TRIP REPORT
CREEK ROAD EFRD SITE – INFILTRATION TESTING

1.0 PURPOSE

This Trip Report presents the field data and results of double-ring soil infiltration tests conducted to support the design of a stormwater management system at the Creek Road EFRD site located in North Middleton Township, Cumberland County, Pennsylvania, as part of the Pennsylvania Pipeline Project (PPP) for Sunoco Pipeline, LP. Three shallow tests (IT-A, IT-B, and IT-C) were performed at the site. The test locations are listed by coordinates (latitude and longitude) in Table 1 and shown on the attached figure.

2.0 FIELD ACTIVITIES

The infiltration tests were conducted by Greg Ritson and Brendan O'Donnell of RETTEW, on September 28, 2016. The test locations were positioned in the field using a handheld, WAAS-enabled GPS unit. Table 1 provides the coordinates of the test locations. All three test units were conducted in a lightly forested area approximately 130 feet north west of Creek Rd.

The infiltration tests were performed in accordance with the procedure specified in the 2006 Pennsylvania Stormwater Best Management Practices (BMP) Manual. The test locations were prepared with hand tools and care was taken to minimize disturbance of the soil surface to be tested. Double-ring infiltrometers were used for testing and consisted of 12-inch diameter and 6-inch diameter sections of steel casing, each 7 inches in height. After digging to the target depth, the test surface was leveled, and loose soil and debris were removed. The rings were driven a minimum of 2 inches into the soil. The infiltration test depths are presented in Table 1.

Test locations were pre-soaked for 1 hour. The tests were then conducted with measurements at 10-minute or 30-minute intervals, based on the observed water level drops during the last half of the pre-soak period. Pre-soak and test information was recorded on infiltration test data sheets; copies of the test data sheets are attached to this report.

During the testing, the weather was sunny, approximately 65 degrees Fahrenheit, and no precipitation was observed during the time of testing. Approximately 0.01 inches of precipitation was observed 24 hours prior to testing.

A hand auger was utilized to characterize the soil, determine the depth to bedrock, if encountered, and inspect for evidence of the seasonal high water table near the test areas. The field team was unable to hand auger down to two feet below the target infiltration test depth. Hand augering was performed to an approximate depth of 18 inches before encountering refusal with the hand auger. Several attempts were made near the test unit. All attempts were unsuccessful. Descriptions of the soil were documented on field logs, which were based on the form example in the BMP manual. Copies of the soil logs are attached to this report.

3.0 RESULTS

3.1 Soil Description

Soils encountered generally consisted of a thin (up to approximately 6 inches) brown (10YR 4/3) silty clay topsoil/surface layer with up to 20% gravels. This topsoil/surface layer was underlain by an illuvial silty clay to clay with channers ranging up to 75% of the horizon. This layer ranged in color from a brown (7.5YR 5/4) to a yellowish brown (10YR 5/6). Auger refusal was encountered at 18 inches.

Seasonal high water was not observed at the testing location, nor was any mottling observed.

According to United States Department of Agriculture Natural Resources Conservation Service Web Soil Survey data, the soil type for the test locations is mapped as follows:

- Weikert Very Channery Silt Loam - (WeD soil symbol) with 15-25 percent slopes; with high runoff and is well drained.

3.2 Infiltration Tests Results

Table 1 summarizes the infiltration rates (inches per hour) calculated from the test data. Infiltration rates presented in Table 1 were calculated from the average water level drop of the last four stabilized readings measured in the inner ring.

The pre-soak test results for IT-A and IT-C (shallow) indicated an excessive infiltration rate which caused the tests to be terminated with no data being collected. The pre-soak test results for IT-B (surface) indicated a high infiltration rate, requiring a 10 minute test cycle.

Table 1
Summary of Infiltration Test Results
Creek Road ERFD
North Middleton Township,
Cumberland County, PA
Sunoco PPP

Test Location (IT-)	Location Data		Test Depth (inches)	Infiltration Test Result (inches/hour)
	LATITUDE	LONGITUDE		
IT-A (shallow)	40.2424018°	- 077.1915611°	6	NA
IT-A (deep)	40.2423530°	- 077.1913461°	6	5.91
IT-B (shallow)	40.2422746°	- 077.1914811°	6	NA

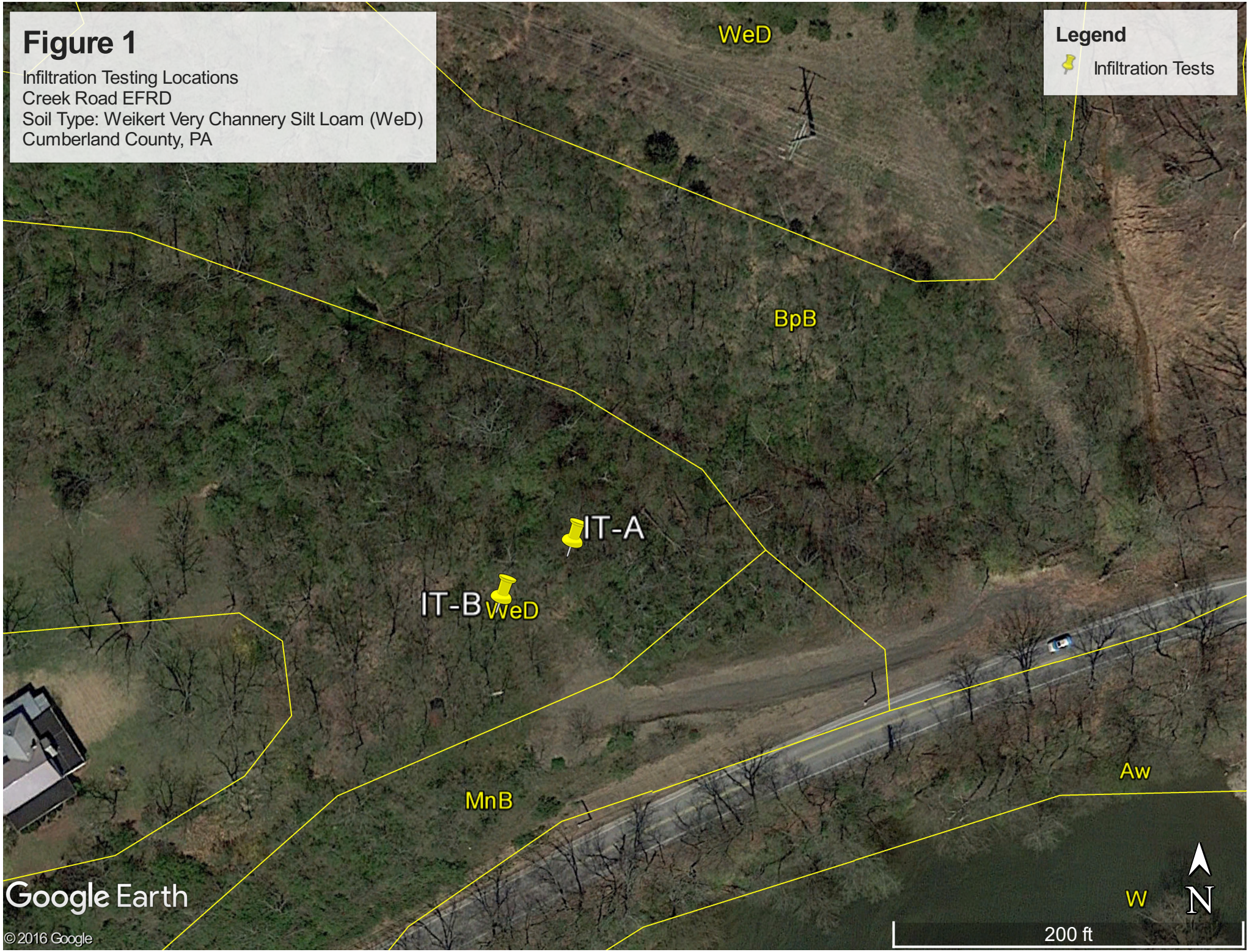
Figure 1
Infiltration Testing Locations
Creek Road EFRD
Soil Type: Weikert Very Channery Silt Loam (WeD)
Cumberland County, PA
Legend
Infiltration Tests
WeD
BpB
IT-A
IT-B
WeD
MnB
Aw
Google Earth
© 2016 Google
W
N
200 ft

ATTACHMENTS

SOIL LOGS

TETRA TECH

Soil Log

Tested By: Greg Ritson (Retter) | Project: Sunoco PPP | Project No.: 112C05958

Test Pit: Creek Road (a) | Date: 9/28/2016 | Elevation: | Equipment Used: Sharpshooter

Geology: | Soil Type: | Land Use: | Weather:

Additional Comments

Horizon	Upper Boundary	Lower Boundary	Soil Textural Class	Type, Size, Coarse Fragments, etc.	Soil Color	Color Patterns	Pores, Roots, Rock Structure	Depth to Bedrock	Depth to Water	Comments
A	O	6"	SiL	weak, fine, SBK friable	7.5YR 4/2	—	few coarse common fine & very fine Gravel (20%)	—	—	O material mixed w/ A
B	6"	16"	SiCL	moderate, fine, SBK friable	7.5YR 5/4	—	few fine, med, coarse extremely Channery (75%)	—	—	

Horizon:	USDA Definition	Soil Textural Class	Boundary	Notes:
O	Organic debris	Use ternary diagram from US Department of Agriculture Soil Conservation Service	Use depth and classification	
A	Dark colored, mixed mineral organic matter		Classification as Follows: Abrupt	
B	Maximum accumulation of silicate clay minerals		Clear	
C	Weathered parent material		Gradual	
R	Layer of consolidated rock beneath the soil		Diffuse	

Table based on: Sample soil log located on page 12 of the Pennsylvania Stormwater Best Management Practices Manual
USDA Definitions located from: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/edu/?cid=nrcs142p2_054308

TETRA TECH

Soil Log

Tested By: Greg Ritson (Rettew) | Project: SUNOCO PPP | Project No.: 112KC05458

Test Pit: Creek Road (b) | Date: 9/28/2016 | Elevation: | Equipment Used: Sharpshooter

Geology: | Soil Type: | Land Use: | Weather:

Additional Comments

Horizon	Upper Boundary	Lower Boundary	Soil Textural Class	Type, Size, Coarse Fragments, etc.	Soil Color	Color Patterns	Pores, Roots, Rock Structure	Depth to Bedrock	Depth to Water	Comments
A	O	4"	SiL	moderate, fine, SBK friable	10YR 4/3	—	many fine, medium, coarse	—	—	
B	4"	18"	CL	moderate, medium, SBK friable	10 YR 5/6	—	few very coarse			denser fines

Horizon:	USDA Definition	Soil Textural Class	Boundary	Notes:
O	Organic debris	Use ternary diagram from US Department of Agriculture Soil Conservation Service	Use depth and classification	
A	Dark colored, mixed mineral organic matter		Classification as Follows: Abrupt	
B	Maximum accumulation of silicate clay minerals		Clear	
C	Weathered parent material		Gradual	
R	Layer of consolidated rock beneath the soil		Diffuse	

Table based on: Sample soil log located on page 12 of the Pennsylvania Stormwater Best Management Practices Manual
USDA Definitions located from: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/edu/?cid=nrcs142p2_054308

TETRA TECH

Soil Log

Tested By: Greg Ritson (Rettew) | Project: Sunoco PPP | Project No.: 112C05958

Test Pit: Creek Road (c) | Date: 9/28/2016 | Elevation: | Equipment Used: Sharpshooter

Geology: | Soil Type: | Land Use: | Weather:

Additional Comments

Horizon	Upper Boundary	Lower Boundary	Soil Textural Class	Type, Size, Coarse Fragments, etc.	Soil Color	Color Patterns	Pores, Roots, Rock Structure	Depth to Bedrock	Depth to Water	Comments
A	O	4"	SiL	weak, fine, SBK friable	10YR 4/3	—	many fine, medium few coarse	—	—	
B	4"	16"	SiL	weak, fine, SBK friable	10YR 4/4	—	common fine, medium extremely channery (70%)	—	—	

Horizon:	USDA Definition	Soil Textural Class	Boundary	Notes:
O	Organic debris	Use ternary diagram from US Department of Agriculture Soil Conservation Service	Use depth and classification	
A	Dark colored, mixed mineral organic matter		Classification as Follows: Abrupt	
B	Maximum accumulation of silicate clay minerals		Clear	
C	Weathered parent material		Gradual	
R	Layer of consolidated rock beneath the soil		Diffuse	

Table based on: Sample soil log located on page 12 of the Pennsylvania Stormwater Best Management Practices Manual
USDA Definitions located from: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/edu/?cid=nrcs142p2_054308

INFILTRATION TEST DATA SHEETS

INFILTRATION TEST DATA SHEET

Tetra Tech, Inc.

PROJECT NAME: Sunoco PPP
PROJECT NUMBER: 112IC05958
TEST AREA ID: Creek Road (test a)
PERSONNEL: Greg Ritson & Brendan O'Donnell (Retter)

TEST METHOD: (Double Ring Infiltrometer) Percolation
Single Ring Infiltrometer

Location Coordinates or Description:
40.2424018, -77.1915611

INNER RING INSIDE DIAMETER/HEIGHT: 6" / 7"
OUTER RING INSIDE DIAMETER/HEIGHT: 12" / 7"

PERCOLATION HOLE DIAMETER: _____ (If performing an open hole perc test)

DATE(s): 9/28/2016 Rainfall in past 24 hrs = 0.01"

Distance from the bottom of the inner ring/hole to measuring point (minimum water column of 6-8 inches):

MEASURING POINT: (Ring Rim) Indicator Mark

DEPTH OF TEST: Surface (6")

TIME	ELAPSED TIME SINCE START OF TEST (minutes)	WATER LEVEL DROP, INNER RING OR PERCOLATION HOLE (inches)	VOLUME OF WATER ADDED AT EACH CYCLE, INNER RING (liters)	REMARKS
PRESOAK DATA				
1:58	0	----------	19	de-watered in less than 10 minutes, did not continue attempts to test
TEST DATA				

INFILTRATION TEST DATA SHEET

Tetra Tech, Inc.

PROJECT NAME: SUNOCO PPP
PROJECT NUMBER: 112IC05958
TEST AREA ID: Creek Road (test b)
PERSONNEL: Greg Ritson & Brendan O'Donnell (Rettew)

TEST METHOD: (Double Ring Infiltrometer) Percolation
Single Ring Infiltrometer

INNER RING INSIDE DIAMETER/HEIGHT: 6" / 7"
OUTER RING INSIDE DIAMETER/HEIGHT: 12" / 7"

Location Coordinates or Description: 40.242 3530, -77.191 3461

PERCOLATION HOLE DIAMETER: _____ (If performing an open hole perc test)

DATE(s): 9/28/2016 Rainfall in last 24 hrs = 0.01"

Distance from the bottom of the inner ring/hole to measuring point (minimum water column of 6-8 inches):

MEASURING POINT: (Ring Rim) Indicator Mark

DEPTH OF TEST: Surface (6")

TIME	ELAPSED TIME SINCE START OF TEST (minutes)	WATER LEVEL DROP, INNER RING OR PERCOLATION HOLE (inches)	VOLUME OF WATER ADDED AT EACH CYCLE, INNER RING (liters)	REMARKS
PRESOAK DATA				
2:04	0	----------		19+ liters added to stabilize both rings
2:34	30	dewatered	7.5	
3:04	60	3 1/8	3.7	
TEST DATA				
3:04	0	----------	3.7	
3:14	10	1 7/8	2	
3:24	20	1 1/8	1.5	
3:34	30	1	1.5	
3:44	40	1	1	
3:54	50	15/16	1	
4:04	60	1		

INFILTRATION TEST DATA SHEET

Tetra Tech, Inc.

PROJECT NAME: Sunoco PPP
PROJECT NUMBER: 112IC05958
TEST AREA ID: Creek Road (test c)
PERSONNEL: Greg Ritson & Brendan O'Donnell

TEST METHOD: (Double Ring Infiltrometer) Percolation
Single Ring Infiltrometer

Location Coordinates or Description: 40.2422746, -77.1914811

INNER RING INSIDE DIAMETER/HEIGHT: 6"/7"
OUTER RING INSIDE DIAMETER/HEIGHT: 12"/7"

PERCOLATION HOLE DIAMETER: _____ (If performing an open hole perc test)

DATE(s): 9/28/2016 Rainfall in last 24 hrs: 0.01"

Distance from the bottom of the inner ring/hole to measuring point (minimum water column of 6-8 inches):

MEASURING POINT: (Ring Rim) Indicator Mark

DEPTH OF TEST: Surface (6")

TIME	ELAPSED TIME SINCE START OF TEST (minutes)	WATER LEVEL DROP, INNER RING OR PERCOLATION HOLE (inches)	VOLUME OF WATER ADDED AT EACH CYCLE, INNER RING (liters)	REMARKS
PRESOAK DATA				
2:42	0	----------		7.8 liters to both rings, refilled
3:12	30	dewatered	7.8	at 2:52
3:35	53	dewatered		Did not continue attempting to
				test - Excessive Drop - did not
				stabilize after second presoak
TEST DATA				
