

TRIP REPORT

WYOMISSING ROAD VALVE 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 Wyomissing Road Valve site located in Cumru Township, Berks County, Pennsylvania, as part of the Pennsylvania Pipeline Project (PPP) for Sunoco Pipeline, LP. Three surface 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 Keith Simpson and Jake Marlow of Tetra Tech Inc., on October 6, 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. The tests were located in an agricultural field on the east side of Wyomissing Road.

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 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.

The 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 drop 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. Additionally, no precipitation was observed 24 hours prior to testing.

Test pits were excavated near each testing location to characterize the soil, determine the depth to bedrock, if encountered, and inspect for evidence of the seasonal high water table. The test pits were identified with the corresponding infiltration test name. The test pits were machine-excavated to 2 feet below the target infiltration test depth or refusal at Test unit C and to 28 inches at Test units A and B. Descriptions of the soil were recorded on field logs, which were based on the form example in the BMP manual. Copies of the field soil logs are attached to this report.

3.0 RESULTS

3.1 Soil Description

Soils encountered generally consisted of a thin (up to approximately 15 inches) brown (7.5YR 4/3) silt loam with several small roots and trace small rock fragments underlain by an illuvial layer consisting of a strong brown (7.5YR 4/6) silty clay loam with few fine roots and few small rock fragments. 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 test locations are mapped as follows:

- Joanna Loam - (JnB soil symbol) with 3-8 percent slopes; with medium runoff and is well drained,
- Joanna Loam - (JnC soil symbol) with 8-15 percent slopes; with medium runoff and is well drained.

3.2 Infiltration Tests Results

Table 1 summarizes the infiltration rates (inches per hour) calculated from the test data. The 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, IT-B, and IT-C indicated moderate to high infiltration rates, requiring 10 minute test cycles for IT-A and IT-C; and a 30-minute test cycle for IT-B.


Table 1
Summary of Infiltration Test Results
Wyomissing Road Valve
Cumru Township, Berks County, PA
Sunoco PPP

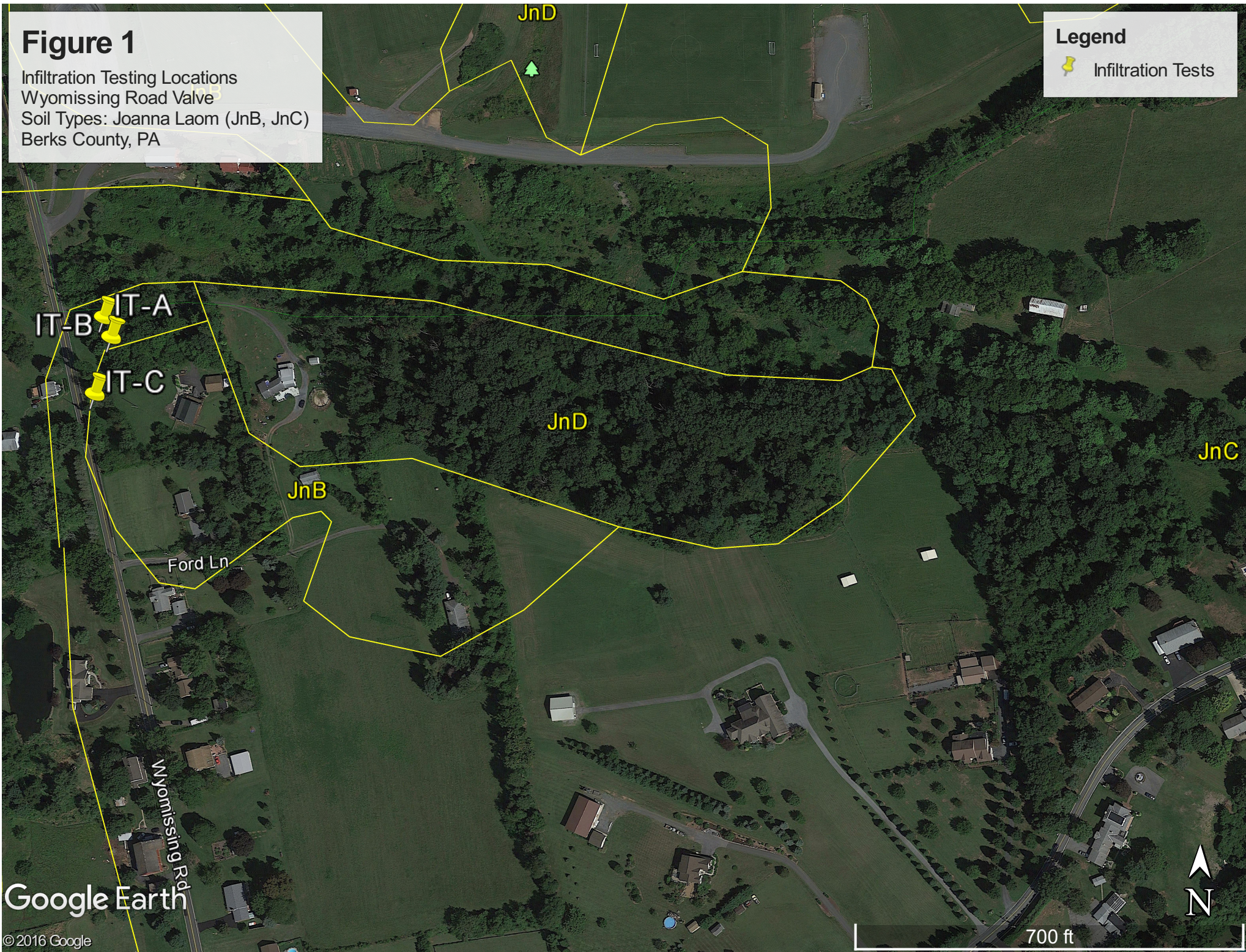
| Test Location (IT-) | Location Data | | Test Depth (inches) | Infiltration Test Result (inches/hour) |
|------------------------|---------------|----------------|---------------------|--|
| | LATITUDE | LONGITUDE | | |
| IT-A (shallow) | 40.2545523° | - 075.9892816° | 7 | 3.19 |
| IT-B (shallow) | 40.2544396° | - 075.9892101° | 8 | 3.50 |
| IT-C (shallow) | 40.2541246° | - 075.9893019° | 2 | 10.31 |

Figure 1

Infiltration Testing Locations
Wyomissing Road Valve
Soil Types: Joanna Laom (JnB, JnC)
Berks County, PA

Legend

-  Infiltration Tests



ATTACHMENTS

SOIL LOGS



Soil Log

Tested By: Jake Marlow

Project: SUNOCO PPP

Project No.: 112IC05958

Test Pit: W/missing Road Valve IT-A Date: 10/6/16

Elevation: _____

Equipment Used Mini Excavator

Geology: _____ Soil Type: _____

Land Use: _____

Weather: 70's Sunny

Additional Comments

Mini Excavator to 28"

| 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 | 0" | 1" | Loam | Fine sand | 10YR 2/2 | | Pores Several roots | - | - | Dry |
| A | 1" | 9" | Silt Loam | Silt w/ minor Fine sand F-C (travel) | 7.5YR 3/2 | Solid | Pores Several Roots | - | - | Dry |
| B | 9" | 28" | Silty clay loam | Clay w/ silt trace Fine sand | 7.5YR 4/6 | Solid | Pores Few roots | - | - | 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 | - Did Not Encounter Seasonal High Ground water - No Refusal - <0.5" of Rain in Past 24 hours |
| A | Dark colored, mixed mineral organic matter | | Classification as Follows: Abrupt | |
| B | Maximum accumulation of silicate clay minerals | | Clear | |
| C | Weathered parent material | | <u>Gradual</u> | |
| R | Layer of consolidated rock beneath the soil | | Diffuse | |



Soil Log

Tested By: Jake Marlow

Project: SUNOCO PDP

Project No.: 112IC05958

Test Pit: Wyomissing Road Valve IT-B Date: 10/6/16

Elevation: _____

Equipment Used Mini Excavator

Geology: _____ Soil Type: _____

Land Use: _____

Weather: 70's Sunny

Additional Comments

Mini Excavator to 28"

| 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 | 0" | 1" | Loam | Fine sands | 10YR 2/2 | | Pores Several Roots | - | - | Dry organic Debris |
| A | 1" | 8" | Loam | Silt w/ Fine sand trace clay F-C gravel | 7.5YR 4/3 | Solid | Pores, Several Roots | - | - | Dry |
| B | 8" | 28" | Silty clay loam | Clay w/ Fine silt trace Fine sand | 7.5YR 4/6 | Solid | Few Pores >1/4" Rocks | - | - | 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 Season 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 Merlow

Project: Sunoco PPP

Project No.: 112IC05958

Test Pit: Wyomissing Road Valve IT-C Date: 10/6/16

Elevation: _____

Equipment Used Mini Excavator

Geology: _____ Soil Type: _____

Land Use: _____

Weather: 70s Sunny

Additional Comments

Mini Excavator to 27"

| 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 | 0" | 1" | Loam | Fine Sand | 10YR 3/2 | | Pores Roots | - | - | Dry |
| A | 1" | 15" | Silty Clay Loam | Clay w/silt Trace Fine Sand & Miner | 10YR 4/2 | Solid | Pores Few Roots 1/4" to 1/2" Rock | - | - | Dry |
| B | 15" | 27" | Silty Clay Loam | Clay w/silt Trace Fine Sand | 10YR 4/4 | Solid | Few Pores Few Rocks 1/4" to 1/2" | - | - | 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 | - Did Not Encounter High Seasonal Groundwater - No Refusal - <0.5" of Rain in Past 24 Hours |
| 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 | |

INFILTRATION TEST DATA SHEETS



Tetra Tech, Inc.

INFILTRATION TEST DATA SHEET

WYOMISSING RD. VALLE

PROJECT NAME: SUNOCO LOGISTICS TEST AREA ID: IT-A SURFACE
 PROJECT NUMBER: 112IC05958 - 17 PERSONNEL: K. SIMPSON, J. MARLOW

TEST METHOD: Double Ring Infiltrometer Percolation
 Single Ring Infiltrometer

INNER RING INSIDE DIAMETER/HEIGHT: 6" X 10"
 OUTER RING INSIDE DIAMETER/HEIGHT: 10" X 10"

Location Coordinates or Description:
40.2545523
- 075.9892816

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

DATE(s): 10/6/16

Distance from the bottom of the inner ring/hole to measuring point (minimum water column of 6-8 inches): 7 1/4"

MEASURING POINT: Ring Rim Indicator Mark

DEPTH OF TEST: 7" 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 | | | | |
| 1618 | 0 | ----- | 3.5 | |
| 1648 | 30 | 4 ⁰ /16 | 1.3 | |
| 1718 | 60 | 3 ⁴ /16 | 1.0 | |
| TEST DATA 10 MIN INTERVALS | | | | |
| 1718 | 0 (60) | ----- | — | |
| 1728 | 10 (70) | 10/16 | 0.25 | |
| 1738 | 20 (80) | 9/16 | 0.2 | |
| 1748 | 30 (90) | 8/16 | 0.2 | |
| 1758 | 40 (100) | 7/16 | 0.15 | |
| IN WOOD LOTS OF ROOTS @ TOP DUG DOWN TO 7" TO CLEAR ROOTS | | | | |
| NO RAIN OVER LAST 24 HRS | | | | |
| SEE ALSO PHOTO & SOIL LOG | | | | |



INFILTRATION TEST DATA SHEET

Tetra Tech, Inc.

C

WYOMISSING RD. VALUE

PROJECT NAME: SUNOCO LOGISTICS TEST AREA ID: IT-C SURFACE
 PROJECT NUMBER: 112105958 - 17 PERSONNEL: K. SIMPSON, J. MARLOW

TEST METHOD: Double Ring Infiltrometer Percolation
Single Ring Infiltrometer

Location Coordinates or Description:

INNER RING INSIDE DIAMETER/HEIGHT: 6" x 10"
 OUTER RING INSIDE DIAMETER/HEIGHT: 10" x 10"

40.2541246
-075.9893019

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

DATE(s): 10/6/16

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

MEASURING POINT: Ring Rim Indicator Mark

DEPTH OF TEST: 2" BG-S

| 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

| | | | | |
|------|----|--------|-----|-------------------------|
| 1505 | 0 | ----- | 4.2 | 1320 DROP 3.5" ADD 1.9L |
| 1535 | 30 | 5 1/16 | 1.9 | 1552 " 3.5" " 1.9L |
| 1605 | 60 | 4 1/16 | 1.5 | |

TEST DATA

10 MIN TEST

| | | | | |
|------|----------|-------|-----|------------------|
| 1605 | 0 (60) | ----- | — | START TEST |
| 1615 | 10 (70) | 26/16 | 1.0 | |
| 1625 | 20 (80) | 28/16 | 1.0 | |
| 1635 | 30 (90) | 28/16 | 1.0 | |
| 1645 | 40 (100) | 28/16 | 1.0 | END TEST, STABLE |

NO RAIN OVER LAST 24 HRS

SEE ALSO PHOTO & SOIL LOG