is concluded that the remote leach fields represent the cheapest and simplest effective solution for the Shandaken CWMP. Of course, as the remote leach field option is innovative, the NYCDEP engineering and NYSDEC Region 3 may require additional elements that have not been incorporated into the preliminary design of that option such as resting beds and 100% reserve areas. Such elements have not been included in the preliminary design because the regulatory positon regarding improvement of existing on-site systems has always been to provide the best possible solution given existing conditions and site constraints.

Ultimately the wastewater solution that is selected for the Shandaken CWMP will need to satisfy the concerns for all involved.

Other Revisions to the Draft PER

In addition to the On-site Septic System and Cluster System option evaluated above, there are also some additional changes that need to occur throughout the Draft PER. These changes amend the Draft PER as follows:

1. Section 3.2.a. should be replaced with the following paragraph:

"Since the Hamlet of Shandaken has no centrally managed sewer system, wastewater system records are scarce. NYCDEP and the CWC were contacted to obtain any information on past or current reports of failures of septic systems in the Hamlet of Shandaken. See Exhibit 3.2.a.A for a map indicating the lots in the Shandaken Planning Area with known septic failures or violations based on information obtained from the CWC and NYCDEP. There are twenty-four (24) documented failures in the Planning Area. Some of the properties identified have participated in the CWC Septic System Program. Although, some of these properties have participated in the CWC Septic System Program, many of these systems are being managed where only portions of their septic system have been repaired or replaced. Very few properties within the EFC service area have had complete replacements of their septic system. Systems that have been repaired or replaced through the CWC Septic System Program only comply with current standards to the extent possible. Most of the managed septic systems cannot meet the current standards and/or are still failing but for on-going septic pump-outs reimbursed through CWC. The managed septic systems are awaiting a permanent solution to their various problems through the CWC Community Wastewater Management Program."

2. Please find enclosed revised Exhibit 3.2.a.A – Septic Failures Map

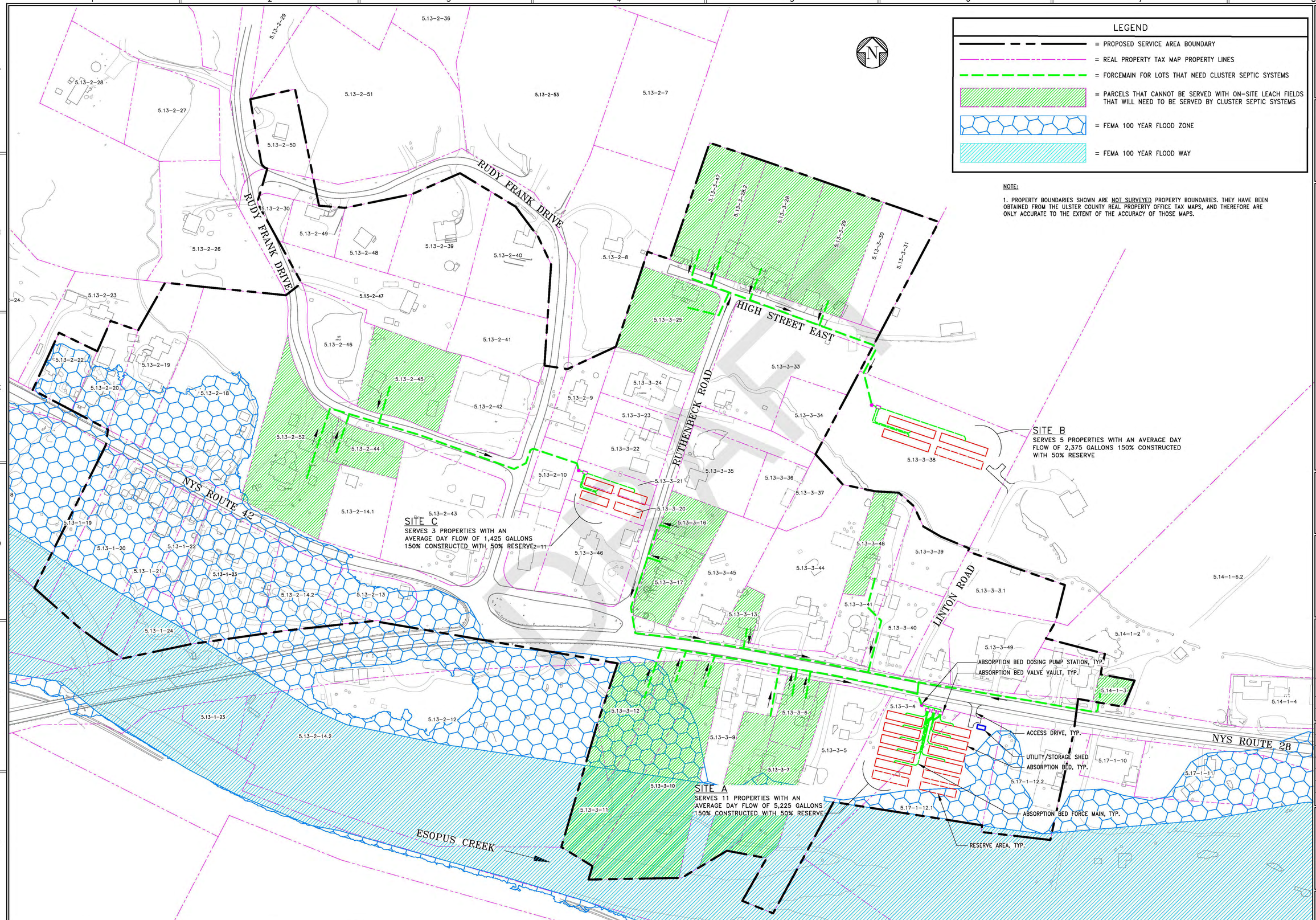
3. Please add the following paragraph…Section 6.2.b.i – *Pumping to An Existing Nearby Wastewater Treatment Facility* as follows:

   "Some communities are located relatively near a neighboring community's existing wastewater collection system and treatment system. If that neighbor is willing to take on the responsibility for treating the wastewater for a reasonable cost or for other considerations, such as annexation in the case of a town hamlet or a village, then pumping wastewater to the existing system could prove to be the best option. When a community proposes such a deal to its neighbor, it must remember that the neighbor has no legal or moral obligation to provide the service requested and that therefore the proposal must be financially advantageous to the neighbor. Indeed, if the deal were not in the interest of the neighbor, then the neighbor would have an obligation to its citizens to reject the idea."

   "One disadvantage to the option of pumping to a neighboring community's wastewater system is that the availability of future additional wastewater treatment capacity is entirely within the power of the neighbor to grant or deny."

4. Please replace Exhibit 10.2.A – Permits and Approvals Inventory with the attached revised Permits and Approvals Inventory which now includes the necessary utility easements and lateral access agreements from landowners.

5. Delete Section 10.3 – Identify Additional Funding Sources. This section does not apply to a Septic Maintenance District.



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SHANDAKEN SEWER DISTRICT
COMMUNITY WASTEWATER MANAGEMENT PROGRAM
ULSTER COUNTY NEW YORK STATE

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Stamp

Issue Rev.	Date	Remarks

Project Number	2014044
Drawn By	NW
Designed By	NW
Checked By	HL
Date	11/8/16
Scale	1"=100'
File Name	COLLECTION CLUSTER

Sheet Title

PRELIMINARY STEP LAYOUT TO CLUSTER SEPTIC SYSTEMS

Sheet No.

CLUSTER

Shandaken CWMP
Opinion of Probable Cost for
On-Site Systems and Cluster Systems
in a Septic Maintenance District

	Item	Description		Amount
1	**STEP Collection System**		$	945,000
2	**Shallow Cut-and-Fill Absorption Bed Sites**		$	1,390,000
	Cluster System Collection and Treatment Sub-total Construction Cost =		**$**	**2,335,000**
3	**Non-Construction (25%)**	Includes administrative, legal, SEQRA Compliance, permitting, engineering (design & construction), easement acquisition, etc.	$	584,000
4	**Property Acquisition**		$	500,000
	Cluster System Collection and Treatment Sub-total Non-Construction Cost =		**$**	**1,084,000**
		On-Site Septic Systems Sub-total =	**$**	**2,750,000**
	O&M Cost (Yearly) for Shallow Cut-and-Fill Absorption Beds		$	25,000
	O&M Cost (Yearly) for On-Site Septic Systems		$	20,000
		Total O&M Endowment =	**$**	**2,410,000**
		Total Project Cost =	**$**	**8,579,000**

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Shandaken CWMP
Opinion of Probable Cost for
On-Site Systems and Cluster Systems
in a Septic Maintenance District

Cluster System				
STEP Collection System Capital Cost				
Item	Quantity	Units	Unit Price*	Amount
STEP HDPE FM	5,250	LF	$ 75	$ 393,750
Highway Crossing No. 1	50	LF	$ 300	$ 15,000
Cleanout	15	EA	$ 1,000	$ 15,000
Sewer Lateral Connection and All Appurtenances	19	EA	$ 17,000	$ 323,000
				$ 746,750
			Inflation 10%	$ 74,675
			Subtotal	$ 821,425
			Contingency (15%)	$ 123,214
			Grand Total	**$ 944,639**
*Unit Prices based on previous CWMP project cost estimates and bidding results.				

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Shandaken CWMP
Opinion of Probable Cost for
On-Site Systems and Cluster Systems
in a Septic Maintenance District

Cluster System
Shallow Cut and Fill Absorption Bed Capital Cost

	Item	Description	Units	Quantity	Unit price	Amount	
Site Preparation							
	Environmental Protection		LS	1	$ 20,000	$ 20,000	
	Site Preparation		LS	1	$ 20,000	$ 20,000	
	Mobilization/Demobilization		LS	1	$ 25,000	$ 25,000	
	Survey and Stakeout		LS	1	$ 10,000	$ 10,000	
	Access Road Construction		LS	1	$ 20,000	$ 20,000	
	Restoration		LS	1	$ 20,000	$ 20,000	
	Site Work		LS	1	$ 30,000	$ 30,000	
	Subtotal Site Preparation						$ 145,000
Site A Absorption Beds							
	Absorption Bed Dosing Pump Station		EA	1	$ 50,000	$ 50,000	
	Valve Vault with Valves and Flow Meter		EA	3	$ 20,000	$ 60,000	
	3" HDPE Force main to Leach Beds		LF	1,175	$ 50	$ 58,750	
	1' of Topsoil Removal, Stockpile, Installation, and Seeding	9 leach beds at 80' (+10') x 20' (+10') x 1' of removal	CY	900	$ 35	$ 31,500	
	2' Excavation and Disposal of Material	9 leach beds at 80' (+10') x 20' (+10') x 2' of removal	CY	1,800	$ 25	$ 45,000	
	Installation of Fill Material	9 leach beds at 80' (+10') x 20' (+10') x 2' of installation + 10' wide outside perimeter of bed x 1'	CY	2,167	$ 40	$ 86,667	
	Crushed Stone Bedding	9 leach beds at 80' x 20 x 1' of removal	CY	533	$ 40	$ 21,333	
	Leach Field Absorption Bed Piping		LF	2,700	$ 20	$ 54,000	
	Barrier Material - Geotextile Fabric		SF	29,160	$ 0.5	$ 14,580	
	Site A Subtotal Absorption Beds						$ 421,830
Site B Absorption Beds							
	Absorption Bed Dosing Pump Station		EA	1	$ 50,000	$ 50,000	
	Valve Vault with Valves with Flow Meter		EA	1	$ 20,000	$ 20,000	
	3" HDPE Force main to Leach Beds		LF	400	$ 50	$ 20,000	
	1' of Topsoil Removal, Stockpile, Installation, and Seeding	6 leach beds at 120' (+10') x 20' (+10') x 1' of removal	CY	433	$ 35	$ 15,167	
	2' Excavation and Disposal of Material	6 leach beds at 120' (+10') x 20' (+10') x 2' of removal	CY	867	$ 25	$ 21,667	
	Installation of Fill Material	6 leach beds at 120' (+10') x 20' (+10') x 2' of installation + 10' wide outside perimeter of bed x 1'	CY	1,033	$ 40	$ 41,333	
	Crushed Stone Bedding	6 leach beds at 120' x 20 x 1' of removal	CY	267	$ 40	$ 10,667	
	Leach Field Absorption Bed Piping		LF	1,380	$ 20	$ 27,600	
	Barrier Material - Geotextile Fabric		SF	14,040	$ 0.5	$ 7,020	
	Site B Subtotal Absorption Beds						$ 213,453
Site C Absorption Beds							
	Absorption Bed Dosing Pump Station		EA	1	$ 50,000	$ 50,000	
	Valve Vault with Valves with Flow Meter		EA	1	$ 20,000	$ 20,000	
	3" HDPE Force main to Leach Beds		LF	285	$ 50	$ 14,250	
	1' of Topsoil Removal, Stockpile, Installation, and Seeding	6 leach beds at 70' (+10') x 20' (+10') x 1' of removal	CY	267	$ 35	$ 9,333	
	2' Excavation and Disposal of Material	6 leach beds at 70' (+10') x 20' (+10') x 2' of removal	CY	533	$ 25	$ 13,333	
	Installation of Fill Material	6 leach beds at 70' (+10') x 20' (+10') x 2' of installation + 10' wide outside perimeter of bed x 1'	CY	644	$ 40	$ 25,778	
	Crushed Stone Bedding	6 leach beds at 70' x 20 x 1' of removal	CY	156	$ 40	$ 6,222	
	Leach Field Absorption Bed Piping		LF	780	$ 20	$ 15,600	
	Barrier Material - Geotextile Fabric		SF	8,640	$ 0.5	$ 4,320	
	Site C Subtotal Absorption Beds						$ 158,837
Utility Shed							
	Wood Frame Building (incl. Foundation)		SF	200	$ 150	$ 30,000	
	Misc. Bldg		LS	1	$ 15,000	$ 15,000	
	Driveway and Parking Area		LS	1	$ 20,000	$ 20,000	
	Subtotal Utility Shed						$ 65,000
Electrical			LS	1	$ 75,000	$ 75,000	$ 75,000
Utilities			LS	1	$ 20,000	$ 20,000	$ 20,000
						SUBTOTAL	$ 1,099,120
						Inflation (10%)	$ 109,912
						Subtotal	$ 1,209,032
						Contingency (15%)	$ 181,355
						Grand Total	**$ 1,390,387**

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Shandaken CWMP
Opinion of Probable Cost for
On-Site Systems and Cluster Systems
in a Septic Maintenance District

On-Site System Cost (41 properties)

Item	Quantity	Units	Unit Price	Amount
Simple Conventional On Site	14	EA	$ 22,000	$ 308,000
Shandaken Methodist (Simple Conventional)	1	EA	$ 22,000	$ 22,000
Motel (Simple Conventional)	1	EA	$ 120,000	$ 120,000
Special Conventional On Site	10	EA	$ 55,000	$ 550,000
9 Unit Residential Apartments (Special Conventional)	1	EA	$ 120,000	$ 120,000
Special Conventional System w/ Pretreatment	9	EA	$ 70,000	$ 630,000
Vacants in District (10% Growth Based on 55 Occupied Lots)	5	EA	$ 70,000	$ 350,000
			Grand Total**	**$ 2,100,000**

* Includes: All construction, permitting, legal and engineering required

** The Grand Total equals the cost of constructing all of the on-site systems at current construction costs. Since the on-site systems will be construted at a rate of one ever year, the grand total must be capitalized. Capitalziation of the grand total over 41 years will equate to $2,750,000.

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Shandaken CWMP
Opinion of Probable Cost for
On-Site Systems and Cluster Systems
in a Septic Maintenance District

Cluster System
Operation and Maintenance Cost

Line Item Description	Budget	COMMENTS
Utilities		
Electricity Cost	$ 1,500	Includes pump costs for all absorption bed systems
Generator Fuel	$ 500	Diesel Fuel for Generator
Utilities Subtotal	**$ 2,000**	
Chemicals		
De-greasers and De-odorizers	$ 500	For use in pump chambers, wet-wells and septic tanks if needed.
Chemicals Subtotal	**$ 500**	
Personnel		
O&M Operator	$6,760	Based on one operator 2 hours a week @ $65.00 per hour
O&M Engineering	$ 1,000	Itemized cost. Trouble-shooting operations-related issues.
Personnel Subtotal	**$ 7,760**	
Administration		
O&M Legal	$ 1,000	Itemized cost. From Hamden budgeted amount.
Administrative Services/Contract	$ 950	Based on EFC recommendation from their Strategic Planning Study, of $50.00 per user account.
Force Account/Clerical	$ 250	Record keeping and reporting including assistance in preparing reconciliation, monthly reports, annual reports, and other obligations under the O&M Agreement.
Office Supplies	$ 250	Record keeping and reporting.
Insurance	$ 1,000	
Administration Subtotal	**$ 3,450**	
O&M		
Preventive Maintenance/Service Contracts	$ 1,000	Estimated service contract for Emergency Generator. Based on previous projects.
Telephone for Auto Dialers	$ 1,000	Based on previous projects.
Building Maintenance -- includes grounds maintenance	$ 2,500	Assumes grounds keeping to be sub-contracted and to include lawn mowing, and summer grounds care, as well as snow plowing and removal in winter.
Plant Equipment/Spare Parts/Repairs	$ 1,000	Based on previous projects.
Maintenance Supplies	$ 200	Cleaning Supplies, shovels, portable pumps etc,.
O&M Subtotal	**$ 5,700**	
Collection System O&M		
General O&M	**$ 3,500**	Cost includes 6 - 1200 gallon septic tank pump outs per year @ $0.45/gal plus pump station and collection main O&M (pump electrical, periodic flushing of mains, etc.)
Total O&M Budget Subtotal	$ 22,910	
Contingency	$ 2,291	10% of the budget before contingency.
TOTAL	**$ 25,201**	
TOTAL PROPOSED O&M BUDGET	**$ 25,000**	

Shandaken CWMP
Opinion of Probable Cost for
On-Site Systems and Cluster Systems
in a Septic Maintenance District

On-Site System Operation and Maintenance Cost

Operation and Maintenance					
Administration and Management	Units	Quantity	Unit Price		Total
Administration and Management	Hrs	125	$80		**$ 10,000**
Septic System Designation	Design Flow of System (s) GPD	Number of Lots / Systems	O&M Per Lot Every 3 Years	O&M Per Lot Per Year	Total O&M Per Year
Inspections and Pump-outs (every 3 years per lot)					
Simple Conventional On Site	400	14	$ 600.00	$ 200.00	$ 2,800
Shandaken Methodist (Simple Conventional)	700	1	$ 1,200.00	$ 400.00	$ 400
Motel (Simple Conventional)	1200	1	$ 1,700.00	$ 566.67	$ 567
Special Conventional On Site	400-475	10	$ 600.00	$ 200.00	$ 2,000
9 Unit Residential Apartments (Special Conventional)	1200	1	$ 1,700.00	$ 566.67	$ 567
Special Conventional System w/ Pretreatment	400-475	9	$ 800.00	$ 266.67	$ 2,400
Vacants in District (10% Growth Based on 55 Occupied Lots)	400	5	$ 600.00	$ 200.00	$ 1,000
Subtotal:					**$ 9,733**
Total O&M per Year =					**$ 19,733**

* The administration and management costs represents the value of Town staff (or contracted staff): Fund financial management, scheduling and coordination of septic tank pump-outs, coordination and scheduling of system inspections on a rotating basis, coordination and scheduling of routine maintenance such as servicing pumps, fielding constituent calls and complaints, annual budgeting, planning decisions and management of annual repairs and replacements including engineering and construction thereof, bookkeeping and reporting. In short, all administrative and management tasks and leadership to insure the adequate treatment and disposal of the community wastewater management system, the SMD.

** The septic system O&M work consists of the septic tank pump-outs every 3 years on average, septic tank filter cleaning and replacement at pump-out, system inspections at pump-out or at the time of reported concerns or failure, and minor corrections or repairs at the time of pump-out or inspection.

Shandaken CWMP
Opinion of Probable Cost for
On-Site Systems and Cluster Systems
in a Septic Maintenance District

One (1) Replacement Every Year After (Replaces all Remaining 41 Septic Systems in 41 Years)		
$2,750,000.00		
Years	Yearly Expenses	Net Reserve
1	$ 51,219.51	$ 2,752,756.10
2	$ 52,925.12	$ 2,753,827.60
3	$ 54,687.53	$ 2,753,122.87
4	$ 56,508.62	$ 2,750,546.53
5	$ 58,390.36	$ 2,745,999.29
6	$ 60,334.76	$ 2,739,377.82
7	$ 62,343.91	$ 2,730,574.60
8	$ 64,419.96	$ 2,719,477.73
9	$ 66,565.14	$ 2,705,970.84
10	$ 68,781.76	$ 2,689,932.86
11	$ 71,072.20	$ 2,671,237.87
12	$ 73,438.90	$ 2,649,754.95
13	$ 75,884.42	$ 2,625,347.95
14	$ 78,411.37	$ 2,597,875.31
15	$ 81,022.46	$ 2,567,189.91
16	$ 83,720.51	$ 2,533,138.78
17	$ 86,508.41	$ 2,495,562.98
18	$ 89,389.14	$ 2,454,297.33
19	$ 92,365.79	$ 2,409,170.16
20	$ 95,441.57	$ 2,360,003.16
21	$ 98,619.78	$ 2,306,611.05
22	$ 101,903.82	$ 2,248,801.37
23	$ 105,297.21	$ 2,186,374.24
24	$ 108,803.61	$ 2,119,122.04
25	$ 112,426.77	$ 2,046,829.18
26	$ 116,170.58	$ 1,969,271.76
27	$ 120,039.06	$ 1,886,217.35
28	$ 124,036.37	$ 1,797,424.61
29	$ 128,166.78	$ 1,702,642.99
30	$ 132,434.73	$ 1,601,612.42
31	$ 136,844.81	$ 1,494,062.97
32	$ 141,401.74	$ 1,379,714.46
33	$ 146,110.42	$ 1,258,276.12
34	$ 150,975.89	$ 1,129,446.23
35	$ 156,003.39	$ 992,911.70
36	$ 161,198.30	$ 848,347.66
37	$ 166,566.21	$ 695,417.08
38	$ 172,112.86	$ 533,770.31
39	$ 177,844.22	$ 363,044.61
40	$ 183,766.43	$ 182,863.74
41	$ 177,094.95	$ 5,884.17

Basis:

1. Construction Inflation = 3.33%
(based on ENR data)
2. Rate of Return = 2.00%
(based on DeLancey Experience)

Note:

By reiterative calculations, this calculation demonstrates that $2,750,000 is needed to fund one (1) replacement every year for forty-one (41) years.

Shandaken CWMP
Opinion of Probable Cost for
On-Site Systems and Cluster Systems
in a Septic Maintenance District

SMD Operation and Maintenance (41 Years)		
$2,410,000		
Years	Yearly Expenses	Net Reserve
1	$ 44,733.33	$ 2,412,572.00
2	$ 46,222.95	$ 2,413,676.03
3	$ 47,762.18	$ 2,413,232.13
4	$ 49,352.66	$ 2,411,157.06
5	$ 50,996.10	$ 2,407,364.18
6	$ 52,694.27	$ 2,401,763.30
7	$ 54,448.99	$ 2,394,260.60
8	$ 56,262.14	$ 2,384,758.42
9	$ 58,135.67	$ 2,373,155.21
10	$ 60,071.59	$ 2,359,345.29
11	$ 62,071.97	$ 2,343,218.78
12	$ 64,138.97	$ 2,324,661.41
13	$ 66,274.80	$ 2,303,554.34
14	$ 68,481.75	$ 2,279,774.04
15	$ 70,762.19	$ 2,253,192.09
16	$ 73,118.57	$ 2,223,674.99
17	$ 75,553.42	$ 2,191,084.00
18	$ 78,069.35	$ 2,155,274.94
19	$ 80,669.06	$ 2,116,098.00
20	$ 83,355.34	$ 2,073,397.52
21	$ 86,131.07	$ 2,027,011.77
22	$ 88,999.24	$ 1,976,772.79
23	$ 91,962.91	$ 1,922,506.08
24	$ 95,025.28	$ 1,864,030.42
25	$ 98,189.62	$ 1,801,157.62
26	$ 101,459.33	$ 1,733,692.25
27	$ 104,837.93	$ 1,661,431.41
28	$ 108,329.03	$ 1,584,164.43
29	$ 111,936.39	$ 1,501,672.60
30	$ 115,663.87	$ 1,413,728.91
31	$ 119,515.48	$ 1,320,097.70
32	$ 123,495.34	$ 1,220,534.41
33	$ 127,607.74	$ 1,114,785.20
34	$ 131,857.07	$ 1,002,586.69
35	$ 136,247.91	$ 883,665.56
36	$ 140,784.97	$ 757,738.20
37	$ 145,473.11	$ 624,510.39
38	$ 150,317.36	$ 483,676.89
39	$ 155,322.93	$ 334,921.04
40	$ 160,495.18	$ 177,914.37
41	$ 165,839.67	$ 12,316.19

Basis:

1. Construction Inflation = 3.33%
(based on ENR data)
2. Rate of Return = 2.00%
(based on DeLancey Experience)

Note:

By reiterative calculations, this calculation demonstrates that $2,410,000 is needed to fund the Operation and Maintenance of all On-Site Systems as well as the Community Cluster Systems for forty-one (41) years.

LEGEND	
APPROXIMATE NYS EFC STUDY SERVICE AREA	
PROPERTY BOUNDARY	
PARCELS PARTICIPATING IN THE CWC SEPTIC REHABILITATION AND REPLACEMENT PROGRAM	
PARCELS LISTED WITH NYCDEP WITH PAST OR PRESENT SEPTIC SYSTEM FAILURES OR VIOLATIONS	

NOTE:

1. PROPERTY BOUNDARIES SHOWN ARE NOT SURVEYED PROPERTY BOUNDARIES. THEY HAVE BEEN OBTAINED FROM THE ULSTER COUNTY REAL PROPERTY OFFICE TAX MAPS, AND THEREFORE ARE ONLY ACCURATE TO THE EXTENT OF THE ACCURACY OF THOSE MAPS.

PARCELS PARTICIPATING IN THE CWC SEPTIC REHABILITATION AND REPLACEMENT PROGRAM

PARCEL #	ACREAGE	OWNER
5.13-1-19	0.40	MEINECKE, DONALD H.
5.13-1-21	0.59	STOREY, BRUCE A. & LINDA
5.13-1-23	1.41	JONES, ROBERT BARBARA
5.13-1-24	0.36	MONTAGNO, RANDOLPH V.
5.13-2-19	0.99	STOREY, CHAD AND LYNNIE
5.13-2-20	0.49	HEICK, BONNIE
5.13-2-22	0.38	JONES, TRACY A.
5.13-2-39	1.14	LOCKWOOD-HELM, WENDY
5.13-2-47	1.12	NEAL, GERALD A.
5.13-2-49	0.34	SCHUYLER, MINEW
5.13-2-50	0.52	BLOODGOOD, LINDA
5.13-3-10	1.68	PRINZIVALLI, LINDA
5.13-3-25	0.97	SHAW, WILLIAM AND LEDERMAN, JESSICA
5.13-3-28	1.06	CHRISTIE, ART AND JEN
5.13-3-3.100	1.01	WALTERS, GREGORY, NANCY
5.13-3-33	1.63	VANBLARCUM, BARBARA
5.13-3-40	0.61	TODD, WARD AND JANE
5.13-3-41	0.62	TODD, WARD AND JANE
5.13-3-5	1.37	YERRY, DENNIS AND JONES, MARGARET
5.13-3-7	0.72	PAWLOWSKI, RONALD
5.13-3-8	0.65	RUTULANTE, DONNA AND LARISH, CARL
5.14-1-3	0.13	PIERCE, JEAN

PARCELS LISTED WITH NYCDEP WITH PAST OR PRESENT SEPTIC SYSTEM FAILURES OR VIOLATIONS

PARCEL #	ACREAGE	OWNER
5.13-2-50	0.52	BLOODGOOD, LINDA
5.13-3-28	1.06	CHRISTIE, ARTHUR & RABUFFO, JENNIFER
5.14-1-3	0.13	FITCHNER, VIVA
5.13-2-22	0.38	FRANO, DALE & TRACY
5.13-2-20	0.49	HEICK, DAVID
5.13-1-23	1.41	JONES, ROBERT
5.13-1-19	0.39	KEAVENY, KEVIN J
5.13-2-39	1.14	LOCKWOOD-HELM, WENDY
5.13-2-49	0.34	MINEW, SCHUYLER
5.13-1-24	0.36	MONTAGNO, RANDY
5.13-2-47	1.12	NEAL, GERALD & CATHERINE
5.13-3-7	0.72	PAWLOWSKI, HELEN
5.13-3-10	1.68	PRINZIVALLI, LINDA
5.13-3-22	0.57	RABUFFO, CLIFTON
5.13-2-14.1	0.68	ROBERTS, GARY
5.13-3-8	0.65	RUTULANTE, DONNA & LARISH, CARL
5.13-1-21	0.59	STOREY, BRUCE
5.13-2-19	0.99	STOREY, CHAD
5.13-3-40	0.61	TODD, WARD D.
5.13-3-33	1.63	VANBLARCUM, BARBARA
5.13-3-3.1	1.01	WALTERS, GREGORY

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MANAGEMENT PROGRAM
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Stamp

Issue Rev.	Date	Remarks

Project Number	2014044
Drawn By	AHJ
Designed By	CJY
Checked By	HL
Date	11/4/16
Scale	1"=200'
File Name	SEPTIC FAILURE

Sheet Title

SEPTIC FAILURE MAP

Sheet No.

3.2.a.A

Hamlet of Shandaken
Permits and Approvals Inventory

Agency	Application or Submission	Reason
NYSDEC	SPDES Permit - Stormwater	Stormwater discharge from a construction site
	Article 15 Permit - Stream Crossing	Stream bed or bank disturbance
	SPDES Permit - Wastewater	Wastewater surface discharge
	Facility Plan Submission	
	Final Design Submission	
ACOE	Nationwide Permit 12	Utility installation in a wetland or stream
	Nationwide Permit 33	Stream/ Wetland Dewatering for utility installation
NYCDEP	Stormwater Permit/ SWPPP	Stormwater discharge
	Facility Plan Submission	
	Plan approval	
SHPO	Submission	Assess archeological impacts
Town	Floodplain Work Permit	Installation of piping in the floodplain/floodway
	Building Permit Review	
County DPW	Highway Work Permit	Pipe Installation within the County Highway ROW
NYSDOT	Utility Work Permit	Pipe Installation within the State Highway ROW
	Non-utility work permit	WWTF or Pump station access drives
NYSDOH	Plan Review and Approval	
Shandaken	Utility Easements	For installation of STEP on Private Property
Landowners	Lateral Access Agreements	For installation of STEP laterals on Private Property

DRAFT

AMENDMENT #2

to the
PRELIMINARY ENGINEER'S REPORT
COMMUNITY WASTEWATER MANAGEMENT PROGRAM
for the
Hamlet of Shandaken
Town of Shandaken
Ulster County, New York

June 1, 2017

Nick Warner

From: Nick Warner
Sent: Wednesday, April 26, 2017 9:34 AM
To: jmathiesen@cwconline.org
Cc: alrosa@cwconline.org; timothycox@cwconline.org; Chris Yacobucci; Henry Lamont; Mike Harrington
Subject: Shandaken CWMP - Multiple Pipes in Single Trench
Attachments: 8.2.A - Onsite and Remote System Map Single Trench-Trench Detail (2).pdf; 8.2.A - Onsite and Remote System Map Single Trench-Trench Detail.pdf; 8.2.A - Onsite and Remote System Map Single Trench-24x36.pdf

John,

Please see the attached site plan which shows the relocation of the proposed septic tank effluent force mains outside of the NYSDOT pavement. Also attached you will find our proposed conceptual design details for multiple force mains in a single trench and multiple pipes crossing the NYSDOT ROW via one crossing.

Let us know if there is anything else Lamont needs to provide DEP in order to move forward with Shandaken.

Sincerely,

Nick Warner, P.E.
Project Engineer

Lamont Engineers, P.C.
Dedicated to Service...Committed to Excellence

Phone: (518) 234-4028, Ext. 104
Fax: (518) 234-4613
Cell: (518) 701-6189

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Conserve natural resources ... Please print this document only if you need to.

NOTE:

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MAPPING ACKNOWLEDGMENTS:

TAX PARCEL DATA PROVIDED BY ULSTER COUNTY REAL PROPERTY TAX DEPARTMENT, DATED 10/12/2005.

MAPPING COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY EXPOSED 04/16/15 BY LAND AND MAPPING SERVICES. 300 NORTH SECOND STREET, CLEARFIELD, PA. 16830.

FEMA FLOOD ZONE INFORMATION DIGITIZED FROM FEMA FIRM MAP NUMBER 36111C0210E. REVISED PRELIMINARY MAP, DATED NOVEMBER 20, 2014.

LEGEND

- = PROPOSED SERVICE AREA BOUNDARY
- = REAL PROPERTY TAX MAP PROPERTY LINES
- = DIVIDING LINE BETWEEN SUITABLE AND UNSUITABLE SOILS
- = FORCEMAIN FOR LOTS THAT MAY NEED REMOTE LEACH FIELDS
- = FEMA 100 YEAR FLOOD ZONE
- = PARCELS THAT CANNOT BE SERVED WITH ON-SITE LEACH FIELDS THAT WILL NEED TO BE SERVED BY REMOTE LEACH FIELDS OR ADJACENT PROPERTIES DUE TO SOIL AND SLOPE RESTRICTIONS
- = PARCELS THAT COULD BE SERVED BY SPECIAL CONVENTIONAL ON SITE SYSTEMS OR REMOTE LEACH FIELDS DUE TO PARCEL SIZE RESTRICTIONS
- = PARCELS THAT COULD BE SERVED BY SPECIAL CONVENTIONAL ON SITE SYSTEMS OR REMOTE LEACH FIELDS DUE TO FLOOD ZONE RESTRICTIONS
- = PARCELS THAT COULD BE SERVED BY SPECIAL CONVENTIONAL ON SITE SYSTEMS DUE TO 100' OFFSET TO WATERWAYS
- = PARCELS THAT ARE VACANT AND NOT BUILDABLE DUE TO SITE CONSTRAINTS
- = PARCELS THAT ARE VACANT BUT ARE SUITABLE FOR ON SITE SYSTEMS
- = CONTIGUOUS PARCELS OWNED BY THE SAME PROPERTY OWNER AND THEREFORE PROBABLE CAPACITY FOR ON SITE SYSTEMS
- = APPROXIMATE WELL LOCATION WITH 100' BUFFER (NOTE, ONLY A FEW WELLS WERE LOCATED DURING THE WINDSHIELD SURVEY)
- TYP. 4 BR = AREA REQUIRED FOR A SIMPLE CONVENTIONAL LEACH FIELD SIZED FOR A 4 BEDROOM RESIDENCE SEE EXHIBIT 9.1.B SIZING REQUIREMENTS

RUDY FRANK DRIVE
HIGH STREET EAST
RUTHENBECK ROAD
LINTON ROAD
NYS ROUTE 28
ESOPUS CREEK
SITE A
SITE B
SITE C
SITE D
100' OFFSET TO WATERWAY
FORCE MAIN CROSSING STRUCTURES

5.13-2-51 THONGS, JOHN H
5.13-2-53 FRIEARY, AVE M
5.13-2-50 BLOODGOOD, LINDA RSF
5.13-2-30 JOHNSON, SEAN F V
5.13-2-26 MILLIER, LUCIEN
5.13-2-49 SCHYLER, MINEW RSF
5.13-2-48 HAY, DAVID RSF
5.13-2-39 LOCKWOOD-HELM, WENDY RSF
5.13-2-8 ALLISON, ROBERT B
5.13-2-40 ALVAN AND RUTH HEVELONE RSF
5.13-2-41 ALVAN AND RUTH HEVELONE V
5.13-2-47 NEAL, GERALD A RSF
5.13-2-23 SYLAK, JOHN M
5.13-2-46 VITARIUS, WILLIAM V
5.13-2-45 VITARIUS, WILLIAM BRUCE RSF
5.13-2-9 BERRYANN, KENNETH RSF
5.13-2-42 NYSEG - TAX DEPT C
5.13-2-52 JONES, ROBERT RSF
5.13-2-44 JONES, ROBERT RSF
5.13-2-10 JOHNSON, SEAN F V
5.13-2-14.1 ROBERTS, GARY RSF
5.13-2-43 NAZZARO, FRANK A RSF
5.13-2-11 JOHNSON, NANCY RSF
5.13-2-14.2 JONES, ROBERT L SR V
5.13-2-13 BUZZEO, DAISY RSF
5.13-1-24 MONTAGNO, RANDOLPH V
5.13-1-19 KEAVENY, KEVIN & MARGARET RSF
5.13-1-20 NO DATA RSF
5.13-1-22 STIRBL, AREN RSF
5.13-1-21 STOREY, BRUCE A RSF
5.13-1-23 JONES, ROBERT RA
5.13-2-22 JONES, TRACY A RSF
5.13-2-18 STOREY, CHAD A RSF
5.13-2-20 HEICK, BOONIE RSF
5.13-2-16 SUDAN, SEEMA CA
5.13-3-25 SHAW, WILLIAM LEDERMAN, JESSICA RSF
5.13-3-33 VANBLARCUM, PAUL RSF
5.13-3-24 CURTIS, ROBERTA RSF
5.13-3-23 SUTTON, JEFFREY STAPLETON, MEGHAN RSF
5.13-3-22 SUTTON, JEFFREY STAPLETON, MEGHAN V
5.13-3-21 ABRAHAMSEN, HAZEL V
5.13-3-20 ABRAHAMSEN, HAZEL V
5.13-3-35 JOHNSON, NANCY RSF
5.13-3-16 CEMETERY V
5.13-3-17 CEMETERY V
5.13-3-34 HILGERS, TIMOTHY V
5.13-3-38 HILGERS, TIMOTHY V
5.13-3-3.2 WALTERS, GREGORY RSF
5.13-3-16 ABRAHAMSEN, HAZEL RSF
5.13-3-48 SANCHIS, FRANK EMILE RSF
5.13-3-45 BLYDENBURG, JOHN BUTLER, LISA RSF
5.13-3-17 SHANDAKEN ALLABEN HOSE CO M
5.13-3-44 RUOFF-HILGERS, MELISSA RSF
5.13-3-39 TODD, WARD V
5.13-3-3.1 WALTERS, GREGORY RSF
5.13-3-13 ODATO, STACY RSF
5.13-3-41 TODD, WARD, D RSF
5.13-3-40 TODD, WARD RSF
5.13-3-49 SHANDAKEN METHODIST IA
5.14-1-2 XIQUES, THOMAS V
5.14-1-1 XIQUES, THOMAS RSF
5.14-1-3 PIERCE, JEAN RSF
5.14-1-6.2 FICHTNER, WILLIAM K
5.14-1-4
5.13-3-12 SHARON, LEIGHANN AND STACY RSF
5.13-3-9 FORD, SIDNEY C
5.13-3-8 TODD, WARD RSF
5.13-3-5 YERRY, DENNIS AND MARGARET JONES
5.13-3-7 PAWLOWSKI, HELEN RSF
5.13-3-10 PRINZIVALLI, LINDA RSF
5.13-3-11 ARNOLD, LINDA J RSF
5.13-3-4 ROSS, JOSEPH A
5.13-3-6 RUTULANTE, DONNA RSF
5.17-1-12.1 TINTLE, THOMAS
5.17-1-12.2 WALTERS, RICHARD
5.17-1-10 TINTLE, THOMAS W JR
5.17-1-11

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Issue/Rev.	Date	Remarks

Project Number	2014044
Drawn By	NW
Designed By	NW
Checked By	MDH
Date	4/24/17
Scale	1"=100'
File Name	SEPTIC LIMITATIONS

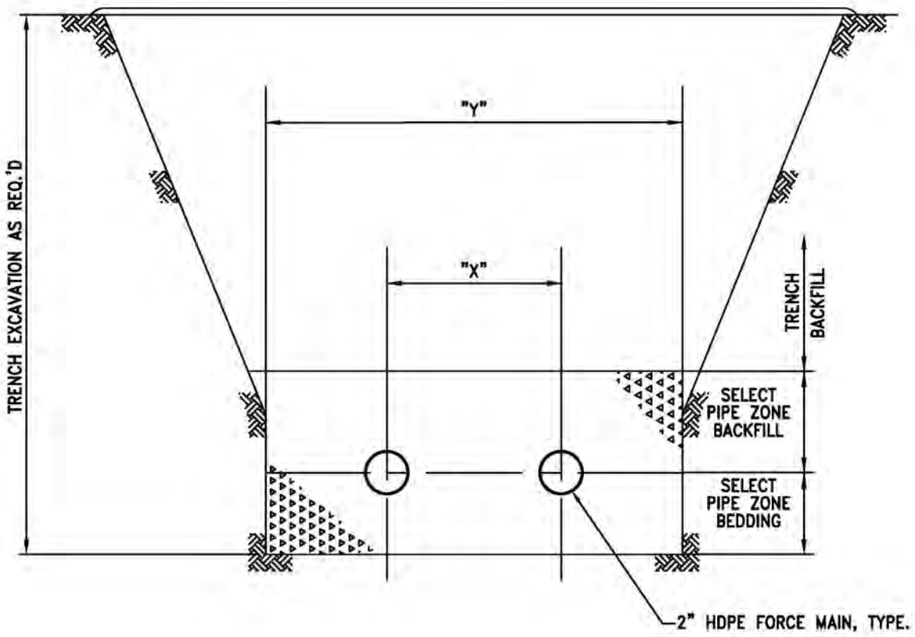
Sheet Title

SMD
ON-SITE AND
REMOTE SYSTEMS
MAP

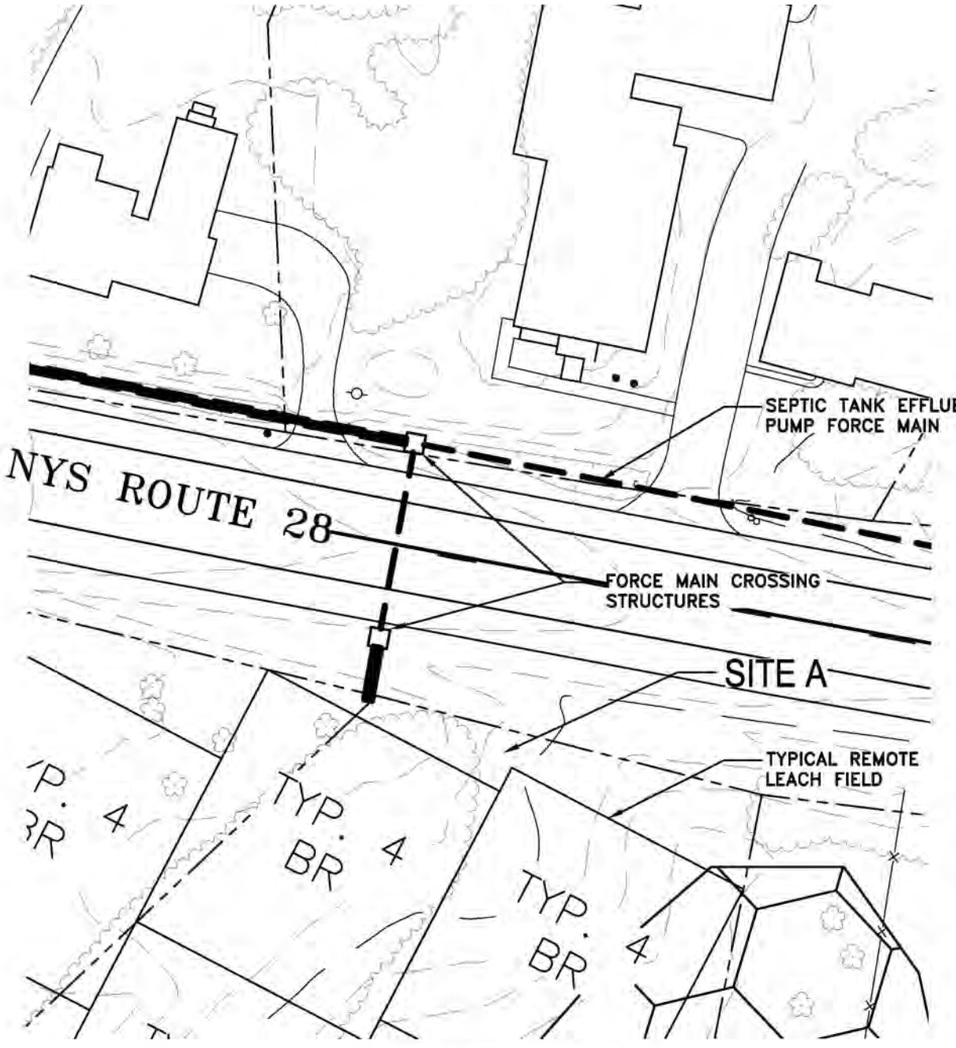
Sheet No.

8.2.A

Number of Pipes in Trench	"X" Seperation Distance Between Pipes (inches)	"Y" Total Trench Width (feet)
1	6	3.00
2	6	3.50
3	6	4.00
4	6	4.50
5	6	5.00
6	6	5.50
7	6	6.00
8	6	6.50
9	6	7.00
10	6	7.50



3 TYPICAL DETAIL FOR MULTIPLE PIPES IN THE SAME TRENCH
SCALE: N.T.S.



DETAILED SITE PLAN

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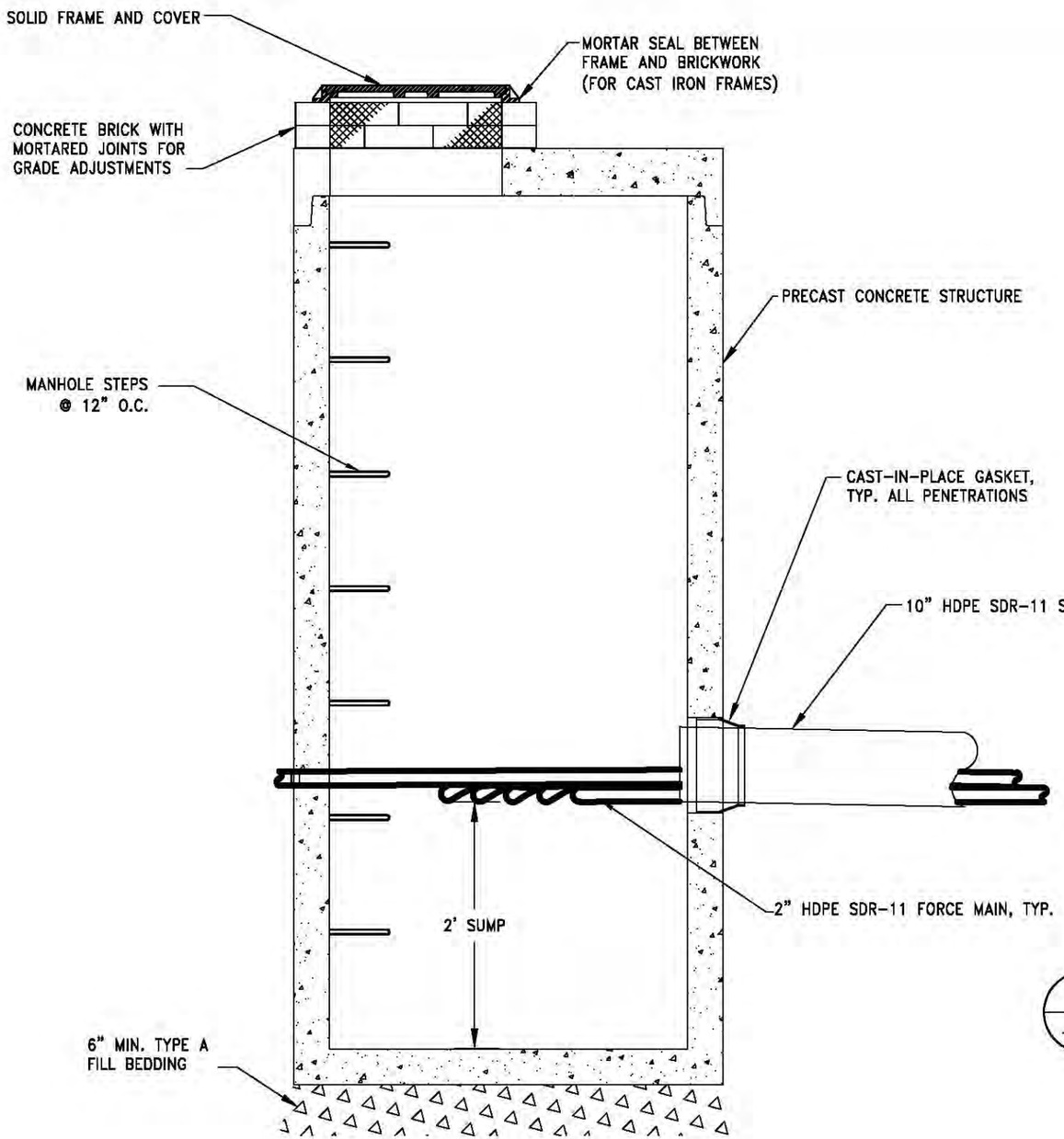
Project Number	2014044
Drawn By	NW
Designed By	NW/CY
Checked By	CY
Date	4/10/17
Scale	AS SHOWN
File Name	8.2.A

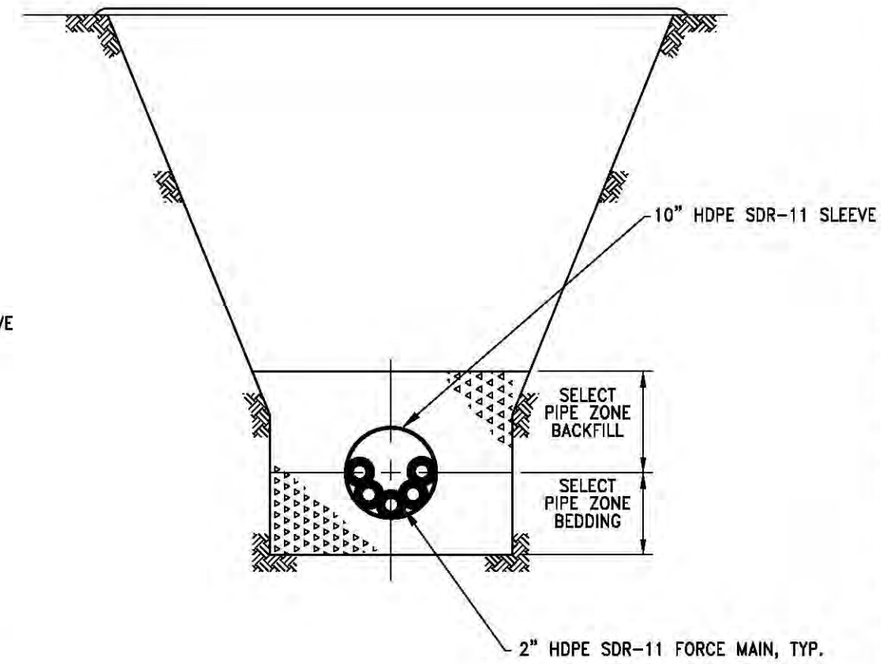
Sheet Title
FORCE MAIN TRENCH DETAIL

Sheet No.



1 — TYPICAL FORCE MAIN CROSSING STRUCTURE

SCALE: N.T.S.



2 — HDPE SLEEVE WITH MULTIPLE FORCE MAINS

SCALE: N.T.S.

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Date	4/10/17
Scale	AS SHOWN
File Name	8.2.A

Sheet Title: FORCE MAIN SLEEVE DETAILS

Sheet No.

TABLE OF CONTENTS

EXHIBITS

EXECUTIVE SUMMARY

Pursuant to the January 1997 New York City Watershed Memorandum of Agreement (MOA), the November 2002 EPA Filtration Avoidance Determination (2002 FAD), as amended, and the July 2007 EPA Filtration Avoidance Determination (2007 FAD), New York City (NYC) provided funding for the Community Wastewater Management Program (CWMP), to be administered by the Catskill Watershed Corporation (CWC).

The Community Wastewater Management Program is currently intended to fund the planning, design and construction of community septic systems and/or the creation of septic maintenance districts or wastewater treatment plants if community septic systems or septic maintenance districts are not practicable due to site conditions, and there is a demonstrable water quality problem due to failing septic systems for the remaining communities identified in the MOA in the New York City Watershed West of the Hudson (Catskill and Delaware System).

The Hamlet of Shandaken is Identified Community No. 18 among 22 named in the priority list of communities lacking community wide wastewater treatment which was included in the 1997 New York City Watershed Memorandum of Agreement (MOA).

This Preliminary Engineer's Report is a preliminary step in development of community wastewater management facilities for the Hamlet of Shandaken.

The primary objectives of the Preliminary Engineer's Report are (1) to determine the existing wastewater needs, (2) to determine an estimated wastewater flow, (3) to consider various alternative methods for managing those wastewater needs, (4) to recommend a method or methods for managing those wastewater needs, and (5) to estimate the costs involved with the recommended method.

Based on review of existing engineering, planning, GIS mapping, USGS quadrangle topographic mapping and tax mapping, a planning area was identified where further consideration of wastewater needs was warranted. Detailed new topographic mapping was obtained for that area.

In that area existing wastewater problems were reviewed through identification of potential wastewater problems including small lot sizes, flooding areas, proximity to waterways, high groundwater table, steep slopes, records of existing wastewater system failures, and poor soils, and through a community survey questionnaire and a property use windshield survey.

The Septic Maintenance District wastewater management option was evaluated and it was determined that all occupied and available potentially buildable vacant properties could be served by various types of on-site systems, including on-site systems with

individual remote leach fields. Vacant sites were identified in the proposed service area that could host remote individual leach fields.

Therefore, On-Site Septic Systems in a Septic Maintenance District is recommended for the Hamlet of Shandaken. Subject to results of further on-site investigations including well locations, soil testing and bedroom counts, and to results of property acquisition efforts, the recommended option would include 16 properties that could be served by Simple Conventional systems, 11 properties that could be served by Special Conventional systems, 9 lots that could be served by Special Systems with Pretreatment, and 19 lots that could be served by on-site septic tanks and remote individual leach fields. This option allows for 10% future growth by budgeting for ultimate replacement of septic systems on five (5) vacant lots in the District.

Summary of Wastewater Treatment with Total Project Costs and O&M Costs	
TOTAL CONSTRUCTION* =	$ 4,970,000
LAND ACQUISITION =	$ 500,000
O&M* =	$ 1,300,000
TOTAL COST	**$ 6,770,000**
O&M Cost (Yearly)	$ 24,000

* Equals 3.33% inflation of estimated capital and annual O&M costs over 41 years with investment returns at 2%, based on building 20 systems in year one (1) and then one (1) system per year to replace all 60 systems once.

INTRODUCTION

The January 1997 New York City Watershed Memorandum of Agreement (MOA) established a program for development of community wastewater treatment facilities in 22 communities located in the New York City Water Supply watersheds west of the Hudson River. These communities were listed by priority in the MOA.

The first seven (7) of these communities were addressed by a program called the New Sewage Treatment Infrastructure Program (NIP) administered by the New York State Environmental Facilities Corporation (NYSEFC).

Pursuant to the November 2002 EPA Filtration Avoidance Determination (2002 FAD), as amended, and the July 2007 Filtration Avoidance Determination (2007 FAD), New York City (NYC) provided funding for the Community Wastewater Management Program (CWMP), administered by the Catskill Watershed Corporation (CWC).

The CWMP is currently intended to fund the planning, design and construction of community septic systems and/or the creation of septic maintenance districts (or wastewater treatment plants if community septic systems or septic maintenance districts are not practicable due to site conditions, and there is a demonstrable water quality problem due to failing septic systems) for the remaining communities identified in the MOA in the New York City Watershed west of the Hudson River (the Catskill and Delaware Systems). Depending on the type of wastewater management system chosen for each hamlet, property owners may be required to pay for laterals, which are hook-ups from their homes or businesses to the collection mains, if other funds are not available.

So far the governing boards of fourteen (14) identified communities, numbered 8 through 13, 15 through 17, and now 18 through 22, have been invited to participate in this program. (Haines Falls (H), Identified Community No. 14 was connected to the Village of Tannersville WWTP owned and operated by New York City Department of Environmental Protection.) All fourteen (14) of these communities have entered into agreements with CWC to proceed toward the development of a community wastewater management program. In order of priority these fourteen (14) communities are Bloomville, Boiceville, Hamden, DeLancey, Bovina Center, Ashland, Trout Creek, Lexington and South Kortright, Shandaken, West Conesville, Claryville, Halcottsville, and New Kingston.

The Hamlet of Shandaken is Identified Community No. 18 among the 22 communities named in the priority list of communities lacking community-wide wastewater treatment which was included in the MOA.

The Catskill Watershed Corporation (CWC) selected Lamont Engineers, P.C. of Cobleskill to coordinate, evaluate and design the projects for these fourteen (14) hamlets.

Under the program, the basic wastewater management options are:

- Septic Maintenance District: Homes and businesses retain individual on-site septic systems that are inspected and pumped on a regular cycle and repaired or replaced when necessary using district funds (assuming availability).
- Community Septic System: Functions like an individual septic system, only on a larger scale. Wastewater is carried from occupied structures through lateral pipes and collection mains to tanks where the solids settle out, and the liquids are dispersed to leach fields for treatment and filtration back into the ground.
- Cluster Septic Systems: Similar to above but serving smaller pockets of homes and businesses.
- Combination Community/Cluster Septic System and Septic Maintenance District, or Sewer District with a Combination Community/Cluster Septic System with On-Site Systems.
- If a Community Septic System or Septic Maintenance District is not practicable due to site conditions, and there is a demonstrable water quality problem due to failing septic systems, NYCDEP, in consultation with the CWC and the Town of Shandaken, may elect to allocate program funds to study and construct a new wastewater treatment plant (WWTP), including the related sewage collection system.

This Preliminary Engineer's Report is part of the third step of about 14 major steps involved in development of a wastewater management system for the Hamlet of Shandaken.

The other steps are:

1. Project Conception (done)
2. Project Organization (done)
3. Project Development including the Preliminary Engineer's Report (started)
4. Environmental Review
5. Sewer District Establishment
6. Bonding (if applicable; not applicable for Shandaken CWMP)
7. Funding
8. Design
9. Permits and Approvals
10. Land Acquisition
11. Construction Bids
12. Construction
13. Completion and Start-Up
14. Operation and Maintenance

The primary objectives of the Preliminary Engineer's Report are (1) to determine the existing wastewater needs, (2) to determine an estimated wastewater flow, (3) to consider

various alternative methods for managing those wastewater needs, (4) to recommend a method or methods for managing those wastewater needs, and (5) to estimate the costs involved with the recommended method.

The Preliminary Engineer's Report scope of work is included herewith as Exhibit A. A Participant's List that identifies the Town, County, Regulatory agency, and funding agency participants for this project is included herewith as Exhibit B.

Previous Study

In December 2000, the New York State Environmental Facilities Corporation (NYSEFC), working for the New York City Department of Environmental Protection (NYCDEP) and the Identified Communities, issued the Strategic Wastewater Planning Study: A Report of the New Sewage Treatment Infrastructure Program for Communities 8-22 (NYSEFC Report) which included a chapter on each Identified Community. That report analyzed wastewater needs, estimated flows, proposed service areas and solutions for those service areas. These studies were reviewed in the development of this Preliminary Engineer's Report and are referred to herein. Chapter 6, Report for Community #18, Hamlet of Shandaken from the NYSEFC Report is included herewith as Exhibit C. The NYSEFC Report for Community #18 recommends one (1) community cluster septic system using small diameter gravity sewers and individual septic systems on 33 properties for Shandaken.

SECTION 1

Overview of Hamlet of Shandaken

(Much of this information is quoted from NYSEFC Report, Exhibit C, edited and updated where possible)

1.1. Description of Area

The Hamlet of Shandaken is located on NYS Route 28 at the intersection with NYS Route 42 within the Town of Shandaken in Ulster County, New York. The Hamlet of Shandaken was identified by the New York City Watershed Memorandum of Agreement (MOA) as Identified Community No. 18. The entire Town is located within the New York City Watershed. The Town of Shandaken is sparsely developed. The primary land uses found within the Town are Wild/Forested, Low Density Residential, and Vacant land. There are also some commercial centers in the Town's Hamlets.

The Hamlet of Shandaken is one of the few hamlets in the Town of Shandaken. Other hamlets in the Town include Pine Hill, which is located on NYS Route 28 approximately 5 miles west of the Hamlet of Shandaken and the Hamlet of Phoenicia, the largest hamlet in the Town, located on NYS Route 28, approximately 5 miles east of the Hamlet of Shandaken. Shandaken is also approximately 11 miles south of the Hamlet of Lexington, NY, Town of Lexington, Greene County. See Exhibit 1.1.A for the Location Maps of the area.

The Hamlet of Shandaken has a hotel, firehouse, church, post office, auto garage, NYSEG Substation, storage facility and yoga studio. The main street of the Hamlet is NYS Route 28. The Hamlet's center is at the intersection NYS Route 28 and NYS Route 42.

1.2. Population

According to the 2010 Census, the population of the Town of Shandaken is 3,085 persons. The Hamlet of Shandaken is not identified in the 2000 Census as a Census Designated Place (CDP) which would further break down information from the town level to the hamlet level, so there is no census population for the Hamlet of Shandaken.

See Exhibit 1.2.A for the 2010 US Census Bureau information for the Town of Shandaken.

1.3. Housing

The 2010 Census reports a total of 2,776 housing units within the Town of Shandaken. (1,505 occupied units and 1,271 vacant units). Based on 2,776 persons in 1,505 occupied units, the average number of persons per household in 2010 was 2.05.

The Town population primarily uses on-site wells for drinking water. The Hamlet of Shandaken does not have a public water system. All units within the Hamlet dispose of wastewater onsite.

1.4. Local Economy

According to the 2010 Census, the median household income in the Town of Shandaken was $43,349, compared to the state median household income of $55,603.

There are several businesses and institutions currently in operation in and around the Hamlet of Shandaken including a hotel, an auto garage, a post office, the NYSEG Substation, and a yoga studio.

1.5. Land Use

The Hamlet of Shandaken developed around and to the east of the intersection of NYS Route 42 and NYS Route 28.

The total land area of the Town of Shandaken is estimated to be approximately 79,200 acres (123.8 square miles). The predominant land use is overwhelmingly Wild, Forested, Conservation Lands & Public (75%), followed by residential (12%) and vacant land (8%).

The following table breaks down the area by land use category found within the Town of Shandaken, as calculated by the Ulster County GIS Department.

Land Use	Acres	Percentage
Residential	9,829.59	12.41%
Commercial	732.89	0.93%
Community Services	760.73	0.96%
Entertainment & Recreation	737.50	0.93%
Industrial	8.35	0.01%
Public Services	170.30	0.21%
Vacant Land	5,985.11	7.56%
Wild, Forested, Conservation Lands & Public	59,719.37	75.38%
no match with rps data (149 parcels)	1,275.37	1.61%
	79,219.21	100.00%

1.6. Local Planning

The Town of Shandaken has a Comprehensive Plan and a Zoning Law. Shandaken also has its own codes enforcement officer, who administers the NYS Building Code.

SECTION 2

Planning Area

An area encompassing the Hamlet of Shandaken and the immediate surrounding area of the Town of Shandaken was flown for aerial photography and topographic maps were obtained at 1"=40' scale, 1-foot contour intervals for use in eventual site design work for the project.

The Hamlet of Shandaken, MOA Identified Community No. 18, indicated in the NYSEFC Report as the "Preliminary Service Area", and herein called the EFC Service Area, is the central objective of the aerial photo area chosen.

The area that was photographed was chosen in an attempt to include all properties that might ultimately be placed within a Septic Maintenance District or a Sewer District plus possible community septic or wastewater treatment facility sites within a reasonable distance from the Hamlet area. (See Section 6 for further description.) This photo area was therefore inclusive of most areas of relatively higher population density and smaller lot size and areas that might have significant wastewater disposal needs. The area that was photographed was based on the information obtained from existing available large scale aerial photography and the USGS Quadrangle map.

The area chosen for new, detailed topographical mapping is smaller than the aerial survey limit due to cost constraints, but is somewhat larger than the EFC service area so that (1) areas with significantly problematic sanitary problems were covered and (2) potential reasonable cluster or community septic system sites or wastewater treatment sites were not left out. This is the project detailed Mapping Limit and Planning Area.

See Exhibit 2.A, Aerial Photography and Mapping Limit for the areas flown and mapped for Shandaken.

SECTION 3
Identify, Assess and Plan for Wastewater Needs

3.1. Identify Existing Wastewater Problems

3.1.a. Identify Limiting Property Lot Size

The most fundamental feature of a property relative to establishing an up-to-standard, adequate on-site leach field is the available area. The smaller the area available for construction of a leach field, the less likely that an up-to-standard, adequate leach field can be constructed on the property.

After review of the site information through site visits, tax maps and Ulster County GIS information, the potential for adequate on-site wastewater systems was determined based on size and other constraints such as proximity to streams, wetlands, steep slopes, property line setbacks, etc. pertaining to the New York State Department of Environmental Conservation Design Standards for Wastewater Treatment Works, 1988 (1988 NYSDEC Standards) and the Rules and Regulations for the Protection from the Contamination, Degradation and Pollution of the New York City Water Supply and its Resources, 2002 (NYCWRR).

There are several different soil types found in the Hamlet of Shandaken. The area on the north side of NYS Route 28 as well as the area to the north of NYS Route 42 is predominantly Tunkhannock gravelly loam. On the south side of NYS Route 28 east of the intersection of NYS Route 42, the portions of the properties along the road are also Tunkhannock, with the back of these properties along the Esopus having Suncook gravelly loam. The area bounded by NYS Route 28, NYS Route 42 and Shandaken Road has predominantly Barbour soils. (Note: The soils on the very steep areas around the Hamlet (those soil types that are proceeded with a D, E or an F, indicating very steep soils with a percent grade of 15% or greater) are automatically not suitable for on-site septic systems because of the slope. Therefore they were not reviewed in the soils analysis.) Detailed soils data can be found in Exhibit 3.2.b.A.

The range of soil permeability is given in the soil survey information in units of micrometers per sec. This can be converted to percolation rate in minutes per inch by dividing 423.3 by the permeability. A summary of the permeability, percolation and the corresponding application rate for sewage as given in 1988 NYSDEC Standards, Table 10 – Recommended Sewage Application Rates, is shown in the table on the second page of Exhibit 3.2.b.A.

Based on a typical parcel, a layout of a single family residence with 3 bedrooms, a garage, a driveway, miscellaneous landscaping and an on-site private well (which

requires a 100' buffer from absorption field) will occupy an area of approximately 13,000 square feet without the septic system.

The areas required for on-site septic systems, inclusive of the required 100% reserve area, and the resulting required lot size, derived from the sample septic system designs shown in Exhibit 3.1.a.A are summarized in the table below.

Location in Hamlet	Primary Soil Type	Per-meability (µm/sec)	Percolation Rate (min/in)	Application Rate (gal/day/sf)	Septic System Size (sf)	Required Lot Size (sf)	Required Lot Size (acres)
Center of Hamlet	Tunk-Hannock/ Barbour	14	30	0.6	10,000	23,000	0.5
Center of Hamlet	Suncook (Su)	42	30 imported (10 actual)	0.6 imported (0.9 actual)	10,000 imported	23,000	0.5

The slower percolation rate in the range was used to be conservative in the evaluation. However, even the slow range for the Suncook soils is very fast and is likely to have areas of excessive permeability, thereby warranting importing fill to slow down the permeability of the soil and provide better treatment but that would significantly increase the cost of the septic system. That fill will have a maximum percolation rate of 30 minutes/inch. While the permeability of Tunkhannok and Barbour soils is fast enough for a subsurface system, there may be cases within this soil type where excessive permeability could be a problem as well. However, the size of the septic system and resulting lot size would not change since the imported fill would have a maximum percolation rate of 30 min/in.

Depending on site specifics, it may or may not be possible to site a properly functioning leach field on a smaller site than listed in the table above. However, for purposes of identifying which parcels may have issues siting a properly functioning conventional septic system, all parcels located within the Planning Area not meeting the required area within their respective soil types have been identified as being limited for on-site subsurface wastewater disposal. Additionally, properties whose lot sizes are larger than the areas listed in the table above but whose useable area (i.e. not encumbered by steep slopes, water way buffers, unsuitable soils, and the 100 year flood plain) is less than the areas listed in the table above have also been identified as being limited for on-site subsurface wastewater disposal. See Exhibit 3.1.a.B, Septic Limitation Map.

3.1.b. Identify Areas Susceptible to Flooding and High Groundwater Table

Based on the floodplain mapping obtained from FEMA for the Hamlet of Shandaken, areas along the south side of NYS Route 28 east of the intersection of NYS Route 42 and the areas along the north side of NYS Route 28, west of the intersection of NYS Route 42 are susceptible to flooding. See Exhibit 3.1.b.A, Flood Insurance Study Map and Exhibit 3.1.a.B, Septic Limitation Map to view the 100-year flood plain boundaries and 100 foot buffer boundaries from waterways.

3.1.c. Identify Areas on 15% Slope or Greater

The 1988 NYSDEC Standards states that trenches for absorption fields should not be placed on slopes greater than 20 percent. NYCWRR Part 75 and Appendix 75A requirements call for avoidance of slopes greater than 15%. Therefore, a slope of 15 percent or greater will be considered a limiting factor for on-site subsurface wastewater disposal for this wastewater study.

Using the digital elevation model created by NYSDEC from the USGS Quad maps, in conjunction with functions of AutoCAD software that identify slopes chosen by the user, areas with slopes greater than 15 percent were identified.

These identified slopes were located predominately on the north side of NYS Route 28 and on both the east and west sides of NYS Route 42. Generally the areas along the Esopus Creek consist of slopes of 5% or less. See Exhibit 3.1.a.B, Septic Limitation Map.

3.2. Assess Potential Wastewater Disposal Issues

3.2.a. Existing Wastewater System Information

Since Shandaken has no centrally managed sewer system, wastewater system records are scarce. However, per the NYSEFC Report, presented in Exhibit C, there are six (6) known systems on record with the Catskill Watershed Corporation as having problems (tax map parcel numbers 5.13-1-23, 5.13-1-37.2, 5.13-2-47, 5.13-2-53, 5.13-3-10 and 5.13-3-7). See Exhibit 3.2.a.A, Septic Failures Map.

3.2.b. Soil Data

Soil interpretations were based on data from the "Soil Survey of Ulster County, New York", published by the USDA – Soil Conservation Service in 1993 and the information published on the Natural Resources Conservation Service, United States Department of Agriculture, Web Soil Survey, available online at *http://websoilsurvey.nrcs.usda.gov/*.

The soil survey data indicates that the majority of the soil unit types situated within the more populated portions of the Planning Area are generally suited for septic systems, except for the potential of excessive permeability in the subsoil. This can be corrected by bringing in imported fill that has a slower percolation rate than the soil in situ.

The NYSEFC Chapter 6 report recommended on-site systems for larger lots with one (1) cluster septic system. The soil type for a portion of the cluster septic system site identified by NYSEFC is suitable for subsurface cluster systems, but the soil type on a majority of the 30 acre property is not suitable and is located in the flood plain. The only area available that is out of the flood plain is approximately 1.3 acres.

3.2.c. Property Surveys

3.2.c.i. Property Use Windshield Survey

A property use windshield survey was conducted to observe and ascertain what the existing property uses were for each property located within the Planning Area. The survey was conducted along public streets and roads. Landowners were not contacted during the survey.

Based on observations, designations of use were assigned to each property based on the following categories:

RSF - Residential Single Family
RTF - Residential Two Family
C - Commercial
CA - Commercial with Apartment
M - Municipal
V - Vacant
I - Institutional
IA - Intuitional with Apartment
RA - Residential Apartment

Exterior features such as number of mailboxes, number of electric meters, or number of satellite dishes were observed and used to help estimate the number of occupied spaces for residential properties or commercial and institutional properties with apartments.

Non-residential (commercial, municipal, or institutional) properties were further evaluated to determine the sub category such as a hotel, Fire Department, church, etc.

The property use windshield survey is helpful because the information obtained is used to help develop flow estimates for the eventual Proposed Service Area (see Sections 4 and 5).

The property uses were recorded on data sheets entitled "Property Use Windshield Survey". See Exhibit 3.2.c.A, Property Use Windshield Survey.

The Hamlet of Shandaken consists of many single-family dwellings and a few commercial establishments. Most dwellings and businesses in the center of the Hamlet are located very close together on small lots. The character and makeup of the Hamlet area is similar to many small rural villages and hamlets found throughout the region.

All of the properties located within the Planning Area are served by on-site private wells.

It was observed that a large majority of the lots in the Hamlet of Shandaken are small and are in close proximity to the Esopus Creek and associated tributaries. These lots may not be large enough to support up-to-standard septic systems.

A more detailed "Septic System Windshield Survey" will be needed during the design phase in the future to observe and locate site-specific factors and to discuss site specific issues with landowners.

3.2.c.ii. Septic System Survey

A survey questionnaire was sent to all property owners in the Planning Area. The survey questionnaire is presented in Exhibit 3.2.c.B along with a tabulation of the results. Survey questionnaires were completed and returned by owners representing 17 properties out of 71 properties (or about 24% of properties) in the service area.

Questionnaires were completed representing 11 residential, 1 commercial/institutional, 3 mixed use and 2 vacant properties.

Of 15 septic systems reported, 6 were of an age greater than 25 years.

Of 14 questionnaires reporting on recent problems with septic systems, 9 reported no problems and 5 reported problems.

Of 15 questionnaires reporting on prior septic system failures, 8 systems had failed and 7 had not.

Of 15 questionnaires reporting on the frequency of pump outs of their septic systems, 8 reported that they pump their septic tanks out less frequently than once every three years, and of those, 5 reported that their tanks are never pumped out.

Of 16 questionnaires reporting on drainage on the property, 11 property owners reported that the drainage on their property is "good'; 4 "okay"; and 1 "terrible" drainage.

No one reported using a garbage disposal and 1 has a water softener.

Notable comments from the survey:

1. I am very careful with my septic and DO NOT want to "share" expenses or equipment with others OR have my property "dug up" for others convenience. NEVER. I WILL NEVER GRANT AN EASEMENT OR ALLOW ANY TRESPASS ON MY PROPERTY.
2. Dry well was added about 25 years ago. System currently requires frequent pump out. Pump out is done by CWC.
3. When the water in the creek and our ground elevation are the same our property and everyone around us floods.
4. Would this system have any impact on my well water? I am not in the water district.

3.2.d. Stormwater Disposal

Stormwater runoff from the Hamlet of Shandaken flows to the Esopus Creek. The stormwater system is comprised of mainly road side ditches. There are a few catch basins along NYS Route 42 that discharge to the Esopus Creek. It is recommended that the Town of Shandaken investigate the existing stormwater conditions and submit an application to the Catskill Watershed Corporation Stormwater Retrofit Grant Program for funding assistance for needed improvements to improve water quality in the hamlet.

3.2.e. On-site Wells

The Hamlet of Shandaken does not have a public water system and properties use on-site wells for drinking water. The lack of a community water system and the reliance on an on-site well on each parcel has an impact on the lot size needed for on-site septic systems due to the requirement of 100 feet horizontal separation from well to a subsurface wastewater treatment system.

3.3. Summary of Wastewater Disposal Issues

Based on the reviewed materials, it is clear that developing up-to-standard, properly functioning on-site individual septic systems will be difficult to do especially within the more densely populated areas of the Hamlet of Shandaken. It is possible that there may be many inadequate septic systems that will lead to failures in the future. The Service Area delineation in Section 4 is based on the compilation of the observations on existing wastewater needs as discussed above.

SECTION 4

Delineate Proposed Wastewater Service Area

The wastewater service areas identified in the development of the MOA were used by NYSEFC in their preliminary engineer's reports, and therefore, the area defined in the NYSEFC report was the initial area considered for service for the current report.

Based on the property use windshield survey and the site limitations mapping, four (4) additional properties were identified that could justifiably be added to the service area defined in the NYSEFC report. Those parcels are as follows: 5.13-3-5, 5.13-3-4, 5.17-1-12.1 and 5.17-1-12.2.

Parcels 5.13-3-5, 5.13-3-4, 5.17-1-12.1 and 5.17-1-12.2 located on the eastern end of the EFC Service Area along NYS Route 28 are recommended to be part of the Main Proposed Service Area. Parcels 5.17-1-12.1, 5.17-1-12.2, 5.13-3-4 combined were identified in the NYSEFC Report as Site A, a potential subsurface treatment site. In 2011, parcel 5.17-1-12.1 was being offered for sale to NYCDEP. However, the Shandaken CWMP had not been offered the opportunity yet to participate in the CWMP program. As a result NYCDEP contacted CWC and authorized them to complete preliminary testing to determine its suitability for a subsurface treatment site. That testing was completed in July/August of 2011, and a small portion of that property was deemed potentially suitable for a subsurface system. (See Section 6.3.b for further description of the testing performed on this property.) Therefore it is recommended that these three (3) parcels, along with 5.13-3-5, which lies between the edge of the EFC Service Area and the three (3) parcels identified as Site A in the NYSEFC Report and is significantly encumbered by the 100-year flood plain, be included in the Proposed Service Area.

See Exhibit 4.A for the Proposed Service Area Map and Table Summary of Parcels.

There are 73 parcels in the Proposed Service Area, however, two of these parcels are the vacant lots identified as Site A. Therefore the number of parcels served by the project will be two (2) less than the number of parcels in the Proposed Service Area. There is also an additional 16 vacant lots (for a total of 18 vacant lots) in the Proposed Service Area.

SECTION 5
Determine Wastewater Flows for Service Area

5.1. Equivalent Dwelling Units and Population Equivalents

The concepts of equivalent dwelling units (EDU's) and population equivalents are commonly used to simplify wastewater generation estimating. Non-residential units are converted to equivalent dwelling units (EDU's) based on the amount of wastewater generation. The EDU concept converts all wastewater usage proportionally to that equivalent to a typical single family residence. Then an engineering estimate of the wastewater generation per population equivalent is used to calculate an estimated Average Daily Wastewater load or flow.

During the property use windshield survey, an EDU count was completed within the study area for the Hamlet of Shandaken. Each parcel was evaluated to determine its current use (Residential Single Family, Residential Two Family, Residential Apartment, Commercial, Institutional, Municipal, Commercial with Apartment, Institutional with Apartment, or Vacant). If it was determined that the parcel was residential, it was then given an EDU count depending on how many housing units were located on the parcel, based on the number of utility meters, number of mailboxes, etc.

When a parcel was determined to be used for other than residential use, an evaluation of the site was performed to the extent possible with the information obtained through the property use windshield survey. NYSDEC Design Standards for Wastewater Treatment Works 1988 (1988 NYSDEC Standards), Table 3, Expected Hydraulic Loading Rates, was used during the site evaluation to determine the flow rates for a particular facility. See Exhibit 3.2.c.A to review the property use windshield survey conducted for the Hamlet of Shandaken.

5.2. Estimate Wastewater Flow for Service Area

The MOA states "Upon agreement of the City and an Identified Community, the maximum permitted flow may be adjusted to equal the existing flow within the agreed-upon service area plus ten percent (10%)." The Hamlet of Shandaken's maximum permitted flow as estimated in the MOA was 36,000 gpd (30-day average).

The NYSEFC Strategic Wastewater Planning Study, Chapter 6 estimated the Hamlet of Shandaken wastewater flow at 26,000 gpd based on an inventory of residential, commercial and institutional facilities, an estimated population of 185 persons and current estimating standards. See Exhibit C for Table 6.1 NYSEFC Wastewater Flow Estimate. However, the NYSEFC Report inventory was performed over 15 years ago, and the current study proposes to add 4 (four) properties to the service area

originally proposed in the NYSEFC Report. Therefore, the Hamlet of Shandaken's wastewater flow was recalculated.

The Recommended Standards for Wastewater Facilities – 2004 Edition (Ten States Standards) requires that the sizing of wastewater facilities receiving flows from new wastewater collection systems shall be based on an average daily flow of 100 gallons per capita plus wastewater flow from industrial plants and major institutional and commercial facilities unless water use data or other justification upon which to better estimate flow is provided.

According to the U.S Census Bureau, 2010 Census data for the Town of Shandaken, the number of persons per household is 2.05. The 2010 Census data indicates the New York State number of persons per household is 2.65 and that the Nation's (United States of America) number of persons per household is 2.59. To be cautious, for this study a figure of 2.60 persons per household (same as the NYSEFC Report) was used to determine the flow per residence. See Exhibit 5.2.A for the 2010 U.S. Census Bureau information for New York State.

Using the 2.60 persons per household times 100 gallons per capita, as recommended by the Ten States Standards, results in a total of 260 gallons per residence (or EDU). Observations made during the site evaluations conducted during the property use windshield survey were used to determine the flows of all potentially large users. The flow estimate was then divided by the average residential use of 260 gallons to determine the EDU count for those properties.

This most current inventory of the properties in the Proposed Service Area suggests that the existing wastewater load for the Proposed Service Area for Shandaken is approximately 18,000 gpd. The estimated residential EDU count is 60 EDU's and the estimated EDU count for the entire Proposed Service Area is 69 EDU's. With the 10% allotment added for growth, the Shandaken Total Wastewater Flow Estimate is 20,000 gpd, or 77 EDU's.

See Exhibit 5.2.B for the Hamlet of Shandaken Wastewater Flow Estimate for the Proposed Service Area.

SECTION 6
Identification and Review of Wastewater Management Options

6.1. Septic Maintenance District

When soil conditions are favorable and lot sizes are adequate, rather than implement some form of centralized sewage disposal, a town can form a district to take responsibility for individual septic systems serving private property. This is called a Wastewater Disposal District or Septic Maintenance District. The town board is authorized to exercise all powers with respect to Wastewater Disposal Districts, which are provided for Sewer Districts, to the extent that such powers are consistent with the purposes of a Wastewater Disposal District. The charges for all Wastewater Disposal District services shall be sufficient to pay all estimated annual costs of operation and maintenance and all annual installments of principal and interest on obligations issued on behalf of the Wastewater Disposal District. To the extent that revenue in any year is insufficient, the excess cost over the revenues may be assessed against the real property of the district in the following year. A Wastewater Disposal District cannot include any portion of a Sewer District. However, a Sewer District can include the maintenance of individual on-site septic systems (from Guide to Developing a Municipal Wastewater Project by Lamont Engineers, P.C. and Young, Sommer…LLC (Guidance Manual), Chapter 5, Paragraph 5.12)

The services of a Septic Maintenance District are defined locally. The services can be as basic as a town providing awareness and information about how to properly maintain a private septic system, inventorying the systems, and reminding homeowners of maintenance at the appropriate intervals. However, services of a Septic Maintenance District can also be as involved as the town operating and maintaining the on-site system still owned by the private individual, including providing repairs to the system or even full replacement by construction of entirely new on-site septic systems.

On-site septic tank and subsurface treatment and disposal systems, if properly applied to adequate site(s), and if properly operated and maintained, are effective, and these systems are the least costly wastewater management option in initial capital costs, on-going operation and maintenance costs and future replacement or rehabilitation costs.

The key issue is whether the individual lots are adequate in size, hydrogeologic and physical characteristics. The sites must be evaluated with caution. If a significantly large majority of the community sites can support an adequate, properly sized and designed system meeting current regulatory requirements including the 100% reserve requirement, and if the balance of the community's sites can support specially engineered systems, then the community can pursue the development of this option with reasonable confidence. If a significant number of sites are insufficient, then the septic maintenance district option should be rejected in favor of an option with more

potential for full and long-term success (from Alternatives for Municipal Wastewater Management Systems, by Lamont Engineers, P.C., Chapter 10, Paragraph 1).

6.2. Sewer District

A district is an area of a town that receives a service from the town that benefits only the properties within the district. A Sewer District is a legal formation of properties within a town that are benefited by and pay for sewage treatment and disposal. The district ensures that households within the municipality that are not benefited by the sewer system are not unfairly burdened with its cost. Different types of Sewer Districts may be comprised of a portion of a town or a portion of a town and village within the same town, with the village's approval. A Sewer District may not cross town lines. Sewer districts do not have to be contiguous; sewer districts can have separate sections or areas that are not contiguous (from Guidance Manual, Chapter 5, Paragraph 5.11). The typical Sewer District is served by a sewage collection system, a wastewater treatment plant, and a permitted surface discharge to a stream.

Sewer Districts can be developed for smaller communities that implement alternative approaches to the wastewater collection and treatment systems that are typical of larger municipalities. Not everyone needs to be connected to a centralized sewer system. Districts can be formed with one or more of the properties connected to a septic tank and providing a pump out of septic tanks, or a combination of a centralized sewage system and individual septic systems, or numerous clustered systems within the district itself. These systems may be located on public or private property. A sewer district can include the maintenance of individual on-site septic systems. The charges imposed within the sewer district can vary in direct proportion to the benefit of the service provided.

6.2.a. Community Septic System

The flow strength and volume of a small rural community is typically lower than that of a city and therefore simpler methods of treating and discharging of the wastewater may be implemented. A community septic system is a wastewater collection and treatment system that is intermediate in scale and complexity. A community septic system may have a collection system that collects raw sewage and conveys it to a central location. Solids are collected in a tank, and liquid is discharged to a large leach field, where it is treated and discharged. The treated effluent is discharged below the ground, as opposed to a wastewater treatment plant where the discharge is usually to surface waters. The extent and complexity of treatment of the wastewater in a community septic system is typically less than in a wastewater treatment plant.

6.2.a.i. Cluster System

Cluster systems are a method of wastewater treatment and disposal where two or more homes may be connected to a common septic tank and disposal system. These systems may be located on public or private property. This type of multi-home septic system is more suitable for small rural communities than for large, densely populated areas.

6.2.b. Wastewater Treatment Plant System

A wastewater treatment plant system refers to the type of sewage treatment and disposal typical of larger municipalities, villages and cities. A wastewater treatment plant may be necessary even in a small community if adequate subsurface treatment and disposal sites are unavailable. Typically large diameter gravity collection system pipes carry raw sewage directly from the homes and businesses to pump stations, where necessary, but ultimately to a central location where the sewage is treated and disposed of directly to a stream as a surface discharge. Wastewater treatment plants treat the sewage through biological, mechanical and chemical processes in order to prepare the wastewater to be legally discharged to a body of water (i.e. without posing a health threat to the public or creating an environmental problem).

6.2.c. Conveyance to Existing Wastewater Treatment Plant

Some communities are located relatively near a neighboring community's existing wastewater collection and treatment system. If that neighbor is willing to sell some of its excess capacity at a reasonable price and if that neighbor is willing to take on the responsibility for treating the wastewater for a reasonable cost or for other considerations, such as annexation in the case of a town, hamlet, and a village, then pumping wastewater to the existing system could prove to be the best option. When a community proposes such a deal to its neighbor, it must remember that the neighbor has no legal or moral obligation to provide the service requested and that therefore the proposal must be financially advantageous to the neighbor. Indeed, if the deal were not in the interest of the neighbor, then the neighbor would have an obligation to its citizens to reject the idea.

One disadvantage to the option of pumping to a neighboring community's wastewater system is that the availability of future additional wastewater treatment capacity is entirely within the power of the neighbor to grant or deny.

6.3. Practical Wastewater Management Options for the Hamlet of Shandaken

6.3.a. Septic Maintenance District

The Proposed Service Area for the Hamlet of Shandaken contains 73 properties as shown in Exhibit 4.A. Site features inhibiting or prohibiting the development of adequate conventional, on-site septic systems were found on many of these properties. As shown on the Septic Limitation Map in Exhibit 3.1.a.B, these features are:

1. location too close to waterways (minimum 100' setback)
2. location within the FEMA 100-year flood zone boundary
3. too steep (>15% slopes)
4. insufficient lot size
5. unsuitable soils
6. location too close to private wells

The properties located within the Proposed Service Area were reviewed to determine if an individual on-site septic system meeting Chapter 10 of the New York Codes, Rules, and Regulations Part 75 and Appendix 75-A (10 NYCWRR Part 75 and Appendix 75-A) could be sited on the property while avoiding the limiting septic system site features.

To do this, the Sample Conventional Septic System Layout and Design in Exhibit 3.1.a.A, were used for the locations described in Chapter 3. These sample conventional septic systems were based on a flow rate of 400 gpd, per the NYSDEC 1988 Design Standards for Wastewater Treatment Works (1988 NYSDEC Standards), Table 3 – Expected Hydraulic Loading Rates, for a 3 bedroom housing unit.

Sample Conventional Septic System Layouts and Designs were also done for the larger commercial water users in the Proposed Service Area. The flow rates for the larger commercial water users were determined per Table 3 in the 1988 NYSDEC Standards and are as shown in Exhibit 5.2.B, Wastewater Flow Estimate.

There are a total of 73 properties in the Proposed Service Area. Based on this review of the properties within the Proposed Service Area, it was determined that 15 of 73 properties (21% of total) could maintain an individual on-site septic system with the required 100 percent leach field reserve area available. Of the remaining 58 properties (79% of total) properties, 5 properties (7% of total) would not meet the 2012 NYSDOH Residential Onsite Wastewater Treatment Systems Design Handbook's strong recommendation to avoid the 100-year flood plain, 1 property (1% of total) cannot avoid the 100' offset from streams, 4 properties (6% of total) would not meet the NYCWRR Part 75 and Appendix 75-