Wastewater Feasibility Study
FINAL

Town of Amenia
Dutchess County, NY

November 2012

Project No. 3901201

CLARK ENGINEERING & SURVEYING, P.C.

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Parcel 7167-00-186672, Route 22, Amenia, NY
Wastewater Feasibility Study - FINAL Results
November 16, 2012

Introduction

The parcel 7167-00-186672 was identified in the July 12, 2012 Wastewater Feasibility Study for the Hamlet of Amenia by Clark Engineering & Surveying, PC. At that time the owners of the parcel were unresponsive to requests from the Town for access to on-site investigation. Since that time, access to the site became available. The results of the on-site analysis are presented here.

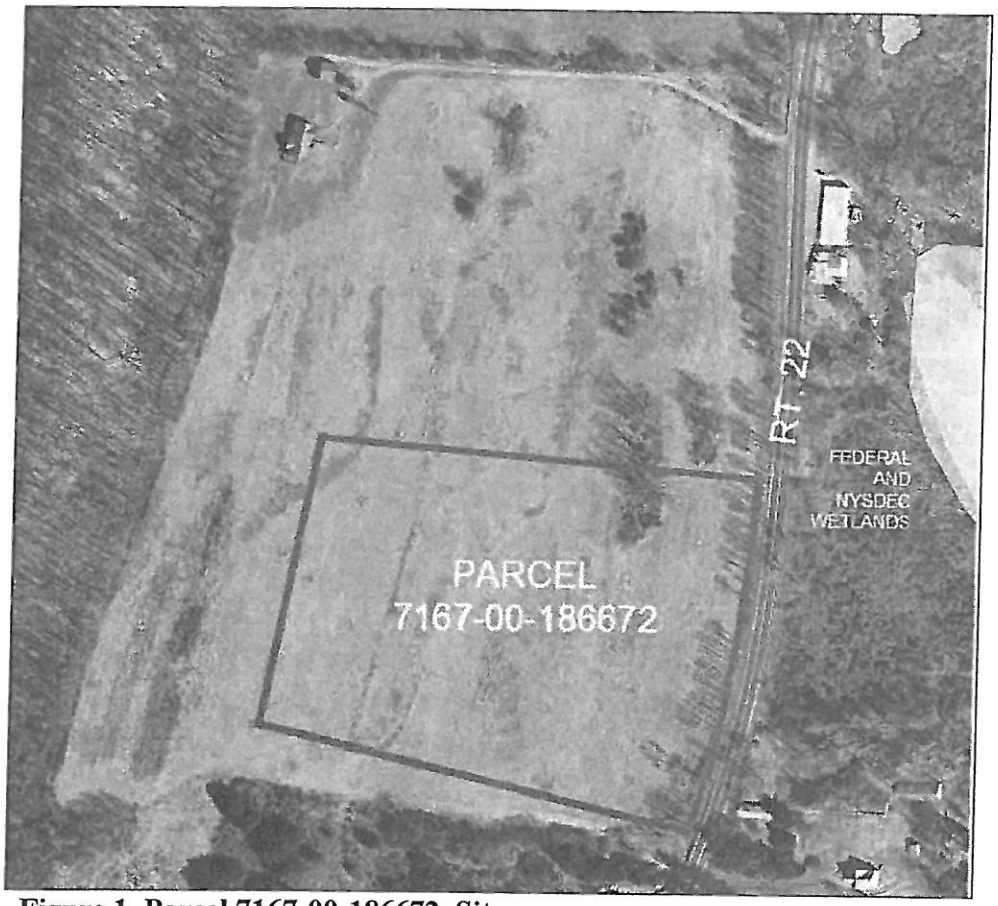

Figure 1 Parcel 7167-00-186672 Site

Background

This 8 acre parcel appears to be used as a hay field. The parcel has a very advantageous location for wastewater treatment in due to its close proximity to the hamlet center and and has none of the restrictions that impact other identified parcels (i.e. parkland, agricultural district, wetlands, floodplain)

Soils

The parcel soil type is Stockbridge Loam (Sm). Stockbridge loam consists of very deep, well drained soils formed in loamy calcareous till. They are nearly level to very steep soils on till plains, smooth hills, low ridges and drumloidal landforms. Slope ranges from 0 to 60 percent. Permeability is moderate in the surface layer and subsoil and moderately slow or slow in the substratum.

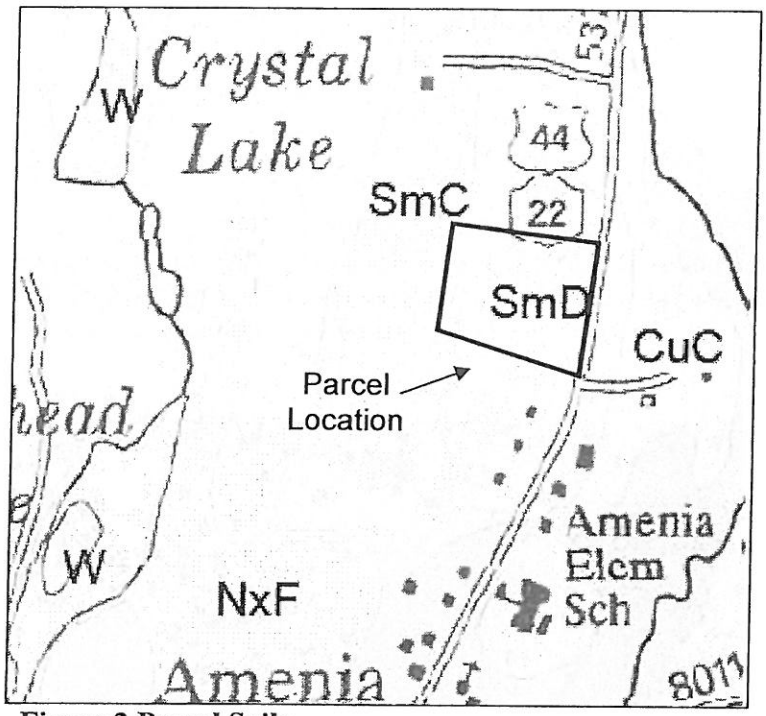

Figure 2 Parcel Soils

Topography

The parcel has an approximate 8% slope toward State Route 22, as shown in Figure 3.

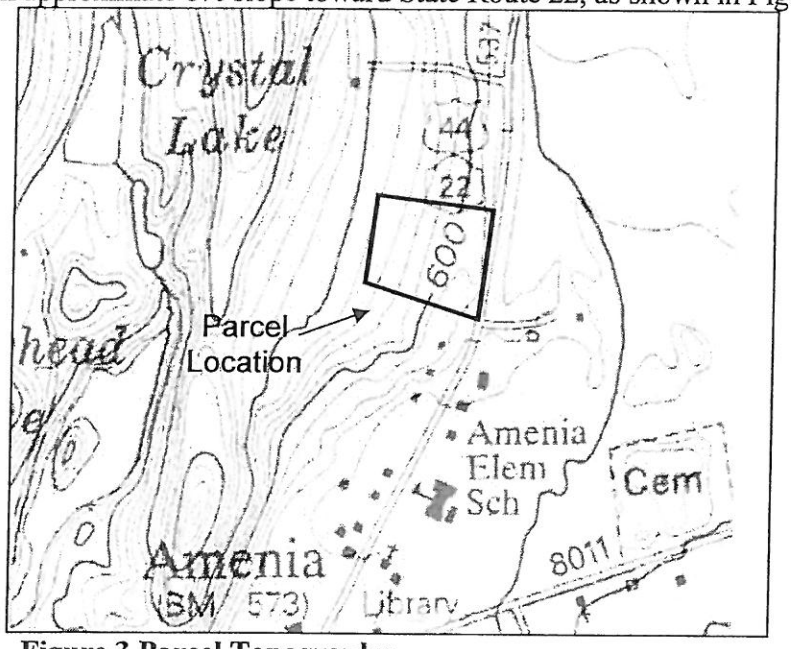

Figure 3 Parcel Topography

Site Investigation

On-site investigation was completed on this parcel on October 11th 2012. The details results of this can be found in Attachment A. In general soils were found to be silty loam with under layers of sandy gravel and the percolation rate was found to be less than 6 minutes per inch in all but one location. In one area a rate of 9 minutes per inch was noted, but given the percolation rates at other areas of the property, we would recommend soil amendment in this area to increase the percolation rate.

Site Capacity

The calculations to determine the disposal capacity of the site are outlined below:

Total Parcel Area:	8.0 acres	
Offset Areas:	1.0 acres	(Includes 10' property line offset per NYSDEC, area for treatment system and treatment system expansion, 20' sideline offset for vehicular access around disposal beds)
Remaining Area:	7.0 acres	
	292,708 sf	
50% Reserve Area:	97,569 sf	(50% of treatment area required for reserve capacity)
Abs. Field Area:	195,139 sf	
Area Width:	620 ft	
Pipe Spacing:	6 ft	(2 ft trenches, 6 ft on center)
Potential Laterals:	103 each	(Area Width / Pipe Spacing)
Avg. Area Length:	315 ft	(Abs. Field Area / Area Width)
Total Lateral Length:	32,445 ft	(Potential Laterals x Avg. Area Length)
Trench Width:	2.0 ft	
Leaching Area:	64,890 sf	(Lateral Length x Trench Width)
Applications Rate:	1.0 gpd/sf	(Based upon percolation rate of 7 min/inch)
Total Area Capacity:	64,890 gpd	
Factor of Safety:	10%	(Provides additional area for manifolds as well)
Treatment Capacity:	**58,000 gpd**	

These calculations are based upon NYSDEC Design Standards for Wastewater Treatment Works, an application rate of 1.0 gallon/day /square foot is appropriate for the fields. The resulting capacity of the parcel is 58,000 gpd. Note this is theoretical capacity of the site based upon the field investigation and standard design assumptions. Actual design may result in a slightly higher or lower capacity depending on field layout and the willingness of NYSDEC to allow fill/soil modification in any area they deviate from the typical conditions encountered during the field investigation.

Subsurface Treatment Layout

If subsurface disposal at parcel 7167-00-186672 can be successfully pursued, then the treatment components will consist of:

- Flow Meter
- Anoxic Tank
- Equalization Tank
- Orenco Advantex Treatment Modules
- Effluent Dosing Pump Station
- Absorption Fields

The preliminary site layout is provided in Figure 4.

Figure 4 Proposed Site Layout

This layout is based upon 24,000 gpd which was presented as the design wastewater flow rate for the hamlet.

Costs

Detailed cost estimates are included as Attachment B. The system capital costs for the collection system are presented in Table 1 below and are in accordance with the methodologies presented in the July 2012 study.

Table 1 Collection System Capital Cost Summary	
Item	Amount
Subtotal (STEP):	$1,455,390
Subtotal (Collection):	$ 460,565
Subtotal Collection System Construction Cost:	$1,915,955
Construction Contingency (10%)	$ 191,595
Collection System Construction Cost:	$2,107,550
(Design Development (30%)	$ 632,265
ROW Easements:	$ 40,000
DCWWA Project Costs (3.65%)	$ 76,926
Project Cost	$2,856,741
Project Contingency (10%)	$ 285,674
Total Project Cost - June 2012	$3,142,415
June 2012 ENR CC Index	9,291
Estimated December 2012 ENR CC Index	9,367
Total Project Cost - December 2012	$3,168,119
ENR Projected Annual CCI Escalation	2.10%
Total Project Cost - December 2014[1]	**$3,302,578**

Note 1: Does not include project financing

This collection system cost is slightly higher than the costs associated with the Town Hall or Beekman Park as the parcel is slightly further from the service area then these two locations.

The following Table 2 provides the capital costs for the subsurface treatment systems utilizing the Orenco Advantex system:

Table 2 Treatment System Capital Cost Summary	
Item	Amount
Subtotal (Treatment)	$ 504,000
Subtotal (Disposal)	$ 120,488
Subtotal Treatment System Construction Cost:	$ 624,488
Construction Contingency (10%)	$ 62,449
Treatment System Construction Cost:	$ 686,488
(Design Development (30%)	$ 206,081
DCWWA Project Costs (3.65%)	$ 25,073
Project Cost	$ 918,090
Project Contingency (10%)	$ 91,809
Total Project Cost - June 2012	$1,009,899
June 2012 ENR CC Index	9,291
Estimated December 2012 ENR CC Index	9,367
Total Project Cost - December 2012	$1,1018,160
ENR Projected Annual CCI Escalation	2.10%
Total Project Cost - December 2014[1]	**$1,061,372**

The following Table 3 provides the total capital costs for the total wastewater system:

Table 3 Subsurface Disposal Capital Cost Summary			
System	Collection System	Treatment & Disposal	Total[1]
Cost	$3,302,578	$1,061,372	**$4,363,950**

Note 1: Does not include project financing

Operation and maintenance costs presented in Table 4, are as described in the July 2012 study.

Table 4 Annual O&M Cost Summary	
Item	Subsurface
Subtotal (Operation)	$ 24,070
Subtotal (Equipment & Materials):	$ 1,580
Subtotal (Contracted Costs):	$ 8,475
Subtotal (Utilities):	$ 2,840
System Operation Cost Subtotal:	$ 36,965
DCWWA Operational Contingency (5%):	$ 1,848
Annual O&M Cost:	**$ 38,813**

Based upon the CWSRF interest rate of 0% and the 30-year loan term, Table 5 presents the debt service required by the capital costs.

Table 5 Annual Debt Service Fees	
Item	Cost
Capital Costs	$4,363,950
DSRF & COI Cost (6.5%)	$283,657
Total Financing Capital Costs	$4,647,607
Annual Debt Service (30 yrs @ 0% interest)	$154,920
BA Fee	$2,500
Trustee Fee	$1,750
Total Annual Debt Service Cost	$159,170

The total annual costs including the operation and maintenance costs are presented in Table 6.

Table 6 Combined Annual Costs	
Item	Cost
Total Annual Debt Service Cost	$159,170
Annual O&M Cost:	$38,813
Annual Cost Subtotal:	$197,983
DCWWA Administration Cost (9.5%)	$18,808
Total System Annual Cost:	$216,791

By applying the total annual costs developed in Table 6 to the total benefit units calculated in in the July 2012 study the annual cost per benefit unit is calculated as provided in Table 7.

Table 7 Cost per Benefit Unit	
Item	Cost
Total System Annual Cost:	$216,791
Service Area Benefit Units:	154.5
Annual Cost per Benefit Unit:	$1,403

It is important to note that these estimates do not include any costs associated with procurement of real property, including the parcel which is the subject of this investigation.

Conclusion

This property appears well suited to provide for subsurface wastewater disposal to the Amenia hamlet. If subsurface disposal is on this parcel is pursued, additional percolation tests and test holes would be recommended to in the proposed absorption field areas.

Attachment A – Parcel Subsurface Investigation
Attachment B – Cost Estimates

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ATTACHMENT A
PARCEL SUBSURFACE INVESTIGATION

Development Site: Town of Amenia
Parcel 7167-00-186672
Date: 10/11/2012
Weather Conditions: Sunny

County: Dutchess
Tests Conducted By: Clark E&S PC
EKM/KSG

New York State Department of Health
Test Pit Data
Bureau of water Supply protection

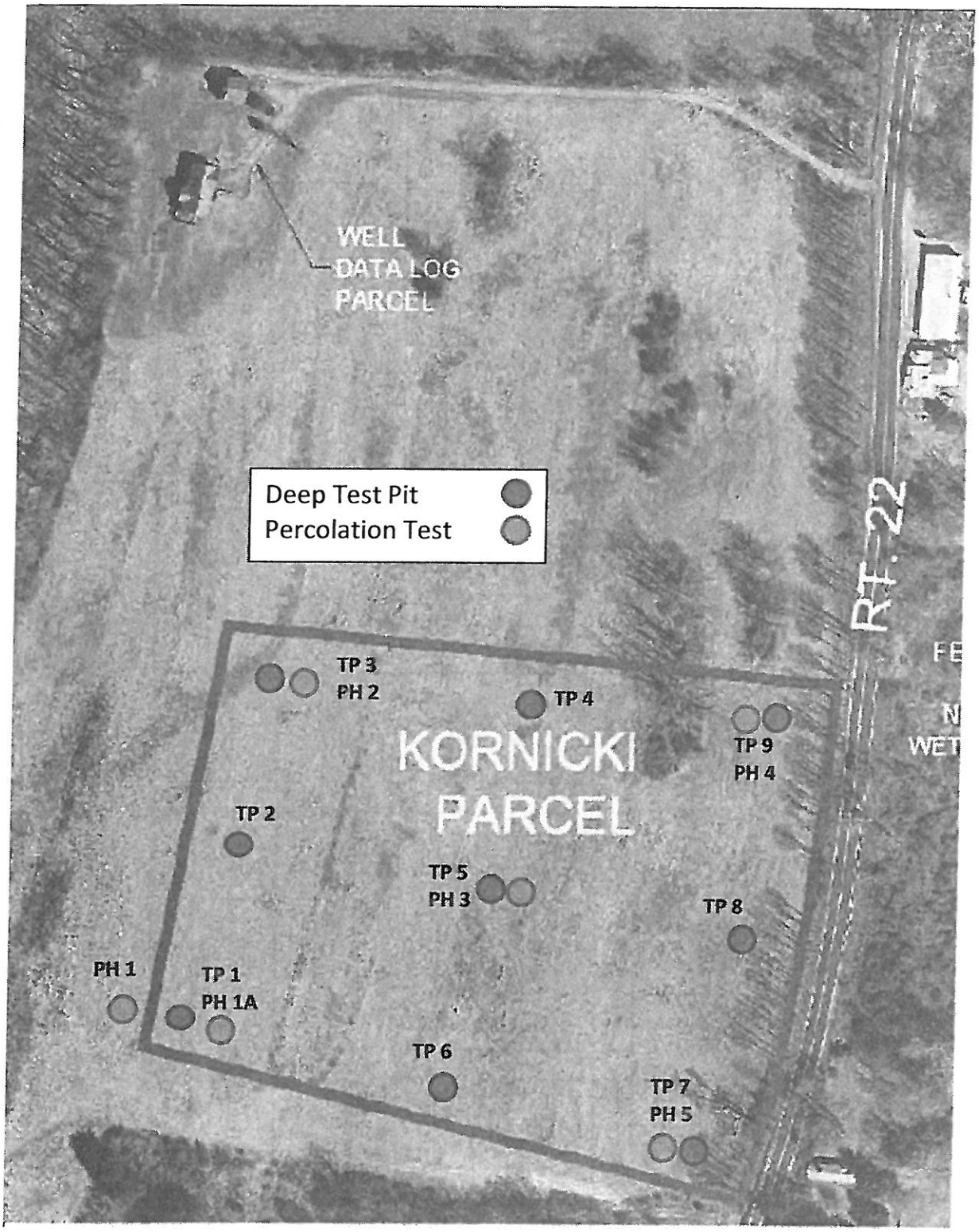
Test Hole No.	Test Hole Depth (inches)	Soil Profile Description and Groundwater Depth (if identified)	Presoaking Date & Time	Time	Percolation Test			
					1	2	3	4
PH1	24"	0"-18" Topsoil with roots 18"-24" Brown silty loam with shale fragments NOTE: This perc. test location is off of the parcel and appears to be on a graded roadway.	10/10/2012	End				
				Begin				
				Result	34 min 13 sec	43 min 25 sec	45 min 32 sec	
TP1 PH1A	73 "	0"-18" Topsoil with roots 18"-48" Brown silty loam 48"-60"Brown medium loam with gravel, some cobbles 60" - 73" Brown sandy gravel with fractured shale fragments increasing with depth 73"+ Fractured Shale No ground water, no mottling	10/10/2012	End				
				Begin				
				Result	2 min 50 sec	3 min 15 sec	3 min 22 sec	3 min 30 sec
TP2	72"	0"-18" Topsoil with roots 18"-36" Brown silty loam w/ some gravel 36"-48" Brown medium loam with gravel, some cobbles 48" - 68" Light brown sandy gravel with fractured shale fragments increasing with depth 68" - 72"+ Fractured Shale No ground water, no mottling	10/10/2012	End				
				Begin				
				Result				
TP3 PH2	76"	0"-18" Topsoil with roots 18"-54" Brown silty loam w/ some gravel 54"-76" Brown grey sandy gravel with fractured shale fragments increasing with depth 68" - 76"+ Fractured Shale No ground water, no mottling	10/10/2012	End				
				Begin				
				Result	4 min 45 sec	5 min 26 sec	5 min 44 sec	
TP4	74"	0"-12" Topsoil with roots 12"-54" Brown silty loam w/ some gravel, cobbles increasing with depth 54"-74" Brown grey sandy gravel No ground water, no mottling	10/10/2012	End				
				Begin				
				Result				
TP5 PH3	72"	0"-18" Topsoil with roots 18"-48" Brown silty clay loam 48"-72"Brown sandy clay loam with gravel No ground water, no mottling	10/10/2012	End				
				Begin				
				Result	7 min 37 sec	9 min 24 sec	9 min 35 sec	

Development Site: Town of Amenia
Parcel 7167-00-186672
Date: 10/11/2012
Weather Conditions: Sunny

County: Dutchess
Tests Conducted By: Clark E&S PC
EKM/KSG

New York State Department of Health
Test Pit Data
Bureau of water Supply protection

TP6	72"	0"-12" Topsoil with roots 12"-42" Brown silty clay loam with fractured shale increasing in depth 48"-72"Brown silty clay loam with gravel and fractured shale No ground water, no mottling	10/10/2012	End				
				Begin				
				Result				
TP7 PH5	74"	0"-24" Topsoil with roots 24"-66" Brown silty clay loam with fractured shale increasing in depth 48"-72"Brown silty clay loam with gravel and fractured shale No ground water, no mottling	10/10/2012	End				
				Begin				
				Result	2 min 43 sec	3 min 8 sec	3 min 12 sec	
TP8	74"	0"-12" Topsoil with roots 12"-74" Brown clean sandy gravel No ground water, no mottling	10/10/2012	End				
				Begin				
				Result				
TP9 PH4	78"	0"-12" Topsoil with roots 12"-74" Brown clean sandy gravel No ground water, no mottling	10/10/2012	End				
				Begin				
				Result	4 min 14 sec	5 min 17 sec	5 min 31 sec	


WELL
DATA LOG
PARCEL
Deep Test Pit
Percolation Test
RT. 22
TP 3
PH 2
TP 4
KORNICKI
PARCEL
TP 9
PH 4
TP 2
TP 5
PH 3
TP 8
PH 1
TP 1
PH 1A
TP 6
TP 7
PH 5

ATTACHMENT B
COST ESTIMATE

Amenia Wastewater Feasibility Study
Construction Cost Estimate - Collection System

Item	Unit	Est. Qty	Unit $	Amount
STEP (septic tank pump effluent system)				
Septic tank, pumps, complete (Single Family)	EA	75	$ 13,000	$ 975,000
Septic tank, pumps, complete (Large Commercial)	EA	6	$ 25,000	$ 150,000
HDPE Serivce Lateral	LF	8,500	$ 28	$ 238,000
Abandon Existing Tanks	EA	100	$ 500	$ 50,000
Mobilization/Demobilization	LS	1	3.0%	$ 42,390
Subtotal (STEP):				$ 1,455,390
Collection				
2"/3" HDPE Forcemain				
Route 22	LF	3600	$ 35	$ 126,000
Route 343	LF	2200	$ 35	$ 77,000
Route 44	LF	1000	$ 35	$ 35,000
Mechanic Street	LF	900	$ 35	$ 31,500
Broadway	LF	900	$ 35	$ 31,500
Morton	LF	0	$ 35	$ -
Additional To Treatment System	LF	800	$ 38	$ 30,400
Air Release	EA	6	$ 3,000	$ 18,000
Cleanouts	EA	25	$ 2,000	$ 50,000
Pavement Repair	SY	70	$ 25	$ 1,750
NYSDOT Crossing	EA	2	$ 3,000	$ 6,000
Lawn Restoration	SY	5000	$ 6	$ 30,000
Driveway/Parking Lot Restoration	SY	500	$ 20	$ 10,000
Mobilization/Demobilization	LS	1	3.0%	$ 13,415
Subtotal (Collection):				$ 460,565
Subtotal Collection System Construction Cost:				$ 1,915,955
Construction Contingency (10%)				$ 191,595
Collection System Construction Cost:				**$ 2,107,550**
(Design Development (30%)				$ 632,265
(includes survey, subsurface tests, engineering, legal, construction admin., construction inspection)				
ROW Easements:	SF	80000	$ 0.5	$ 40,000
(Utility easement cost for mainlines only - no easement value for services or tanks)				
DCWWA Project Costs (3.65%)				$ 76,926
Project Cost				$ 2,856,741
Project Contingency (10%)				$ 285,674
Total Project Cost - June 2012				**$ 3,142,415**
June 2012 ENR CC Index				9,291
Estimated December 2012 ENR CC Index				9,367
Total Project Cost - December 2012				$ 3,168,119
ENR Projected Annual CCI Escalation				2.10%
Total Project Cost - December 2014				**$ 3,302,578**

Amenia Wastewater Feasibility Study
Construction Cost Estimate - Subsurface Treatment - Advantex

Item	Unit	Est. Qty	Unit $	Amount
Advantex Wastewater Treatment				
AdvanTex Treatment Units	EA	9	$ 22,500	$ 202,500
Anoxic Tank	EA	1	$ 85,000	$ 85,000
Recirculation Tank	EA	1	$ 97,000	$ 97,000
Discharge Pump Station	EA	1	$ 25,000	$ 25,000
Discharge Flout	EA	1	$ 8,000	$ 8,000
Control Shed	SF	100	$ 25	$ 2,500
Flow Meter	EA	1	$ 5,000	$ 5,000
Instrumentation & Control	LS	1	$ 5,000	$ 5,000
Electrical Improvements	LS	1	$ 10,000	$ 10,000
Misc. Site Improvement - Fence, Access Road	LS	1	$ 40,000	$ 40,000
Mobilization/Demobilization	LS	1	5.0%	$ 24,000
Subtotal (Treatment)				**$ 504,000**
Subsurface Discharge				
4" Preforated PVC Pipe	LF	12000	$ 5	$ 60,000
4"" PVC Pipe	LF	500	$ 5	$ 2,500
Filter Fabric	SY	2000	$ 2	$ 3,000
Excavation	CY	1200	$ 5	$ 6,000
Washed Stone Borrow	CY	550	$ 30	$ 16,500
Backfill	CY	550	$ 5	$ 2,750
Distribution Boxes	EA	12	$ 250	$ 3,000
Grading & Seeding	SY	4200	$ 5	$ 21,000
Mobilization/Demobilization	LS	1	5.0%	$ 5,738
Subtotal (Disposal)				**$ 120,488**
Subtotal Treatment System Construction Cost:				$ 624,488
Construction Contingency (10%)				$ 62,449
Treatment System Construction Cost:				**$ 686,936**
(Design Development (30%)				$ 206,081
(includes survey, subsurface tests, engineering, legal, construction admin., construction inspection)				
DCWWA Project Costs (3.65%)				$ 25,073
Project Cost [1]				$ 918,090
Project Contingency (10%)				$ 91,809
Total Project Cost - June 2012				**$ 1,009,899**
June 2012 ENR CC Index				9,291
Estimated December 2012 ENR CC Index				9,367
Total Project Cost - December 2012				$ 1,018,160
ENR Projected Annual CCI Escalation				2.10%
Total Project Cost - December 2014				**$ 1,061,372**

Note 1: The Project Cost does not include any costs associated with procurement of real property, including the parcel which is the subjuct of this investigation.

Amenia Wastewater Feasibility Study
Annual O&M Cost Estimate - Subsurface Disposal

Item	Unit	Est. Qty	Unit $	Amount
Operator				
Regular Labor - 4 hrs per week @ $75 per hour	Week	52	$ 300	$ 15,600.00
(Assumes operator carring own insurance and				
overhead, reduce cost if Owner covering)				
Emergency Labor	Hr	12	$ 100	$ 1,200
Landscape Labor - 1 hr per week @ $25 per hour	Week	52	$ 25	$ 1,300
Administration, Billing, & Accounting	LS	1	$ 5,895	$ 5,895
Permitting Fees	LS	1	$ 75	$ 75
Subtotal (Operator):				$ 24,070
Equipment & Materials				
pH Meter - Assume every 5 years	Year	0.2	$ 300	$ 60
pH Meter - Calibration Solution	Year	1	$ 40	$ 40
Flow Meter Calibration	Year	1	$ 100	$ 100
Air Release Valve Seals	Year	1	$ 50	$ 50
Distribution Valve Seals	Year	4	$ 50	$ 200
Septic Tank Lid	Year	2	$ 40	$ 80
Pump Replacement - Assume every 1 per year	Year	1	$ 1,000	$ 1,000
Building Maintenance Supplies	Year	1	$ 50	$ 50
Subtotal (E&M):				$ 1,580
Contracted Costs				
Laboratory Testing - Nitrate - Quarterly	EA	4	$ 50	$ 200
Septic Tank Pumping	Year	22	$ 300	$ 6,600
Anoxic Tank Pumping	Year	0.125	$ 3,000	$ 375
Insurance	LS	1	$ 800	$ 800
Legal	LS	1	$ 200	$ 200
Engineering	LS	1	$ 300	$ 300
Subtotal (Contract):				$ 8,475
Utilities				
Electricty @ 70/kWh/day	kWh	25550	$ 0.09	$ 2,300
(Rate adjusted to include standard charge items)				
Telephone Service	Month	12	$ 45	$ 540
Subtotal (Utility):				$ 2,840
Annual O&M Cost:				**$ 36,965**
DCWWA Operational Contingency (5%):				$ 1,848
Total Annual O&M Costs:				**$ 38,813**