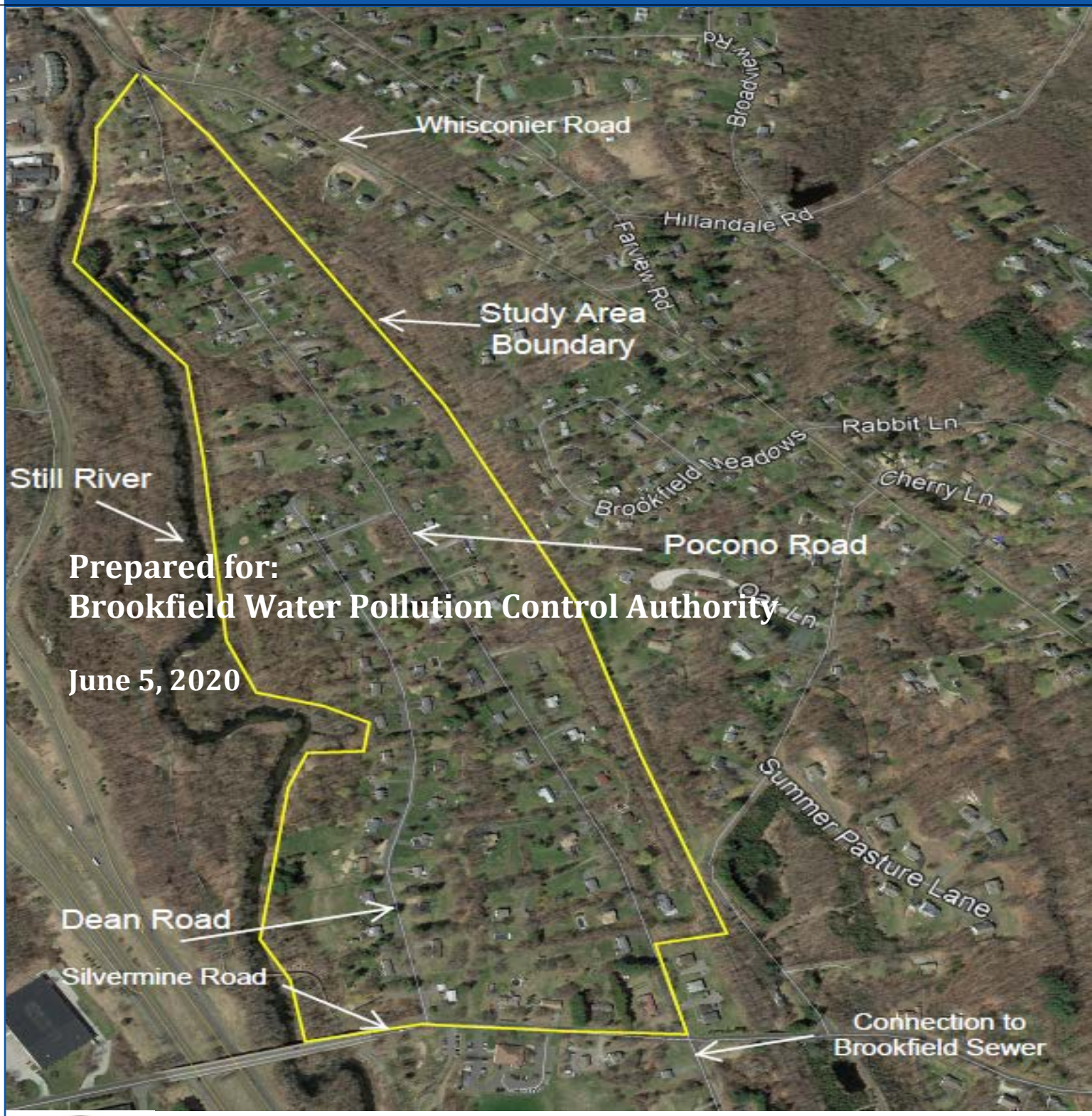
Dean & Pocono Roads Wastewater Management Plan



Prepared for:
Brookfield Water Pollution Control Authority

June 5, 2020

Environmental Engineers/Consultants

LOMBARDO ASSOCIATES, INC.

188 Church Street, Newton, Massachusetts 02458

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EXECUTIVE SUMMARY

The Brookfield Water Pollution Control Authority (WPCA) commissioned this Engineering Plan to address the Town's wastewater management issues and needs for the 90 parcels of which 85 are developed and are predominately residential properties in the WPCA Area of Concern (AoC) to the east of and near to Still River along Dean and Pocono Road, see Figure ES-1.

Figure ES-1 Dean & Pocono Roads Study Area

The Brookfield – Dean and Pocono Road Wastewater Management Plan has performed the following:

✓ Evaluated existing conditions, in particular wastewater management practices

✓ Determined wastewater system's impacts on public health and the environment

✓ Developed cost effective, technically reliable solutions to address problem systems

✓ Developed an Implementation Plan

A major project goal is to develop a more affordable solution than the 2018 Langan plan, which is presented in Appendix A.

The Study Area soil types and surficial geology have characteristics of shallow depth to groundwater, restrictive soils, shallow depth to impermeable layer (i.e. hardpan was noted in soil logs for 29% of Study Area properties that had soil logs) – all of which are not conducive to the use of individual On-Site Wastewater Treatment Systems (OWTS), aka septic systems. The USDA Natural Resource Conservation Services classifies the study area soils as very limited in their use for septic systems and cannot be overcome without major soil reclamation, special design, or expensive installation procedures. NRCS further states that "poor performance and high maintenance can be expected."

The Brookfield Board of Health files on the septic systems of all study area properties were reviewed and septic design data and site conditions digitized.

Virtually all properties with data, 20% of all properties, have challenging/unfavorable site conditions for use of OWTS and/or require an off-site solution due to insufficient space and/or unacceptable site conditions. Numerous properties have curtain drains around drainfields that discharge to brooks that are part of the Still River watershed. These properties are likely causing e. coli contamination of the surface waters as well as causing nutrient enrichment of the Still River. Alternately stated, very few properties, have sufficient data/information to enable a determination that the property septic system is not causing a public health and/or water quality problem.

Extrapolating from this data and in consideration of site soils/surficial geology and wetlands, Lombardo Associates, Inc. concludes that an excessive (from public health and environmental protection perspectives) number of properties experience OWTS malfunctioning events with negative public health and water quality implications.

Report Tables provide details on a property by property basis, on soils, depth to groundwater, mottling and bedrock and curtain drains and variances for properties with data.

Additionally, the study area is laced with creeks, drainage ditches and wetlands that would, along with the restrictive soils and surficial geology, not be conducive to the use of OWTS and be pathways for e. coli contamination by septic systems.

Extrapolating from this data and in consideration of site soils/surficial geology and wetlands, Lombardo Associates, Inc. concludes that an excessive (from public health and environmental protection perspectives) number of properties experience OWTS malfunctioning events with negative public health and water quality implications. The Brookfield Board of Health is of a similar opinion, per Board correspondence presented in Appendix B.

Consequently, it is recommended that the Study Area be sewered and connect to the existing Brookfield sewer system in the area of the intersection of Silvermine Road and Pocono Road.

The full range of gravity, low-pressure and hybrid gravity-low pressure sewers were evaluated with the recommendation of the least cost option being a septic tank effluent system, see Figure ES-2, in a hybrid gravity and low-pressure configurations with two small pump stations as shown on Figure ES-3.

Eight (8) of the 85 developed properties will require individual pumps which maximizes the number of properties with gravity connections without the need for deep, expensive sewers. A small number of individual house pumps is significantly more cost effective than deep sewers, as can be seen from the Appendix A unit prices for conventional sewers which increases from $70 per foot to $210 per foot to which would be added dewatering costs (as the area has shallow groundwater) and rock excavation – soil borings are needed to quantify. When a gravity wastewater system is installed deep to serve a few properties, it will continue to remain deep until surface elevation decreases rapidly, which does not occur in the Study Area.

Based upon the estimated project cost of $2.937 million and assuming no grants, the sewer assessment for an average Study Area property with a Grand List Value (GLV) of $183,000 would be 17.9% of the GLV or $33,000. Assuming inflation rate of 3%, 5 years for implementation and no grants results in project capital costs of $3.5 million and $38,300 assessment for a property with an average GLV. It is noted that all GLV values are based upon the 2016 Town Valuation and cost estimates are +/- 20%.

Upon sewer connection, sewer assessments would be paid by property owners financed with a bond or loan provided by the Town of Brookfield. The Brookfield WPCA will aggressively pursue federal and state grant funding for the project. The Brookfield WPCA also has programs to assist qualified property owners who are unable to pay for their assessments.

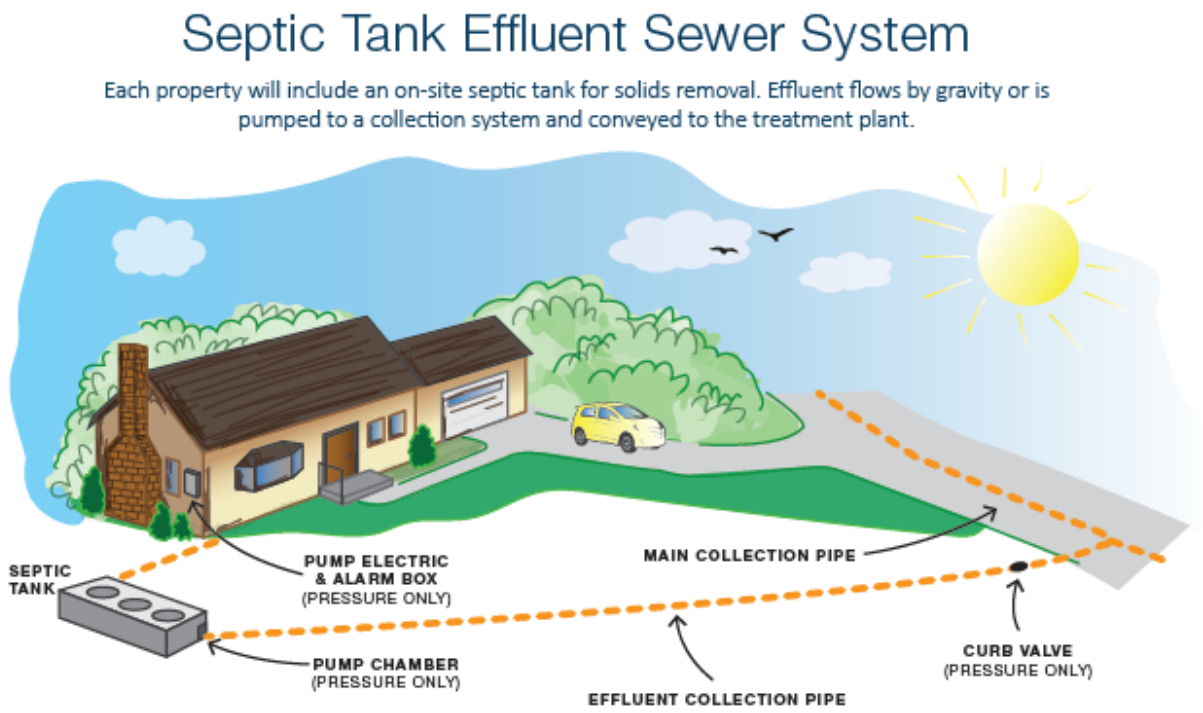


Figure ES-2 Septic Tank Effluent Sewer System Illustration

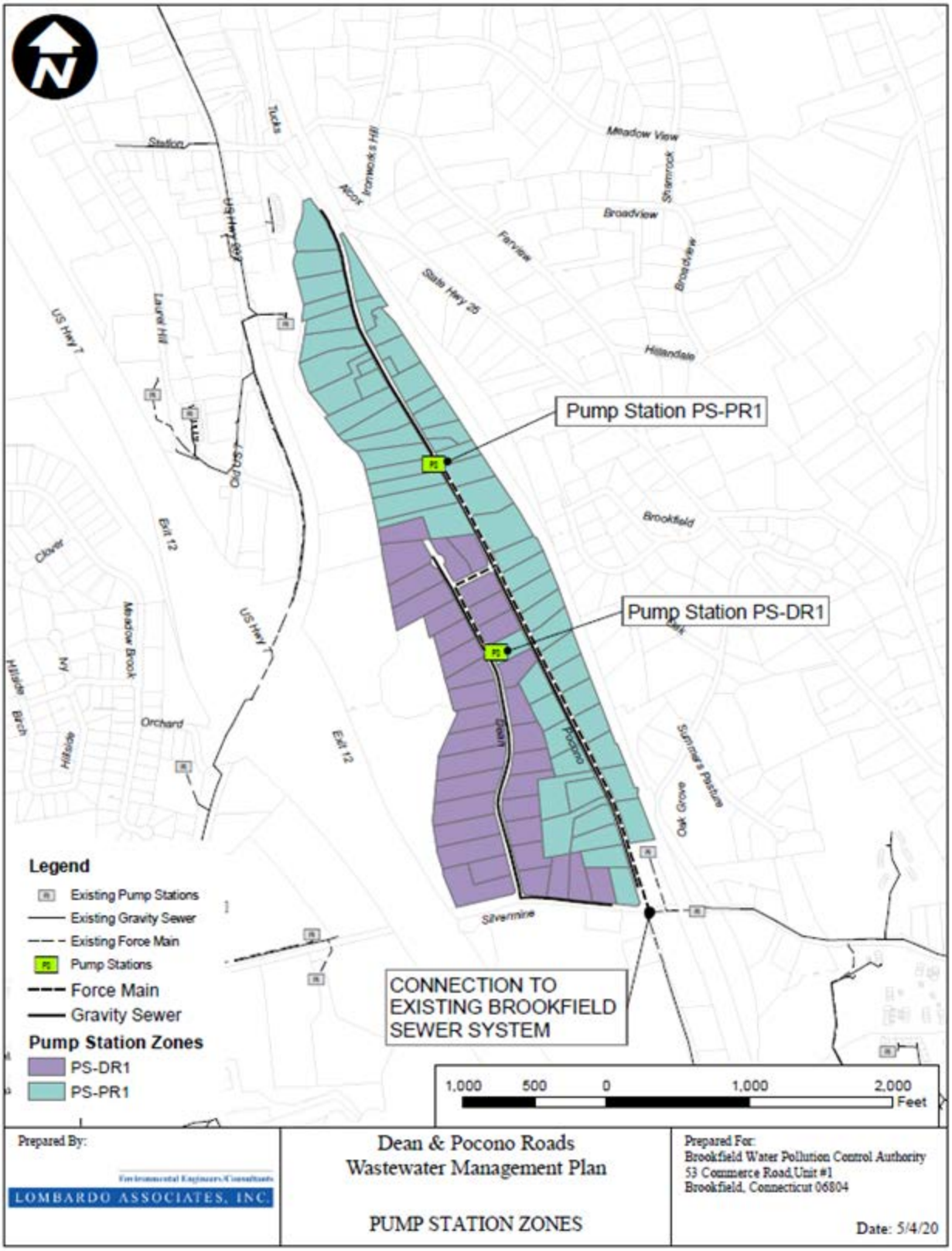


Figure ES-3 Recommended Hybrid STEP-STEG Sewer System Layout

1 INTRODUCTION

This Engineering Plan addresses the wastewater management issues/needs in the Brookfield Water Pollution Control Authority's (BWPCA) Area of Concern (AoC) east of the Still River along Dean and Pocono Roads, Figure 1-1 north of Silvermine Road. The WPCA's initiative is in part due to the concern that wastewater systems are failing in the area due to poor soils and high groundwater conditions, and thereby being a public health problem and causing water quality contamination. Study Area septic systems are expected to be adversely affecting the quality of the Still River, such as e. coli contamination and eutrophication due to wastewater nitrogen and phosphorus contributions, as well as eutrophication of downstream water bodies.

Figure 1-1 Dean & Pocono Roads Study Area

The primary objective of this Engineering Plan is to present a Community Profile of the Study Area, evaluate wastewater management practices, determine their public health and environmental impacts and develop cost effective, technically reliable solutions to mitigate the negative impacts.

Some key project findings are:

- There are 85 developed predominately residential properties within the Study Area, the majority of which were built in the 1960s.

- Approximately 50% of all parcels within the Area of Concern lie mostly or totally within the floodplain of Still River.

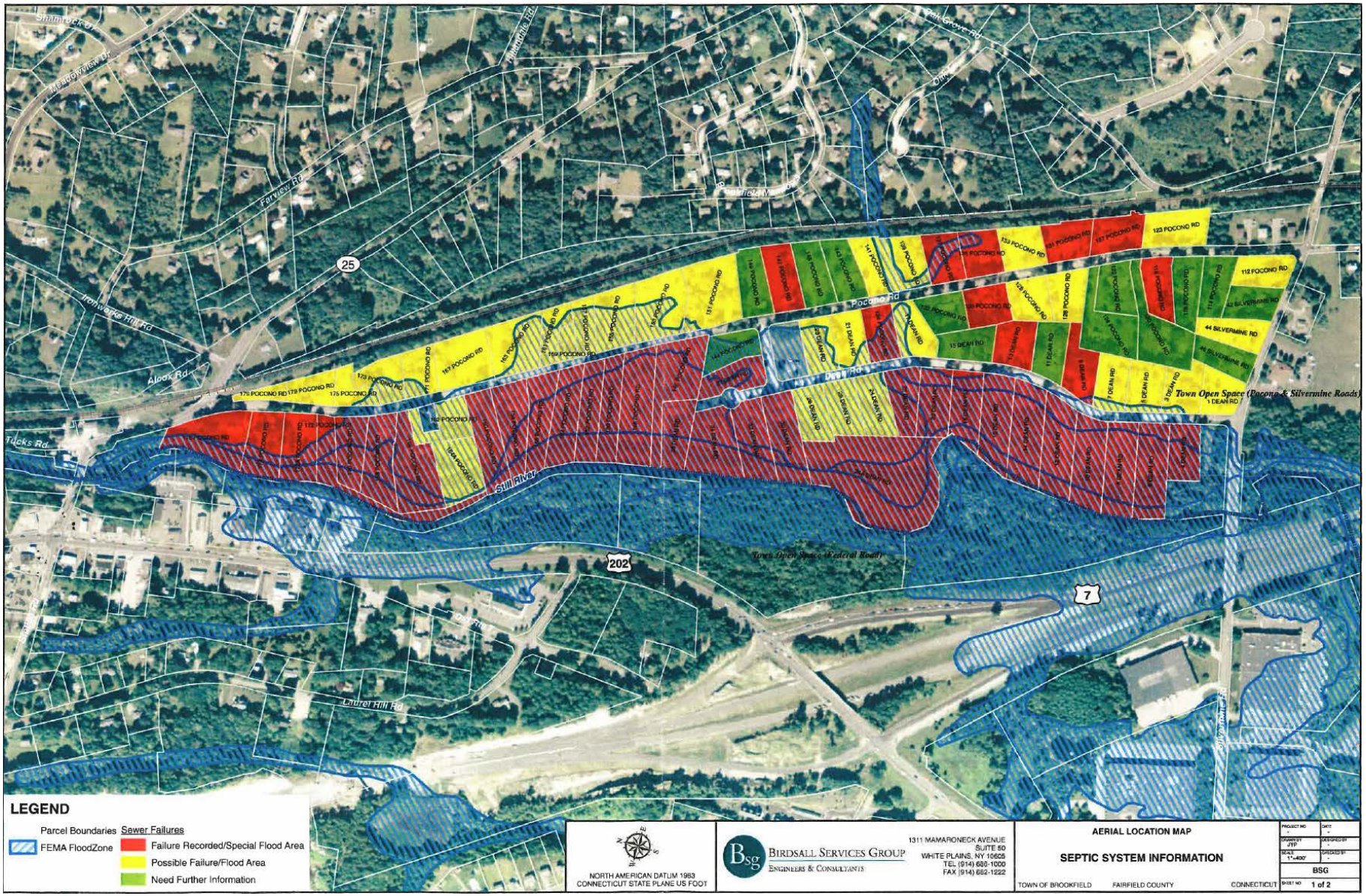


Figure 1-2 Study Area Property by Property Septic System Failure Characterization

Figure 1-3, from US EPA, illustrates how wastewater from septic systems infiltrates to the groundwater and then surface water, such as the Still River.

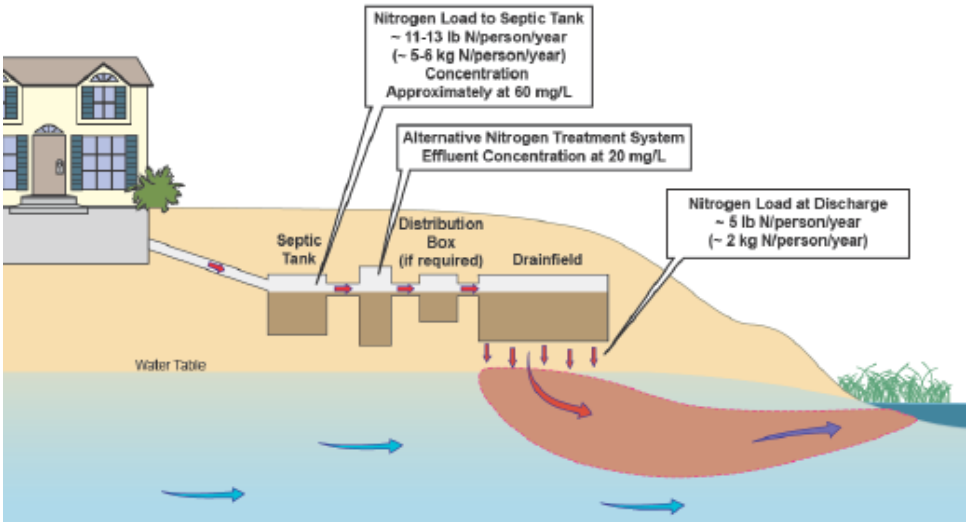


Figure 1-3 Septic Effluent Travel to Groundwater & River

- Due to E. coli contamination, the Still River is currently classified as an impaired water body not able to support aquatic life or recreation.

- Due to septic nitrogen and phosphorus discharges, eutrophication of the Still River will be accelerated along with downstream impacts on Lakes Lillinonah and Zoar.

The BWPCA has identified the study area as an area of concern for wastewater management and has investigated sewering the area and connecting to the Danbury wastewater treatment facility by either conventional sewers or a low-pressure option. However, the cost of conventional sewer systems is greater than the properties can sustain by the typical Benefit Assessment approach.

Consequently, the BWPCA is interested in an examination of alternatives to the previously examined sewering options. This Project is to develop creative solutions for the inadequate septic systems by performance of these major activities:

1. Document natural resources that affect wastewater management and the causes of wastewater difficulties through property by property review of Board of Health files
2. Identify and evaluate creative wastewater management solutions
3. Prepare preliminary engineering layouts and budgets of alternative solutions, along with preliminary Implementation plan
4. Prepare Executive Level Final Management / Financing Plans, and Implementation Schedule.

The project goals include:

a. Determining types of solutions that are technically reliable and more cost effective than conventional and low-pressure sewering,
b. Develop an Implementable Plan to reduce septic impacts on Still River

2 EXISTING CONDITIONS OF DEAN AND POCONO ROADS STUDY AREA

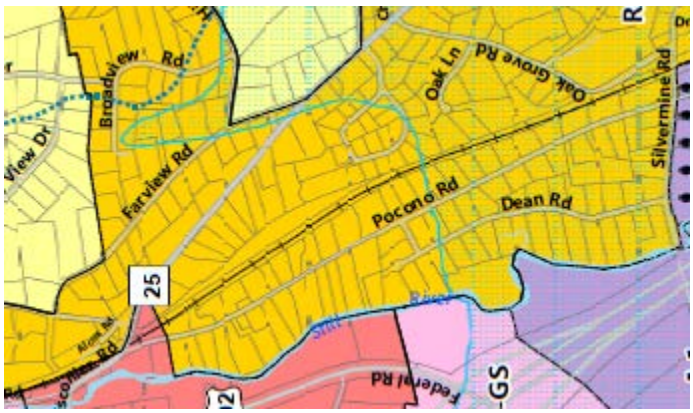
Community Profile

2.1 STUDY AREA DEFINITION

The Study Area is defined as:

- ✓ 90 parcels with 85 developed predominately residential properties along Dean and Pocono Roads

is approximately 103 acres in size, and abuts the Still River. Table 2-1 presents a list of Study Area properties and their estimated design wastewater flow in gallons per day (gpd). Figure 2-1a presents the zoning map for the area and consists of Residential R-40 and Town Center District (TCD). R-40 has a minimum lot size of 40,000 sf.



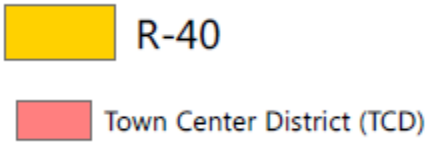


Figure 2-1a Zoning in Study Area

Table 2-1 Study Area Parcels Information

Count	House Pump	House No.	Street	Owner's Name	GLV	Land Use	Area (sf)	WW Flow (gpd)
1	0	1	Dean Rd	LARSSON PAUL J	$211,700	Single Family	37,873	200
2	0	3	Dean Rd	PFLOMM RICHARD W & DOROTHY L	$209,450	Single Family	41,019	200
3	1	4	Dean Rd	BRENNAN KENNETH & JODI	$185,360	Single Family	41,092	200
4	0	5	Dean Rd	KOLF JOSEPH P & DARLENE SWIFT	$194,450	Single Family	41,650	200
5	0	6	Dean Rd	BURKE EDWARD JR & CHERYL	$179,860	Single Family	69,415	200
6	0	7	Dean Rd	MITCHELL VINCENT B JR	$182,570	Single Family	40,027	200
7	1	8	Dean Rd	PURR BRIAN W & CHRISTINA M	$181,200	Single Family	66,307	200
8	0	9	Dean Rd	LEE RUBEN J & NORMA	$214,200	Single Family	43,829	200
9	1	10	Dean Rd	MANN DONALD H	$170,550	Single Family	67,770	200
10	0	11	Dean Rd	TORRES JOSEPH A & MARIE SPINO	$180,600	Single Family	41,758	200
11	1	12	Dean Rd	THOMSEN SARA E & ALLEN J III	$169,480	Single Family	70,663	200
12	0	13	Dean Rd	PEREIRA VALDIR S & MARILENE	$198,780	Single Family	41,566	200
13	1	14	Dean Rd	SCALZO AMBER M & MICHAEL	$227,670	Single Family	75,809	200
14	0	15	Dean Rd	GORNICKI KRZYSZTOF & TERESA	$209,810	Single Family	40,145	200
15	1	16	Dean Rd	GROGAN BRUCE & GROGAN MARYANN	$182,710	Single Family	66,135	200
16	0	17	Dean Rd	LUALLEN CHARLES E & THERESA A	$183,710	Single Family	42,120	200
17	1	18	Dean Rd	LIGHT MARY A	$178,870	Single Family	50,840	200
18	0	20	Dean Rd	LIPPY STEVEN A	$190,280	Single Family	50,332	200
19	0	21	Dean Rd	MALINAK DANIEL J	$228,390	Single Family	40,171	200
20	0	22	Dean Rd	WEISS ARTHUR & NICOLE (SV)	$180,660	Single Family	43,121	200
21	0	23	Dean Rd	MARTIN WILLARD J	$192,120	Single Family	39,325	200
22	0	24	Dean Rd	TOTTEN ANA	$191,280	Single Family	45,414	200
23	0	25	Dean Rd	GRAVIUS WAYNE	$174,660	Single Family	40,623	200
24	0	26	Dean Rd	GILBERT CHARLES J & PATRICIA P	$162,410	Single Family	40,715	200
25	0	27	Dean Rd	SASSETTI LAWRENCE J & VICKI E	$173,580	Single Family	41,439	200
26	0	28	Dean Rd	SEITER LEONARD J & SUSAN A	$188,250	Single Family	40,202	200
27	0	30	Dean Rd	BERTILSON EARL S	$192,370	Single Family	65,583	200
28	0	32	Dean Rd	NESCI EDNA	$192,010	Single Family	58,491	200
29	0	34	Dean Rd	MARSCHNER RUTHANN	$181,270	Single Family	73,091	200
30	0	36	Dean Rd	WATTERS BARBARA AND JOHN	$184,080	Single Family	44,924	200
31	0	112	Pocono Rd	DUCUSIN ROMULO T & ARLEEN J	$192,040	Single Family	40,835	200
32	0	114	Pocono Rd	LUTRUS ALAN J & JOANNE	$205,660	Single Family	41,775	200
33	0	116	Pocono Rd	KRUZANSKY ELAINE E	$224,980	Single Family	44,456	200
34	0	118	Pocono Rd	VOLPINTESTA NAMI AHN & EDWARD J	$203,940	Single Family	39,672	200
35	0	120	Pocono Rd	GAULARD THOMAS & ALLISON	$223,460	Single Family	69,991	200
36	0	122	Pocono Rd	DEMASSI GIUSEPPE & IDA (LU) & DEMASI	$234,610	Single Family	42,682	200
37	0	123	Pocono Rd	DESOUZA MARCO A & LENIZA P (SV)	$202,300	Single Family	51,893	200
38	0	124	Pocono Rd	ZANCAN DOMINIC J & MAURA L	$221,920	Single Family	64,257	200
39	0	126	Pocono Rd	ORE AMERICA & BARREDA GERARDO	$194,460	Single Family	41,126	200
40	0	127	Pocono Rd	PNACEK PETR & TIRPAKOVA JANA	$186,270	Single Family	42,570	200
41	0	128	Pocono Rd	CHEH JOSEPH W & PAMELA N	$183,450	Single Family	39,686	200
42	0	130	Pocono Rd	ESTEVES CYNTHIA A	$189,090	Single Family	39,780	200
43	0	131	Pocono Rd	DRISCOLL JOHN J	$169,460	Single Family	41,886	200
44	0	132	Pocono Rd	EGELHOFF STEPHEN & CAREN	$181,960	Single Family	38,441	200
45	0	133	Pocono Rd	ABATE PETER J AND OBRIEN LORI A	$171,690	Single Family	40,840	200
46	0	135	Pocono Rd	HAMILTON TYLER & THERESA	$175,710	Single Family	41,214	200
47	0	136	Pocono Rd	EIRICH DONALD	$202,490	Single Family	39,151	200

Count	House Pump	House No.	Street	Owner's Name	GLV	Land Use	Area (sf)	WW Flow (gpd)
48	0	137	Pocono Rd	DELFIN ADELCE J & ELIJAH H	$186,930	Single Family	40,812	200
49	0	139	Pocono Rd	AQUARION WATER COMPANY OF CT	$14,480	Vacant Res Land	41,045	0
50	0	141	Pocono Rd	MACINTYRE DEBORAH J	$160,440	Single Family	44,077	200
51	0	143	Pocono Rd	CARNEIRO STEVEN M & DIANE E	$167,700	Single Family	43,908	200
52	0	144	Pocono Rd	JIMENEZ ANDRE & GROSKI PAIGE	$192,630	Single Family	39,635	200
53	0	145	Pocono Rd	FOX THOMAS M & THELMA M	$197,290	Single Family	46,530	200
54	0	146	Pocono Rd	CZUPKOWSKI HELEN D & ROBERT M	$262,260	2 Family	80,990	400
55	0	147	Pocono Rd	DECARVALHO MARCOS A	$170,140	Single Family	47,856	200
56	0	148	Pocono Rd	DINHO JOSEPH M	$187,560	Single Family	87,678	200
57	0	149	Pocono Rd	RUSSO MARK A & MARIA C	$183,800	Single Family	45,282	200
58	0	150	Pocono Rd	EMMONS TAMMIE L	$38,250	Vacant Res Land	49,806	0
59	0	151	Pocono Rd	REED SANDRA J	$248,660	Single Family	83,968	200
60	0	152	Pocono Rd	DEALMEIDA MARIO & VALENZUELA	$6,990	Vacant Res Land	48,554	0
61	0	153	Pocono Rd	DOMINGOS SUSANA	$214,650	2 Family	71,426	400
62	0	154	Pocono Rd	DEALMEIDA MARIO & VALENZUELA DANOL	$236,380	Single Family	58,042	200
63	0	155	Pocono Rd	FESH JAMES S & GAIL J	$150,300	Single Family	47,893	200
64	0	156	Pocono Rd	DEMERS RONALD A & MARYELLEN	$169,910	Single Family	53,944	200
65	0	157	Pocono Rd	SYMES CHRISTOPHER L	$138,400	Single Family	30,718	200
66	0	158	Pocono Rd	SALVATO JOSEPH F & BARBARA A	$258,360	SFR w/Acc Apt	60,789	400
67	0	159	Pocono Rd	MOUNTAIN CHURCH OF GOD INC	$183,270	Religious	13,477	300
68	0	160	Pocono Rd	ODONNELL ROBERT W	$183,400	Single Family	65,609	200
69	0	161	Pocono Rd	TRUCHSESS DEBORAH J	$135,850	Single Family	32,924	200
70	0	162	Pocono Rd	VALA DENNIS R JR AND HEIDI L	$183,480	Single Family	29,207	200
71	0	163	Pocono Rd	HAGER ALBERT LELAND	$164,860	Single Family	39,437	200
72	0	164	Pocono Rd	GOSPEL HALL	$238,550	Religious	10,215	300
73	0	165	Pocono Rd	WALL ANTHONY J	$158,820	Single Family	24,936	200
74	0	166	Pocono Rd	DEFINA ENTERPRISES LLC	$260,760	2 Family	81,233	400
75	0	167	Pocono Rd	KOENECKE GUSTAV R II & LISA MARIE	$213,330	Single Family	47,546	200
76	0	168	Pocono Rd	WABOL DAVID M & DAWN M	$169,620	Single Family	61,625	200
77	0	169	Pocono Rd	GOSPEL HALL - Parking Lot Only	$19,480	Religious Lnd	7,849	0
78	0	170	Pocono Rd	CONNECTICUT LIGHT & POWER CO	$95,060	Vacant Res Land	44,731	0
79	0	171	Pocono Rd	SHANNON ANNE MARIE	$173,500	Single Family	44,784	200
80	0	172	Pocono Rd	GRADIA WADE P	$179,390	Single Family	34,807	200
81	0	173	Pocono Rd	GLENN & BARBARA ROONEY TTEES	$213,660	Single Family	37,470	200
82	0	174	Pocono Rd	BARRY PAUL E	$203,490	Single Family	54,268	200
83	0	175	Pocono Rd	GILCHRIST C B MARSHALL & MARLENE	$158,320	Single Family	27,305	200
84	1	176	Pocono Rd	GEREG SANDRA	$203,560	SFR w/Acc Apt	70,054	400
85	0	179	Pocono Rd	MCGINNISS KEVIN T	$166,760	Single Family	45,539	200
86	0	164A	Pocono Rd	DEFINA ENTERPRISES LLC	$165,450	Single Family	70,029	200
87	0	172A	Pocono Rd	MILLER BONNIE L	$202,380	Single Family	54,688	200
88	0	42	Silvermine Rd	MURO BRIGITTE	$168,770	Single Family	40,830	200
89	0	44	Silvermine Rd	SWEET JOHN E SR TTEE ESTATE OF	$155,230	Single Family	41,507	200
90	0	46	Silvermine Rd	HASENEY RICHARD C & DIANE LYNN	$214,380	Single Family	40,623	200
Total	**8**				**$16,452,320**		**4,305,353**	**18,200**

2.2 NATURAL RESOURCES

Soils

Figure 2-1b presents the soils types in the Study area with Table 2-2 describing Study Area soils characteristics. Site specific soils information is presented in Section 2.3. Appendix B presents the Brookfield Board of Health's assessment of soil conditions in the Study Area.

Table 2-2 Soils Characteristics Summary

Soils Map Legend	Soils Description	Approximate % of Study Area	Depth to water table	Depth to Limiting Layer	Hydric soil rating
94C	Farmington-Nellis complex, 3-15 % slopes	8%	> 80 "	17 to 80 in. : bedrock	No
103	Rippowam fine sandy loam	9%	0 to 18 in.	0 to 18 in. : GW	Yes
221A	Ninigret-Urban land complex, 0 to 5 % slopes	16%	18 to 30 in.	18 to 30 in. : GW	No
306	Udorthents-Urban land complex	40%	54 to 72 in.	54 to 72 in. : GW	No
307	Urban land	6%			No
701A	Ninigret fine sandy loam, 0 to 3 % slopes	19%	17 to 39 in.	17 to 39 in. :GW	No
701B	Ninigret fine sandy loam, 3 to 8 % slopes	4%	17 to 39 in.	17 to 39 in. :GW	No
	Total	100%			

Soil types 221A—Ninigret-Urban land complex + 701A & B—Ninigret fine sandy loam 39% of Study Area Depth to water ~17 to 30 – 39 inches

306—Udorthents-Urban land complex 40% of Study Area Depth to water 54' – 72"

All soils are classified as Very Limited by the Natural Resource Conservation Services (NRCS) of the USDA. Per NRCS web site (https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm)

"Very limited indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected."

The soils data clearly indicate that the soils in the area are not conducive / are problematic to the use of individual septic systems for wastewater management. Shallow depth to groundwater and impeding layer (i.e. hardpan) would cause septic system failures, adverse water quality impacts and public health problems. The location of wetlands and creeks in the Study Area are indicative that septic problems will likely occur, especially during the spring high groundwater season. The surficial geology of the area is predominately Till and Fines (very fine sand, silt, and clay). These surficial geology conditions can be problematic for septic systems due to shallow depth to impermeable layers and slow percolation rates.

Surficial Geology

Figure 2-2 presents the surficial geology of the Study area with a description of the predominant surficial geology characteristics for fines and till presented below from CT Environmental Conditions Online.

Fines (very fine sand, silt, and clay) - Composed of well-sorted, thin layers of alternating silt and clay, or thicker layers of very fine sand and silt. Very fine sand commonly occurs at the surface and grades downward into rhythmically bedded silt and clay varves.

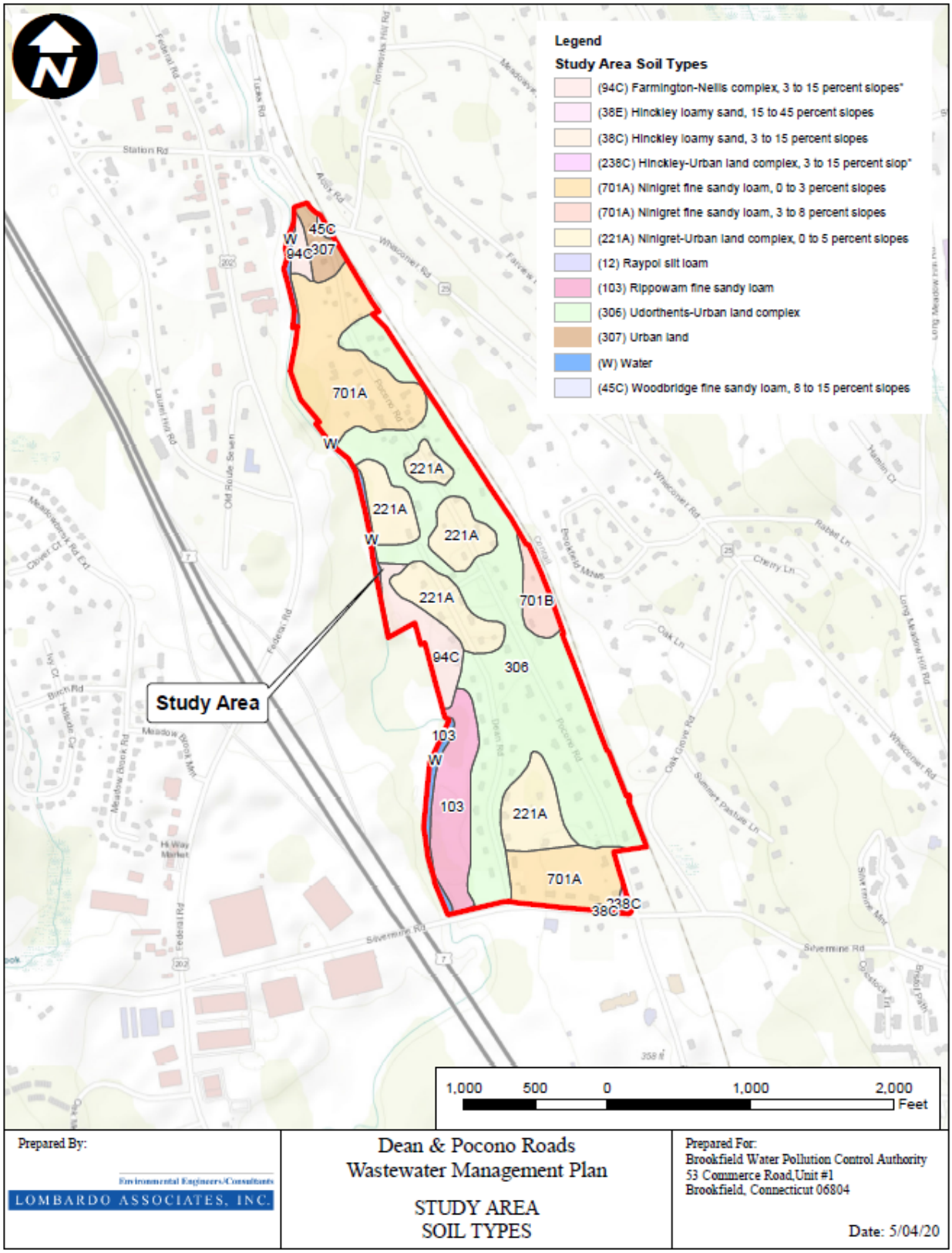


Figure 2-1b Soil Types in Study Area

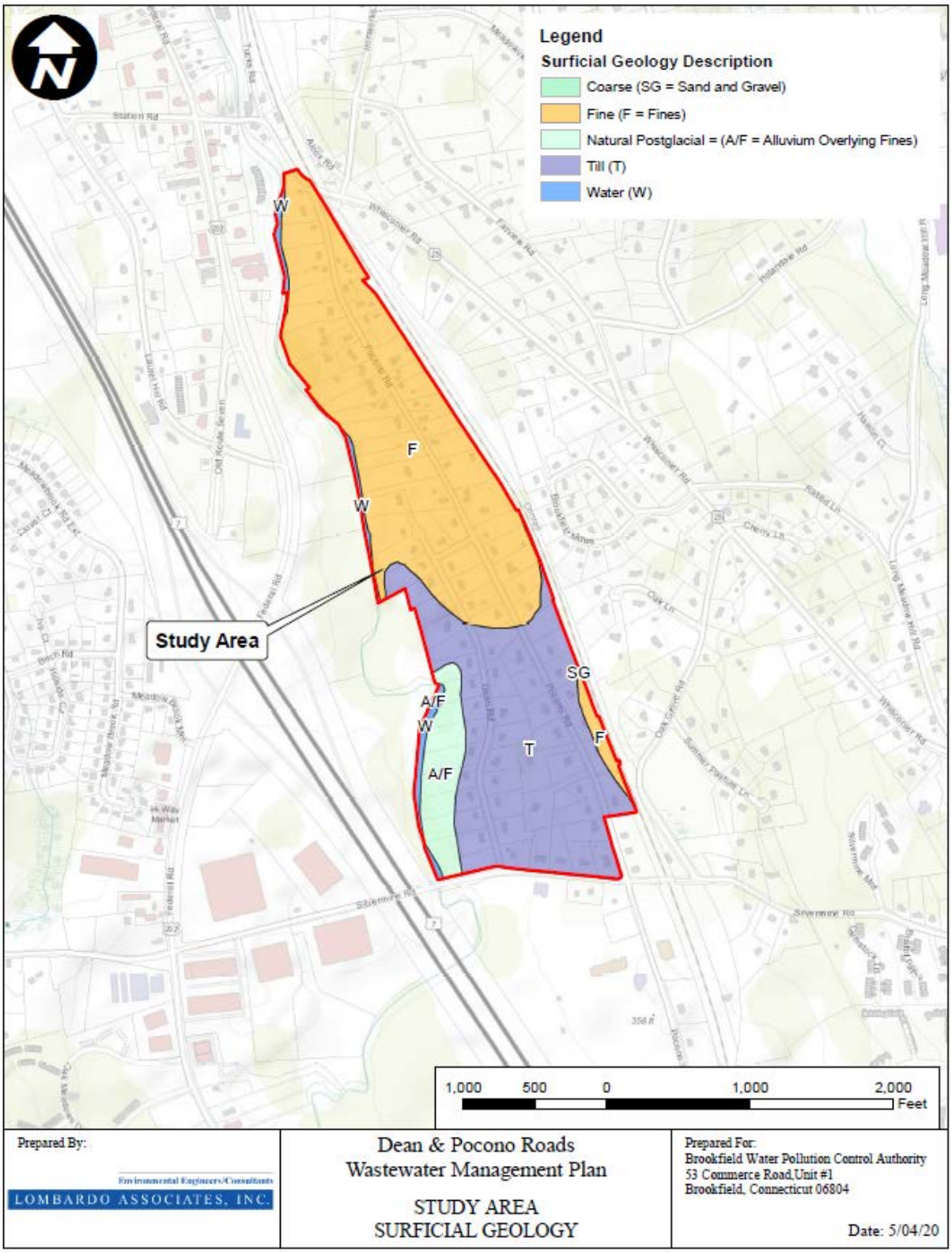


Figure 2-2 Surficial Geology of Study Area

Till - areas where till is generally less than 10-15 ft thick and including areas of bedrock outcrop where till is absent. Predominantly upper till; loose to moderately compact, generally sandy, commonly stony. Two facies are present in some places; a looser, coarser-grained ablation facies, melted out from supraglacial position; and a more compact finer-grained lodgement facies deposited subglacially. In general, both facies of upper till derived from the red Mesozoic sedimentary rocks of the central lowland of Connecticut are finer-grained, more compact, less stony and have fewer surface boulders than upper till derived from crystalline rocks of the eastern and western highlands.

Flood Plains - Figure 2-3 presents the flood plains information of the Study Area.

Wetlands / Creeks – Figures 2-4 and 2-5 present the wetlands and creeks within the Study Area. As can be seen the Study Area is laced with creeks / drainage ditches and wetlands.

Figure 2-6 presents water quality data, with a location map on Figure 2-7, for Dean & Pocono Roads Streams which indicates violation of US EPA Recreational Water Quality e. coli standard of geometric mean of 125 cfu/100 mL and a statistical threshold value (STV) of 410 cfu/100 mL, which is not to be exceeded by more than 10% of samples.

PO Box 1567
New Milford, CT 06776
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860/350 2258 FAX
www.gohydro.com

HYDRO
TECHNOLOGIES INC.
Report of Analysis

Name:	Town of Brookfield 100 Pocono Road Brookfield, CT 06804	**Sample ID#:**	164648
		Sample Type:	Surface water
		Sample Source:	Grab
Sample Date:	5/10/2012	**Sampler:**	P. Avery
Receipt Date:	5/10/2012		
Report Date:	5/11/2012 1:47:24 PM		
Site:	Pocono & Dean Road Streams		

Parameter	Sample Result	Units
Biological		
E. coli(A)	336 *	MPN/100ml
E. coli(B)	227	MPN/100ml
E. coli(C)	345 *	MPN/100ml
E. coli(D)	449 *	MPN/100ml
E. coli(E)	570 *	MPN/100ml
E. coli(F)	> 4840	MPN/100ml
E. coli(G)	75	MPN/100ml
Nutrient		
Phosphorus-T as P(A)	0.047	mg/L
Phosphorus-T as P(B)	0.047	mg/L
Phosphorus-T as P(C)	0.047	mg/L
Phosphorus-T as P(D)	0.110	mg/L
Phosphorus-T as P(E)	0.063	mg/L
Phosphorus-T as P(F)	0.067	mg/L
Phosphorus-T as P(G)	0.047	mg/L

Figure 2-6 Creeks to Still River Water Quality Data

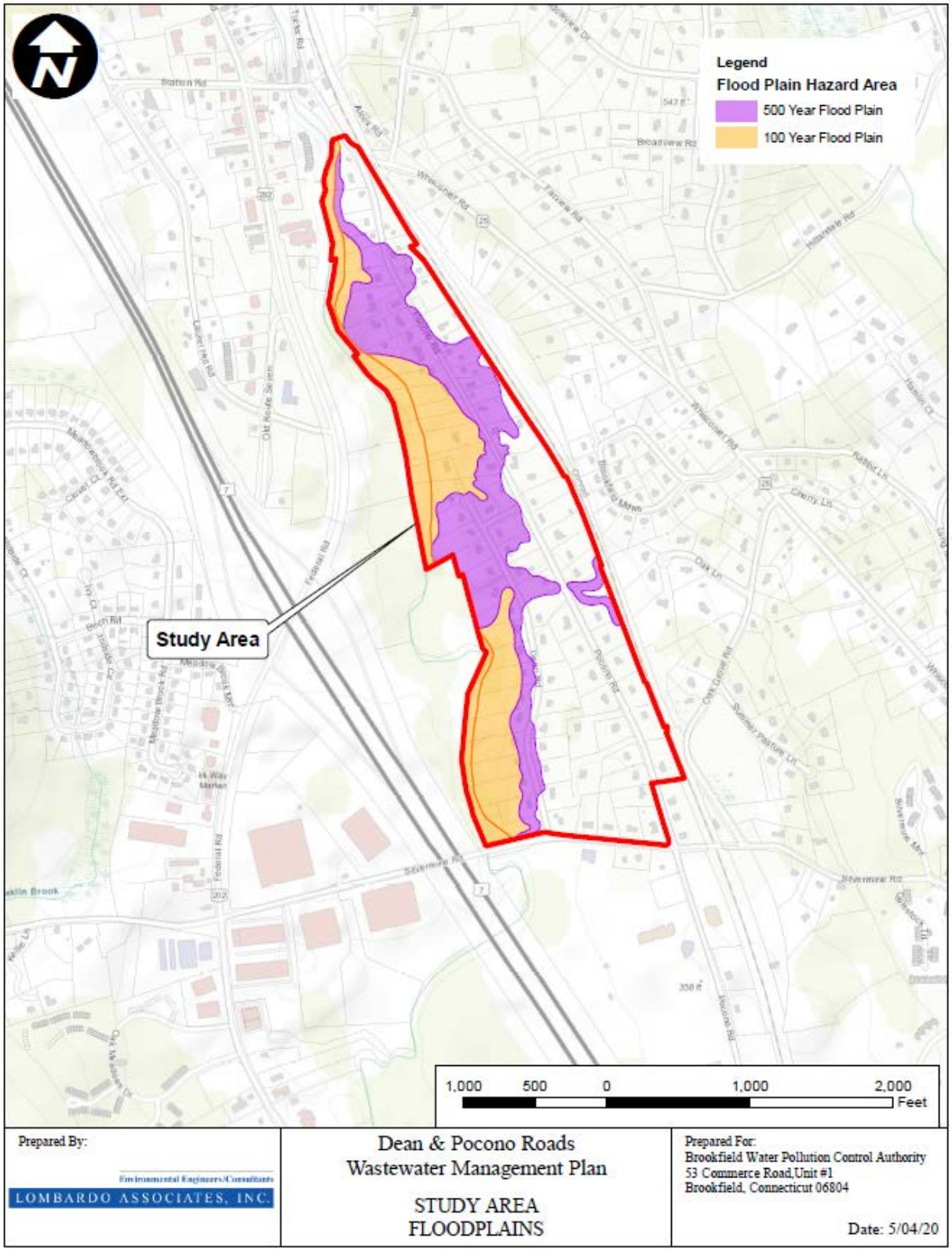

Figure 2-3 Flood Plains in Study Area

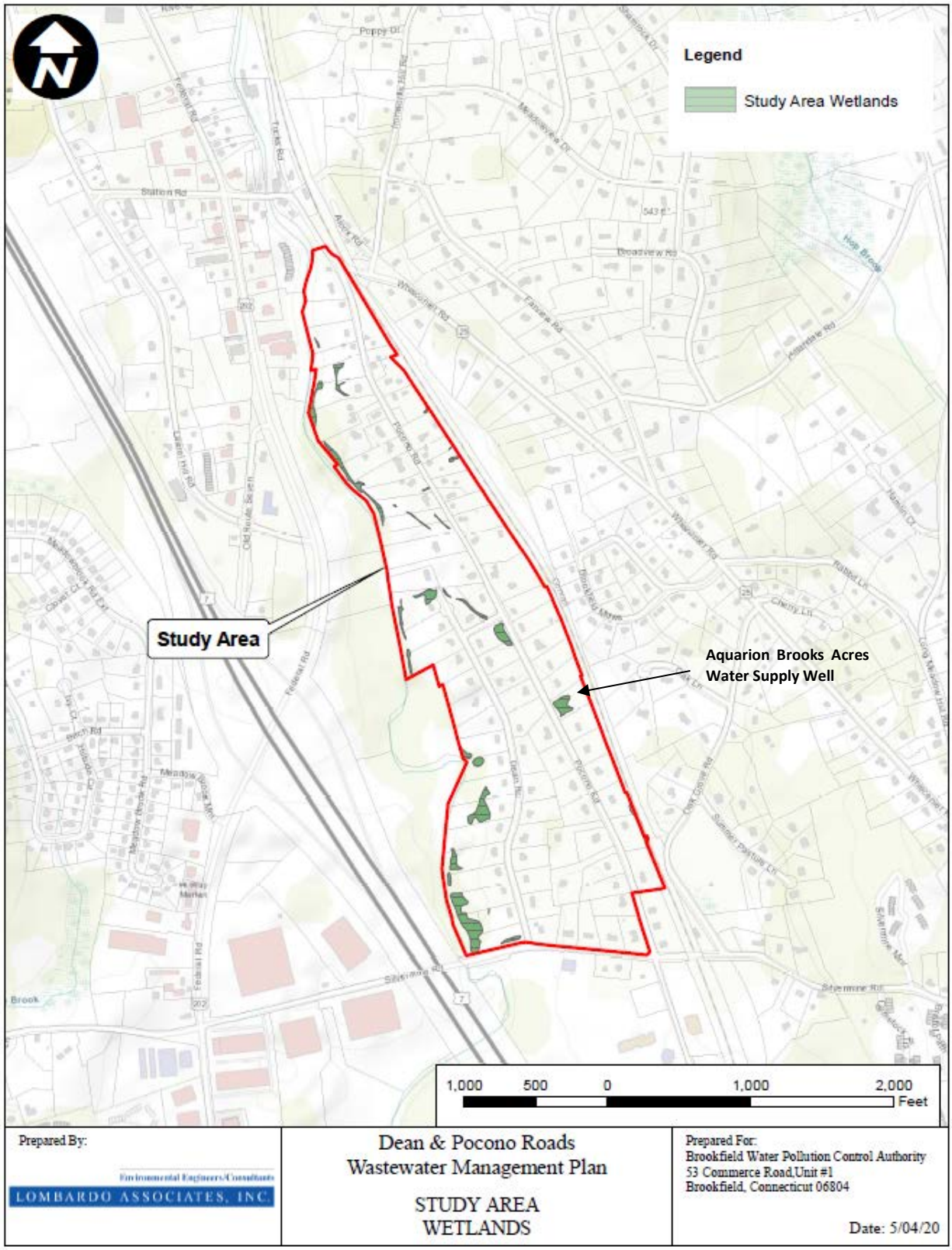

Figure 2-4 Wetlands in Study Area

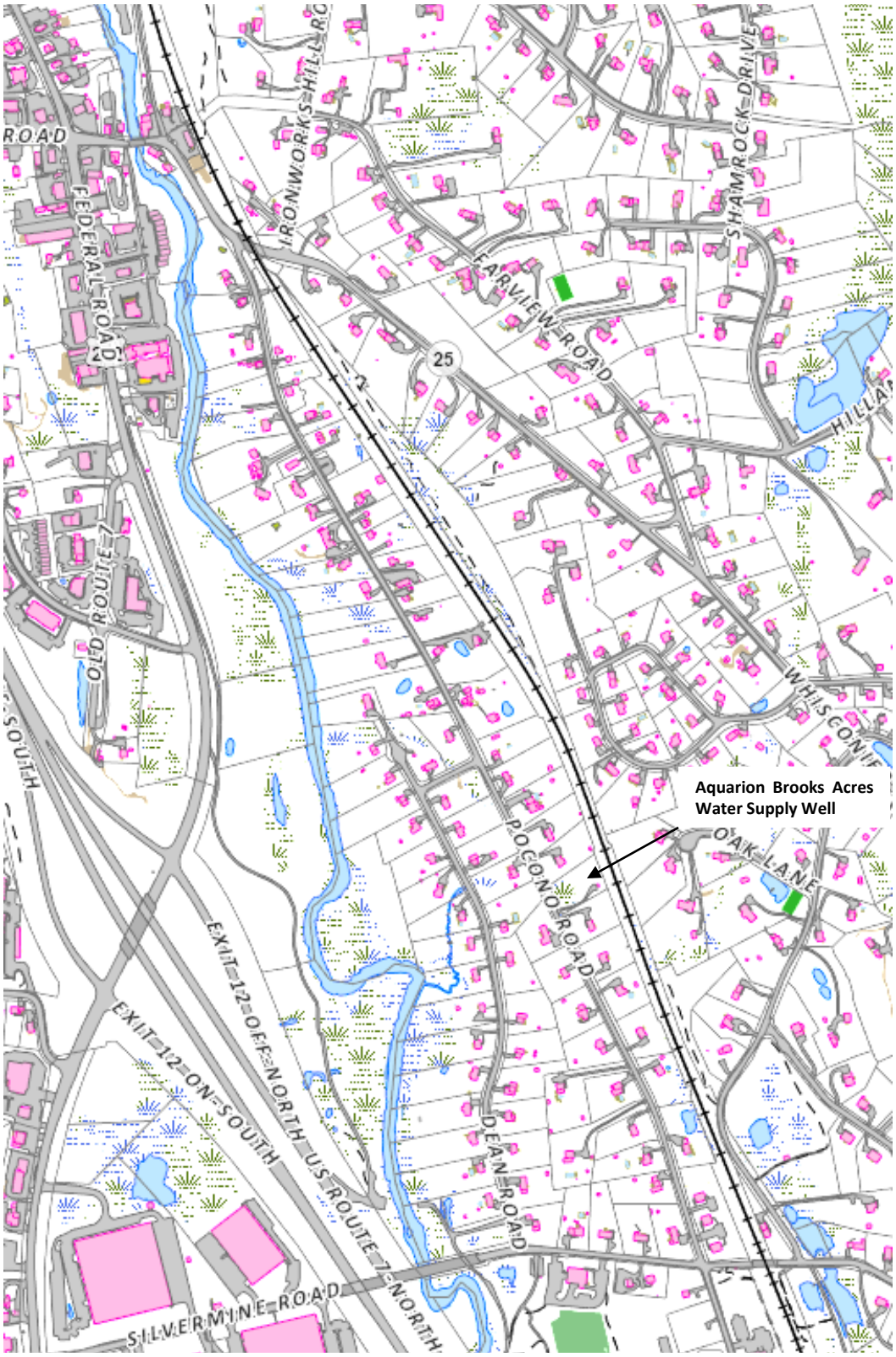

Figure 2-5 Creeks & Wetlands in Study Area

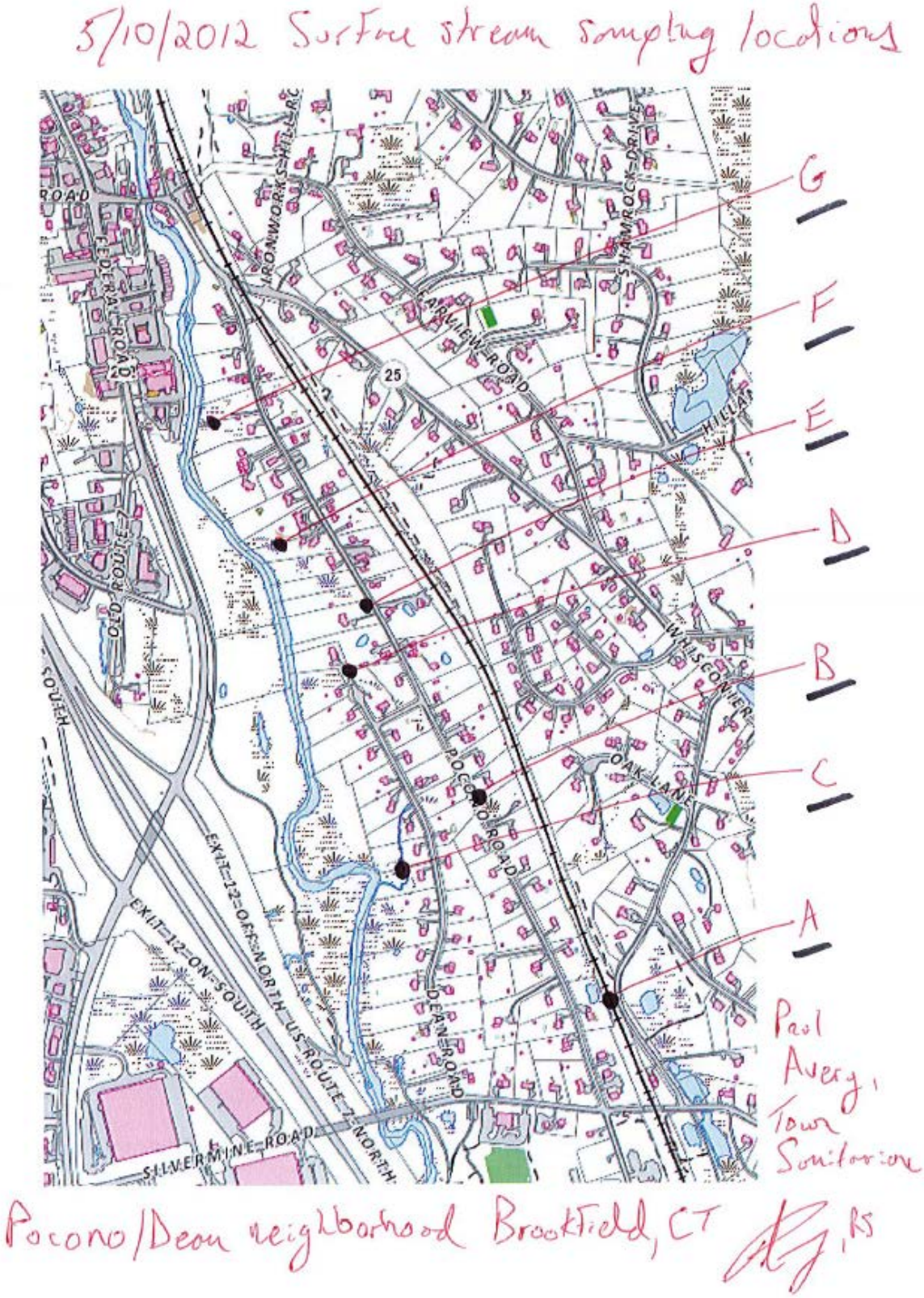

Figure 2-7 Creeks Sampling Locations

2.3 WASTEWATER MANAGEMENT PRACTICES

All developed properties in the Study Area rely on individual septic systems. The Brookfield Board of Health septic system files were reviewed to assess site characteristics and septic system design features. Table 2-3 presents a summary of the site and septic system information, with the detailed property specific information in Appendix D.

OWTS are required meet a number of minimum separation requirements, per CT DoH Code, as listed below.

Water Supply Wells	75 to 200 feet based on well flow
Groundwater	1.5' (increases when perc rate is < 5mpi)
Bedrock	4.0'
Open Water Course	50' For lots in existence prior to 8/16/82 that are not on a public water supply watershed, the distance shall be reduced to not less than 25 feet
Property line	10'
Building	10'
Groundwater Drain	25' upgradient; 50' downgradient
Stormwater Catch Basin/MH	25'
Stormwater infiltration systems	25' – 75' depending on site conditions; 10' for rain gardens

Brookfield Inland Wetlands Commission has jurisdiction over and permits are required for activities within these distances to a wetland, stream or watercourse.

Wetlands*	75'
Stream*	100'
Watercourse*	100'

*For slopes > 5%, up to 200' is the jurisdictional distance.

The Inland Wetlands Commission does not have setback requirements – rather, the Commission works with property owners to achieve best achievable setbacks.

Table 2-4 presents a listing of properties with challenging site conditions and those that require / likely require an off-site solution, i.e. community sewer. Table 2-5 provides the details on soils, depth to groundwater, mottling and bedrock by property for properties with soils data

Virtually all properties with data, 20% of all properties, have challenging/unfavorable site conditions for use of OWTS and/or require an off-site solution due to insufficient space and/or unacceptable site conditions. Numerous properties have curtain drains around drainfields that discharge to brooks that are part of the Still River watershed. These properties are likely causing e. coli contamination of the surface waters as well as causing nutrient enrichment of the Still River. Alternately stated, very few properties, have sufficient data/information to enable a determination that the property septic system is not causing a public health and/or water quality problem.

Extrapolating from this data and in consideration of site soils/surficial geology and wetlands, Lombardo Associates, Inc. concludes that an excessive (from public health and environmental protection perspectives) number of properties experience OWTS malfunctioning events with negative public health and water quality implications.

Table 2-3 Board of Health Septic System File Review Summary

Dean and Pocono Road Study Area - Property Septic Plans & Soil Design Data Statistics															
Subdivision	Master Listing									Perc		Soils Texture		Slope	
	Total Reviewed Properties	With Plans		Without Plans		With Soils Data		Without Soils		No.Properties w/ Perc Data	% of Reviewed	No. Properties w/ Soil	% of Reviewed	No. Properties w/ Slope Data	% of Reviewed
		No.	% of Total	No.	% of Total	No.	% of Total	No.	% of Total						
Study Area	82	56	68%	26	32%	17	21%	65	79%	22	27%	17	21%	7	9%
Total	**82**	**56**	**68%**	**26**	**32%**	**17**	**21%**	**65**	**79%**	**22**	**27%**	**17**	**21%**	**7**	**9%**

Dean and Pocono Road Study Area - Perc Rate & Slope Staticstics								
Subdivision	Perc				Slope			
	No. Properties w/Perc Data	Max	Mean	Min	No. Properties w/Slope Data	Max	Mean	Min
Study Area	22	40	17	10	7	10	4	1
Total	**22**				**7**			
% of Plans	**39%**				**13%**			

Dean and Pocono Road Study Area - Soils Texture Data at Elevation > 30"							
Subdivision	Total No. Properties w/Soils	Sandy Loam	Sand	Silty Sand	Fine Silty Sand	Hardpan	Totals
Study Area	17	1	5	3	3	5	17
Total	**17**	**1**	**5**	**3**	**3**	**5**	**17**
% of Total		**6%**	**29%**	**18%**	**18%**	**29%**	**100%**

Dean and Pocono Road - Study Area Septic System Types									
Subdivision	Total Systems	Trench	Gallery	Eljen	Infil	Trench + Gallery	Drywell	Tank Replace	Totals
Study Area	56	32	15	1	7	1	0	0	56
Total	**56**	**32**	**15**	**1**	**7**	**1**	**0**	**0**	**56**
% of Total		**57%**	**27%**	**2%**	**13%**	**2%**	**0%**	**0%**	**100%**

Dean & Pocono Road Study Area Septic System Date Inventory				
Subdivision	Total Plans	Plans w/ Dates	Plans w/o Dates	Totals
Study Area	56	46	10	56
Total	**56**	**46**	**10**	**56**
% of Total		**82%**	**18%**	**100%**

Table 2-4 Septic Systems with Challenging Site Conditions / Requiring Off-Site Solution

Count	#	Street	OWTS Issues of Concern	Water Supply	Depth to Mottling, GW - Ledge	Fill	Excess pumping	Off-Site Solution Likely Required
10	12	Dean Road			19" to mottling			1
11	13	Dean Road	Due to limited Available Area, this system provides 49 % of the required MLSS					1
12	14	Dean Road		community	40" to mottling			1
13	15	Dean Road	New system 2019 - variances for 81% of req'd MLSS and separation to foundation wall 33 feet provided					
15	17	Dean Road			20" to mottling			1
20	23	Dean Road		community				
23	26	Dean Road	repaired March 2019					
25	28	Dean Road		community	36" +/- to ledge and mottling			1
29	36	Dean Road					1	1
31	112	Pocono Road			20" to mottling	2 feet fill added		1
35	118	Pocono Road				2 feet fill added		
38	123	Pocono Road	curtain drain that discharges to brook					1
40	126	Pocono Road		community				
41	127	Pocono Road	drainfield 65 feet to brook	individual well				1
46	133	Pocono Road		individual well				
47	135	Pocono Road	TerraLift permitted in 2009 drainfield must have been malfunctioning					
48	136	Pocono Road	drainfield within 33 feet to brook					
49	137	Pocono Road	Failed system in 1987 - temporary permit issued - no repair record	community				
50	141	Pocono Road	water softener may be connected to septic					
51	143	Pocono Road		community		2 feet fill added		
53	145	Pocono Road		community				
54	147	Pocono Road	curtain drain that appears to discharge to brook					1
57	151	Pocono Road	curtain drain that appears to discharge to brook					1
60	156	Pocono Road	severely undersized at 47 gpd vs design gpd		7" to mottling			1
62	158	Pocono Road			26" to mottling			1
63	159	Pocono Road	church well in basement					1
71	167	Pocono Road			water @ 36"			1
78	179	Pocono Road	non-compliant OWTS for MLSS & Setbacks	individual well	16" to mottling			1
81	44	Silvermine Road		community				
Count		82						
		Number	14	11	9			16
		Percent of Total	17%	13%	11%			20%

Table 2-4 Site Soils Data from Septic Files

Count	#	Street	Depth to Rest. Layer (ft)	Depth to BR (ft)	Depth to GW (ft)	Depth to Mottles (ft)	Depth to Hardpan (ft)	Soil Texture (>30")
5	6	Dean Road	3.17	N/A	3.75	3.17	N/A	Sand
10	12	Dean Road	1.58	N/A	2.67	1.58	N/A	Fine Silty Sand
12	14	Dean Road	3.33	N/A	N/A	3.33	N/A	Sand
13	15	Dean Road	2.54					
15	17	Dean Road	1.67	N/A	4.00	1.67	N/A	Fine Silty Sand
22	25	Dean Road	2.50					
25	28	Dean Road	2.75	3.50	N/A	2.75	N/A	Silty Sand
26	30	Dean Road	5.17	5.17	N/A	N/A	N/A	Sandy Loam
30	100	Pocono Road	2.50	8.08	N/A	2.92	2.5	Hardpan
31	112	Pocono Road	1.67	N/A	6.00	1.67	N/A	Fine Silty Sand
35	118	Pocono Road	1.50	N/A	N/A	1.50	1.5	Hardpan
51	143	Pocono Road	3.00	N/A	N/A	N/A	3	Hardpan
55	148	Pocono Road	6.25					
56	149	Pocono Road	2.58	N/A	2.58	N/A	N/A	Sand
59	155	Pocono Road	0.58	N/A	2.67	0.58	N/A	Silty Sand
62	158	Pocono Road	2.17	4.00	3.33	2.17	N/A	Silty Sand
65	161	Pocono Road	3.17	N/A	5.33	3.17	3.17	Hardpan
71	167	Pocono Road	3.00	N/A	3.00	3.00	3	Hardpan
78	179	Pocono Road	1.33	N/A	N/A	1.33	N/A	Sand
		Total Count	19					

2.4 WATER SUPPLY PRACTICES

The Study Area properties rely on individual wells and a community water supply system. Figure 2-8 presents the area that relies on individual wells and area that has access to a community water system. According to the BoH files some properties in the Study Area within the Aquarion Water Company (AWC) Brook Acres service area is not connected to the community water system.

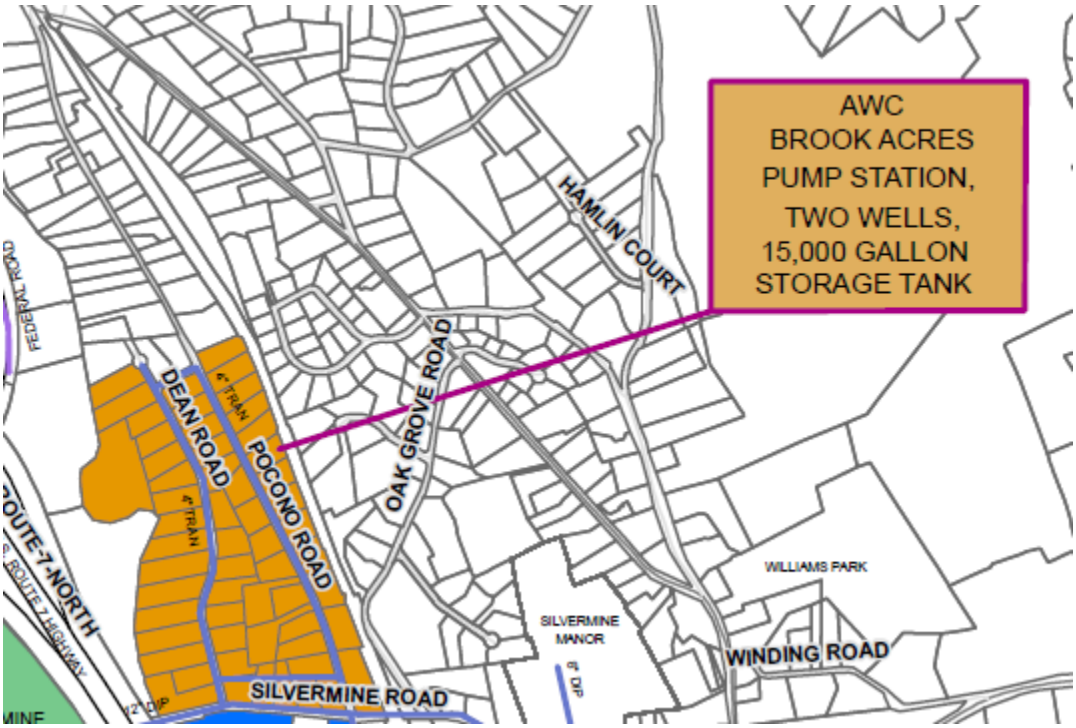

Figure 2-8 Study Area Community Water Supply Map

3 STUDY AREA SEWER OPTIONS

The technically viable options to address the wastewater needs for the Dean & Pocono Roads Study Area are to sewer the area and discharge the wastewater to the Brookfield sewer system which discharges to the Danbury Wastewater Treatment Plant (WWTP), see Figure 3-1, with a connection at Silvermine and Pocono Roads

The other option is to discharge to a new in-Brookfield wastewater treatment and disposal system. As evaluated in the Candlewood Lake Drainage Area Wastewater Management Plan, the in-Brookfield option is not cost effective as compared to the Danbury connection.

3.1 SEWER TYPES AND FEASIBLE OPTIONS

Sewer system types are:

1. Total wastewater
    a. Pumped in a low-pressure system with grinder pumps (GP) or
    b. Hybrid/combined gravity/pressure system.
    c. Vacuum system in which wastewater moves through the collection system based upon a vacuum created at a central vacuum pump station.

2. Septic tank effluent (STE) – whereby septic tanks remain to retain solids and liquid is transported to a treatment plant.
    a. Gravity, referred to as STEG
    b. Pumped in a low-pressure system with septic tank effluent pumps (STEP) or
    c. Hybrid combined gravity/pressure system.

Vacuum sewers are not considered desirable. The total wastewater gravity and entirely low-pressure sewer system was evaluated by Langan, see Table 1-1 and Appendix A.

As an alternative to the Langan evaluated options, the other technically viable sewer options are:

Septic Tank Effluent – see Figure 3-2

1. **Low pressure** collection system using septic tank effluent pumps (STEP), or
2. **Hybrid -** Low pressure using STEPs with STE gravity and pump stations as needed. This system maximizes the use of gravity effluent sewers and uses STEP systems as needed to avoid deep gravity sewers.

Figures 3-3 and 3-4 present the layout for a hybrid STEP – STEG system and illustrate the location of the two (2) pump stations, which are described on Table 3-1. The pump stations enable for the 78 of the 85 developed properties to rely on gravity system (STEG) and avoid the deep sewers that would be required with a total gravity system. The cost estimates for the STEP-STEG options are presented on Table 3-2, and a comparison of these costs to the Langan costs are presented on Table 3-3.

As road restoration costs could be covered under other programs, the project costs and the percent of Grand List Values are presented on Table 3-3 assume cut and replace. Table 3-4 presents costs for complete road restoration ion the Study Area.

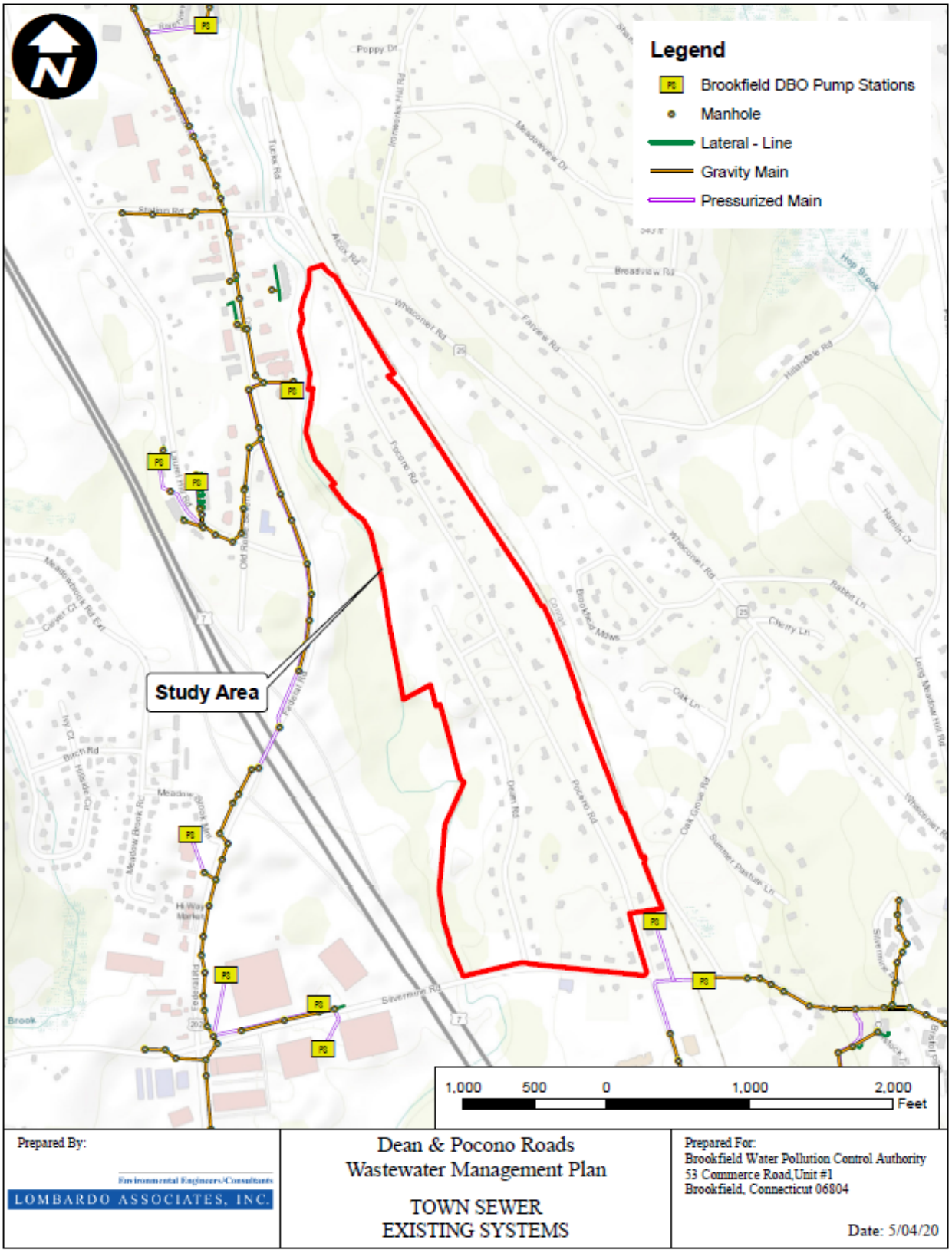

Figure 3-1 Existing Sewers Near Dean-Pocono Roads Study Area

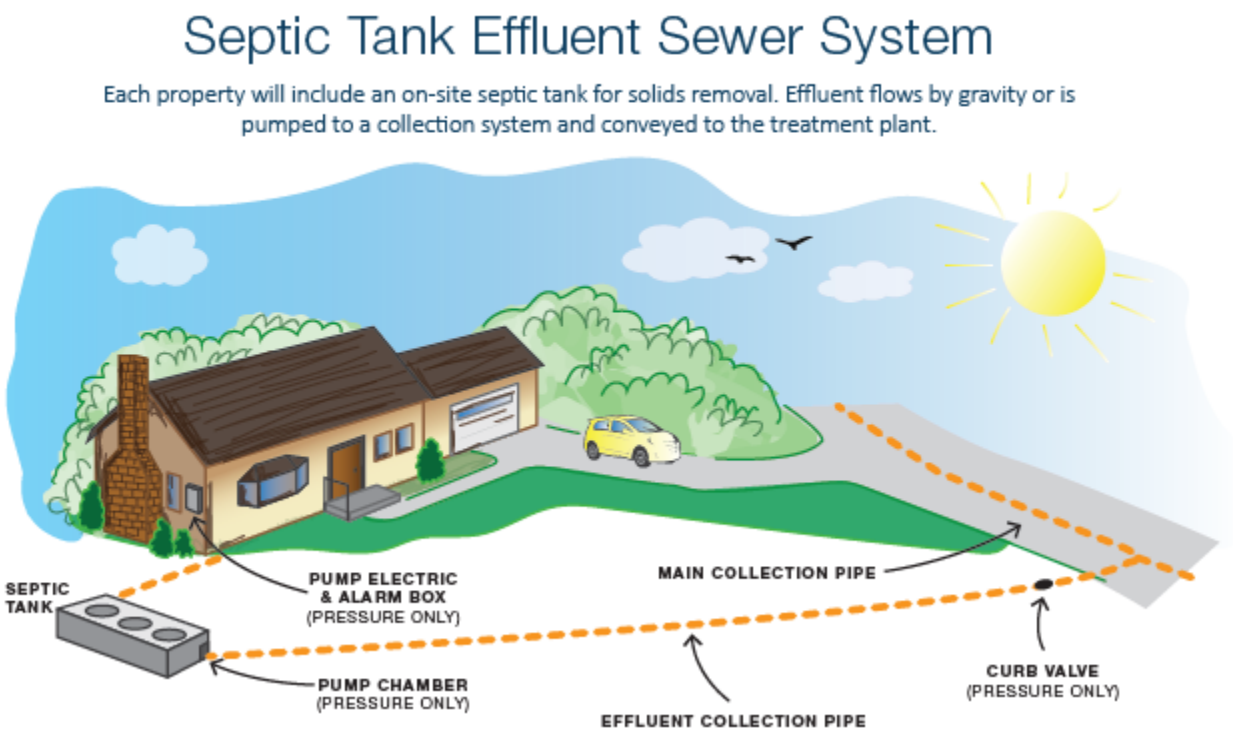

Figure 3-2 STEP – STEG Illustration

Table 3-1 Hybrid STEP-STEG Pump Station Site Details

PS Locations & Service Amounts						
PS Name	**Service Area**	**Location Address**	**Location Owner**	**Building Type**	**Service Amounts (EDU)**	**Service Amounts (GPD)**
PS-DR1	Dean Road and Silvermine Road	136 Pocono Road	EIRICH DONALD	Single Family Residence	34	6,800
PS-PR1	Pocono Road	152 Pocono Road	Mario & Valenzuela Dealmeida	Vacant Land	55	11,000

Table 3-2 Collection System Options - Cost Comparison

Item	Dean & Pocono Area Sewer Options											
	Hybrid						All Low Pressure					
	STEP / STEG			Grinder / Conv. Gravity			STEP			Grinder		
	Qty	Unit Cost	Total	Qty	Unit Cost	Total	Qty	Unit Cost	Total	Qty	Unit Cost	Total
Septic Tanks - Replace	12	$6,000	$72,000	0	$6,000	$0	12	$6,000	$72,000	0	$6,000	$0
Septic Tank Repair / Abandon / Convert to Grinder	12	$1,000	$12,000	12	$2,000	$24,000	12	$1,000	$12,000	12	$2,000	$24,000
House Connections (LF)	1,700	$40	$68,000	1,700	$40	$68,000	1,700	$40	$68,000	1,700	$40	$68,000
House Lateral Unpaved - Gravity (LF)	3,080	$36	$111,000	3,080	$40	$123,000	0	$36	$0	0	$40	$0
House Lateral Paved - Gravity (LF)	1,155	$36	$42,000	1,155	$40	$46,000	0	$36	$0	0	$40	$0
House Lateral Unpaved - Pressure (LF)	320	$36	$12,000	3,400	$40	$136,000	3,400	$36	$122,000	3,400	$40	$136,000
House Lateral Paved - Pressure (LF)	120	$36	$4,000	1,275	$40	$51,000	1,275	$36	$46,000	1,275	$40	$51,000
Pressure Connection Valve Assemblies	8	$500	$4,000	8	$500	$4,000	85	$500	$43,000	85	$500	$43,000
Street Sewer (LF)	8,452	$55	$465,000	8,452	$80	$676,000	0	$55	$0	0	$45	$0
Force Main (LF)	4,380	$45	$197,000	4,380	$45	$197,000	8,552	$45	$385,000	8,552	$45	$385,000
Cleanouts	91	$500	$46,000	15	$500	$7,000	91	$500	$46,000	91	$500	$46,000
Manholes	4	$4,500	$18,000	35	$4,500	$158,000	4	$4,500	$18,000	4	$4,500	$18,000
House Pump Station (EA)	8	$7,000	$56,000	8	$10,000	$80,000	85	$7,000	$595,000	85	$10,000	$850,000
Area Pump Station (EA)	2	$160,000	$320,000	2	$180,000	$360,000	0	$160,000	$0	0	$180,000	$0
Asphalt cut, remove / replace (SY)	4,670	$60	$280,000	4,670	$60	$280,000	4,670	$60	$280,000	4,670	$60	$280,000
	Sewer Subtotal		$1,707,000	Subtotal		$2,210,000	Subtotal		$1,687,000	Subtotal		$1,901,000
	Danbury Con. Fee		$100,000	Danbury Con. Fee		$100,000	Danbury Con. Fee		$100,000	Danbury Con. Fee		$100,000
Miscellaneous		10%	$181,000		10%	$231,000		10%	$179,000		10%	$200,000
Contingency/Dewatering/Rock		15%	$271,000		15%	$347,000		15%	$268,000		15%	$300,000
Sewer + WWTP Construction Subtotal			$2,259,000			$2,888,000			$2,234,000			$2,501,000
Admin, Legal, Engin. Services		30%	$678,000		30%	$678,000		30%	$678,000		30%	$678,000
Total Capital Costs			$2,937,000			$3,566,000			$2,912,000			$3,179,000
Final Road Restoration			$864,000			$864,000			$864,000			$864,000

Table 3-3 Options Cost Comparison

Dean - Pocono Road 2018 Sewer System Options Cost Estimates									
		Brief Description	Sewer Construction Cost	Danbury Connect Cost	Add'l Misc & Contingency	Total Sewer-WWTP Construction Cost	Capital Cost	GLV ($1,000s)	Capital Cost as % GLV
Langan	Gravity	8" sewers, 6' – 20' deep	$ 2,272,000	$100,000	$ 593,000	$ 2,965,000	$ 3,855,000	$16,452	23.4%
	Low Pressure	3" sewers, 4' deep	$ 2,056,000	$100,000	$ 539,000	$ 2,695,000	$ 3,504,000	$16,452	21.3%
LAI	Hybrid	4" STEG sewers, 8 STEP	$ 2,159,000	$100,000		$ 2,259,000	$ 2,937,000	$16,452	17.9%
	STEP	All STEP, 1.5" - 3" Force Mains	$ 2,134,000	$100,000		$ 2,234,000	$ 2,904,000	$16,452	17.7%
Recommended Option									

Eight (8) of the 85 developed properties will require individual pumps which maximizes the number of properties with gravity connections without the need for deep, expensive sewers. A small number of individual house pumps is significantly more cost effective than deep
sewers, as can be seen from the Appendix A unit prices for conventional sewers which increases from $70 per foot to $210 per foot to which would be added dewatering costs (as the area has shallow groundwater) and rock excavation – soil borings are needed to quantify. When a gravity wastewater system is installed deep to serve a few properties, it will continue to remain deep until surface elevation decreases rapidly, which does not occur in the Study Area.

Table 3-4 presents the estimated costs to restore the entire ~ 9,00 feet of Dean and Pocono Roads.

Table 3-4 Road Restoration Costs

Dean & Pocono Roads - Road Restoration Cost Estimate				
Quantities		Costs		
9,000	feet roads	20,000	sy	
20	feet wide	$ 3.00	$/sy milling	
180,000	sf	$ 160.00	per ton	
4	inches thick pavement			
60,000	cf asphalt	$ 691,200	asphalt	
144	asphalt - lb/cf	$ 60,000	Milling	
8,640,000	lbs	$ 112,680	Contingency	15%
4,320	tons	$ 864,000	Construction Total	
		$ 172,800	Admin, Legal, Engin. Services	20%
		$ 1,036,800	Total	

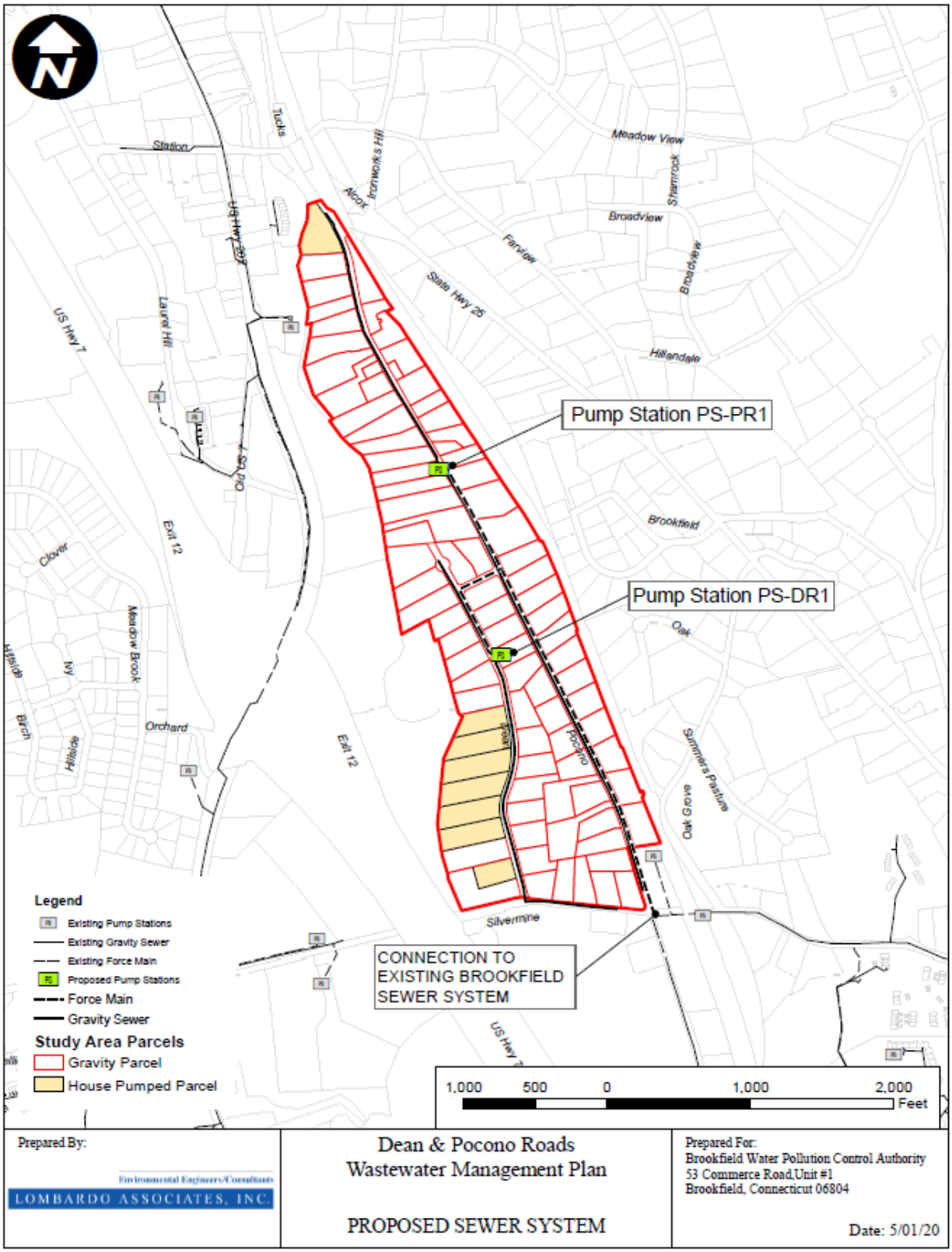

Figure 3-3 Hybrid STEP-STEG Sewer System Layout

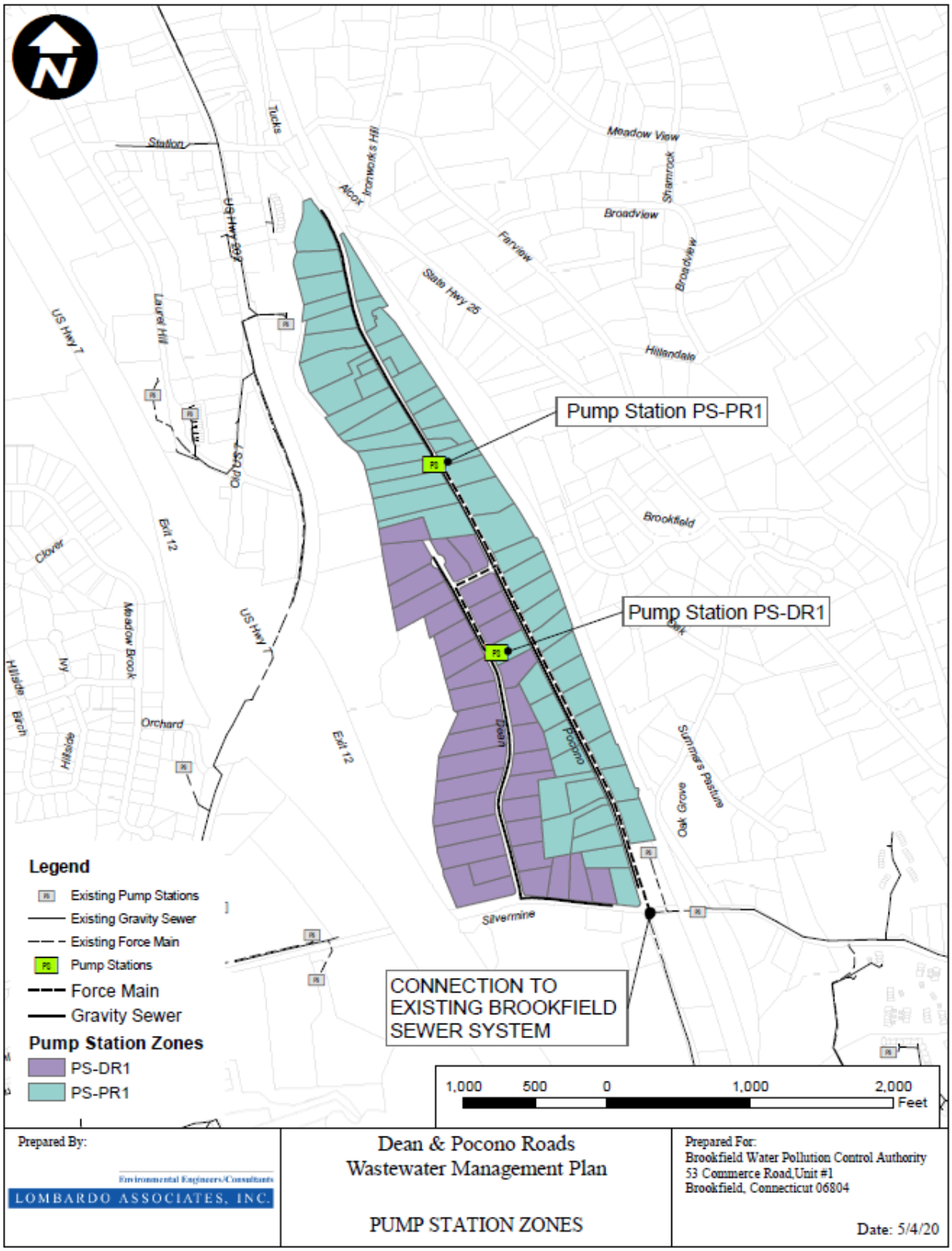

Figure 3-4 Hybrid STEP-STEG Pump Station Service Areas

4 RECOMMENDED WASTEWATER MANAGEMENT SYSTEM

Based upon the analysis in this Report, it is recommended that a hybrid STEP-STEG sewer system as illustrated on Figure 3-5 be implemented for the Study Area.

Based upon the estimated project cost of $2.937 million in 2020 dollars and assuming no grants, the sewer assessment for an average Study Area property with a Grand List Value (GLV) of $183,00 would be 17.9% of the GLV or $33,000.

Assuming inflation rate of 3%, 5 years for implementation and no grants results in project capital costs of $3.5 million and $38,300 assessment for a property with an average GLV. It is noted that all GLV values are based upon the 2016 Town Valuation and cost estimates are +/- 20%.

5 IMPLEMENTATION PLAN – SCHEDULE

Figure 5-1 presents the steps and preliminary estimated schedule for implementation of the recommended sewer project. It is noted that the schedule is preliminary as it will depend upon the timing of approvals and grant requests and should be viewed as the minimum amount of time for project implementation.

Proposed Brookfield Dean & Pocono Roads Sewer Implementation Schedule										
Activity #	Description	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21
1	Public Meeting on Project Findings & Recommendations									
	Public Hearing									
2	WPCA Adoption of Facilities Plan									
3	Presentation to & Authorization by Board of Selectmen									
4	Planning Commission Section 8-24 approval									
		Jan-21	Mar-21	May-21	Jul-21	Sep-21	Nov-21	Jan-22	Mar-22	May-22
5	DEEP Approvals & Agreement with Danbury WWTP									
6	Presentation to & Authorization by Board of Selectmen for Financing									
7	Finance Committee Review & Bond Counsel									
8	Public Hearing									
9	Town Bonding Referendum									
		Aug-22	Oct-22	Dec-22	Jan-23	Apr-23	Jun-23	Aug-23	Oct-23	Dec-23
10	Design									
11	Permitting									
		Apr-24	Jul-24	Aug-24	Oct-24	Dec-24	Mar-25	May-25	Jul-25	Sep-25
12	Construction									
	Public Hearing on Assessments									

Figure 5-1 Dean & Pocono Roads Sewer Program Implementation Schedule

APPENDIX A LANGAN GRAVITY & LOW-PRESSURE SEWER COST ESTIMATES

GRAVITY SEWER – predominately 8” sewers, 6’ – 20’ deep

LANGAN

ENGINEER'S ESTIMATE
Project: Dean Pocono Road
Sewer Main Extension
Brookfield, CT
Langan Project 190047501
September 2018

DESCRIPTION OF ITEM	QUANTITY	UNIT	COST	TOTAL COST
Construction Items (Phase 1)				
I. SITE PREPARATION/DEMOLITION				
A. Mobilization/Demobilization	1	LS	$ 25,000	$ 25,000
B. Tree Removal	1	LS	$ 5,000	$ 5,000
C. Boring (27 Total & 1 Monitoring Well)	1	LS	$ 8,000	$ 8,000
			SUBTOTAL	**$ 38,000**
II. SITEWORK				
A. Asphalt Conc. Binder Course				
1. 4" Temporary Asphalt	1,050	Ton	$ 160	$ 168,000
B. Subbase Course				
1. 16" Processed Stone	2,000	CY	$ 50	$ 100,000
C. Temporary Pavement Markings	1	LS	$ 7,500	$ 7,500
D. Maintenance and Traffic Protection	1	LS	$ 40,000	$ 40,000
			SUBTOTAL	**$ 315,500**
III. SANITARY SEWER				
A. Gravity Sewer Pipe (including trenching and backfill):				
1. 8" diameter PVC Gravity Sewer (0'-6' deep)	4040	LF	$ 70	$ 282,800
2. 8" diameter PVC Gravity Sewer (6'-8' deep)	1630	LF	$ 90	$ 146,700
3. 8" diameter PVC Gravity Sewer (8'-10' deep)	320	LF	$ 130	$ 41,600
4. 8" diameter PVC Gravity Sewer (10'-15' deep)	1620	LF	$ 160	$ 259,200
5. 8" diameter PVC Gravity Sewer (15'-20' deep)	650	LF	$ 200	$ 130,000
B. Force Main (including trenching and backfill):				
1. 3" diameter PVC Sewer (4' deep)	3000	LF	$ 45	$ 135,000
C. Sewer Manhole (including excavation and backfill):				
1. 4' diameter Sewer Manhole (0'-6')	15	Ea	$ 4,000	$ 60,000
2. 4' diameter Sewer Manhole (6'-8')	4	Ea	$ 5,000	$ 20,000
3. 4' diameter Sewer Manhole (8'-10')	2	Ea	$ 7,500	$ 15,000
4. 4' diameter Sewer Manhole (10'-15')	4	Ea	$ 10,000	$ 40,000
5. 4' diameter Sewer Manhole (15'-20')	2	Ea	$ 12,500	$ 25,000
D. Force Main Cleanout (including trenching and backfill):				
1. 5' diameter Force Main Cleanout (including valves)	5	Ea	$ 5,000	$ 25,000
E. General Construction of Pump Station	1	L.S.	$ 150,000	$ 150,000
E. Pump Station Electrical Components	1	L.S.	$ 60,000	$ 60,000
F. Sewer Force Main Connection to Ex. SMH	1	Ea	$ 3,500	$ 3,500
H. 6" PVC Sewer Lateral Connections	1860	LF	$ 40	$ 74,400
			SUBTOTAL	**$ 1,468,200**

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LANGAN

ENGINEER'S ESTIMATE
Project: Dean Pocono Road
Sewer Main Extension
Brookfield, CT
Langan Project 190047501
September 2018

DESCRIPTION OF ITEM	QUANTITY	UNIT	COST	TOTAL COST
Construction Items (Phase 1)				
IV. EROSION CONTROL				
B. Silt Fence	1000	LF	$ 3.5	$ 3,500
C. Inlet Protection	1	LS	$ 5,000	$ 5,000
D. Dewatering	1	LS	$ 10,000	$ 10,000
			SUBTOTAL	**$ 18,500**
V. MISC.				
A. Rock Excavation (Allowance)	1	LS	$ 125,000	$ 125,000
B. Miscellaneous Additional Work	1	LS	$ 100,000	$ 100,000
			SUBTOTAL	**$ 225,000**
			TOTAL	**$ 2,065,200**
			10% CONTINGENCY	**$ 206,520**
			TOTAL CONSTRUCTION COST	**$ 2,271,720**

NOTES:

1. This Engineer's estimate is based on a set of plans titled "Dean & Pocono Road Sewer Main Extension Concept", Town OF Brookfield, Fairfield County, Connecticut," prepared by Langan dated September 14, 2018.

2. This estimate is an approximate cost of construction and reflects available cost information for construction located in Brookfield, Connecticut.

3. This Engineer's estimate represents an opinion of the probable costs of construction, within a reasonable degree of certainty. This estimate does not guarantee the cost of labor, material, or equipment, nor the means, methods and procedures of the Contractor's work as determined by the Contractor and/or Owner, nor the competitive bidding submissions.

4. The estimated pricing includes rock excavation for the associated improvements.

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Page 2 of 2

LANGAN

ENGINEER'S ESTIMATE
Project: Dean Pocono Road
Sewer Main Extension
Brookfield, CT
Langan Project 190047501
September 2018

DESCRIPTION OF ITEM	QUANTITY	UNIT	COST	TOTAL COST
Construction Items (Phase 2 - Permanent Pavement Restoration)				
I. SITE PREPARATION/DEMOLITION				
A. Mobilization/Demobilization	1	LS	$ 5,000	$ 5,000
B. 4" Thick Milling	11,000	SY	$ 3	$ 33,000
			SUBTOTAL	**$ 38,000**
II. SITEWORK				
A. Asphalt Conc. Top Course				
1. 1.5" Thick item 403.17 top course asphalt conc.	950	Ton	$ 160	$ 152,000
B. Asphalt Conc. Binder Course				
1. 2.5" Thick item 403.17 binder course	1,580	Ton	$ 160	$ 252,800
I. Pavement Markings	1	LS	$ 15,000	$ 15,000
M. Maintenance and Traffic Protection	1	LS	$ 25,000	$ 25,000
			SUBTOTAL	**$ 444,800**
			TOTAL	**$ 482,800**
			10% CONTINGENCY	**$ 48,280**
			TOTAL CONSTRUCTION COST	**$ 531,080**

NOTES:

1. This Engineer's estimate is based on a set of plans titled "Dean & Pocono Road Sewer Main Extension Concept", Town OF Brookfield, Fairfield County, Connecticut," prepared by Langan dated September 14, 2018.

2. This estimate is an approximate cost of construction and reflects available cost information for construction located in Brookfield, Connecticut.

3. This Engineer's estimate represents an opinion of the probable costs of construction, within a reasonable degree of certainty. This estimate does not guarantee the cost of labor, material, or equipment, nor the means, methods and procedures of the Contractor's work as determined by the Contractor and/or Owner, nor the competitive bidding submissions.

4. The estimated pricing includes rock excavation for the associated improvements.

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Page 1 of 1

LOW PRESSURE SEWER – predominately 3" force main, 4' deep

LANGAN

ENGINEER'S ESTIMATE
Project: Dean Pocono Road
Sewer Main Extension
Brookfield, CT
Langan Project 190047501
September 2018

DESCRIPTION OF ITEM	QUANTITY	UNIT	COST	TOTAL COST
Construction Items (Force Main Alternative)				
I. SITE PREPARATION/DEMOLITION				
A. Mobilization/Demobilization	1	LS	$ 25,000	$ 25,000
B. Tree Removal	1	LS	$ 5,000	$ 5,000
			SUBTOTAL	**$ 30,000**
II. SITEWORK				
A. Asphalt Conc. Binder Course				
1. 4" Temporary Asphalt	90	TONS	$ 160	$ 14,400
B. Subbase Course				
1. 16" Processed Stone	357	TONS	$ 160	$ 57,120
C. Asphalt Conc. Top Course				
1. 1.5" Thick item 403.17 top course asphalt conc.	34	TONS	$ 160	$ 5,440
D. Asphalt Conc. Binder Course				
1. 2.5" Thick item 403.17 binder course	56	TONS	$ 160	$ 8,960
E. Pavement Markings	1	LS	$ 7,500	$ 7,500
F. Maintenance and Traffic Protection	1	LS	$ 40,000	$ 40,000
G. Driveway Replacement	90	EA	$ 1,500	$ 135,000
			SUBTOTAL	**$ 268,420**
III. SANITARY SEWER				
A. Gravity Sewer Pipe (including trenching and backfill):				
1. 8" diameter PVC Gravity Sewer (0'-6' deep)	700	LF	$ 70	$ 49,000
B. Force Main (including trenching and backfill):				
1. 3" diameter PVC Sewer (4' deep)	15800	LF	$ 35	$ 553,000
C. Sewer Manhole (including excavation and backfill):				
1. 4' diameter Sewer Manhole (0'-6')	3	Ea	$ 4,000	$ 12,000
D. Force Main Cleanout (including trenching and backfill):				
1. 5' diameter Force Main Cleanout (including valves)	8	Ea	$ 5,000	$ 40,000
E. General Construction of Pump Station	1	L.S.	$ 150,000	$ 150,000
E. Pump Station Electrical Components	1	L.S.	$ 60,000	$ 60,000
F. Sewer Force Main Connection to Ex. SMH	1	Ea	$ 3,500	$ 3,500
I. Sewage Pump and Laterals	90	Ea	$ 6,500	$ 585,000
			SUBTOTAL	**$ 1,452,500**
IV. EROSION CONTROL				
B. Silt Fence	1000	LF	$ 3.5	$ 3,500
C. Inlet Protection	1	LS	$ 5,000	$ 5,000
D. Dewatering	1	LS	$ 10,000	$ 10,000
			SUBTOTAL	**$ 18,500**
V. MISC.				
A. Rock Excavation (Allowance)	1	LS	$ 50,000	$ 50,000
B. Miscellaneous Additional Work	1	LS	$ 50,000	$ 50,000
			SUBTOTAL	**$ 100,000**
			TOTAL	**$ 1,869,420**
			10% CONTINGENCY	**$ 186,942**
			TOTAL CONSTRUCTION COST	**$ 2,056,362**

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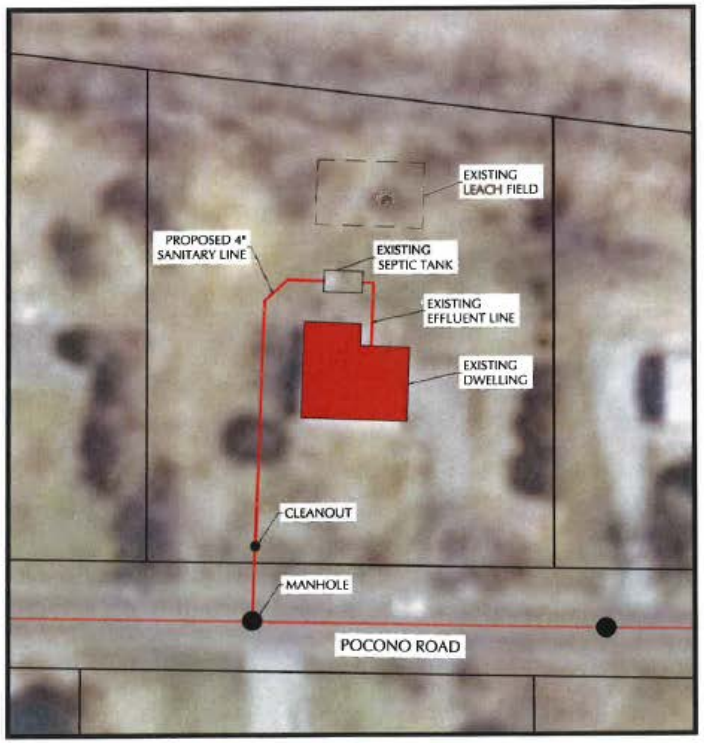
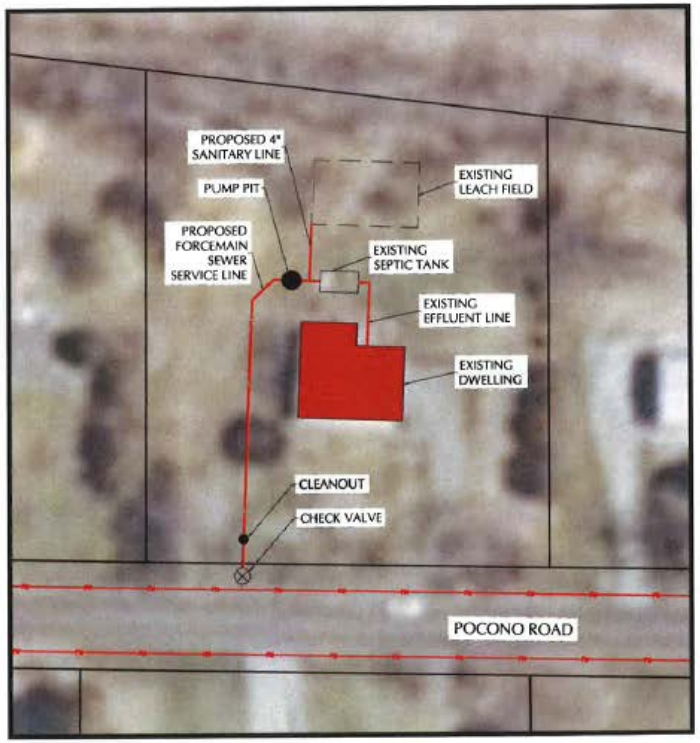
Page 1 of 1

TYPICAL BUILDING LOT

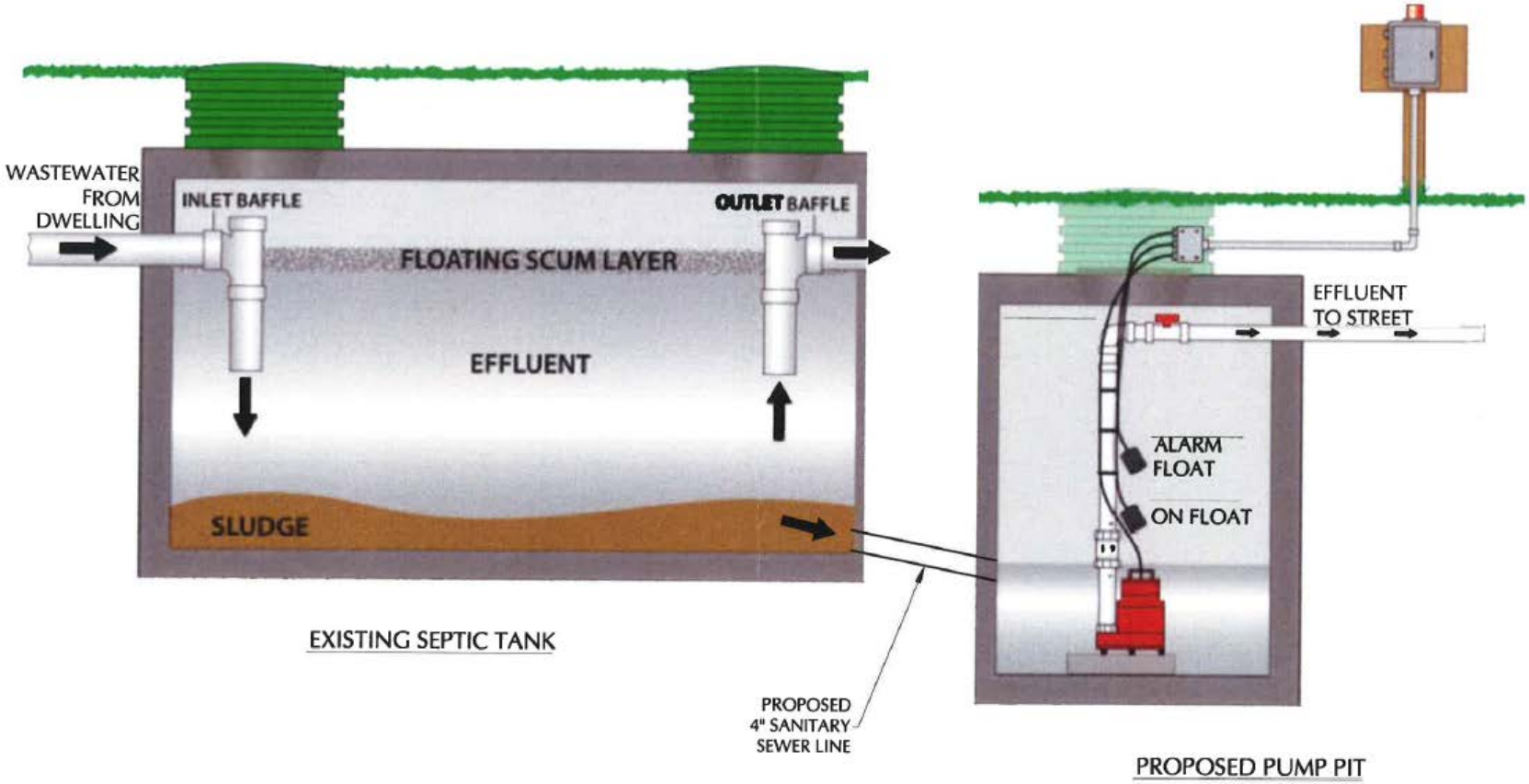


GRAVITY SANITARY SERVICE LINE

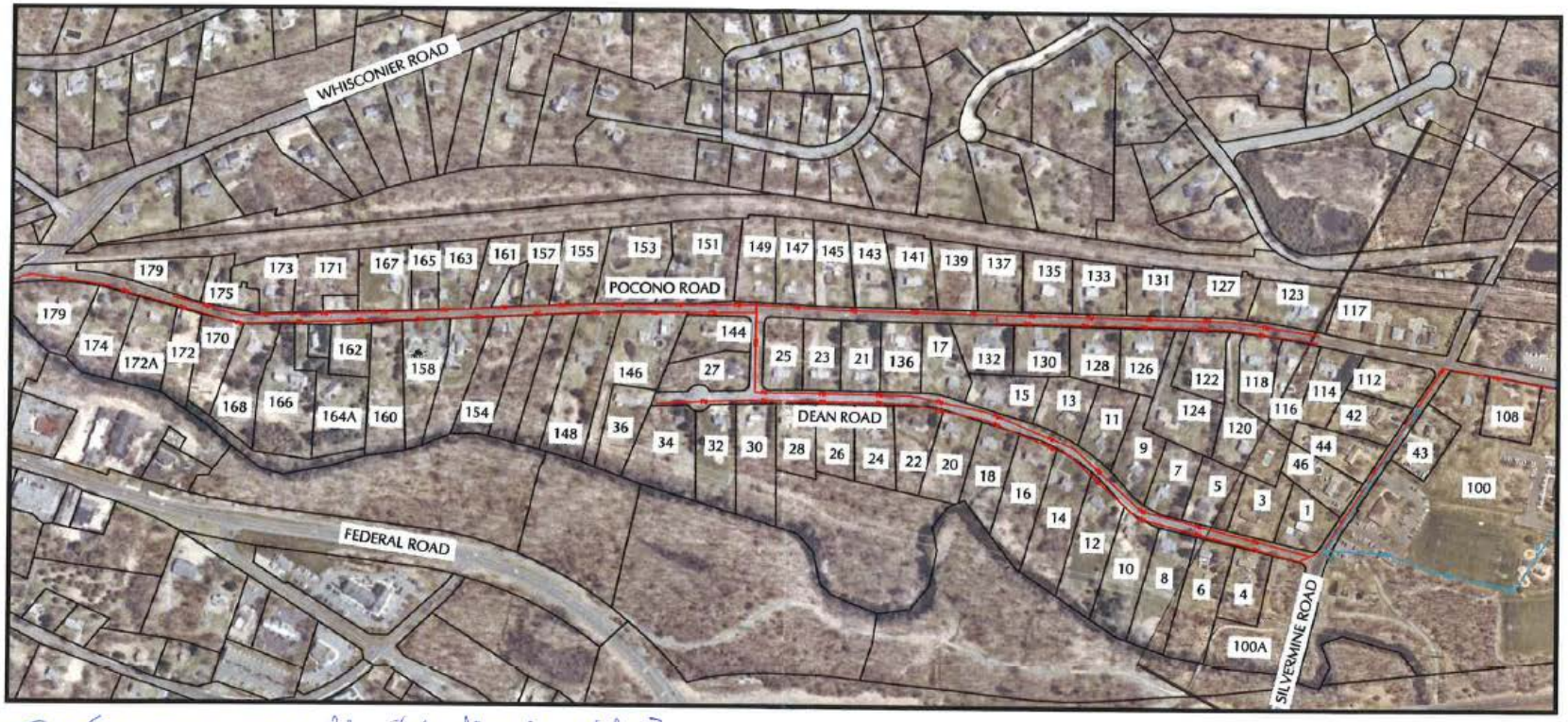


FORCEMAIN SANITARY SERVICE LINE

LANGAN


WASTEWATER FROM DWELLING
INLET BAFFLE
OUTLET BAFFLE
FLOATING SCUM LAYER
EFFLUENT
SLUDGE
EXISTING SEPTIC TANK
PROPOSED 4" SANITARY SEWER LINE
EFFLUENT TO STREET
ALARM FLOAT
ON FLOAT
PROPOSED PUMP PIT

LANGAN



(36) - force mains are small - it handles the solids?

(46) Silvermine - clarification between the two systems

(179) McGoiness - put a septic system in in 2009

(158)

(1) - TREES

(116) - has PC & it's a long way from the MAIL

DEAN & POCONO ROAD SEWER MAIN EXTENSION CONCEPT 2

LANGAN

APPENDIX B DEAN & POCONO ROADS STUDY AREA SOILS DESCRIPTIONS

Spring 2008 - hired by TOB
Summer 2010 - brought issue to WPCA's attention

Town Of Brookfield

Memo

To: Bill Davidson, First Selectman

From: Paul Avery, R.S.
Town Sanitarian, Health Department

CC: Nelson Malwitz, Chairman, Brookfield Water Pollution Control Authority (BWPCA)
Jay Pisco, Birdsall Services Group (BSG)

Date: February 24, 2011

Re: Extension of Brookfield sanitary sewers to Pocono Road, Dean Rd., and a portion of Silvermine Rd.

The purpose of this memo is to support the extension of sewer service to certain areas of Brookfield.

Attached is a summary of information obtained from Brookfield Health Department files on soil suitability for septic repair/installation and septic repair history in the referenced neighborhood. To date, with the help of BSG, I have compiled and analyzed data only for that area, but information is forthcoming for the Greenridge District. The goal is to extend sanitary sewers to areas of town with the greatest need. I have identified specific areas of concern to the Brookfield Water Pollution Control Authority (WPCA) based upon the poor septic soils recorded by myself over the last three years, my tenure as Brookfield's Sanitarian. My investigations are most often due to repair work required by failing septic systems in these neighborhoods. To that information I added the soils/repair record from our files of the last thirty-some years as recorded by my predecessors in the Health Department.

The information compiled is consistent in revealing poor draining soils with high restrictive layers due to either wetlands characteristics or high impervious hardpan soils. As these systems fail, in most cases, the septic system repair cannot comply with today's Regulations and Technical Standards for Subsurface Sewage Disposal (septic) Systems due to the unsuitability of the soils. Additionally, during periods of high water/soil moisture such as early Spring following winter melt, septic systems in these types of soils are particularly prone to back-ups into homes, and/or septage at the surface and the associated health and environmental hazards, and foul odor.

In reviewing the data please note that curtain drains are designed and installed at the discretion of the designers (engineers, sanitarians, or licensed septic installers) to artificially lower a high water table in the area of leaching fields where periodic flooding is a concern.

Septic soils and septic repair data for POCONO ROAD, DEAN ROAD, and a portion of SILVERMINE ROAD

1	Number of lots with homes	85

All the homes

"HIGH" RESTRICTIVE LAYERS

2	Number of those lots with restrictive layer (R/L) information available	38 (or 45%)
3	...of the 38 lots with R/L information available, number with R/L's 30 inches deep or less ("high" R/L's)	24 (or 63%)
4	...of the 24 lots with "high" restrictive layers, number with R/L's less than 18 inches deep (unsuitable soil)	9 (or 38%)

≈ ½ w/ soils data available

- 63% of those have R/L's ≤30"

38% of those have ≤18"

"SLOW" PERCOLATION RATES

5	Number of total lots (85) with percolation rate data available	36 (or 42%)
6	...of the 36 lots with perc. rate data available, number with rates 1 inch of water drop in 30 minutes or greater ("slower" perc. rates)	10 (or 28%)

SEPTIC SYSTEM REPAIR HISTORY

7	Number of total lots (85) with (a) recorded repair(s)	39 (or 46%)
8	...of the 39 lots with a recorded repair, number that had curtain drains installed as part of the repair	8 (or 21%)

Paul Avery

From:	Paul Avery
Sent:	Friday, July 08, 2011 11:08 AM
To:	Bill Davidson
Cc:	Ginny Giovanniello; Nelson Malwitz
Subject:	For Tuesday's BOS Meeting as I am on vacation
Attachments:	image001.gif

Ginny/Nelson,

Bill asked me for these notes when I told him I was on vacation week of 7/11 thru 7/15/11.

- Most Pocono and Dean Road properties have poor draining soils with high restrictive layers (<18" from the surface) and less than desired percolation rates (water cannot disperse into the soils as with good draining soils) due to wetlands characteristics. As septic systems here fail, in most cases, the repair cannot comply with today's Regulations and Technical Standards for Subsurface Sewage Disposal (septic) Systems due to the unsuitability of the soils.

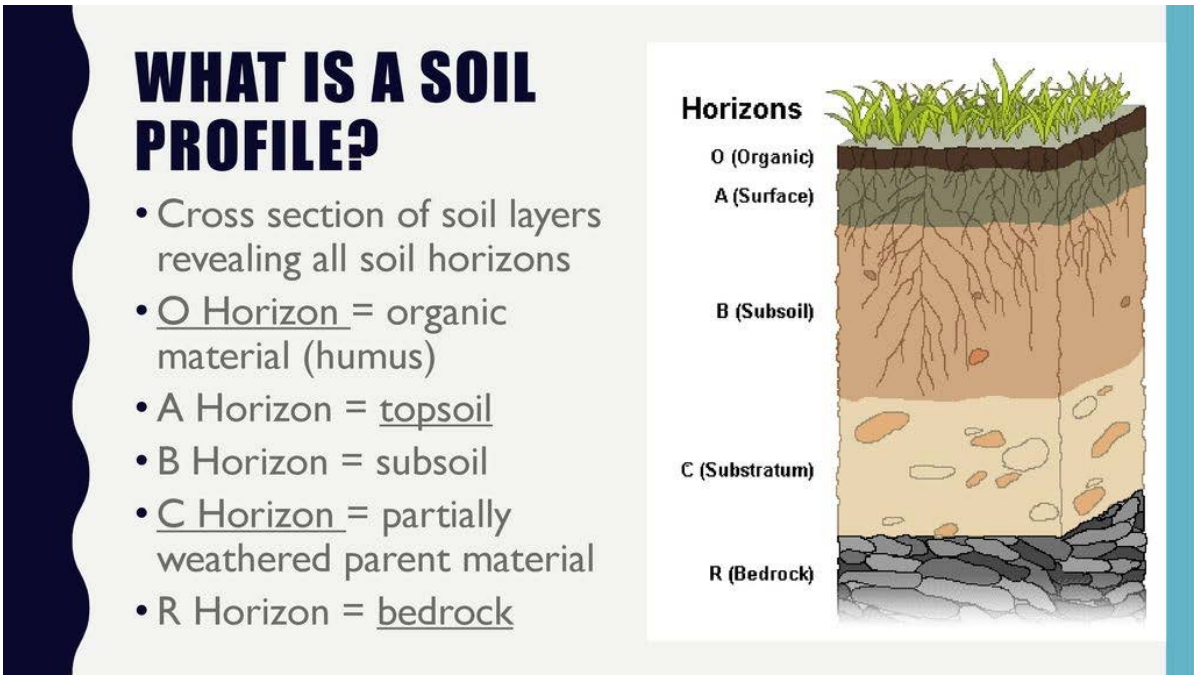
- Homes requiring septic would not even be permitted to be built there today without Professional Engineers proving soil suitability (for septic) through ground water monitoring and soil permeability testing. Additionally, new homes being constructed in an area like this would include engineered designs for on-site and/or neighborhood water retention systems to combat overall neighborhood flooding.

- During periods of high water/soil moisture such as early spring following winter melt, septic systems in these types of soils are particularly prone to back-ups into homes, and/or septage at the surface and the associated health and environmental hazards, and foul odor.

- Curtain drains were (and are) often installed in this neighborhood at the discretion of the septic system designers (engineers, sanitarians, or licensed septic installers) to artificially lower a high water table in the area of leaching fields where periodic flooding is a concern.

Paul Avery, RS
Town Sanitarian
Town of Brookfield
100 Pocono Road
Brookfield, CT 06804
(203)775-7315 Phone
(203)775-7677 Fax
email: pavery@brookfieldct.gov

1



Horizon suffixes
a: Highly decomposed organic matter (used only with O)
e: Moderately decomposed organic matter (used only with O)
g: Strong gley.
i: Slightly decomposed organic matter (used only with O)
p: Plow layer or other artificial disturbance
w: Weak color or structure within B (used only with B)

94C—Farmington-Nellis complex, 3 to 15 percent slopes,

Description of Farmington

Typical profile

A - 0 to 3 inches: fine sandy loam
Bw1 - 3 to 8 inches: fine sandy loam
Bw2 - 8 to 17 inches: fine sandy loam
2R - 17 to 80 inches: bedrock

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: More than 80 inches
Hydrologic Soil Group: D

Description of Nellis

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bw1 - 8 to 14 inches: fine sandy loam
Bw2 - 14 to 25 inches: fine sandy loam
BC - 25 to 27 inches: loam
C - 27 to 60 inches: sandy loam

Properties and qualities

Slope: 3 to 15 percent
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Hydrologic Soil Group: B

103—Rippowam fine sandy loam

Description of Rippowam

Typical profile

A - 0 to 5 inches: fine sandy loam
Bg1 - 5 to 12 inches: fine sandy loam
Cg2 - 12 to 19 inches: fine sandy loam
Cg3 - 19 to 24 inches: sandy loam
Cg4 - 24 to 27 inches: sandy loam
Cg5 - 27 to 31 inches: loamy sand
Cg6 - 31 to 65 inches: stratified very gravelly coarse sand to loamy fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)

Depth to water table: About 0 to 18 inches
Frequency of flooding: Frequent
Available water storage in profile: Low (about 5.9 inches)
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

221A—Ninigret-Urban land complex, 0 to 5 percent slopes

Description of Ninigret

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bw1 - 8 to 16 inches: fine sandy loam
Bw2 - 16 to 26 inches: fine sandy loam
2C - 26 to 65 inches: stratified very gravelly coarse sand to loamy fine sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.9 inches)
Hydrologic Soil Group: B

306—Udorthents-Urban land complex

Description of Udorthents

Typical profile

A - 0 to 5 inches: loam
C1 - 5 to 21 inches: gravelly loam
C2 - 21 to 80 inches: very gravelly sandy loam

Properties and qualities

Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 1.98 in/hr)
Depth to water table: About 54 to 72 inches
Hydrologic Soil Group: C

Description of Urban Land

Typical profile
M - 0 to 6 inches: material
Properties and qualities
Depth to restrictive feature: 0 inches to manufactured layer
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Hydrologic Soil Group: D

307—Urban land

Description of Urban Land

Typical profile

H - 0 to 6 inches: material
Hydrologic Soil Group: D

701A—Ninigret fine sandy loam, 0 to 3 percent slopes

Description of Ninigret

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bw1 - 8 to 16 inches: fine sandy loam
Bw2 - 16 to 26 inches: fine sandy loam
2C - 26 to 65 inches: stratified loamy sand to loamy fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 18 to 38 inches to strongly contrasting textural stratification
Natural drainage class: Moderately well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
*Depth to water table: About **17 to 39 inches***
Hydrologic Soil Group: C

701B—Ninigret fine sandy loam, 3 to 8 percent slopes

Description of Ninigret

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bw1 - 8 to 16 inches: fine sandy loam
Bw2 - 16 to 26 inches: fine sandy loam
2C - 26 to 65 inches: stratified loamy sand to loamy fine sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 18 to 38 inches to strongly contrasting textural stratification
Natural drainage class: Moderately well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
*Depth to water table: **About 17 to 39 inches***
Hydrologic Soil Group: C

APPENDIX C BOARD OF HEALTH LETTER + MISCELLANEOUS DOCUMENTS

TOWN OF BROOKFIELD

BROOKFIELD, CT 06804

May 22, 2020

John Siclari
Director, Brookfield Water Pollution Control Authority
Brookfield Town Hall
100 Pocono Road
Brookfield, CT 06804

Re: Sanitary sewers for the Dean Road/Pocono Road area between Silvermine Road and Whisconier Road (Route 25)

John:

I am restating the Brookfield Health Department's recommendation to provide sanitary sewers to the referenced neighborhood. Regarding septic systems that serve the homes, this neighborhood has been a concern to me since shortly after I arrived in Brookfield in the spring of 2008. The reason for the recommendation is the same now as it was when I first made it in 2011.

Septic systems function best in well-draining soils and this neighborhood has wetlands type soils and/or soils with high restrictive layers associated with high impervious hardpan layers. These poor-draining soils tend to prohibit leaching fields from emptying well, especially during periods of soil saturation associated with high precipitation and winter snow melt. When the upper layers of the soil where the leaching fields are contained are saturated, these systems are more likely to back-up raw sewage into the homes or bleed effluent onto the lawns. When this occurs septic systems are no longer renovating effluent properly through organic digestion under the ground, but rather presenting public health and environmental concerns as exposure to contaminated waters occurs.

The neighborhood is a low-lying, relatively flat area bordered by the Still River to the west, the railroad tracks to the east, Whisconier Road to the north and Silvermine Road to the south. The neighborhood drains surface and subsurface waters that descend form the eastern heights of the Whisconier Road and Long Meadow Hill Road ridge above it. Waters descending this rise pass through the neighborhood before ultimately draining to the Still River. Flow is generally east to west and southeast to northwest through the residential parcels with 85 homes and individual septic systems. As such during saturation periods, the contaminated septic effluent is less likely to properly renovate through digestion as it more likely dilute through flooding causing potentially higher, harmful bacterial levels in streams through the neighborhood and in the river. Normally, in better draining soils, these bacteria are consumed in natural subsurface digestive processes that occur immediately adjacent the leaching fields. In the interest of examining this likelihood I did some surface water bacterial testing in May of 2012 and though there are no

Health Department – 100 Pocono Rd., Brookfield, CT 06804 (203) 775-7315

TOWN OF BROOKFIELD

BROOKFIELD, CT 06804

standards for the results other than an EPA Recreational (swimming) water standard, that standard was exceeded in five of the seven locations tested.

When septic systems in this neighborhood fail, due to the poor septic soils, some repairs will not comply with today's Public Health Code due to the unsuitability of soil conditions for replacement leaching field installation. Soils with less than 18 inches of suitable, naturally-occurring effluent receiving soils are deemed not usable for new home construction today. Repairs in unsuitable soils for existing homes with these soils require exceptions to the Code that are noted on the final repair Permits to Discharge issued at the close of the repair project. These exceptions require a note that warns the owners of excessive water use due to the "non-compliant repair." Most repairs in this neighborhood require significant installations of costly select septic fill (sand) to artificially elevate the leaching systems above the problematic poor draining natural soils below. These septic system leaching field mounds are clearly visible along Pocono Road. Some system repairs require the installation of costly curtain drains to artificially lower excessive subsurface waters that flood a particular leaching field and prevent it from renovating effluent and draining properly.

Please consider the ongoing perceived health and environmental concerns associated with the aging septic systems in the Pocono and Dean Road neighborhood, the challenges of repairing those systems effectively and inexpensively and provide sanitary sewers to the area to eliminate those concerns.

Do not hesitate to call me at the number below with any questions or concerns moving forward.

Sincerely,

Paul Avery, R.S.
Town Sanitarian

cc: Dr. Raymond Sullivan, Brookfield Director of Health
Alice Dew, Brookfield Land Use Director
Nelson Malwitz, Chairman, Brookfield Water Pollution Control Authority

Health Department – 100 Pocono Rd., Brookfield, CT 06804 (203) 775-7315

Draft Minutes
BROOKFIELD PLANNING COMMISSION
THURSDAY, September 1, 2011 7:30 PM
MEETING ROOM #133 – TOWN HALL, 100 POCONO ROAD

1. **Convene Meeting :** Chairman J. Van Hise convened the meeting at 7:30 p.m. and established a quorum of members: Chairman J. Van Hise; Vice Chairman W. Conner; Secretary A. Kerley; Regular Member R. Baiad, and Alternate D. Frankel.* Also present; Town Director of Public Works, R. Tedesco.

*D. Frankel was appointed a regular member.

Absent: P. Conlon, Regular Member.

2. **Review Minutes of Previous Meetings: 08/18/11: A motion was made by D. Frankel to approve the Minutes of 8/18/11 as amended*. Motion was seconded by R. Baiad and carried 4-0-1 with W. Conner abstaining.**
**Amendment: Item 2: Clarify abbreviated items in motion.*

3. **Old Business:**
   a. **56A & 56B Stony Hill Road #201100338: 3-lot subdivision "Maria's Court"**
      1. **Letter from N. Marcus to J. Van Hise dated 08/22/11 Re: 56A & 56B Stony Hill Road #201100338**

No one present. Chairman J. Van Hise noted that a memo was received from Attorney Marcus with his opinion that the easements are acceptable. Since this was a stipulation of approval, the developers can now go forward. The Commission awaits the mylar to sign.

4. **New Business:**
   a. **Dean Road, Silvermine Road, Pocono Road #201100721: 8-24 Referral – Sewer Extensions**
      1. **Memo from K. McPadden to the Planning Commission dated 08/26/11 Re: 8-24 Referral**
      2. **Memo from W. Davidson to WPCA dated 08/22/11 Re: Proposed Dean Road Sewer Extension**
      3. **Sheet No. 1 of 1 – Proposed Sewer Options Dean Road prepared by Birdsall Services Group dated 06/13/11**

N. Malwitz, Chairman WPCA, present. Chairman Van Hise noted the correspondence items submitted on this referral (listed above). WPCA Chairman Malwitz offered background for this proposed project, noting that the Town Sanitarian has deemed the area of about 60 properties "septically challenged," meaning that most cannot build a conforming septic system. He added, "nothing beats pipes and pumps." Per the topography, this proposal will need two pump stations: one at a swale on Dean Road, and one at the intersection of Pocono Road and Route 25, near the bridge. Alternates were discussed and pointed out on the map (Options 1 and 2) and each will be evaluated by the engineer in terms of feasibility and cost. We have "plenty of capacity", stated Mr. Malwitz, when responding to W. Conner's concern over enough capacity for the commercial/industrial properties, which according to the Plan of Development, have priority for sewering. D. Frankel raised the concern over who would incur the cost of the engineering study should the project not go forward. Mr. Malwitz said the WPCA would have to absorb that cost, but he added that that has never happened to date. Mr. Frankel also wanted assurance that the residents who would be affected would have a forum to air their concerns about the project, and Mr. Malwitz said there would be three public hearings on this project.
A motion was made by W. Conner to send a note to the First Selectmen stating that the Planning Commission views the Dean Road Area Project favorably (Application #2011007). The motion was seconded by R. Baiad and carried unanimously.**
***"...to refer the construction of sewers in the Dean Road and Pocono Road area to the PC for a review and approval under Section 8-24 of the General Statutes."*

APPENDIX D PROPERTY SEPTIC SYSTEM AND SITE DATA

Count	#	Street	Septic Drawings (Yes=1, No=0)	Soils Data	Size of Tank (gal.)	# BR	SSDS Type	Perc. Rate (mpi)	Depth to Rest. Layer (ft)	Depth to BR (ft)	Depth to GW (ft)	Depth to Mottles (ft)	Depth to Hardpan (ft)	Soil Texture (>30")	Slope (%)	Date on Plan	SSDS ELA (sq. ft.)	System Year	System Age	System Age Range
1	1	Dean Road	1	0	1000		Gallery									7/3/2006	710.4	2006	14	11-20
2	3	Dean Road	0	0																
3	4	Dean Road	1	0	750	4	Trench									5/1/2008	408	2008	12	11-20
4	5	Dean Road	1	0	750		Trench									7/12/1996		1996	24	21-30
5	6	Dean Road	0	1	750	3		20	3.17	N/A	3.75	3.17	N/A	Sand	9.4	6/25/2002	675	2002	18	11-20
6	7	Dean Road	0	0	750															
7	8	Dean Road	0	0	750															
8	9	Dean Road	1	0	1000		Gallery									1/15/1997	675	1997	23	21-30
9	10	Dean Road	0	0																
10	12	Dean Road	1	1	1000	4	Gallery		1.58	N/A	2.67	1.58	N/A	Fine Silty Sand		1/12/1998	755	1998	22	21-30
11	13	Dean Road	1	0	1000	3	Infil									1/1/2003		2003	17	11-20
12	14	Dean Road	1	1	1000		Infil	20	3.33	N/A	N/A	3.33	N/A	Sand						
13	15	Dean Road	1	0	1250	5	Infil	20	2.54						1	6/27/2019	935	2019	1	0-10
14	16	Dean Road	1	0	750		Trench									10/17/1997		1997	23	21-30
15	17	Dean Road	1	1	1250		Trench	20	1.67	N/A	4.00	1.67	N/A	Fine Silty Sand		4/28/1999		1999	21	11-20
16	18	Dean Road	0	0																
17	20	Dean Road	1	0	1250	4	Infil									5/1/2005	677.9	2005	15	11-20
18	21	Dean Road	1	0	1000	3	Trench	10									654			
19	22	Dean Road	1	0	750		Trench													
20	23	Dean Road	1	0		3	Trench													
21	24	Dean Road	0	0																
22	25	Dean Road	1	0	1250	4	Infil	10	2.50						3	5/20/2008	666.7	2008	12	11-20
23	26	Dean Road	1	0	750	3	Trench									3/14/2019	336	2019	1	0-10
24	27	Dean Road	1	0	1000		Trench										780			
25	28	Dean Road	1	1	1250	4	Gallery	10	2.75	3.50	N/A	2.75	N/A	Silty Sand		8/12/1994	678.5	1994	26	21-30
26	30	Dean Road	1	1	1000	3	Infil	10	5.17	5.17	N/A	N/A	N/A	Sandy Loam		8/3/2006	501.5	2006	14	11-20
27	32	Dean Road	1	0	1250	3	Trench	10								6/17/1994	636	1994	26	21-30
28	34	Dean Road	0	0																
29	36	Dean Road	1	0	1200		Trench									10/4/1973	492	1973	47	41-50
30	100	Pocono Road	1	1	2000		Trench	20	2.50	8.08	N/A	2.92	2.5	Hardpan		9/30/2010	4500	2010	10	0-10

Count	#	Street	Septic Drawings (Yes=1, No=0)	Soils Data	Size of Tank (gal.)	# BR	SSDS Type	Perc. Rate (mpi)	Depth to Rest. Layer (ft)	Depth to BR (ft)	Depth to GW (ft)	Depth to Mottles (ft)	Depth to Hardpan (ft)	Soil Texture (>30")	Slope (%)	Date on Plan	SSDS ELA (sq. ft.)	System Year	System Age	System Age Range
31	112	Pocono Road	1	1		3	Trench	40	1.67	N/A	6.00	1.67	N/A	Fine Silty Sand		3/22/1988	675	1988	32	31-40
32	114	Pocono Road	1	0	1250	4	Trench + Gallery									8/1/2003		2003	17	11-20
33	115	Pocono Road	0	0																
34	116	Pocono Road	1	0	1250	4	Trench	10								7/3/1988	676	1988	32	31-40
35	118	Pocono Road	1	1	1000	3	Gallery	30	1.50	N/A	N/A	1.50	1.5	Hardpan			755.2			
36	120	Pocono Road	1	0	1000	3	Trench									4/17/2007		2007	13	11-20
37	122	Pocono Road	0	0																
38	123	Pocono Road	1	0			Trench													
39	124	Pocono Road	1	0			Trench													
40	126	Pocono Road	1	0			Trench									12/18/1990		1990	30	21-30
41	127	Pocono Road	1	0	1000		Infil									6/9/1998		1998	22	21-30
42	128	Pocono Road	1	0	1250		Trench								1					
43	130	Pocono Road	1	0	1000		Gallery									7/9/1998		1998	22	21-30
44	131	Pocono Road	1	0	1000		Trench									9/12/1972		1972	48	41-50
45	132	Pocono Road	0	0																
46	133	Pocono Road	1	0		3	Trench									9/25/1972		1972	48	41-50
47	135	Pocono Road	1	0	1000	3	Trench									9/14/1972		1972	48	41-50
48	136	Pocono Road	1	0	1250		Gallery										991.2			
49	137	Pocono Road	0	0																
50	141	Pocono Road	1	0	1000	3	Gallery									9/28/1988		1988	32	31-4
51	143	Pocono Road	1	1	1000	3	Gallery	20	3.00	N/A	N/A	N/A	3	Hardpan	10	4/15/2011	713.9	2011	9	0-10
52	144	Pocono Road	1	0	1100	3	Trench									10/23/1972		1972	48	41-50
53	145	Pocono Road	0	0																
54	147	Pocono Road	1	0	1250	3	Trench									5/13/2004		2004	16	11-20
55	148	Pocono Road	1	0	1000	3	Eljen	10	6.25							12/1/2010	495	2010	10	0-10
56	149	Pocono Road	0	1				10	2.58	N/A	2.58	N/A	N/A	Sand						
57	151	Pocono Road	1	0	1000	3	Trench										500			
58	153	Pocono Road	0	0																
59	155	Pocono Road	1	1	1000	3	Gallery	40	0.58	N/A	2.67	0.58	N/A	Silty Sand	2	11/18/2009	590	2009	11	0-10
60	156	Pocono Road	1	0	1000		Trench									7/16/1997	675	1997	23	21-30

Count	#	Street	Septic Drawings (Yes=1, No=0)	Soils Data	Size of Tank (gal.)	# BR	SSDS Type	Perc. Rate (mpi)	Depth to Rest. Layer (ft)	Depth to BR (ft)	Depth to GW (ft)	Depth to Mottles (ft)	Depth to Hardpan (ft)	Soil Texture (>30")	Slope (%)	Date on Plan	SSDS ELA (sq. ft.)	System Year	System Age	System Age Range
61	157	Pocono Road	1	0	1000		Trench									5/18/1989	792	1989	31	21-30
62	158	Pocono Road	1	1	1250	4	Trench	10	2.17	4.00	3.33	2.17	N/A	Silty Sand		10/27/2003	675	2003	17	11-20
63	159	Pocono Road	1	0	750		Gallery									4/5/2004		2004	16	11-20
64	160	Pocono Road	1	0	1000	3	Gallery									9/23/2004	495.6	2004	16	11-20
65	161	Pocono Road	0	1	1000	2		10	3.17	N/A	5.33	3.17	3.166667	Hardpan						
66	162	Pocono Road	0	0																
67	163	Pocono Road	0	0																
68	164	Pocono Road	1	0	1000	2	Trench									12/1/1967	300	1967	53	50+
69	165	Pocono Road	0	0																
70	166	Pocono Road	0	0																
71	167	Pocono Road	1	1	1250	4	Gallery	20	3.00	N/A	3.00	3.00	3	Hardpan	3	6/3/2002	991	2002	18	11-20
72	168	Pocono Road	1	0	1000		Trench									2/12/1987		1987	33	21-30
73	172	Pocono Road	0	0																
74	172A	Pocono Road	0	0																
75	173	Pocono Road	0	0																
76	175	Pocono Road	0	0																
77	176	Pocono Road	0	0																
78	179	Pocono Road	1	1	750	2	Gallery	10	1.33	N/A	N/A	1.33	N/A	Sand		7/15/2011	389.4	2011	9	0-10
79	42	Silvermine Road	0	0																
80	43	Silvermine Road	1	1	1250	4	Gallery	10	N/A	N/A	N/A	N/A	N/A	Sand		10/1/2001	662.4	2001	19	11-20
81	44	Silvermine Road	1	0			Trench									9/17/1998		1998	22	21-30
82	46	Silvermine Road	1	0	750		Trench									6/29/1984		1984	36	31-40
83	1	Tucks Road	1	0	1000		Trench	10									3312.5			
84	12	Tucks Road	1	1	2000		Trench		6.00	6.00	N/A	N/A	N/A	Sand						
85	272	Whisconier Road	1	0			Trench													
86	277	Whisconier Road	1	1			Drywell	60	1.50	1.50	N/A	N/A	N/A	Sand		3/27/2019		2019	1	0-10
87	281	Whisconier Road	0	0																
88	283	Whisconier Road	1	0			Tank Replacement													
89	290	Whisconier Road	1	0	1000		Trench									8/11/2016		2016	4	0-10

APPENDIX E PROPERTY LIST AND PRELIMINARY SEWER ASSESSMENT

Count	House Pump	House No.	Develop = 1	Street	Owner's Name	GLV	Sewer Assessment
1	0	1	1	Dean Rd	LARSSON PAUL J	$211,700	$38,000
2	0	3	1	Dean Rd	PFLOMM RICHARD W & DOROTHY L	$209,450	$37,000
3	1	4	1	Dean Rd	BRENNAN KENNETH & JODI	$185,360	$33,000
4	0	5	1	Dean Rd	KOLF JOSEPH P & DARLENE SWIFT	$194,450	$35,000
5	0	6	1	Dean Rd	BURKE EDWARD JR & CHERYL	$179,860	$32,000
6	0	7	1	Dean Rd	MITCHELL VINCENT B JR	$182,570	$33,000
7	1	8	1	Dean Rd	PURR BRIAN W & CHRISTINA M	$181,200	$32,000
8	0	9	1	Dean Rd	LEE RUBEN J & NORMA	$214,200	$38,000
9	1	10	1	Dean Rd	MANN DONALD H	$170,550	$30,000
10	0	11	1	Dean Rd	TORRES JOSEPH A & MARIE SPINO	$180,600	$32,000
11	1	12	1	Dean Rd	THOMSEN SARA E & ALLEN J III	$169,480	$30,000
12	0	13	1	Dean Rd	PEREIRA VALDIR S & MARILENE	$198,780	$35,000
13	1	14	1	Dean Rd	SCALZO AMBER M & MICHAEL	$227,670	$41,000
14	0	15	1	Dean Rd	GORNICKI KRZYSZTOF & TERESA	$209,810	$37,000
15	1	16	1	Dean Rd	GROGAN BRUCE & GROGAN MARYANN	$182,710	$33,000
16	0	17	1	Dean Rd	LUALLEN CHARLES E & THERESA A	$183,710	$33,000
17	1	18	1	Dean Rd	LIGHT MARY A	$178,870	$32,000
18	0	20	1	Dean Rd	LIPPY STEVEN A	$190,280	$34,000
19	0	21	1	Dean Rd	MALINAK DANIEL J	$228,390	$41,000
20	0	22	1	Dean Rd	WEISS ARTHUR & NICOLE (SV)	$180,660	$32,000
21	0	23	1	Dean Rd	MARTIN WILLARD J	$192,120	$34,000
22	0	24	1	Dean Rd	TOTTEN ANA	$191,280	$34,000
23	0	25	1	Dean Rd	GRAVIUS WAYNE	$174,660	$31,000
24	0	26	1	Dean Rd	GILBERT CHARLES J & PATRICIA P	$162,410	$29,000
25	0	27	1	Dean Rd	SASSETTI LAWRENCE J & VICKI E	$173,580	$31,000
26	0	28	1	Dean Rd	SEITER LEONARD J & SUSAN A	$188,250	$34,000
27	0	30	1	Dean Rd	BERTILSON EARL S	$192,370	$34,000
28	0	32	1	Dean Rd	NESCI EDNA	$192,010	$34,000
29	0	34	1	Dean Rd	MARSCHNER RUTHANN	$181,270	$32,000
30	0	36	1	Dean Rd	WATTERS BARBARA AND JOHN	$184,080	$33,000
31	0	112	1	Pocono Rd	DUCUSIN ROMULO T & ARLEEN J	$192,040	$34,000
32	0	114	1	Pocono Rd	LUTRUS ALAN J & JOANNE	$205,660	$37,000
33	0	116	1	Pocono Rd	KRUZANSKY ELAINE E	$224,980	$40,000
34	0	118	1	Pocono Rd	VOLPINTESTA NAMI AHN & EDWARD J	$203,940	$36,000
35	0	120	1	Pocono Rd	GAULARD THOMAS & ALLISON	$223,460	$40,000
36	0	122	1	Pocono Rd	DEMASSI GIUSEPPE & IDA (LU) & DEMASI	$234,610	$42,000
37	0	123	1	Pocono Rd	DESOUZA MARCO A & LENIZA P (SV)	$202,300	$36,000
38	0	124	1	Pocono Rd	ZANCAN DOMINIC J & MAURA L	$221,920	$40,000
39	0	126	1	Pocono Rd	ORE AMERICA & BARREDA GERARDO	$194,460	$35,000
40	0	127	1	Pocono Rd	PNACEK PETR & TIRPAKOVA JANA	$186,270	$33,000
41	0	128	1	Pocono Rd	CHEH JOSEPH W & PAMELA N	$183,450	$33,000
42	0	130	1	Pocono Rd	ESTEVES CYNTHIA A	$189,090	$34,000
43	0	131	1	Pocono Rd	DRISCOLL JOHN J	$169,460	$30,000
44	0	132	1	Pocono Rd	EGELHOFF STEPHEN & CAREN	$181,960	$32,000
45	0	133	1	Pocono Rd	ABATE PETER J AND OBRIEN LORI A	$171,690	$31,000

Count	House Pump	House No.	Develop = 1	Street	Owner's Name	GLV	Sewer Assessment
46	0	135	1	Pocono Rd	HAMILTON TYLER & THERESA	$175,710	$31,000
47	0	136	1	Pocono Rd	EIRICH DONALD	$202,490	$36,000
48	0	137	1	Pocono Rd	DELFIN ADELCE J & ELIJAH H	$186,930	$33,000
49	0	139	0	Pocono Rd	AQUARION WATER COMPANY OF CT	$14,480	$3,000
50	0	141	1	Pocono Rd	MACINTYRE DEBORAH J	$160,440	$29,000
51	0	143	1	Pocono Rd	CARNEIRO STEVEN M & DIANE E	$167,700	$30,000
52	0	144	1	Pocono Rd	JIMENEZ ANDRE & GROSKI PAIGE	$192,630	$34,000
53	0	145	1	Pocono Rd	FOX THOMAS M & THELMA M	$197,290	$35,000
54	0	146	1	Pocono Rd	CZUPKOWSKI HELEN D & ROBERT M	$262,260	$47,000
55	0	147	1	Pocono Rd	DECARVALHO MARCOS A	$170,140	$30,000
56	0	148	1	Pocono Rd	DINHO JOSEPH M	$187,560	$33,000
57	0	149	1	Pocono Rd	RUSSO MARK A & MARIA C	$183,800	$33,000
58	0	150	0	Pocono Rd	EMMONS TAMMIE L	$38,250	$7,000
59	0	151	1	Pocono Rd	REED SANDRA J	$248,660	$44,000
60	0	152	0	Pocono Rd	DEALMEIDA MARIO & VALENZUELA	$6,990	$1,000
61	0	153	1	Pocono Rd	DOMINGOS SUSANA	$214,650	$38,000
62	0	154	1	Pocono Rd	DEALMEIDA MARIO & VALENZUELA DANOL	$236,380	$42,000
63	0	155	1	Pocono Rd	FESH JAMES S & GAIL J	$150,300	$27,000
64	0	156	1	Pocono Rd	DEMERS RONALD A & MARYELLEN	$169,910	$30,000
65	0	157	1	Pocono Rd	SYMES CHRISTOPHER L	$138,400	$25,000
66	0	158	1	Pocono Rd	SALVATO JOSEPH F & BARBARA A	$258,360	$46,000
67	0	159	1	Pocono Rd	MOUNTAIN CHURCH OF GOD INC	$183,270	$33,000
68	0	160	1	Pocono Rd	ODONNELL ROBERT W	$183,400	$33,000
69	0	161	1	Pocono Rd	TRUCHSESS DEBORAH J	$135,850	$24,000
70	0	162	1	Pocono Rd	VALA DENNIS R JR AND HEIDI L	$183,480	$33,000
71	0	163	1	Pocono Rd	HAGER ALBERT LELAND	$164,860	$29,000
72	0	164	1	Pocono Rd	GOSPEL HALL	$238,550	$43,000
73	0	165	1	Pocono Rd	WALL ANTHONY J	$158,820	$28,000
74	0	166	1	Pocono Rd	DEFINA ENTERPRISES LLC	$260,760	$47,000
75	0	167	1	Pocono Rd	KOENECKE GUSTAV R II & LISA MARIE	$213,330	$38,000
76	0	168	1	Pocono Rd	WABOL DAVID M & DAWN M	$169,620	$30,000
77	0	169	0	Pocono Rd	GOSPEL HALL - Parking Lot Only	$19,480	$3,000
78	0	170	0	Pocono Rd	CONNECTICUT LIGHT & POWER CO	$95,060	$17,000
79	0	171	1	Pocono Rd	SHANNON ANNE MARIE	$173,500	$31,000
80	0	172	1	Pocono Rd	GRADIA WADE P	$179,390	$32,000
81	0	173	1	Pocono Rd	GLENN & BARBARA ROONEY TTEES	$213,660	$38,000
82	0	174	1	Pocono Rd	BARRY PAUL E	$203,490	$36,000
83	0	175	1	Pocono Rd	GILCHRIST C B MARSHALL & MARLENE	$158,320	$28,000
84	1	176	1	Pocono Rd	GEREG SANDRA	$203,560	$36,000
85	0	179	1	Pocono Rd	MCGINNISS KEVIN T	$166,760	$30,000
86	0	164A	1	Pocono Rd	DEFINA ENTERPRISES LLC	$165,450	$30,000
87	0	172A	1	Pocono Rd	MILLER BONNIE L	$202,380	$36,000
88	0	42	1	Silvermine Rd	MURO BRIGITTE	$168,770	$30,000
89	0	44	1	Silvermine Rd	SWEET JOHN E SR TTEE ESTATE OF	$155,230	$28,000
90	0	46	1	Silvermine Rd	HASENEY RICHARD C & DIANE LYNN	$214,380	$38,000
Total	**8**		**85**			**$16,452,320**	**$ 2,932,000**