

TRIP REPORT

NORTH UNION STREET 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 North Union Street EFRD site located in Middletown Township, Dauphin County, Pennsylvania, as part of the Pennsylvania Pipeline Project (PPP) for Sunoco Pipeline, LP. Two surface tests (IT-A and IT-B) 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 Keith Simpson and Jake Marlow of Tetra Tech, Inc., on October 5, 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. Test unit IT-A was located in a grassy area just west of an access road while test unit IT-B was located just inside the tree line due south of a water tower.

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 a mini-excavator, and care was taken to minimize disturbance of the soil surface to be tested. Double-ring infiltrometers were used for testing and consisted of 10-inch diameter and 6-inch diameter sections of steel casing, each 10 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 70 degrees Fahrenheit, and no precipitation was observed during the time of testing. Additionally, no 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. At each of the Test units, hand augering was completed to a depth of 25 inches below ground surface. 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

Soil encountered generally consisted of a thin topsoil/surface layer composed of a thin (up to approximately 8 inches) dark reddish brown (5YR 3/3) silt loam with trace rock fragments in test unit IT-A, to a dark brown (7.5YR 3/3) sandy clay loam with trace rock fragments in test unit IT-B. This topsoil/surface layer was underlain by a dark reddish brown (2.5YR 3/4) sandy loam with increased clay content in test unit IT-B. Few roots with trace rock fragments were found within this sublayer to approximately 25 inches below ground surface. Bedrock was not encountered.

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 types for the IT-A and IT-B test locations respectively, are mapped as follows:

- Lewisberry Gravelly Sandy Loam - (LrB2 soil symbol) with 3-8 percent slopes; with low runoff and is well drained,
- Lewisberry Gravelly Sandy Loam - (LrC2 soil symbol) with 8-15 percent slopes; with low 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 (surface) indicated a low infiltration rate, requiring a 30 minute test cycle; whereas, the pre-soak test results for IT-B (surface) indicated high infiltration rate, requiring 10 minute test cycle.


Table 1
Summary of Infiltration Test Results
North Union Street ERFD
Middletown Township, Dauphin County, PA
Sunoco PPP

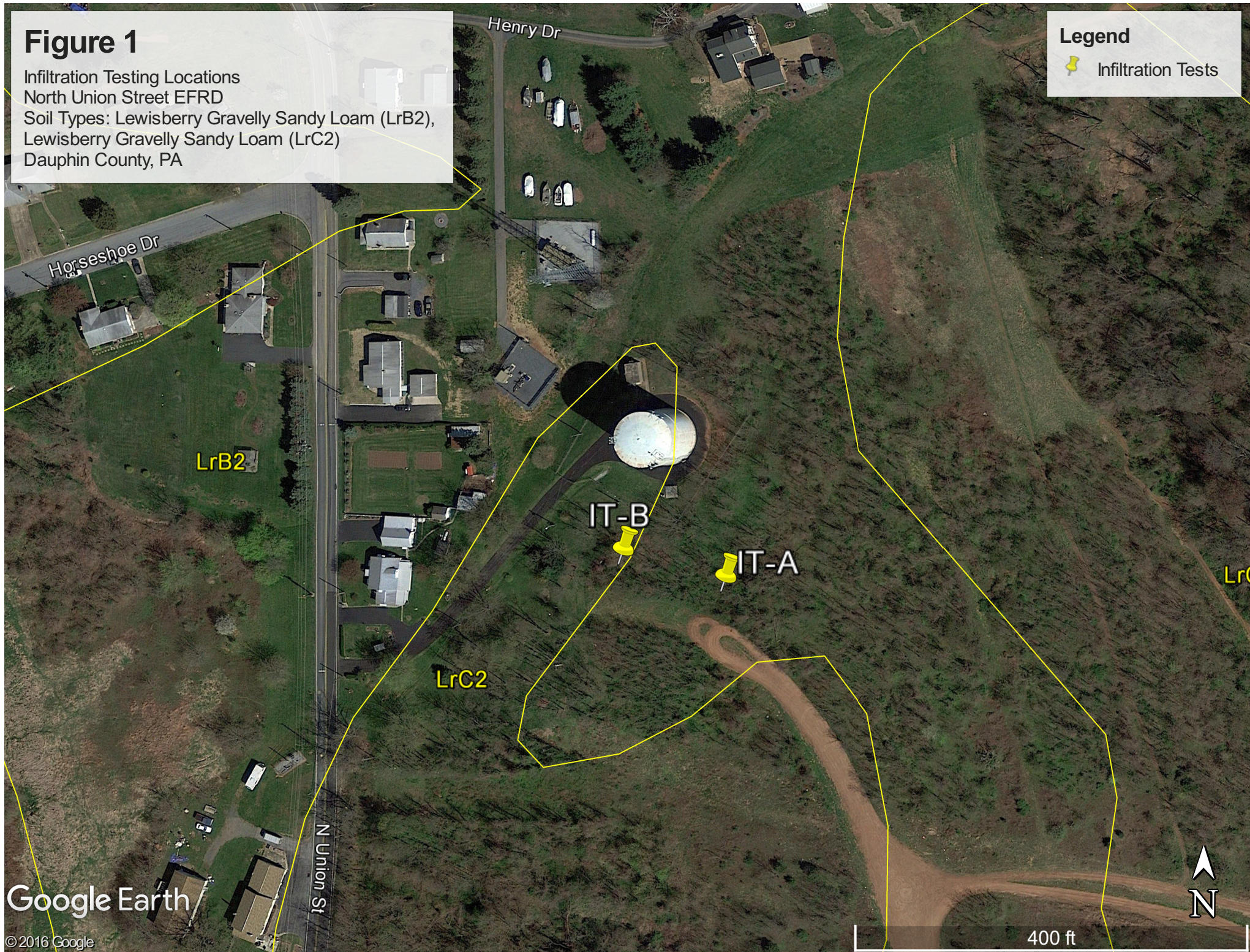
Test Location (IT-)	Location Data		Test Depth (inches)	Infiltration Test Result (inches/hour)
	LATITUDE	LONGITUDE		
IT-A (surface)	40.2148564 °	- 076.7340312 °	4	2.00
IT-B (surface)	40.2150201 °	- 076.7343377 °	4	16.00

Figure 1

Infiltration Testing Locations
North Union Street EFRD
Soil Types: Lewisberry Gravelly Sandy Loam (LrB2),
Lewisberry Gravelly Sandy Loam (LrC2)
Dauphin County, PA

Legend

 Infiltration Tests



ATTACHMENTS

SOIL LOGS

Soil Log

Tested By: JaKe Marlow

Project: Sunoco - PPP

Project No.: 112IC05958

Test Pit: N Union St EFRD IT-A Date: 10/5/16

Elevation: _____

Equipment Used Hand Auger

Geology: Gettysburg Formation Soil Type: Lewisberry gravelly sandy loam Land Use: _____

Weather: 70's Sunny

Additional Comments

Hand Auger to 25"

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
O/A	0"	6"	Silty loam	Silt w/ Fine sand trace clay	6YR 3/3	Solid	Several Roots vegetation 1/4" to 1/2" rocks	-	-	Dry to Moist Organic Debris to top soil
B	6"	25"	Sandy loam	Fine sands w/ silts and trace minor clay	2.5YR 3/4	Solid	Pores. Few Roots 1/4" to 1/2" rock Frag	-	-	Moist

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	- Did Not Encounter Seasonal High Groundwater - No Refusal - < 0.5" of Rain in Past 24 hours
A	Dark colored, mixed mineral organic matter		Classification as Follows:	
B	Maximum accumulation of silicate clay minerals		Abrupt	
C	Weathered parent material		Clear	
R	Layer of consolidated rock beneath the soil		Gradual	
			Diffuse	

Soil Log

Tested By: Jake Marlow

Project: SUNOCO-PPP

Project No.: 112IC05958

Test Pit: N Union St EFRD IT-B Date: 10/5/16

Elevation: _____

Equipment Used Hand Auger

Geology: Gettysburg Formation Soil Type: _____

Land Use: _____

Weather: 70's Clear

Additional Comments

Hand Auger to 25"

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
O/A	0"	8"	Clay Sandy loam	Clay w/ trace Fine silt and minor Fine sand	7.5YR 3/3	Solid	Pores, roots, 1/4" to 1/2" Rock Fragments	—	—	Organic Debris to Top Soil Dry < 1"
B	8"	25"	Sandy Clay loam	Clay w/ minor Fine trace silt sand F-C (gravel)	2.5YR 3/4	Solid	Pores, roots, 1/4" to 1/2" Rock Frag	—	—	Moist to Dry

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	<u>- DID NOT Encounter Seasonal High Groundwater</u> <u>- No Refusal</u> <u>- < 0.5' of Rain in Past 24 hours</u>
A	Dark colored, mixed mineral organic matter		Classification as Follows:	
B	Maximum accumulation of silicate clay minerals		Abrupt	
C	Weathered parent material		Clear	
R	Layer of consolidated rock beneath the soil		Gradual	
			Diffuse	

INFILTRATION TEST DATA SHEETS

INFILTRATION TEST DATA SHEET

Tetra Tech, Inc.

N. UNION ST EFRD

PROJECT NAME: SUNOCO LOGISTICS

TEST AREA ID: IT-A

PROJECT NUMBER: 112 IC 05958 - 17

PERSONNEL: K. SIMPSON, J. MARLOW

TEST METHOD: Double Ring Infiltrometer Percolation
Single Ring Infiltrometer

Location Coordinates or Description:

INNER RING INSIDE

DIAMETER/HEIGHT:

OUTER RING INSIDE

DIAMETER/HEIGHT:

$$6'' \times 10''$$
 $10'' \times 10''$

40. 2148564

- 076-7340312

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

DATE(s): 10/5/16

Distance from the bottom of the inner ring/hole to measuring point (minimum water column of 6-8 inches): 6.5"

MEASURING POINT: (Ring Rim Indicator Mark

DEPTH OF TEST: 4' BGS

TIME	ELAPSED TIME SINCE START OF TEST (minutes)	WATER LEVEL DROP, INNER RING OR PERCCLOATION HOLE (inches)	VOLUME OF WATER ADDED AT EACH CYCLE, INNER RING (liters)	REMARKS
PRESOAK DATA				
1013	0	-----	3.8	
1043	30	12/16	0.85	
1113	60	16/16	1.0	
TEST DATA				
1113	0 (60)	-----	0	START
1143	30 (90)	16/16	1.0	
1213	60 (120)	16/16	1.1	
1243	90 (150)	16/16	1.1	
1313	120 (180)	16/16	1.1	END TEST, STABILIZED
NO RAIN OVER LAST 24 HRS				
MOVED ~35' NNE - OFF OF ENTERPRISE ROW				

SEE ALSO PHOTO & SOIL LOG

B



Tetra Tech, Inc.

INFILTRATION TEST DATA SHEET

N. UNION ST.

PROJECT NAME: SUNOCO LOGISTICS TEST AREA ID: IT - B
 PROJECT NUMBER: 112 IC 05958 - 17 PERSONNEL: K. SIMPSON, J. MARLOW

TEST METHOD: Double Ring Infiltrometer Percolation
Single Ring Infiltrometer

Location Coordinates or Description:

INNER RING INSIDE
 DIAMETER/HEIGHT:
 OUTER RING INSIDE
 DIAMETER/HEIGHT:

6" X 10"

10" X 10"

40.2150201
 - 076.7343377

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

DATE(s): 10/5/16

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

MEASURING POINT: Ring Rim Indicator Mark

DEPTH OF TEST: 2" BGS

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				
1018	0	-----	3.9	10:23 DROP 2" AAA 1.2L
				10:29 2" 1.2L
1048	30	1 1/16	0.65	10:35 2" 1.2L
				10:42 2" 1.2L
1118	60	2	1.2	10:56 2" 1.2L
				11:00 2" 1.2L
				11:08 2" 1.2L

TEST DATA		10 MIN TEST		RUNNING TIME	
1118	0 (60)	-----		START TEST	TEST TOTAL
1122	4 (64)	2" 32/16	1.2		4
1131	9 (73)	2	1.2		13
1140	9 (82)	2	1.2		22
1146	6 (88)	2	1.2		28
1154	8 (96)	2	1.2		36
1200	6 (102)	2	1.2		42
1208	8 (110)	2	1.2		50
1215	7 (117)	2	1.2		57
1222	7 (124)	2	1.2		64
1231	9 (133)	2	1.2		73
1238	7 (140)	2	1.2		80
1245	7 (147)	2	1.2	END TEST	87

VERY LITTLE DROP IN OUTER RING

NO RAIN OVER LAST 24 HR

SEE ALSO PHOTO & SOIL LOGS