



**TO:** Brent Kunkle  
Chester County Health Department

**FROM:** Ken Cowan  
Roy F. Weston, Inc.

**Date:** 27 July, 2001

**RE:** Zoller Drip  
Schuylkill Township

---

On 20 July 2001, a soils investigation was conducted at the Zoller property for a proposed drip irrigation system. The site is located in Schuylkill Township. WESTON soil scientist, Ken Cowan, examined 7 test pits during the investigation to determine whether any soil limitations are present for locating a proposed sewage disposal system. Evans Mills represented the property owner and coordinated test pit activities.

Soil suitability for drip irrigation systems are determined by several factors, including:

- Soil Limitations
- Morphological indicators
- Optional Percolation Rates

Soil interpretations are based on actual soil conditions observed in the test pits and on the soil series mapped by the USDA Natural Resources Conservation Service and published in the Soil Survey of Delaware and Chester Counties, Pennsylvania.

Soil limitations that may inhibit the renovation of sewage effluent include:

- Drainage Mottling
- Fragipan
- Water Table
- High coarse fragment content
- Bedrock



The depth at which a limiting zone is identified in a test pit determines the type of septic system permitted by Chester County Health Department and Pennsylvania Department of Environmental Protection (PADEP) regulations. Test pits that have limiting zones within 20 inches of the ground surface are generally considered unsuitable for the installation of any on-lot subsurface disposal system. Test pits with limiting zones greater than 20 inches below ground surface (bgs) may be considered for placement of some types of subsurface septic systems; however, other requirements, such as slope and percolation rates, must also be considered.

According to PADEP's regulations, sites proposed for drip irrigation technology must be classifiable as either moderately well or well drained soils with a minimum depth to rock or high coarse fragment content greater than 26 inches bgs. In general, these conditions are determined based on field evaluations. The presence of drainage mottling at a depth greater than 20 inches below ground surface (bgs) generally indicates a soil drainage class of at least moderately well drained.

### Results

The property is a wooded lot. Three possible sites were located on the lot. The slope across the site was moderately steep.

Table 1 summarizes the limiting zones observed in the test pits completed at each site. Soil logs for these pits are attached at the end of this report. The location of each test pit is shown on the attached site sketch. Five test pits were limited by the depth of the excavation between 40 and 50 inches bgs. The two remaining test pit was limited by drainage mottling at 20 and 28 inches bgs. Based on the finest soil texture and soil structure a loading rate of 0.28 was chosen for each of the three sites.

Based on these soil characterization results the soils observed meet PADEP's requirements for installation of a standard drip irrigation sewage disposal system.

Sincerely,  
Roy F. Weston, Inc.



Kenneth J. Cowan, CPSSc

**TABLE T**  
**Zeller Drip**  
**Schuylkill Township**

TEST PIT NUMBER	LIMITING ZONE	DEPTH
<b>Site 1</b>		
1	DEPTH OF THE EXCAVATION	40"
2	DEPTH OF THE EXCAVATION	40"
3	DRAINAGE MOTTILING	20"
<b>Site 2</b>		
4	DRAINAGE MOTTILING	28"
<b>Site 2 &amp; 3</b>		
5	DEPTH OF THE EXCAVATION	50"
6	DEPTH OF THE EXCAVATION	50"
<b>Site 3</b>		
7	DEPTH OF THE EXCAVATION	50"

## Field Worksheet for Proposed Drip Irrigation System

Site Name/Lot #: Zoller Drip

Township: Schuylkill

People On-Site: Jeff Miller

### Input Parameters

- 1) GPD 600 (provided by developer/representative) 5 BR
- 2) Loading Rate 0.28 (maximum of 0.34 gals/day) (determined by soil scientist) based on failed perc

### Linear Feet of Tubing

- 1) Linear ft. of Tubing = GPD / Loading Rate

$$\underline{600} / \underline{0.28} = \underline{2143} \text{ Linear ft. of Tubing}$$

- 2) Linear ft. of Tubing per Zone = Linear ft. of Tubing / # of zones (minimum of 2)

$$\underline{2143} / \underline{2} = \underline{1072} \text{ Linear ft. of Tubing per Zone}$$

### Average Daily Gallons of Flow per Day = GPD/0.5

$$\underline{600} \times 0.5 = \underline{300} \text{ gals per day (average daily flow)}$$

### Minimum Horizontal Length of Lateral

- 1) Minimum Horizontal Length = Average Daily Flow / 4.6 (Maximum Gallons per Day)

$$\underline{300} / 4.6 = \underline{66} \text{ ft (Minimum Horizontal Length)}$$

### Horizontal Linear Load

- 1) Horizontal Linear Load = gals per day (average daily flow) / Minimum Horizontal Length or larger length assigned by the developer

$$\underline{300} / \underline{66} = \underline{4.54} \text{ gals per day (horizontal linear load)}$$

### Absorption Area

- 1) Number of Laterals Per Zone = Linear ft. of Tubing per Zone / Minimum Horizontal Length

$$\underline{\quad} / \underline{\quad} = \underline{\quad} \text{ (Number of Laterals Per Zone) [must be an even \#]}$$

- 2) Width of the Zone = Number of Laterals per zone X Lateral Spacing

$$\underline{\quad} \times \underline{\quad} = \underline{\quad} \text{ ft (Width of the Zone)}$$

- 3) Absorption Area = Minimum Length of the Zone X Width of the Zone

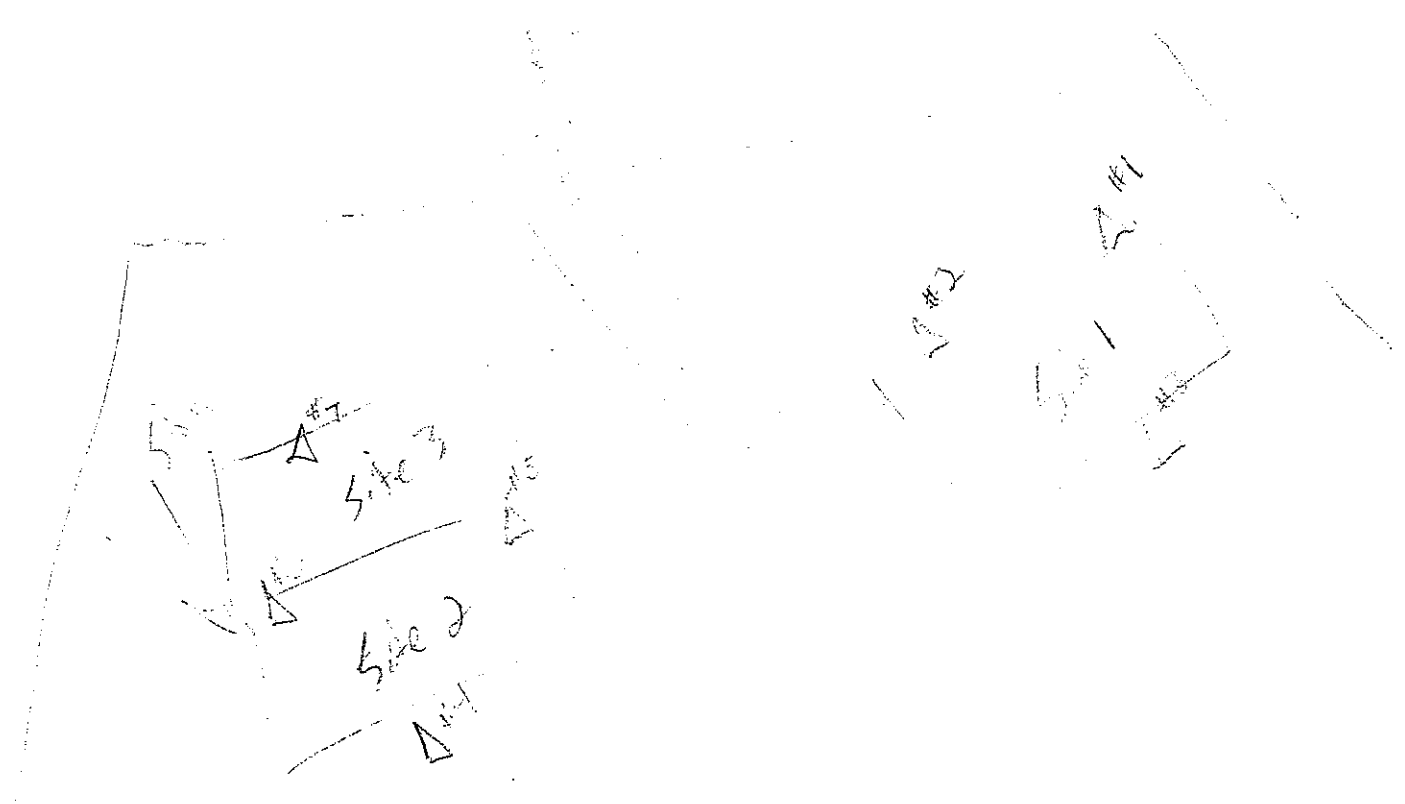
$$\underline{\quad} \times \underline{\quad} = \underline{\quad} \text{ ft}^2 \text{ (Absorption Area)}$$

The loading rate and the horizontal linear load identified above for this site meet PADEP requirements for drip irrigation.

  
Soil Scientist representing CCHD

7/20/01 Date

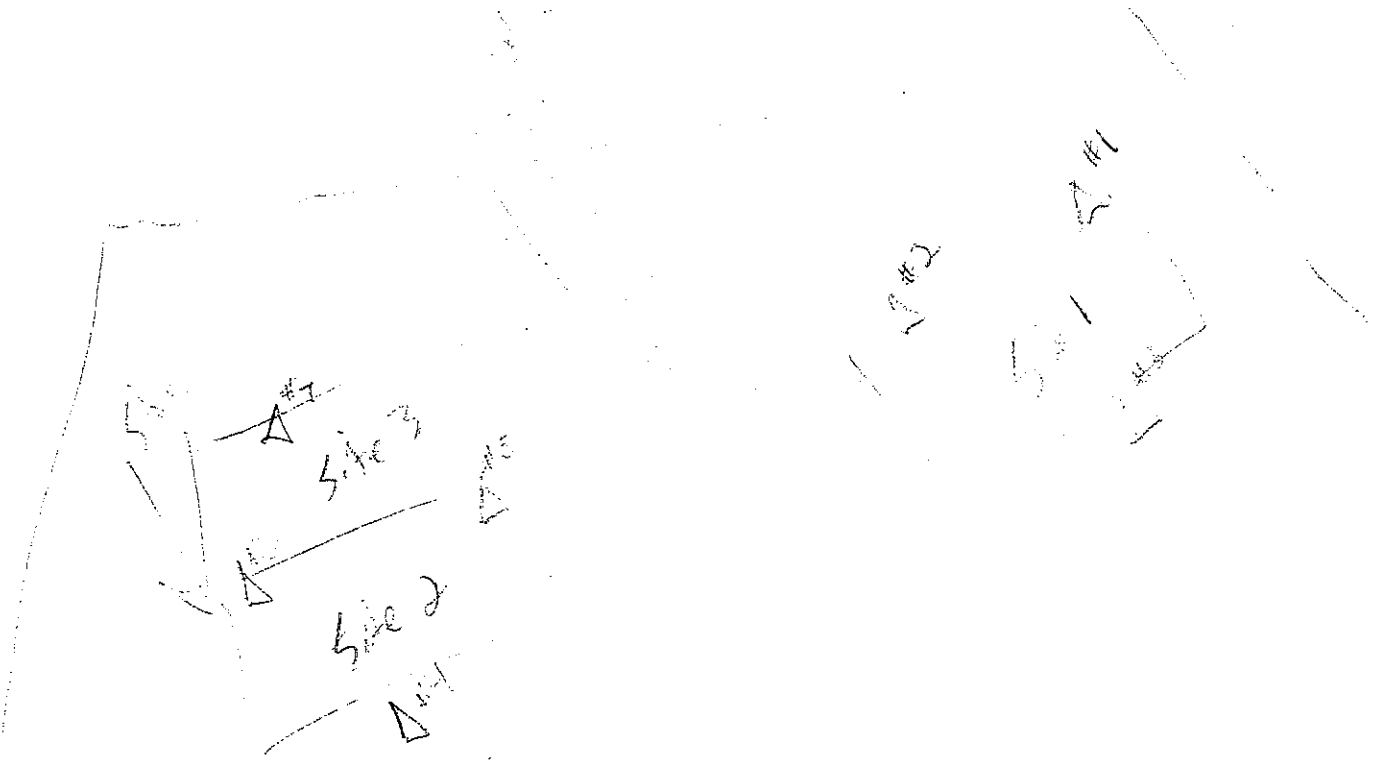
**Site Sketch**



**Site Description**

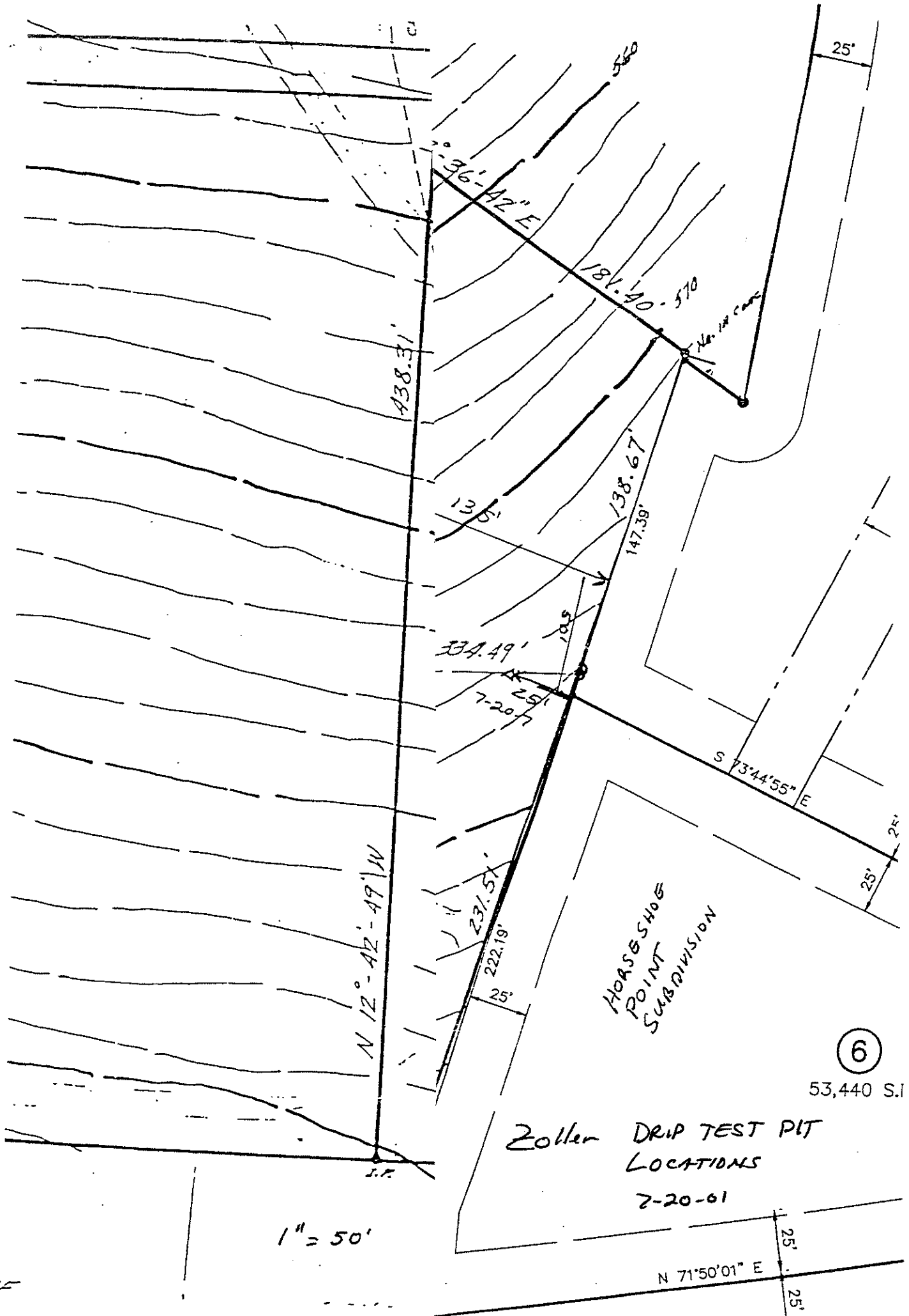
Area of 5.6 Ac. (5.6 Ac.)  
3 sites (1, 2, 3)

# Site Sketch



## Site Description

3 sites identical  
2.3 Ac. (5.6 Ac.)



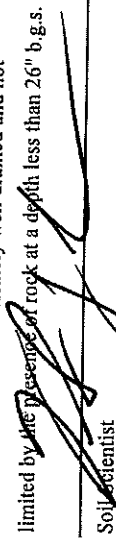
6

53,440 S.I



**SOIL SUITABILITY for ON-LOT SEPTIC SYSTEMS  
for CHESTER COUNTY HEALTH DEPARTMENT**

I have observed this test pit and have determined the soils to be at least moderately well drained and not limited by the presence of rock at a depth less than 26" b.g.s.

Soil Scientist: 

Described By: Ken Cowan  
 Test Pit Number: 7-20-1  
 Lot: Site 1

Township: Schuylkill  
 Drip Site: Zoller Drip  
 Date: 7/20/01

Horizon	Depth (inches)		Distinctness of Boundary	Texture	% Coarse Fragment	Color	Drainage Mottling		Structure		Consistence	Comments
	Upper	Lower					Abundance	Contrast	Type	Grade		
A	0	5	abrupt	loam	-	10 YR 3/3 dark brown	-	-	granular	weak	friable	
E	5	12	clear	loam	-	10 YR 6/6 brownish yellow	-	-	sbk	weak	friable	
EB	12	16	clear	loam	-	10 YR 5/6 yellowish brown	-	-	sbk	weak	friable	
Bt	16	33	clear	loam	10	7.5 YR 5/6 strong brown	-	-	sbk	weak	friable	
B	33	40	-	sandy loam	10	10 YR 6/6 yellowish brown	-	-	sbk	weak	friable	moist

Limiting Zone Depth: 40" Weather:

Determined By: bottom of test pit Additional Comments: adjacent to TP 2-7-1, wooded lot

Slope: \_\_\_\_\_

Soil Drainage Class: well drained





**SOIL SUITABILITY for ON-LOT SEPTIC SYSTEMS  
for CHESTER COUNTY HEALTH DEPARTMENT**

I have observed this test pit and have determined the soils to be at least moderately well drained and not limited by the presence of rock at a depth less than 26" b.g.s.

Township: Schuylkill  
Drip Site: Zoller Drip  
Date: 7/20/01

Described By: Ken Cowan  
Test Pit Number: 7-20-2  
Lot: Site 1

Soil Scientist

Horizon	Depth (inches)		Distinctness of Boundary	Texture	% Coarse Fragment	Color	Drainage Mottling		Structure		Consistence	Comments
	Upper	Lower					Abundance	Contrast	Type	Grade		
A	0	5	abrupt	loam	-	10 YR 3/3 dark brown	-	-	granular	weak	friable	
E	5	14	abrupt	loam	-	10 YR 6/6 brownish yellow	-	-	sbk	weak	friable	
Bt	14	37	clear	heavy silt loam	10	7.5 YR 5/6 strong brown	-	-	sbk	weak	friable	
B	37	40	-	sandy loam	10	10 YR 6/6 brownish yellow	-	-	sbk	weak	friable	

Limiting Zone Depth: 40"

Weather:

Determined By: bottom of test pit

Additional Comments:

Slope:

Soil Drainage Class: well drained



**SOIL SUITABILITY for ON-LOT SEPTIC SYSTEMS  
for CHESTER COUNTY HEALTH DEPARTMENT**

I have observed this test pit and have determined the soils to be at least moderately well drained and not limited by the presence of rock at a depth less than 26" b.g.s.

Soil Scientist

Township: Schuylkill  
Drip Site: Zoller Drip  
Date: 7/20/01

Described By: Ken Cowan  
Test Pit Number: 7-20-3  
Lot: Site 1

Horizon	Depth (inches)		Distinctness of Boundary	Texture	% Coarse Fragment	Color	Drainage Mottling		Structure		Consistence	Comments
	Upper	Lower					Abundance	Contrast	Type	Grade		
A	0	6	abrupt	loam	-	10 YR 3/3 dark brown	-	-	granular	weak	friable	
E	6	20	clear	sandy loam	-	variegated gray/brown orange	-	-	platy	weak	friable	
EB	20	27	clear	sandy loam	-	7.5 YR 5/6 strong brown	many	distinct	platy	weak	friable	dense
Bt	27	40	-	silt loam	-	7.5 YR 5/6 strong brown	-	-	sbk	weak	friable	dense

Limiting Zone Depth: 20"

Weather:

Determined By: drainage mottling

Additional Comments:

Slope:

Soil Drainage Class: moderately well drained



**SOIL SUITABILITY for ON-LOT SEPTIC SYSTEMS  
for CHESTER COUNTY HEALTH DEPARTMENT**

I have observed this test pit and have determined the soils to be at least moderately well drained and not limited by the presence of rocks at a depth less than 26" b.g.s.

Soil Scientist

Township: Schuylkill

Drip Site: Zoller Drip

Date: 7/20/01

Described By: Ken Cowan

Test Pit Number: 7-20-4

Lot: Site 2

Horizon	Depth (inches)		Distinctness of Boundary	Texture	% Coarse Fragment	Color	Drainage Mottling		Structure		Consistence	Comments
	Upper	Lower					Abundance	Contrast	Type	Grade		
A	0	4	abrupt	loam	-	10 YR 3/3 dark brown	-	-	granular	weak	friable	
E	4	17	clear	loam/silt loam	-	10 YR 6/6 brownish yellow	-	-	sbk	weak	friable	
Bt1	17	28	clear	silt loam	-	7.5 YR 5/6 strong brown	-	-	sbk	weak	friable	
Bt2	28	40	-	silt loam	-	7.5 YR 5/6 strong brown	many	distinct	sbk	weak	friable	

Limiting Zone Depth: 28"

Weather:

Determined By: drainage mottling

Additional Comments:

Slope:

Soil Drainage Class: moderately well drained



**SOIL SUITABILITY for ON-LOT SEPTIC SYSTEMS  
for CHESTER COUNTY HEALTH DEPARTMENT**

I have observed this test pit and have determined the soils to be at least moderately well drained and not limited by the presence of rock at a depth less than 26" b.g.s.

Township: Schuylkill

Described By: Ken Cowan

Drip Site: Zoller Drip

Test Pit Number: 7-20-5

Date: 7/20/01

Lot: Site 2 & 3

Soil Scientist: *[Signature]*

Horizon	Depth (inches)		Distinctness of Boundary	Texture	% Coarse Fragment	Color	Drainage Mottling		Structure		Consistence	Comments
	Upper	Lower					Abundance	Contrast	Type	Grade		
A	0	3	abrupt	loam	-	10 YR 3/3 dark brown	-	-	granular	weak	friable	
E	3	15	clear	loam	-	10 YR 6/6 brownish yellow	-	-	sbk	weak	friable	
Bt	15	32	clear	loam	-	7.5 YR 5/6 strong brown	-	-	sbk	weak	friable	
BC	32	40	clear	loam	10	variegated orange tan	-	-	sbk	weak	friable	
C	40	50	-	fine sandy loam	10	10 YR 6/6 brownish yellow	-	-	massive	str less	loose	

Limiting Zone Depth: 50"

Weather:

Determined By: bottom of test pit

Additional Comments:

Slope:

Soil Drainage Class: well drained



**SOIL SUITABILITY for ON-LOT SEPTIC SYSTEMS  
for CHESTER COUNTY HEALTH DEPARTMENT**

I have observed this test pit and have determined the soils to be at least moderately well drained and not limited by the presence of rock at a depth less than 26" b.g.s.

Soil Scientist

Township: Schuylkill

Drip Site: Zoller Drip

Date: 7/20/01

Described By: Ken Cowan

Test Pit Number: 7-20-6

Lot: Site 2 & 3

Horizon	Depth (inches)		Distinctness of Boundary	Texture	% Coarse Fragment	Color	Drainage Mottling		Structure		Consistence	Comments
	Upper	Lower					Abundance	Contrast	Type	Grade		
A	0	4	abrupt	loam	-	10 YR 3/3 dark brown	-	-	granular	weak	friable	
E	4	12	clear	loam	-	10 YR 6/6 brownish yellow	-	-	sbk	weak	friable	
Bt	12	26	clear	silt loam	-	7.5 YR 5/6 strong brown	-	-	sbk	weak	friable	dense
B	26	50	-	loam	-	variegated tan org brown	-	-	sbk	weak	friable	

Limiting Zone Depth: 50"

Weather:

Determined By: bottom of test pit

Additional Comments:

Slope:

Soil Drainage Class: well drained



**SOIL SUITABILITY for ON-LOT SEPTIC SYSTEMS  
for CHESTER COUNTY HEALTH DEPARTMENT**

I have observed this test pit and have determined the soils to be at least moderately well drained and not limited by the presence of a clog at a depth less than 26" b.g.s.

Township: Schuylkill

Drip Site: Zoller Drip

Date: 7/20/01

Described By: Ken Cowan

Test Pit Number: 7-20-7

Lot: Site 3

Soil Scientist

Horizon	Depth (inches)		Distinctness of Boundary	Texture	% Coarse Fragment	Color	Drainage Mottling		Structure		Consistence	Comments
	Upper	Lower					Abundance	Contrast	Type	Grade		
A	0	4	abrupt	loam	-	10 YR 3/3 dark brown	-	-	granular	weak	friable	
E	4	17	clear	loam	-	10 YR 6/6 brownish yellow	-	-	sbk	weak	friable	
Bt	17	46	clear	silt loam	-	7.5 YR 5/6 strong brown	-	-	sbk	weak	friable	
C	46	50	-	sandy loam	-	10 YR 6/6 brownish yellow	-	-	massive	str less	loose	

Limiting Zone Depth: 50"

Weather:

Determined By: bottom of test pit

Additional Comments:

Slope:

Soil Drainage Class: well drained