Appendix K

Supplemental Hydrogeology Investigation and Hydrogeology Investigation Addendum

d/b/a GeoDesign, Inc. P.C.

December 18, 2008
File No. 3052-01.2

Mr. William Balter
Wilder Balter Partners
570 Taxter Road
Elmsford, NY 10523

Via E-mail BBalter@WilderBalter.com

Re: Supplemental Hydrogeology Investigation
North Salem Property
North Salem, New York

Dear Bill:

This letter report provides results of supplemental hydrogeology investigations made at the subject site in November, 2008. These investigations were undertaken to provide supplementary data to further document the soils and bedrock hydrogeologic characteristics in the area of the proposed Subsurface Treatment and Disposal System. This new information is intended to supplement the findings included in Appendix J of the DEIS, which includes our February 5, 2007 Hydrogeology Investigation Report, and our September 20, 2007 Addendum report.

Purpose: Supplemental investigations were performed in the area of the SSTS to provide additional data to support aquifer thickness and hydraulic conductivity to that presented in the referenced previous reports. Specifically, the nature of the bedrock underlying the site had not been characterized previously since no rock coring had been performed at the site, instead its general characteristics had been estimated based on published geologic data and our knowledge of the area. Additional, testing of the overburden was also performed to supplement the previous findings. This testing included additional gradation testing and new laboratory testing of reconstituted samples to measure hydraulic conductivity and compare the resulting value to Kozeny-Carman correlations.

Field Testing: Six new test pits were excavated on November 7, 2008 with a larger excavator than was previously used in an attempt to reach bedrock and excavate below the groundwater level. These are termed TP-100 to TP-105. Logs are attached and locations are shown on Figure A also attached. The locations of these test pits were estimated by line of sight and pacing from existing site features but were not surveyed and are therefore approximate. All these the test pits reached weathered bedrock at depths varying from approximately 5 feet to 10 feet, and localized sound zones of bedrock at highly variable depths of approximately 6 to 12 feet. No groundwater was encountered to the excavator refusal depth (approximately 7 to 13 feet) in any of the test pits, indicating that groundwater levels are below the overburden (within the bedrock). Photographs of selected test pits and nearby bedrock are attached. These photographs depict the weathered nature of some of the bedrock as well as the discontinuities in the bedrock. Both of these characteristics provide zones and a mechanism for the site aquifer to extend into the upper portion of the bedrock.
One new test boring, B-100, was excavated on November 12, 2008 to allow coring and testing of the bedrock. The boring log is attached and its location is shown on Figure A. The location of Boring B-100

was estimated by line of sight and pacing from existing site features but was not surveyed and is therefore approximate. Three packer tests were made in Boring B-100 in an attempt to quantify the hydraulic conductivity of the bedrock. Highly weathered and fractured bedrock was encountered at a depth of 17 feet and sound bedrock was reached at a depth of 22 feet, as indicated by rock quality in the rock cores. Rock quality was determined by the Rock Quality Designation (RQD). The RQD was 25% above a depth of 22 feet and 94% below a depth of 22 feet to the maximum depth cored (29 feet). Attempts were made to perform packer tests in the bedrock as follows:

Test #1 - 21' to 23' deep; Unable to hold seal (lost water pressure at 70 psi)
Test #2 - 22' to 24' deep; Unable to hold seal (lost water pressure at 70 psi)
Test #3 - 23' to 25' deep; 20 psi no measurable flow, 40 psi no measurable flow

These results correlate well with the rock coring data (RQD) indicating highly fractured (pervious) bedrock above a depth of approximately 23 feet and low permeability bedrock below a depth of 23 feet in Boring B-100. Although the lost pressure or the lack of measurable flow within the bedrock during Test #3 precludes quantifying the hydraulic conductivity of the bedrock, we infer that below approximately 23 feet the bedrock is relatively impervious and above approximately 23 feet the bedrock is highly pervious.

In Boring B-100, the thickness of the upper pervious/weathered/fractured bedrock zone is inferred to be approximately 5to 6 feet ([22' or 23'] minus [17']) based on drilling/coring. When comparing the packer tests and RQD results in Boring B-100 to the highest observed bedrock level in nearby Test Pit TP-100, the thickness of this zone is estimated to be approximately 14 feet ([23'] minus [9']). Thus, these data support the assumed approximate 10-foot thickness of pervious bedrock (used in our groundwater model).

Lastly, we measured depth to groundwater in six of the existing wells in 11/12/08. This data has been added to Table 5-1. We also measured depth to water in the newly installed well (B-100), this data is included on the log of Boring B-100. Groundwater levels are consistent with previous data.

Laboratory Testing: We had intended to estimate the hydraulic conductivity of the unconsolidated materials in selected test pits, but were unable to due to the absence of groundwater above the bedrock surface. Instead, we substituted the following testing and calculations to provide additional estimates of the hydraulic conductivity of the unconsolidated materials:

1. We selected three soil samples from B-100 and TP-100 for gradation testing. We then estimated the D_{10} size (sieve size of material which has 10% percent finer), the relative density (using SPT "N-values") and correlated these data to the hydraulic conductivity using Kozeny-Carman analyses. The gradation data is attached and updated Table 5-2 (also attached) presents the resulting calculated estimated hydraulic conductivities (coefficients of permeability). On this Table, we have segregated the hydraulic conductivities of the soils in the Upland site area from those of the Sub Surface Treatment System (SSTS) site area. In the latter area, the average estimated hydraulic conductivities range from about 3.7 to 5.3 feet/day with the average of six samples of 2.3 feet/day.

2. We reconstituted a composite soil sample from material obtained in TP-100 from depth of 3 to 10 feet to its estimated in-situ density (50% based on SPT "N-value - see attached calculations) and performed a Constant Head permeability test (ASTM D 2434) in the laboratory. Test results, attached, indicate an estimated hydraulic conductivity of 1.3 x 10-3 cm/sec or 4.5 ft/day in the laboratory.

These values provide supporting data for the values of hydraulic conductivity which we used in the groundwater model.

Conclusions:

1. Thickness of pervious bedrock zone – Although we were not able to quantify the hydraulic conductivity of the bedrock, the referenced testing supports the design thickness of 10 feet of pervious bedrock which contributes to the aquifer thickness used in the model.

2. The new test pits and boring, and related visual descriptions and laboratory gradation tests confirm the presence and nature of the higher permeability materials in the area of the SSTS (vs. the siltier lower permeability materials in the upland areas). Specifically the D_{10} size of newly tested soils (0.025 to 0.050 mm in B-100 and TP-100) is similar to the range in the previous data (0.32 to 0.37mm in Test Pits TP-G2, G4 & G9). In addition, the six new test pits (TP-100 to TP-105) indicate that the horizontal extent of the higher permeability soils encompasses much of the proposed SSTS area. Very importantly, the new data also indicates that these more pervious materials (where present) extend down to the surface of the fractured bedrock. This condition allows a hydraulic connection between the overburden and the underlying bedrock aquifer. The absence of groundwater above the bedrock in the new test pits (which were all extended to bedrock by using a larger excavator than previously), provides data which supports this conclusion.

3. Despite the absence of groundwater above the bedrock within the more pervious soils, which precluded in-situ testing of the permeability of these materials as had been desired and planned, the constant head permeability laboratory test provides supporting data for hydraulic conductivities used in the model.

Please contact the undersigned if you have any questions.

Very Truly Yours,

GeoDesign, Inc.

Ulrich La Fosse, P.E.
Principal

CC: jwatson@insite-eng.com, jdahlgren@timmillerassociates.com

Enclosures :

Figure A; Boring Log (1); Test Pit Logs (6); Gradation Tests (3); Calculated Estimate of In-situ Density (1 page); Constant Head Permeability Test (1); Revised Tables 5-2 and 5-1; and Photographs (10).

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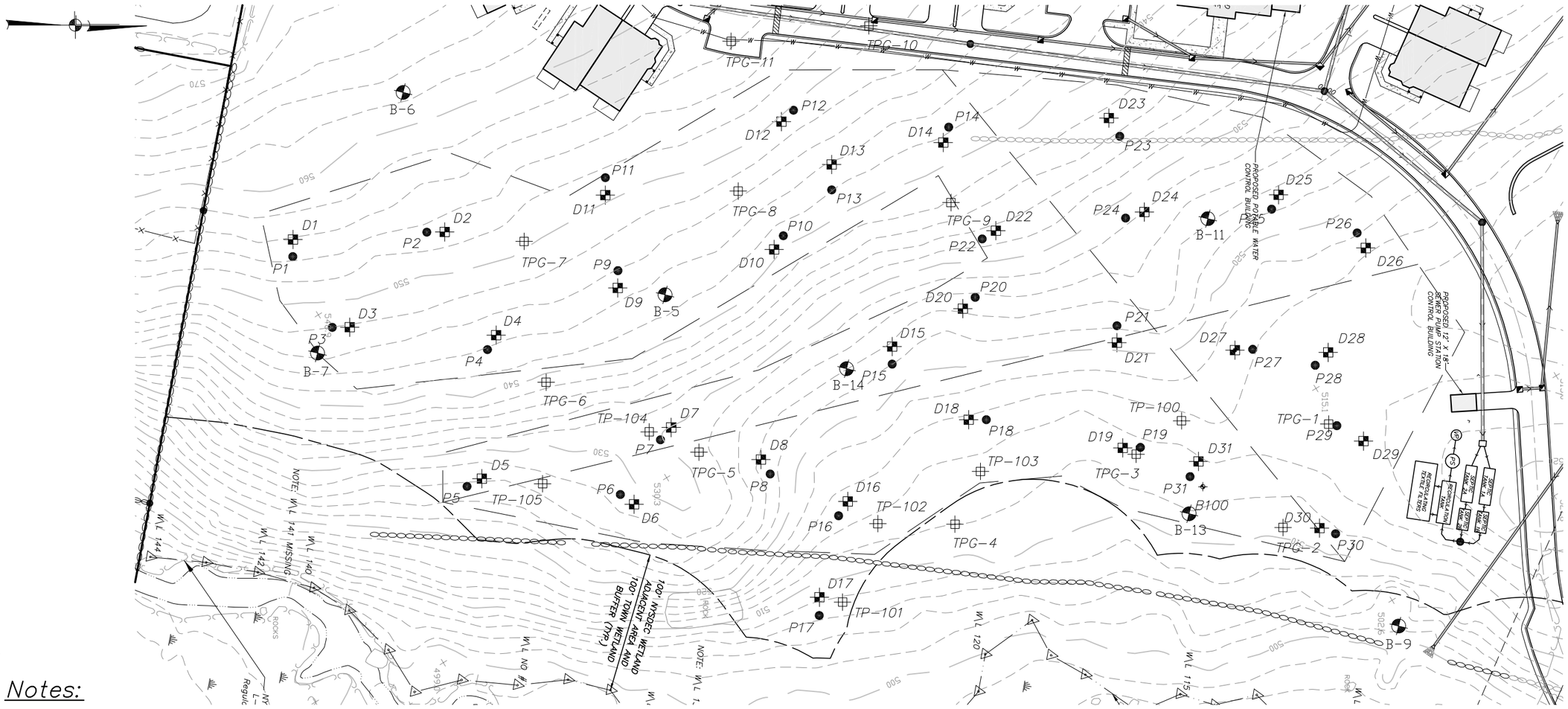

Notes:

1. Refer to Site Plans prepared by Insite Engineering, Surveying & Landscape Architecture, P.C. for General Notes.
2. This plan is schematic and is not to be used for permitting or construction. The intent of this plan is to depict the location of test holes only.

Testing Location Summary:

✚	D1–D31	31 Deep test holes by Insite, witnessed by PCDOH and NYCDEP (July 2007)
●	P1–P31	31 Percolation test holes by Insite, witnessed by PCDOH and NYCDEP (August 2006)
⊕	B1–B14	14 Test borings and groundwater monitoring wells by Geodesign (Installed October 2005–March 2006)
⧾	TPG1–TPG14	14 Test pits by Geodesign (March 2006)
⧾	TP100–TP105	6 Supplemental test pits by Insite, Geodesign and Spectra (November 2008)
⊕	B100	1 Test boring by Geodesign and Spectra (November 2008)

GRAPHIC SCALE

80 0 40 80 160 320

(IN FEET)

1 inch = 80 ft.

DATE: 12-11-08
SCALE: 1" = 80'
PROJECT NO.: 05171.100
FIGURE: A

INSITE
ENGINEERING, SURVEYING & LANDSCAPE ARCHITECTURE, P.C.
3 Garrett Place • Carmel, New York 10512
Phone (845) 225-9690 • Fax (845) 225-9717
www.insite-eng.com

PREPARED BY:

PROJECT: SALEM HUNT
JUNE ROAD, TOWN OF NORTH SALEM, WESTCHESTER COUNTY, NEW YORK

DRAWING: SSTS TESTING LOCATION SUMMARY

Z:\E\05171100\SSTS\Figures\SSTS TESTING LOCATION SUMMARY FIG-1.dwg, 12/10/2008 10:30:00 AM, plot, 1:1

GEODESIGN INCORPORATED
GeoTechnical Engineers and Environmental Consultants
984 Southford Road
Middlebury, Connecticut 06762
Telephone: 203-758-8836 Fax: 203-758-8842

TEST PIT LOG

Project Name

Alfredo Property
Salem Hunt
North Salem, New York

Test Pit No.: TP-100
Page No.: 1 of 1
File No.: 3052-001.2
Checked By: ULF

GeoDesign Rep: Ulrich LaFosse, P.E.
Weather: Clear, 50's
Date: November 7, 2008
Time Started: Time Finished:
N. Coordinate: E. Coordinate:
Ground Surface Elevation (feet): 511±
Station: Offset: ft.

Contractor: Alfredo Site Deveopment
Operator: John Marino
Make: Komatsu
Model: 130
Capacity: 1/4 cu. yd.
Reach: 16 ft

Groundwater Observations			
Date	Depth (ft)	Elevation (ft)	Notes
▼ 11/7/08			Dry after 24 hours
▼			
▼			
▼			

Test Pit Sketches & Strata Description
(view to west)

Depth (feet)	Elevation & Depth (feet)	Symbol	Excavation Effort	Boulder Count and Class	Moisture
1	TOPSOIL				
2	1.2 SUBSOIL				
3	2.6 Gray fine to coarse SAND, little Silt, trace fine Gravel				
4					
5					
6					
7					
8					
9	8.0				
10	9.0 Highly weathered metamorphosed GNEISS/MARBLE BEDROCK				
11					
12	11.0				
13	Weathered metamorphosed GNEISS/MARBLE BEDROCK				
14	Bottom of Exploration at 13.0 ft				
15					

Remarks: Roots observed to 7 feet below grade.

Test Pit Plan
(feet)

Notes:
1. Water level readings have been made at times and under conditions stated, fluctuations of groundwater may occur due to other factors than those present at the time readings were made.
2. Boulder Count Class Designations (diameter range): A = 6"-18" (0.15m - 0.46m) , B = 18"-36" (0.46m - 0.91m), C = >36" (>0.91m).
3. Excavation Effort: E = Easy, M = Moderate, D = Difficult.
4. Proportions Used: Trace = 1-10%; Little = 10-20%; Some = 20-35%; And = 35-50%
5. Stratification lines represent approximate boundary between material types, transitions may be gradual.

Test Pit No.: TP-100

TEST PIT LOG (NEW) 2004 TEST PITS 11-7-08.GPJ GEOTESTPIT.GDT 11/20/08

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GeoTechnical Engineers and Environmental Consultants
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Middlebury, Connecticut 06762
Telephone: 203-758-8836 Fax: 203-758-8842

BORING LOG

Project Name

Alfredo Property

North Salem, New York

Boring No.: B-100
Page No.: 1 of 2
File No.: 3052-001.2
Checked By: ULF

Boring Company: General Borings Inc
Foreman: Jim Casson
GeoDesign Rep.: Brien Waterman
Date Started: November 12, 2008 Date Finished: November 12, 2008
N. Coordinate: E. Coordinate:
Ground Surface Elevation (feet): 511.0
Station: Offset: ft

	Casing:	Sampler:
Type:	NW	SS
I.D.:	3.0 in.	1.38 in.
Hammer Wt.:	300 lbs	140 lbs
Hammer Fall:	24 in.	30 in.
Rig Type:	Diedrich D-50	
Hammer Type:	Automatic - Hydraulic	

Groundwater Observations			
Date	Depth (ft)	Elev. (ft)	Notes
11/12/08	13.5	497.5	Wet sample
11/12/08	13.4	497.6	After 30 minutes

Depth (ft)	Casing Blows/ft	Sample Information: Number	Type	Penetration (inches)	Recovery (inches)	Depth (ft)	Blows / 6 inch Interval: 0 - 6	6 - 12	12 - 18	18 - 24	Coring Time (min./ft)	Moisture Content (%)	Strata Description: Depth & Elevation(feet)	Symbol	Sample Description (Classification System: Modified Burmister)
		1	SS	24	3	0.0	2	3	3	3			Subsoil		Loose, brown fine to medium SAND, some Silt, with Roots, (moist)
													2.2		
		2	SS	24	16	2.0	4	6	7	4			Sand 508.8		Medium dense, tan Top 2": fine to medium SAND, little Silt, trace fine Gravel Bottom 14": fine to medium SAND, trace Silt, trace fine Gravel, (moist)
5															
		3	SS	24	0	5.0	5	3	4	2					Loose, no recovery
		4	SS	24	3	7.0	1	2	1	1					Very loose, tan fine to medium SAND, trace Silt, trace Roots, (1/2" layer near spoon bottom: of brown fine to medium SAND, some Silt), (moist)
													9.0		
10													Gravelly Sand 502.0		
		5	SS	24	16	10.0	6	16	17	10					Dense, brown fine to coarse SAND, little fine to coarse Gravel, little Silt, (moist)
		6	SS	24	16	12.0	10	9	7	4					Medium dense, brown fine to coarse SAND, little fine to coarse (-) Gravel, little Silt, (wet)
15															
		7	SS	24	12	15.0	9	13	15	24					Medium dense, brown/gray Top 4": fine to coarse SAND, little fine to coarse (-) Gravel (up to 1 1/2"), trace Silt Middle 4": fine to medium SAND, trace Silt Bottom 4": fine to coarse SAND, little fine Gravel, trace Silt, (wet)
													17.1		
		8	SS	7	6	17.0	75	50/1"					Weathered Bedrock 493.9		
20		C-1	C	60	40	19.0	[REC= 67%; RQD= 25.4%]				1.3				Very dense, Top 1": brown/gray fine to coarse SAND, little fine to coarse (-) Gravel, trace Silt

Remarks: Auger refusal at 18 feet below grade.
3-inch diameter casing drilled to 19 feet below grade; used 2-inch diameter core barrel.

Notes:
1) Stratification lines represent approximate boundary between material types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations of groundwater may occur due to other factors than those present at the time measurements were made. AC = After coring; NR = Not Recorded.
3) Abbreviations: A = Auger; C = Core; D = Driven; G = Grab; PS = Piston Sample; SS = Split Spoon; SSL = 3.5 Inch ID Split Spoon; ST = Shelby Tube; V = Vane; WOR/H = Weight of Rod/Hammer
4) Proportions Used: Trace = 1-10%; Little = 10-20%; Some = 20-35%; And = 35-50%

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BORING LOG

Project Name

Alfredo Property

North Salem, New York

Boring No.: B-100
Page No.: 2 of 2
File No.: 3052-001.2
Checked By: ULF

Boring Company: General Borings Inc
Foreman: Jim Casson
GeoDesign Rep.: Brien Waterman
Date Started: November 12, 2008 Date Finished: November 12, 2008
N. Coordinate: E. Coordinate:
Ground Surface Elevation (feet): 511.0
Station: Offset: ft

	Casing:	Sampler:
Type:	NW	SS
I.D.:	3.0 in.	1.38 in.
Hammer Wt.:	300 lbs	140 lbs
Hammer Fall:	24 in.	30 in.
Rig Type:	Diedrich D-50	
Hammer Type:	Automatic - Hydraulic	

Groundwater Observations

Date	Depth (ft)	Elev. (ft)	Notes
11/12/08	13.5	497.5	Wet sample
11/12/08	13.4	497.6	After 30 minutes

Depth (ft)	Casing Blows/ft	Sample Information: Number	Type	Penetration (inches)	Recovery (inches)	Depth (ft)	Blows / 6 inch Interval: 0 - 6	6 - 12	12 - 18	18 - 24	Coring Time (min./ft)	Moisture Content (%)	Strata Description (Depth & Elevation(feet))	Symbol	Sample Description (Classification System: Modified Burmister)
											.9		Weathered Bedrock *(Continued)*		Bottom 5": gray/white weathered QUARTZITE, (wet)
											2.1		22.1		Very Poor Quality, Hard,
											2		Bedrock 488.9		Top 17": Extremely Weathered, white/green/purple, biotite GNEISS with Quartzite and inclusions of Marble
											1				Bottom 23": Slightly Weathered, white gray/green/purple, biotite GNEISS with Quartzite and inclusions of Marble, close jointing
25		C-2	C	60	60	24.0	[REC= 100%; RQD= 94.0%]				1.3				
											1.3				Excellent Quality, Hard, Slightly Weathered, white/gray/green, biotite GNEISS with Quartzite and inclusions of Marble, wide jointing
											1.4				
											1.5				
											1.5		29.0		
30													Bottom 482.0 of Exploration at 29.0 ft		
35															
40															

Remarks

Notes:
1) Stratification lines represent approximate boundary between material types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations of groundwater may occur due to other factors than those present at the time measurements were made. AC = After coring; NR = Not Recorded.
3) Abbreviations: A = Auger; C = Core; D = Driven; G = Grab; PS = Piston Sample; SS = Split Spoon; SSL = 3.5 Inch ID Split Spoon; ST = Shelby Tube; V = Vane; WOR/H = Weight of Rod/Hammer
4) Proportions Used: Trace = 1-10%; Little = 10-20%; Some = 20-35%; And = 35-50%

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TEST PIT LOG

Project Name

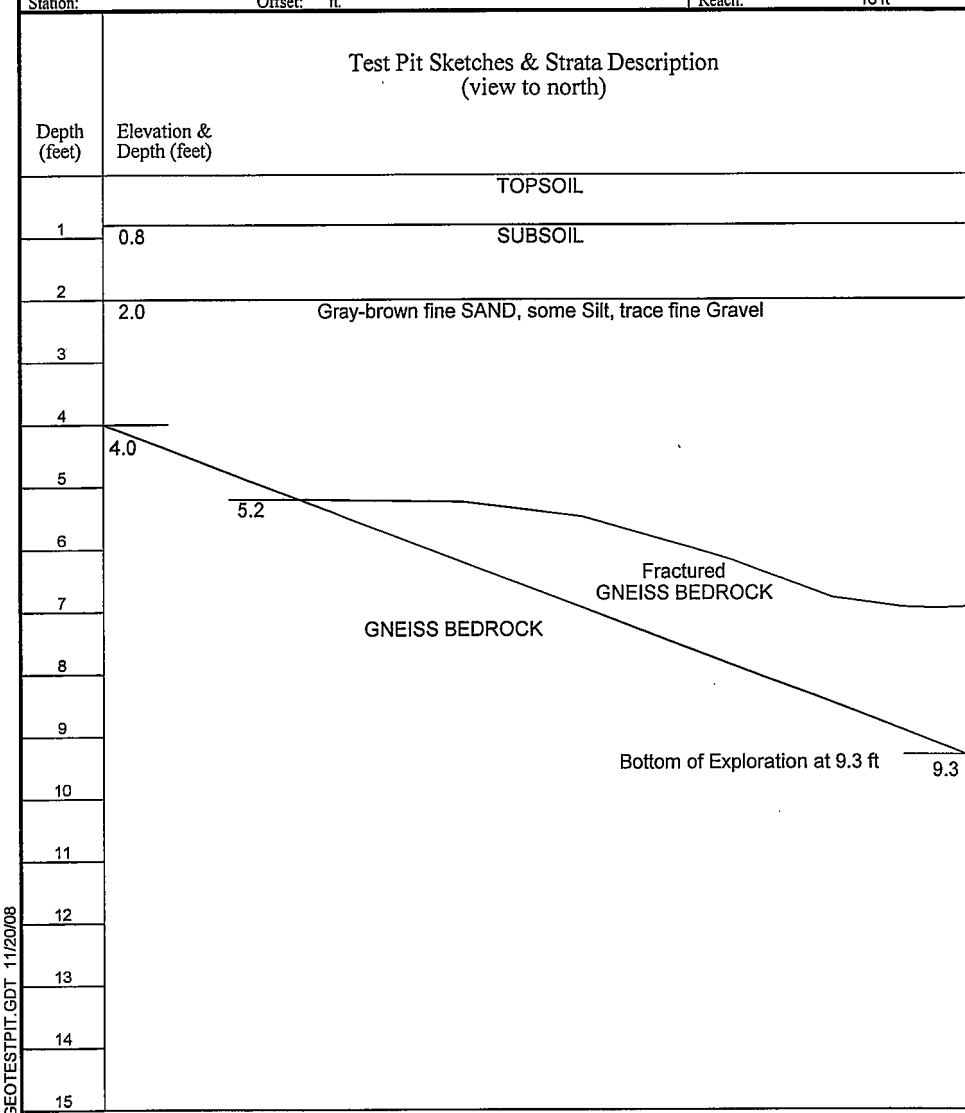
Alfredo Property
Salem Hunt
North Salem, New York

Test Pit No.: TP-101
Page No.: 1 of 1
File No.: 3052-001.2
Checked By: ULF

GeoDesign Rep: Ulrich LaFosse, P.E.
Weather: Clear, 50's
Date: November 7, 2008
Time Started: Time Finished:
N. Coordinate: E. Coordinate:
Ground Surface Elevation (feet): 508±
Station: Offset: ft.

Contractor: Alfredo Site Deveopment
Operator: John Marino
Make: Komatsu
Model: 130
Capacity: 1/4 cu. yd.
Reach: 16 ft

Groundwater Observations			
Date	Depth (ft)	Elevation (ft)	Notes
▼ 11/7/08			Dry after 1.5 hours
▼			
▼			
▼			



Remarks

N

Test Pit Plan (feet)

Notes:
1. Water level readings have been made at times and under conditions stated, fluctuations of groundwater may occur due to other factors than those present at the time readings were made.
2. Boulder Count Class Designations (diameter range): A = 6"-18" (0.15m - 0.46m) , B = 18"-36" (0.46m - 0.91m), C = >36" (>0.91m).
3. Excavation Effort: E = Easy, M = Moderate, D = Difficult.
4. Proportions Used: Trace = 1-10%; Little = 10-20%; Some = 20-35%; And = 35-50%
5. Stratification lines represent approximate boundary between material types, transitions may be gradual.

Test Pit No.: TP-101

TEST PIT LOG (NEW) 2004 TEST PITS 11-7-08.GPJ GEOTESTPIT.GDT 11/20/08

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TEST PIT LOG

Project Name

Alfredo Property
Salem Hunt
North Salem, New York

Test Pit No.: TP-102
Page No.: 1 of 1
File No.: 3052-001.2
Checked By: ULF

GeoDesign Rep: Ulrich LaFosse, P.E.
Weather: Clear, 50's
Date: November 7, 2008
Time Started: Time Finished:
N. Coordinate: E. Coordinate:
Ground Surface Elevation (feet): 514±
Station: Offset: ft.

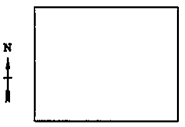
Contractor: Alfredo Site Deveopment
Operator: John Marino
Make: Komatsu
Model: 130
Capacity: 1/4 cu. yd.
Reach: 16 ft

Groundwater Observations			
Date	Depth (ft)	Elevation (ft)	Notes
▼ 11/7/08			Dry after 1.5 hours
▼			
▼			
▼			

Depth (feet)	Elevation & Depth (feet)	Test Pit Sketches & Strata Description (view to)	Symbol	Excavation Effort	Boulder Count and Class	Moisture
1		TOPSOIL				
2	0.8	SUBSOIL				
3						
4	3.3	Gray fine SAND, little Silt, trace fine Gravel, mixed with weathered Cobbles and Boulders				
5						
6						
7	6.3					
8						
9		GNEISS BEDROCK				
10	9.0	Bottom of Exploration at 9.0 ft				
11						
12						
13						
14						
15						

Remarks

Roots observed to 3 feet below grade.



Test Pit Plan (feet)

Notes:
1. Water level readings have been made at times and under conditions stated, fluctuations of groundwater may occur due to other factors than those present at the time readings were made.
2. Boulder Count Class Designations (diameter range): A = 6"-18" (0.15m - 0.46m) , B = 18"-36" (0.46m - 0.91m), C = >36" (>0.91m).
3. Excavation Effort: E = Easy, M = Moderate, D = Difficult.
4. Proportions Used: Trace = 1-10%; Little = 10-20%; Some = 20-35%; And = 35-50%
5. Stratification lines represent approximate boundary between material types, transitions may be gradual.

Test Pit No.: TP-102

TEST PIT LOG (NEW) 2004 TEST PITS 11-7-08.GPJ GEOTESTPIT.GDT 11/20/08

GEODESIGN INCORPORATED
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TEST PIT LOG

Project Name

Alfredo Property
Salem Hunt
North Salem, New York

Test Pit No.: TP-103
Page No.: 1 of 1
File No.: 3052-001.2
Checked By: ULF

GeoDesign Rep:	Ulrich LaFosse, P.E.	Contractor:	Alfredo Site Deveopment
Weather:	Clear, 50's	Operator:	John Marino
Date:	November 7, 2008	Make:	Komatsu
Time Started:		Time Finished:		Model:	130
N. Coordinate:		E. Coordinate:		Capacity:	1/4 cu. yd.
Ground Surface Elevation (feet):	513±	Reach:	16 ft
Station:	Offset: ft.		

Groundwater Observations

Date	Depth (ft)	Elevation (ft)	Notes
▼ 11/7/08			Dry after 30 minutes
▼			
▼			
▼			

Test Pit Sketches & Strata Description
(view to)

Depth (feet)	Elevation & Depth (feet)	Symbol	Excavation Effort	Boulder Count and Class	Moisture
1	TOPSOIL / HUMUS 0.4 SUBSOIL		E		
2	1.4 Gray-brown to brown fine SAND, little Silt		E		
3			E		
4			E		
5	4.3 Fine to medium SAND, little Silt		E		
6	5.0 FRACTURED BEDROCK / Possible BOULDER 5.6		M		
7	Bottom of Exploration at 6.9 ft 6.9				
8					
9					
10					
11					
12					
13					
14					
15					

Remarks

Test Pit Plan
(feet)

Notes:
1. Water level readings have been made at times and under conditions stated, fluctuations of groundwater may occur due to other factors than those present at the time readings were made.
2. Boulder Count Class Designations (diameter range): A = 6"-18" (0.15m - 0.46m) , B = 18"-36" (0.46m - 0.91m), C = >36" (>0.91m).
3. Excavation Effort: E = Easy, M = Moderate, D = Difficult.
4. Proportions Used: Trace = 1-10%; Little = 10-20%; Some = 20-35%; And = 35-50%
5. Stratification lines represent approximate boundary between material types, transitions may be gradual.

Test Pit No.: TP-103

TEST PIT LOG (NEW) 2004 TEST PITS 11-7-08.GPJ GEOTESTPIT.GDT 11/20/08

GEODESIGN INCORPORATED
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984 Southford Road
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TEST PIT LOG

Project Name

Alfredo Property
Salem Hunt
North Salem, New York

Test Pit No.: TP-104
Page No.: 1 of 1
File No.: 3052-001.2
Checked By: ULF

GeoDesign Rep: Ulrich LaFosse, P.E.
Weather: Clear, 50's
Date: November 7, 2008
Time Started: Time Finished:
N. Coordinate: E. Coordinate:
Ground Surface Elevation (feet): 530±
Station: Offset: ft.

Contractor: Alfredo Site Deveopment
Operator: John Marino
Make: Komatsu
Model: 130
Capacity: 1/4 cu. yd.
Reach: 16 ft

Groundwater Observations			
Date	Depth (ft)	Elevation (ft)	Notes
▼ 11/7/08			Dry after 10 minutes
▼			
▼			
▼			

Depth (feet)	Elevation & Depth (feet)	Test Pit Sketches & Strata Description (view to)	Symbol	Excavation Effort	Boulder Count and Class	Moisture
1		TOPSOIL				
2	0.8					
3	1.9	Gray fine SAND, little (-) Silt				
4						
5						
6						
7						
8						
9						
10						
11	10.0	Inferred BEDROCK				
12		Bottom of Exploration at 10.0 ft				
13						
14						
15						

Remarks

Roots observed to 4.5 feet below grade.
Exploration ended at 10 feet below grade on inferred bedrock.

Test Pit Plan (feet)

Notes:
1. Water level readings have been made at times and under conditions stated, fluctuations of groundwater may occur due to other factors than those present at the time readings were made.
2. Boulder Count Class Designations (diameter range): A = 6"-18" (0.15m - 0.46m) , B = 18"-36" (0.46m - 0.91m), C = >36" (>0.91m).
3. Excavation Effort: E = Easy, M = Moderate, D = Difficult.
4. Proportions Used: Trace = 1-10%; Little = 10-20%; Some = 20-35%; And = 35-50%
5. Stratification lines represent approximate boundary between material types, transitions may be gradual.

Test Pit No.: TP-104

TEST PIT LOG (NEW) 2004 TEST PITS 11-7-08.GPJ GEOTESTPIT.GDT 11/20/08

GEODESIGN INCORPORATED
GeoTechnical Engineers and Environmental Consultants
984 Southford Road
Middlebury, Connecticut 06762
Telephone: 203-758-8836 Fax: 203-758-8842

TEST PIT LOG

Project Name

Alfredo Property
Salem Hunt
North Salem, New York

Test Pit No.: TP-105
Page No.: 1 of 1
File No.: 3052-001.2
Checked By: ULF

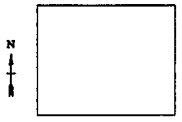
GeoDesign Rep: Ulrich LaFosse, P.E.
Weather: Clear, 50's
Date: November 7, 2008
Time Started: Time Finished:
N. Coordinate: E. Coordinate:
Ground Surface Elevation (feet): 527±
Station: Offset: ft.

Contractor: Alfredo Site Deveopment
Operator: John Marino
Make: Komatsu
Model: 130
Capacity: 1/4 cu. yd.
Reach: 16 ft

Groundwater Observations			
Date	Depth (ft)	Elevation (ft)	Notes
▼ 11/7/08			Dry after 10 minutes
▼			
▼			
▼			

Depth (feet)	Elevation & Depth (feet)	Test Pit Sketches & Strata Description (view to)	Symbol	Excavation Effort	Boulder Count and Class	Moisture
1		TOPSOIL				
2	0.8	SUBSOIL				
3						
4	3.0	Gray fine SAND, little Silt				
5						
6						
7						
8						
9	8.5	Inferred BEDROCK				
10		Bottom of Exploration at 8.5 ft				
11						
12						
13						
14						
15						

Remarks: Exploration ended at 8.5 feet below grade on inferred bedrock.



Test Pit Plan
(feet)

Notes:
1. Water level readings have been made at times and under conditions stated, fluctuations of groundwater may occur due to other factors than those present at the time readings were made.
2. Boulder Count Class Designations (diameter range): A = 6"-18" (0.15m - 0.46m) , B = 18"-36" (0.46m - 0.91m), C = >36" (>0.91m).
3. Excavation Effort: E = Easy, M = Moderate, D = Difficult.
4. Proportions Used: Trace = 1-10%; Little = 10-20%; Some = 20-35%; And = 35-50%
5. Stratification lines represent approximate boundary between material types, transitions may be gradual.

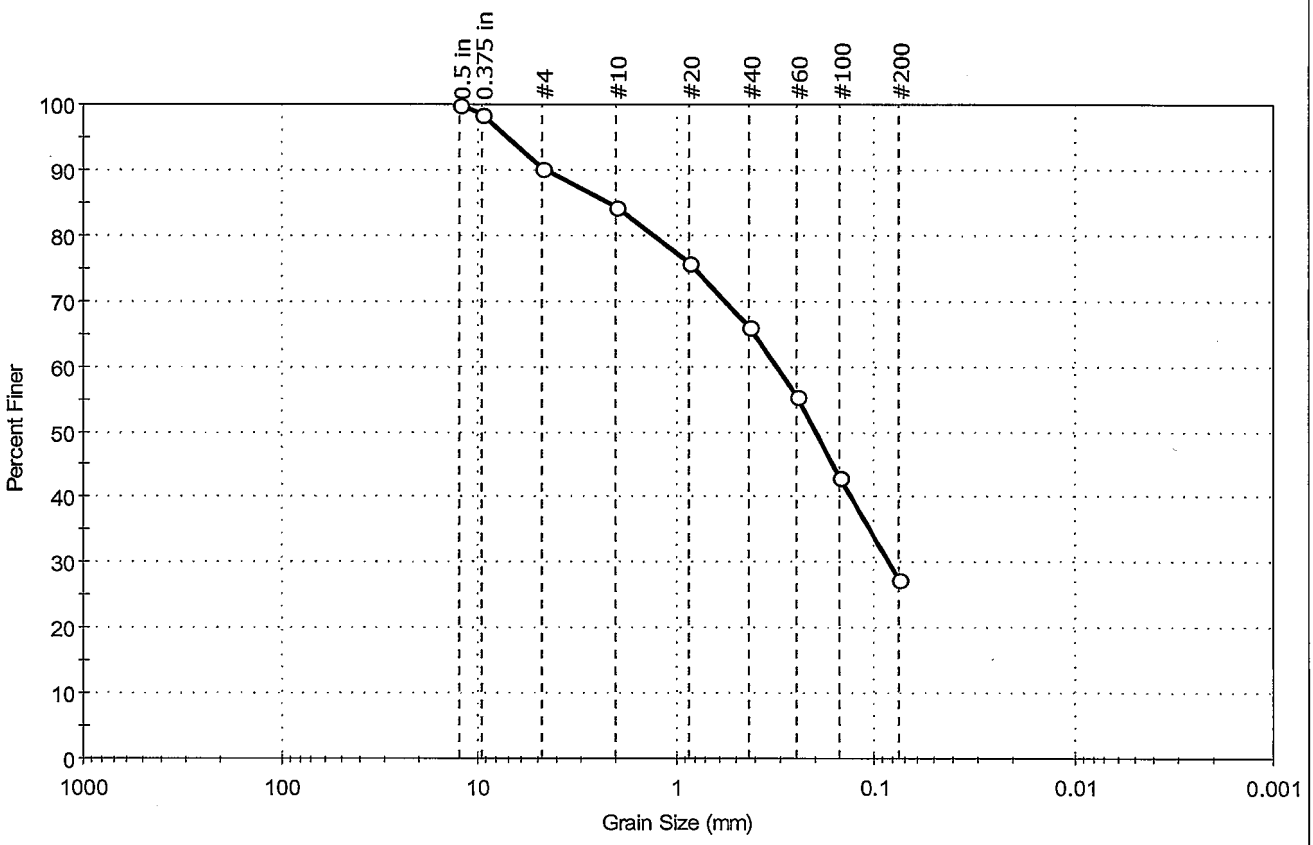
Test Pit No.: TP-105

TEST PIT LOG (NEW) 2004 TEST PITS 11-7-08.GPJ GEOTESTPIT.GDT 11/20/08

GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.				
Project:	Salem Hunt				
Location:	N Salem, NY			Project No:	GTX-8675
Boring ID:	B-100	Sample Type:	jar	Tested By:	ap
Sample ID:	S-5	Test Date:	11/18/08	Checked By:	jdt
Depth :	10-12 ft	Test Id:	142299		
Test Comment:	---				
Sample Description:	Moist, light olive brown silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	9.8	62.9	27.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	99		
#4	4.75	90		
#10	2.00	84		
#20	0.85	76		
#40	0.42	66		
#60	0.25	55		
#100	0.15	43		
#200	0.075	27		

Coefficients

D_{85} =2.2327 mm	D_{30} =0.0843 mm
D_{60} =0.3142 mm	D_{15} =N/A
D_{50} =0.1999 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

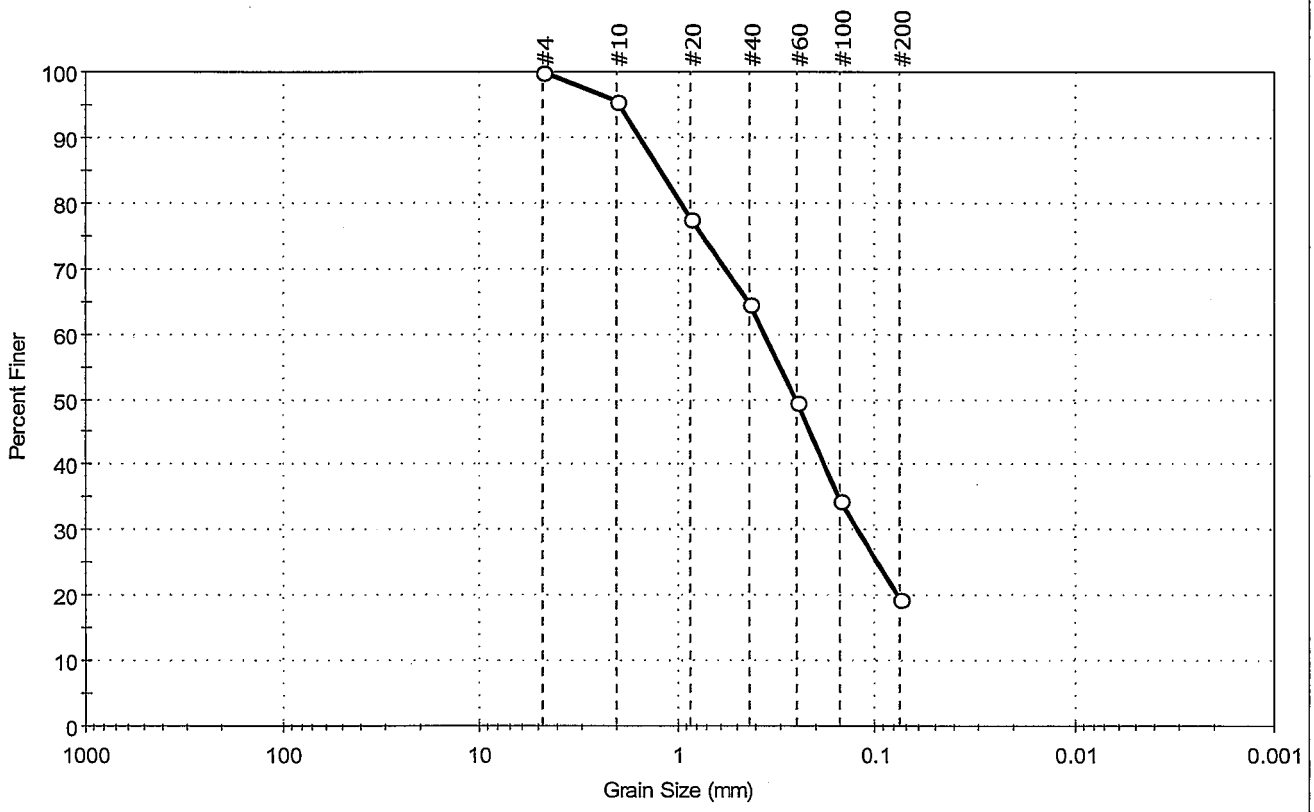
Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.				
Project:	Salem Hunt				
Location:	N Salem, NY			Project No:	GTX-8675
Boring ID:	B-100	Sample Type:	jar	Tested By:	ap
Sample ID:	S-6A	Test Date:	11/18/08	Checked By:	jdt
Depth :	12-14 ft	Test Id:	142300		
Test Comment:	---				
Sample Description:	Moist, light olive brown silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
–	0.0	80.5	19.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	96		
#20	0.85	78		
#40	0.42	65		
#60	0.25	49		
#100	0.15	35		
#200	0.075	19		

Coefficients

D_{85} =1.2098 mm	D_{30} =0.1213 mm
D_{60} =0.3622 mm	D_{15} =N/A
D_{50} =0.2548 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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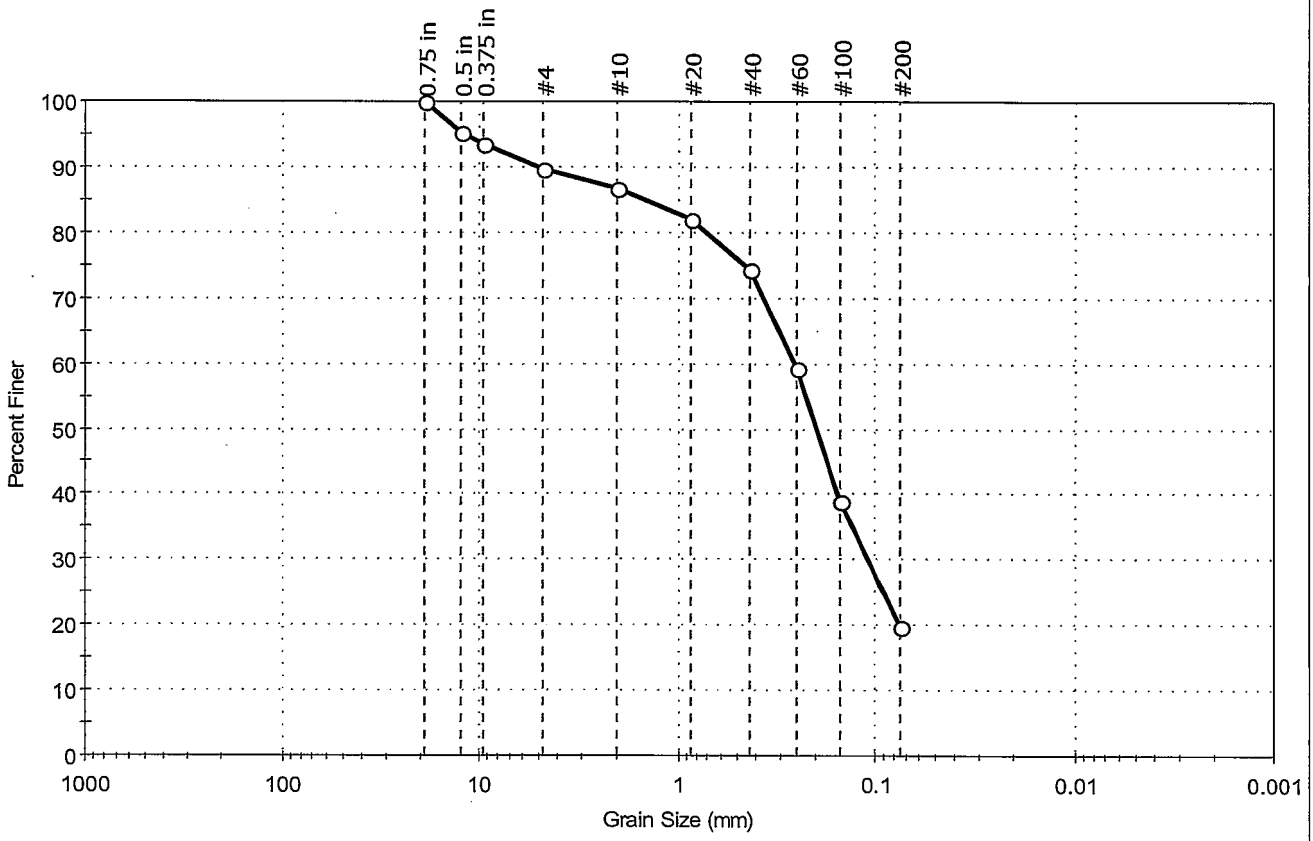
GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign, Inc.				
Project:	Salem Hunt				
Location:	N Salem, NY			Project No:	GTX-8675
Boring ID:	TP-100	Sample Type:	bag	Tested By:	ap
Sample ID:	Test Pit Sample	Test Date:	11/17/08	Checked By:	jdt
Depth :	3-10 ft	Test Id:	142301		
Test Comment:	---				
Sample Description:	Moist, dark olive brown silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
–	10.4	69.8	19.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	95		
0.375 in	9.50	93		
#4	4.75	90		
#10	2.00	87		
#20	0.85	82		
#40	0.42	74		
#60	0.25	59		
#100	0.15	39		
#200	0.075	20		

Coefficients

D_{85} =1.4492 mm	D_{30} =0.1082 mm
D_{60} =0.2558 mm	D_{15} =N/A
D_{50} =0.1975 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

3052-01.2 TP-100 and B-100
Salem Hunt, North Salem NY

Estimate of Insitu Dry Unit Weight (gamma) in pcf
Based on SPT "N" Value

N=15 blows pef ft.	Dr	50 %
	gamma	100 pcf
	gamma max	120 pcf
	gamma min	85 pcf

gamma max/gamma	1.2
gamma-gamma min	15
gamma max-gamma min	35
Relatve Density, Dr	51%

GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoDesign Inc.		
Project Name:	---		
Project Location:	---		
GTX #:	8675		
Start Date:	11/17/08	Tested By:	ema
End Date:	11/18/08	Checked By:	jdt
Boring #:	TP-100		
Sample #:	Test Pit		
Depth:	3-10 ft		
Visual Description:	Moist, dark olive brown silty sand		

Permeability of Granular Soils (Constant Head) by ASTM D 2434

Sample Type: Remolded

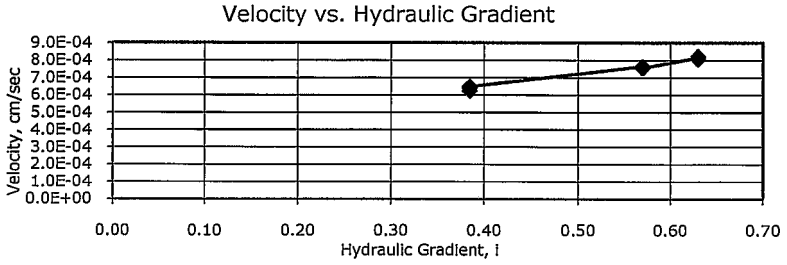
Sample Information:

Maximum Dry Density:	--- pcf
Optimum Moisture Content:	--- %
Compaction Test Method:	---
Classification (ASTM D 2487):	---
Assumed Specific Gravity:	2.65

Sample Preparation / Test Setup: Target Compaction: 100 pcf at air-dried moisture content (value provided by client); >3/8 inch material screened out of sample prior to testing (7% of sample). 5.27 lb surcharge

Parameter	Initial	Final
Height, in	4.03	4.03
Diameter, in	3.98	3.98
Area, in^2	12.4	12.4
Volume, in^3	50.1	50.1
Mass, g	1316	1627
Bulk Density, pcf	100	124
Moisture Content, %	0.5	24.3
Dry Density, pcf	99.5	99.5
Degree of Saturation, %	---	97.0
Void Ratio, e	---	0.66

Date	Reading #	Volume of Flow, cc	Time of Flow, sec	Flow Rate, cc/sec	Gradient	Permeability, cm/sec	Temp., °C	Correction Factor	Permeability @ 20 °C, cm/sec
11/17	1	0.75	15	0.05	0.39	1.6E-03	15.0	1.135	1.8E-03
11/17	2	0.77	15	0.05	0.39	1.7E-03	15.0	1.135	1.9E-03
11/17	3	0.78	15	0.05	0.39	1.7E-03	15.0	1.135	1.9E-03
11/17	4	0.92	15	0.06	0.57	1.3E-03	15.0	1.135	1.5E-03
11/17	5	0.91	15	0.06	0.57	1.3E-03	15.0	1.135	1.5E-03
11/17	6	0.91	15	0.06	0.57	1.3E-03	15.0	1.135	1.5E-03
11/17	7	0.98	15	0.07	0.63	1.3E-03	15.0	1.135	1.5E-03
11/17	8	0.97	15	0.06	0.63	1.3E-03	15.0	1.135	1.5E-03
11/17	9	0.99	15	0.07	0.63	1.3E-03	15.0	1.135	1.5E-03



PERMEABILITY @ 20 °C =

1.6×10^{-3} cm/sec

Table 5-1 SUMMARY OF GROUNDWATER, BEDROCK, AND GRADATION DATA (Revised 11/08)

North Salem Property
North Salem, New York
Project Number 3052-01

Summary of Groundwater Data

Well No.	Ground Surface Elev. (ft.)	Well Stickup (ft.)	Well Reference Elevation (ft.)	Date of Reading: 11/1/05			Date of Reading: 11/7/05			Date of Reading: 3/14/06			Date of Reading: 3/28/06			Date of Reading: 11/12/08		
				Depth to Groundwater from Ref. (ft.)	Depth to Groundwater from Ground (ft.)	Groundwater Elevation (ft.)	Depth to Groundwater from Ref. (ft.)	Depth to Groundwater from Ground (ft.)	Groundwater Elevation (ft.)	Depth to Groundwater from Ref. (ft.)	Depth to Groundwater from Ground (ft.)	Groundwater Elevation (ft.)	Depth to Groundwater from Ref. (ft.)	Depth to Groundwater from Ground (ft.)	Groundwater Elevation (ft.)	Depth to Groundwater from Ref. (ft.)	Depth to Groundwater from Ground (ft.)	Groundwater Elevation (ft.)
B-1	510.5	2.0	512.5	7.8	5.8	504.7	8.2	6.2	504.3	7.1	5.1	505.4	9.0	7.0	503.5			
B-2	529.2	2.7	531.9	7.0	4.3	524.9	7.1	4.4	524.8	8.1	5.4	523.8	8.7	6.0	523.2			
B-3	550.3	3.0	553.3	6.7	3.7	546.6	7.7	4.7	545.6	10.1	7.1	543.2	10.7	7.7	542.6			
B-4	570.1	2.0	572.1	4.0	2.0	568.1	6.4	4.4	565.7	5.5	3.5	566.6	7.3	5.3	564.8			
B-5	541.8	1.9	543.7	19.5	17.6	524.2	18.3	16.4	525.4	21.1	19.2	522.6	21.7	19.8	522.1	21.0	19.1	522.7
B-6	562.3	3.0	565.3	8.1	5.1	557.2	9.4	6.4	555.9	13.0	10.0	552.3	14.6	11.6	550.7	11.5	8.5	553.9
B-7	545.8	2.5	548.3							Dry at 19.54	Dry at 17.1		19.3	16.8	529.1	Dry at 19.5	Dry at 17.0	<528.8
B-8	573.3	2.5	575.8							9.0	6.5	566.8	9.0	6.5	566.8			
B-9	502.0	2.6	504.6										6.6	4.0	498.0	9.8	7.2	494.8
B-10	555.0	2.5	557.5										6.6	4.1	550.9			
B-11	524.3	2.5	526.8							20.3	17.8	506.5	21.9	19.4	504.9			
B-12	532.0	2.5	534.5							6.4	3.9	528.2	5.2	2.7	529.4			
B-13	511.2	2.1	513.3										Dry at 13.6	Dry at 11.5	<499.7	Dry at 13.7	Dry at 11.6	<499.6
B-14	522.7	2.3	525.0										Dry at 19.5	Dry at 17.2	<505.5	19.8	17.5	505.3

Summary of Bedrock Data

Well No.	Ground Surface Elev. Elev. (ft.)	Depth to Top of Bedrock (ft.)	Bedrock Elevation (ft.)	Notes
B-1	510.5	22.0	488.5	Roller bit refusal
B-2	529.2	26.0	503.2	Auger refusal
B-3	550.3	25.5	524.8	Auger refusal
B-4	570.1	19.0	551.1	Auger refusal
B-5	541.8	23.0	518.8	Auger refusal
B-6	562.3	15.0	547.3	Split spoon and auger refusal
B-7	545.8	17.5	528.3	Auger refusal
B-8	573.3	22.5	550.8	Auger refusal
B-9	502.0	18.0	484.0	Auger refusal
B-10	555.0	24.0	531.0	Auger refusal
B-11	524.3	20.2	504.1	Auger refusal
B-12	532.0	>16.5	<516.5	Exploration ended at 16.5 feet without encountering refusal
B-13	511.2	14.0	497.2	Auger refusal
B-14	522.7	20.0	502.7	Auger refusal
B-100	511	22.1	488.9	Cored Rock - Weathered B/R at 17 ft epth

Summary of Gradation Test Data

Boring No.	Sample	Sample Depth	Burmister Description
B-2	S-2	5-7'	SILT and fine to coarse SAND, trace fine Gravel
B-3	S-2	5-7'	SILT, some fine to medium Sand, trace fine Gravel
B-4	S-2	5-7'	Fine to coarse SAND, some Silt, trace fine to coarse Gravel
B-6	S-2	5-7'	Fine to medium SAND and SILT, trace fine Gravel
B-7	S-2 & S-3	5-7' & 10-12'	Fine to medium SAND, some Silt, some fine to coarse Gravel
B-8	S-2	5-7'	Fine to medium SAND and SILT, trace fine Gravel
B-11	S-2	5-7'	Fine to medium SAND and fine to coarse Gravel, little Silt
TP-G1	Composite	2.7'-7.6'	Fine to medium SAND and fine to coarse Gravel, little Silt
TP-G2	Composite	2.7'-7.8'	Fine to medium SAND, little Silt, trace fine Gravel
TP-G4	Composite	2.3'-7.5'	Fine to medium SAND, some Silt, trace fine Gravel
TP-G9	Composite	1.7'-7.3'	Fine to medium SAND, little fine Gravel, little, Silt

Notes:
1.) Ground surface and well reference elevations based on survey data provided by Insite Engineering and interpolation of site topography relative to NAVD 1988 datum.
2.) Falling Head Tests performed at borings B-1, B-2, B-4 and B-8. See Appendix 4 for field test data and results.
3) Ground surtface elevation at B-100 estimated based on elevation at B-13 - Not surveyed.

TABLE 5-2 (revised 11/08)
Kozeny - Carman Analyses
to Estimate Coefficient of Permability

North Salem Property
North Salem, New York

Test Boring/ Test Pit No.	Sample No.	Sample Depth (ft.)	D10 (mm)	SPT "N-value (blows / ft)	Descriptive Density	Relative Density (%)	in-situ void ratio e	in-situ porosity n	Coefficient of Permability k (cm/sec)	Coefficient of Permability k (ft/day)
B-2	S-2	5'-7'	0.006	16	Medium dense	44	0.542	0.35	1.75E-05	4.95E-02
B-3	S-2	5'-7'	0.002	50	Very dense	85	0.255	0.20	2.48E-07	7.04E-04
B-4	S-2	5'-7'	0.007	13	Medium dense	39	0.577	0.37	2.81E-05	7.95E-02
B-6	S-2	5'-7'	0.009	38	Dense	73	0.339	0.25	1.11E-05	3.14E-02
B-7	S-2 & S-3	5'-7'/10'-12'	0.035	48	Dense	83	0.269	0.21	8.83E-05	2.50E-01
B-8	S-2	5'-7'	0.015	25	Medium Dense	58	0.444	0.31	6.41E-05	1.82E-01
B-11	S-2	5'-7'	0.040	68	Very Dense	90	0.220	0.18	6.56E-05	1.86E-01
B-12	S-2	5'-7'	0.025	40	Dense	75	0.325	0.25	7.61E-05	2.16E-01
								Minimum:	2.48E-07	7.04E-04
							Upland Area	Maximum:	8.83E-05	2.50E-01
								Average:	4.39.E-05	1.24E-01
TP-G2	Composite	2.7'-7.8'	0.037	--	Medium dense	40	0.570	0.36	7.59E-04	2.15E+00
TP-G4	Composite	2.3'-7.5'	0.032	--	Loose	35	0.605	0.38	6.64E-04	1.88E+00
TP-G9	Composite	1.7'-7.3'	0.030	--	Loose	35	0.605	0.38	5.84E-04	1.65E+00
B-100	S-5	10'-12'	0.025	33	Dense	65	0.395	0.28	1.30E-04	3.68E-01
B-100	S-6A	12'-14'	0.040	15	Medium dense	40	0.570	0.36	8.87E-04	2.51E+00
TP-100	Composite	3'-10'	0.050	--	Loose	30	0.640	0.39	1.88E-03	5.32E+00
								Minimum:	1.30E-04	3.68E-01
							SSTS AREA	Maximum:	1.88E-03	5.32E+00
								Average:	8.17.E-04	2.32E+00

SPT (bl/ ft)	Descriptive Density	Relative Density (%)
0 to 4	Very loose	0 to 15
4 to 10	Loose	15 to 35
10 to 30	Medium Dense	35 to 65
30 to 50	Dense	65 to 85
50 +	Very dense	85 to 100

emin	emax
0.15	0.85

Notes:

1. SPT values, descriptive density, and relative density for test pit samples estimated from data from nearest test borings


2008/11/07 11:33
TP-100


TP-100
2008/11/07 11:33


2008/11/07 11:35
TP-100
View of Bedrock "knobs" with fault between them. Approximate North to right of page.


TP-100
2008/11/07 11:35


TP-100
2008/11/07 11:35


Decomposed Gneiss / Marble Bedrock
From TP-100 (depth of approximately 9 to 12 feet)
2008/11/07 11:34

Decomposed Gneiss / Marble Bedrock
BEFORE Being Broken Up
From TP-100 (depth of approximately 9 to 12 feet)


Decomposed Gneiss / Marble Bedrock
AFTER Being Broken Up (by hand pressure only)
From TP-100 (depth of approximately 9 to 12 feet)
2008/11/07 11:35


TP-101
2008/11/07 13:12


DIscontinuity in Bedrock Outcrop - Approximately 100 feet south of TP-101 (View to the west)
2008/11/07 13:54

d/b/a Geo**Design**, Inc. P.C.

April 21, 2009
File No. 3052-01.2

Mr. William Balter
Wilder Balter Partners
570 Taxter Road
Elmsford, NY 10523

Via E-mail BBalter@WilderBalter.com

Re: Hydrogeology Investigation Addendum
North Salem Property
North Salem, New York

Dear Mr. Balter:

The attached information presents the updated findings and conclusions of the updated hydrogeology model which reflects the presently envisioned flow distribution for the final subsurface treatment and disposal at the proposed North Salem site, located off of June Road in North Salem, New York.

In conclusion, the reduced per square foot flow rate which results from not cycling the flow (as per the previous design and analyses) will result in a lower groundwater mound than previously predicted. In turn, a significantly reduced amount of fill is now recommended to maintain vertical separation between the post-flow groundwater levels and site grades.

Please contact the undersigned if you have any questions.

Very Truly Yours,

Geo**Design**, Inc.

Original Signed

Ulrich La Fosse, P.E. (NY, CT & MA)
Principal

PC John Watson, P.E. (Insite) jrjwatson@optonline.net
John Bainlardi (Wilder Balter Partners) - jbainlardi@wilderbalter.com

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This document comprises an addendum to **GeoDesign**'s February 5, 2007 hydrogeology report for the North Salem site, located off of June Road in the town of North Salem, New York.

This report includes results of an updated groundwater model based on the proposed septic area and proposed septic effluent flow rates which are current as of April 2009.

Updated Model Results – Groundwater Mounding

The most recent SSDS layout (copy attached as Figure SSDS-1), as prepared by Insite Engineering and provided to GeoDesign on April 13, 2009, was used to update the previous model. The septic effluent will be distributed into two groups of trenches. Unlike the previously contemplated SSDS, due to the proposed pre-treatment of the septic effluent, the flow will not be cycled. That is the entire flow will be distributed to the entire trench all the time.

The resulting design septic effluent flow of 16,000 gallons per day (gpd) will be distributed to the entire area of approximately 150,000 square feet.

The currently proposed SSDS area encompasses the same general area which was previously modeled in February 2007 and submitted in our February 2007 Hydrogeology Investigation.
For this reason the previous model calibration is still applicable and was not modified.

Similarly, the presently proposed septic recharge trenches are very similar in location and in footprint to those modeled in September 2007 and submitted in September 2007 in our Hydrogeology Investigation Addendum. Thus, the model was not modified other than to adjust the effluent flow rate per square foot.

The revised model's flow rates are summarized in Table 1A.

Tables 2A presents the field data (observed), the results of the calibrated model, the predicted post-development groundwater levels (groundwater rise or mounding), and (as necessary) the thickness of fill required to maintain the post-development groundwater levels at a minimum depth of about 3 to 4 feet.

As shown on Table 2A, the predicted groundwater rise at well locations is insufficient to warrant filling (at the well locations). However, the attached Figure No. 1 depicts the contoured post development depth to groundwater contours (in feet) in the limited areas where the groundwater mound is predicted to approach the ground surface. The figure includes a bar scale and each grid "box" is 50 feet by 50 feet. The red lines on this figure depict the edge of the proposed SSDS in the area of concern.

Figure No. 1 depicts the extent of the limited areas where the predicted mound depth will be as shallow as approximately one foot below existing grades. The recommended areas and

thicknesses of fill required to increase this vertical separation distance are also depicted on Figure 1.

This information should be used Insite for finalize proposed site grading.

Conclusions

The site of the proposed North Salem property development on June Road in North Salem, New York has been the subject of a hydrogeological investigation for the purpose of predicting the groundwater flow conditions under a proposed sewage disposal system from a new residential development.

Based on the results of the field investigations, review of precipitation data, review of published USGS geological and groundwater data for this locale, preliminary hydrogeological analyses including the preparation of a three-dimensional computer model, we have been able to make reasonable predictions (simulations) of the groundwater flow conditions at the site. These predictions were made after the groundwater model was first calibrated to known groundwater flow patterns at the site. Following calibration, a simulation was performed using a 16,000-gpd sewage flow rate in the area of the proposed subsurface disposal system. We also considered the effect of the site development on the groundwater recharge and on the aquifer properties.

Based on the results of this simulation, we conclude that a very limited area will require filling to increase the vertical separation between existing site grades and predicted groundwater mound levels.

Limitations

This report is subject to the limitations included in our February 5, 2007 report.

Notes:

1. *Refer to Site Plans prepared by Insite Engineering, Surveying & Landscape Architecture, P.C. for General Notes.*
2. *This plan is schematic and is not to be used for permitting or construction. The intent of this plan is to depict the layout of the proposed primary and expansion absorption trenches.*
3. *The primary SSDS absorption trenches (10,000 l.f. minimum, required 10,068 l.f. provided) and expansion SSDS absorption trenches (8,000 l.f. minimum, required 8,040 l.f. provided) will be evenly divided into two groups (Group 1, and Group 2). Each group will be divided into 6 sections, section 1A, 1B, 1C, 1D, 1E, 1F and section 2A, 2B, 2C, 2D, 2E, 2F.*

GRAPHIC SCALE

80 0 40 80 160 320

(IN FEET)
1 inch = 80 ft.

SSDS LEGEND

- 500 — EXISTING 10' CONTOUR
- EXISTING 2' CONTOUR
- 500 — PROPOSED 10' CONTOUR
- 502 — PROPOSED 2' CONTOUR
- PROPOSED 2' WIDE PRIMARY ABSORPTION TRENCH
- PROPOSED 2' WIDE EXPANSION ABSORPTION TRENCH
- D15 — DEEP TEST HOLE
- P15 — PERCOLATION TEST HOLE
- 1A — SSDS GROUP/SECTION DESIGNATION

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PREPARED BY:

DATE:	4-17-09
SCALE:	1" = 80'
PROJECT NO.:	05171.100
FIGURE:	SSDS-1

PROJECT: SALEM HUNT
JUNE ROAD, TOWN OF NORTH SALEM, WESTCHESTER COUNTY, NEW YORK

DRAWING: SSDS SCHEMATIC

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Table 1A
North Salem Property
Septic Flow Rates Across Subsurface Treatment Area Limits
March 30, 2009

No Flow Cycling (assumes pre-treated Effluent)

	Q Septic Target	15,840	**Say 16,000**		-
	Q septic Actual	15,840	gpd		
	Q septic	2118	ft3 / day		
	Q septic /SF	0.01412	ft / day		
	Q septic /box	35.29	ft3 / day		
				Infiltration Reduction	**In pavement, lawn & building Areas**
16 in/yr	Q rain pre-development	**0.00365**	ft3 / day	**in Septic Areas (grass v. woods)**	
	Q rain post-development	0.00365	ft3 / day	**0%**	Q rain Post-Development
					0.75 **0.00274** ft3 / day
	Q total	**0.01777**	ft3/ day		

	# boxes	**area**	**Total area**
Final Model	60	2500	150,000

Distributed Increase factor = **1**

		Qs per box	**Qs ft3/day**	**Q rain ft3/day**	**Q total ft3/day**	**Q total/SF**	**Area**	**Q**	**gpd**
Hi flow	30	35.29	1058.8	273.8	1332.6	**0.01777**	75,000	1,332.6	7,920
Low Flow	30	35.29	1058.8	273.8	1332.6	**0.01777**	75,000	1,332.6	7,920
Total	**60**		2117.6	547.5	**2665.1**	**0.01777**	150,000	2,665.1	15,840

Table 2A
Model based on Septic Layout with no Cycling as of April 2009
with Increased K (10% in mound area to model Transmissivity increase that results from mounding)
Groundwater Model Calibration Results and Post-development Mounding

North Salem Property
North Salem, New York

16,000 gpd Case IA - Septic Flow To Entire Septic

	Field Data			Model Calibration		Predicted Post-development Groundwater Levels				Add X feet of Fill Locally (ft.)	Adjusted Depth of Water (ft.)	Wells in Septic Area Rise	Wells in Septic Area DTW
Well No./ Target	Ground Surface El. (ft.)	Measured Groundwater Elevation (ft.) (on 3/28/06)	Pre-development Depth to Water (ft.)	Simulated Groundwater Elevation (ft.) (Pre-development)	Difference in Elevation (ft.) (residual)	Post-development Groundwater residual (ft.)	Rise in Groundwater (ft.)	Post-development Groundwater Elevation (ft.)	Post-development Depth to Water (ft.)				
B-1	510.52	499.7	10.8	501.1	-1.43	-1.7	0.2	499.9	**10.6**	0	10.6		
B-2	529.19	522.1	7.1	521.9	0.23	0.3	-0.1	522.0	**7.1**	0	7.1		
B-3	550.30	542.6	7.7	541.4	1.24	-1.5	2.7	545.3	**5.0**	0	5.0	2.7	5.0
B-4	570.10	564.8	5.3	564.4	0.36	1.3	-0.9	563.9	**6.2**	0	6.2		
B-5	541.80	522.1	19.7	523.1	-1.03	-14.0	13.0	535.1	**6.7**	0	6.7	13.0	6.7
B-6	562.30	550.7	11.6	549.5	1.17	-6.5	7.7	558.4	**3.9**	0	3.9	7.7	3.9
B-7	545.80	529.1	16.7	528.9	0.22	-7.7	7.9	537.0	**8.8**	0	8.8	7.9	8.8
B-8	573.30	564.8	8.5	562.8	1.98	2.0	0.0	564.8	**8.5**	0	8.5		
B-9	502.01	498.0	4.0	496.9	1.08	0.7	0.4	498.4	**3.6**	0	3.6	0.4	3.6
B-10	555.00	551.0	4.0	550.5	0.55	0.7	-0.2	550.8	**4.2**	0	4.2		
B-11	524.30	504.9	19.4	506.3	-1.40	-5.1	3.7	508.6	**15.7**	0	15.7	3.7	15.7
B-12	531.58	529.1	2.5	529.1	0.05	0.1	-0.1	529.0	**2.5**	0	2.5		
B-13	511.20	499.7	11.5	499.3	0.45	-0.5	1.0	500.7	**10.5**	0	10.5	1.0	10.5
B-14	522.70	505.5	17.2	504.7	0.80	-3.9	4.7	510.2	**12.5**	0	12.5	4.7	12.5
											Average	**5.1**	**8.4**

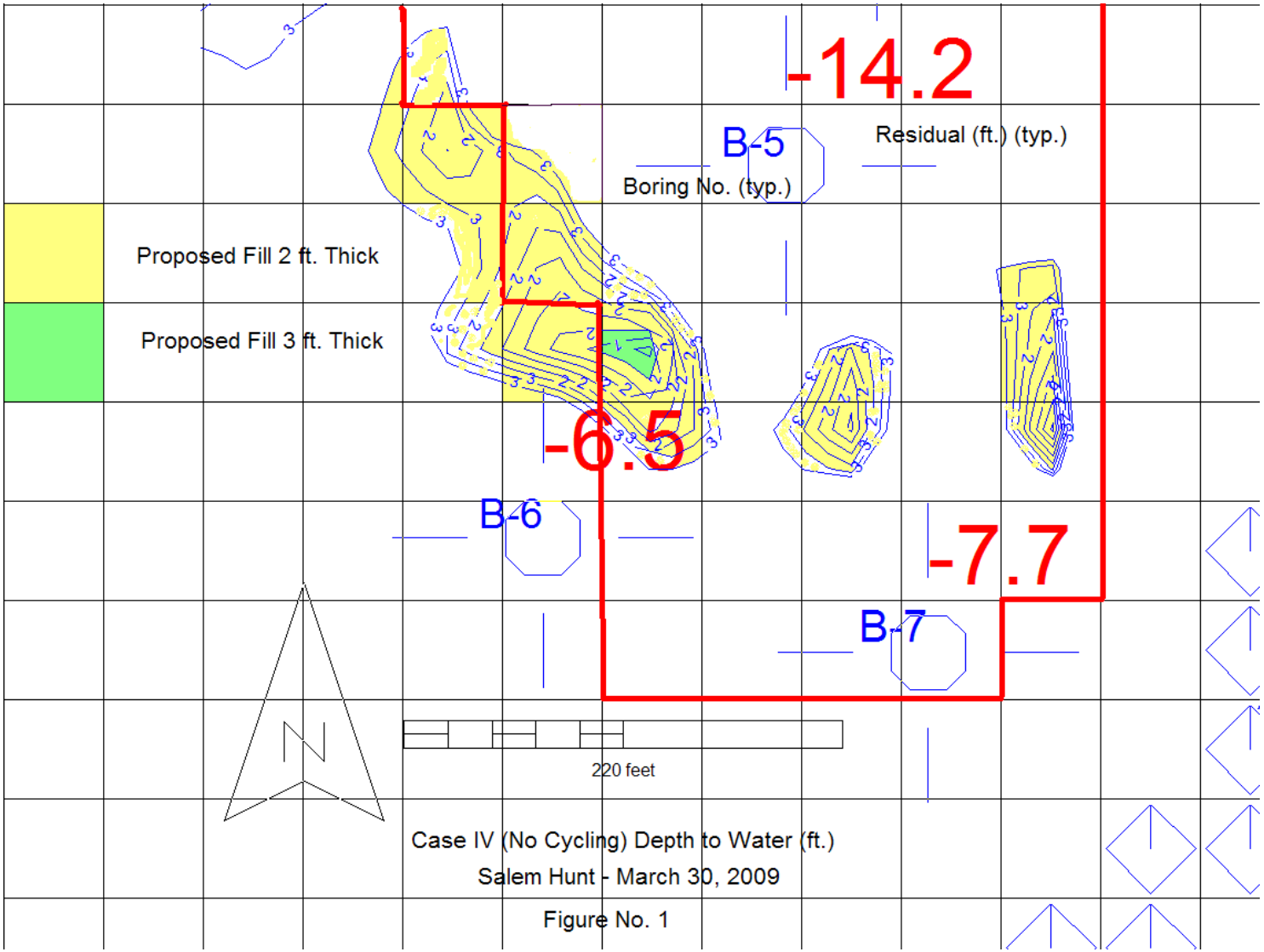
Notes:

1) All above data exept residuals has been rounded to the nearest tenth of a foot.

2) "Residual" refers to the difference in the modeled groundwater table from the field measured groundwater level at each well location. The residual sign convention is as follows:
- Negative residuals occur when the modeled value is higher than the field (actual) value
- Positive residuals occur when the modeled value is lower than the field value

3) Highlighted Wells / Targets indicate need to raise site grades (not applicable

By ULF 4/21/09



Case IV (No Cycling) Depth to Water (ft.)

Salem Hunt - March 30, 2009

Figure No. 1