

RADNOR TOWNSHIP

West Wayne Preserve Stormwater Management Project

Flood Reduction Options for the Darby Creek Watershed

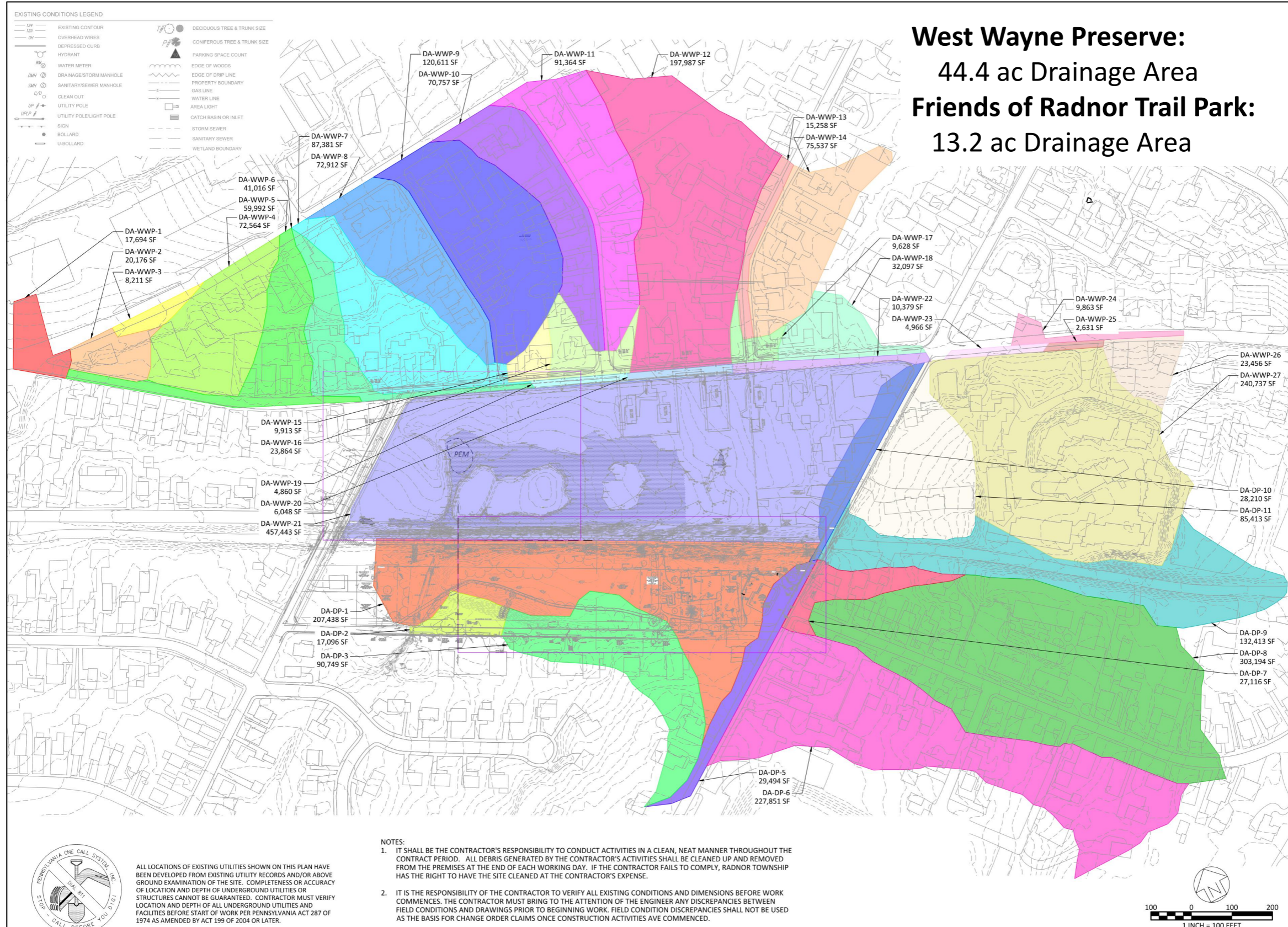
September 9, 2020

Marc Henderson, P.E., Senior Water Resources Engineer,
Meliora Design

West Wayne Preserve & Friends of Radnor Trail Park



West Wayne Preserve & Friends of Radnor Trail Park



West Wayne Preserve:
44.4 ac Drainage Area

Friends of Radnor Trail Park:
13.2 ac Drainage Area

| | |
|------------------------------------------------------------------------------------------------------------|---------------------|
| REVISIONS: | |
| DATE: | ISSUE: |
| | |
| | |
| | |
| OWNER: | |
| RADNOR TOWNSHIP 301 IVEN AVENUE WAYNE, PA 19087-5297 | |
| CIVIL ENGINEERING CONSULTANT: | |
| MELIORA DESIGN 259 MORGAN STREET PHOENIXVILLE, PA 19460 610.933.0123 WWW.MELIORADESIGN.COM | |
| PROJECT TITLE: | |
| WEST WAYNE PRESERVE | |
| SCALE: | |
| 1" = 40' | |
| SUBMISSION: | |
| DESIGN DOCUMENTS | |
| DRAWING TITLE: | |
| EXISTING DRAINAGE AREA PLAN | |
| DATE: | DRAWING NO.: |
| 08/05/20 | C1.35 |
| SCALE: | 1" = 40' |
| DRAWN BY: | MPB |
| CHECKED BY: | MBH |



ALL LOCATIONS OF EXISTING UTILITIES SHOWN ON THIS PLAN HAVE BEEN DEVELOPED FROM EXISTING UTILITY RECORDS AND/OR ABOVE GROUND EXAMINATION OF THE SITE. COMPLETENESS OR ACCURACY OF LOCATION AND DEPTH OF UNDERGROUND UTILITIES OR STRUCTURES CANNOT BE GUARANTEED. CONTRACTOR MUST VERIFY LOCATION AND DEPTH OF ALL UNDERGROUND UTILITIES AND FACILITIES BEFORE START OF WORK PER PENNSYLVANIA ACT 287 OF 1974 AS AMENDED BY ACT 199 OF 2004 OR LATER.

West Wayne Preserve & Friends of Radnor Trail Park

Project Goals:

1. Improve SWM
2. Increase habitat value
3. Provide passive recreational opportunities
4. Reduce downstream flooding
5. Improve existing Township amenities

West Wayne Preserve & Friends of Radnor Trail Park



EXISTING CONDITIONS LEGEND

| | | | |
|--------------------|-------------------------|-------------|------------------------------|
| 1/4" = 1" (Symbol) | EXISTING CONTOUR | TH (Symbol) | DECIDUOUS TREE & TRUNK SIZE |
| 1/2" = 1" (Symbol) | OVERHEAD WIRES | PI (Symbol) | CONIFEROUS TREE & TRUNK SIZE |
| — (Symbol) | DEPRESSED CURB | ▲ (Symbol) | PARKING SPACE COUNT |
| ○ (Symbol) | HYDRANT | — (Symbol) | EDGE OF WOODS |
| ⊙ (Symbol) | WATER METER | — (Symbol) | EDGE OF DRIP LINE |
| DMH (Symbol) | DRAINAGE/STORM MANHOLE | — (Symbol) | PROPERTY BOUNDARY |
| SMH (Symbol) | SANITARY/SEWER MANHOLE | — (Symbol) | GAS LINE |
| ○ (Symbol) | CLEAN OUT | — (Symbol) | WATER LINE |
| UP (Symbol) | UTILITY POLE | — (Symbol) | AREA LIGHT |
| URLP (Symbol) | UTILITY POLE/LIGHT POLE | — (Symbol) | CATCH BASIN OR INLET |
| — (Symbol) | SIGN | — (Symbol) | STORM SEWER |
| — (Symbol) | BOLLARD | — (Symbol) | SANITARY SEWER |
| — (Symbol) | U-BOLLARD | — (Symbol) | WETLAND BOUNDARY |

REVISIONS:

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OWNER:
 RADNOR TOWNSHIP
 301 IVEN AVENUE
 WAYNE, PA 19087-5297

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 259 MORGAN STREET
 PHOENIXVILLE, PA 19460
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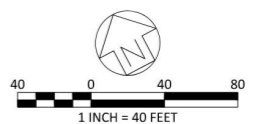
PROJECT TITLE:
 WEST WAYNE PRESERVE

SEAL:
 SUBMISSION:
 DESIGN DOCUMENTS

DRAWING TITLE:
 EXISTING CONDITIONS PLAN

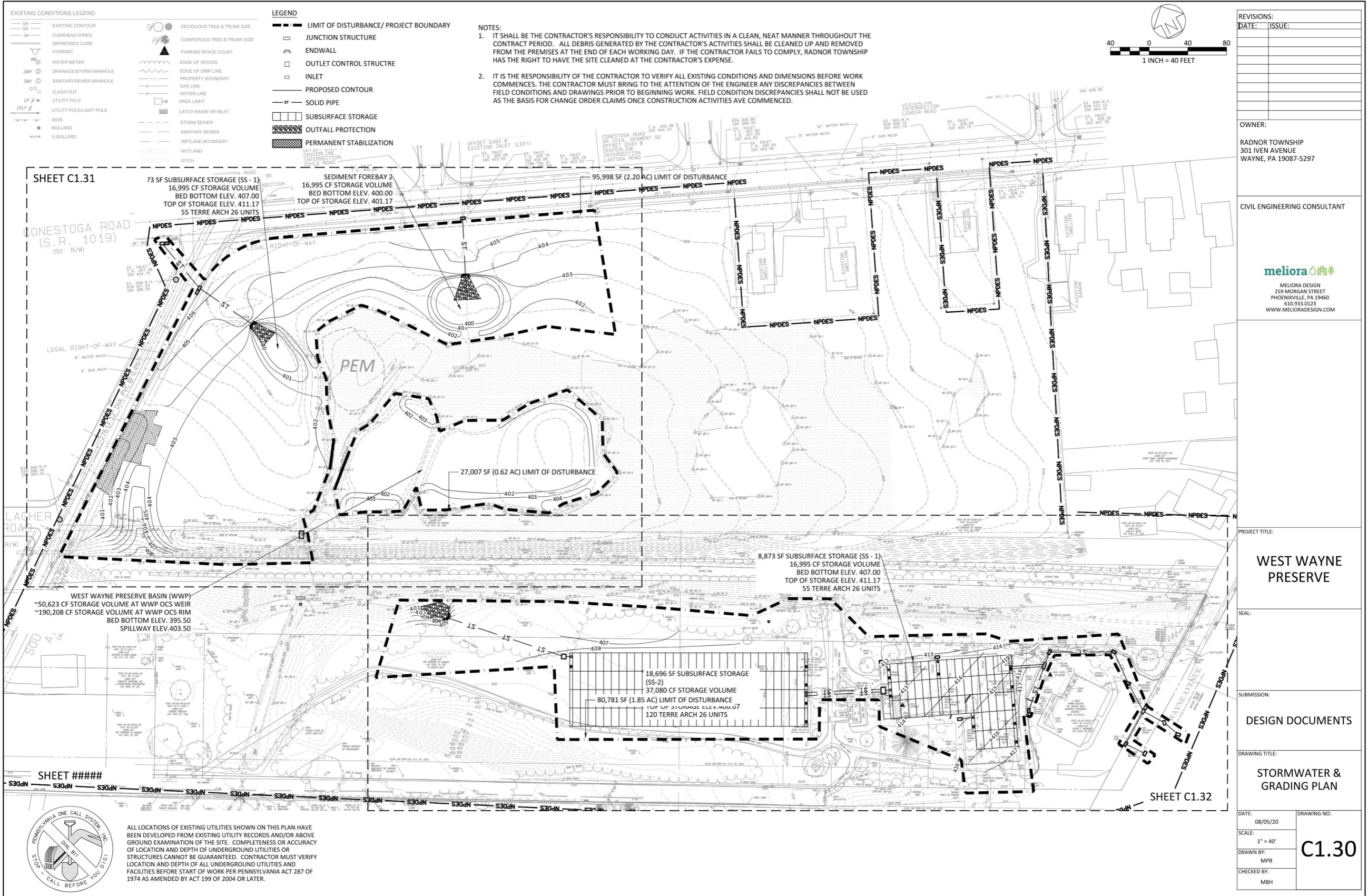
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| DATE: 08/05/20 | DRAWING NO.: C1.00 |
| SCALE: 1" = 40' | |
| DRAWN BY: MPB | |
| CHECKED BY: MBH | |

- NOTES:**
- IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CONDUCT ACTIVITIES IN A CLEAN, NEAT MANNER THROUGHOUT THE CONTRACT PERIOD. ALL DEBRIS GENERATED BY THE CONTRACTOR'S ACTIVITIES SHALL BE CLEANED UP AND REMOVED FROM THE PREMISES AT THE END OF EACH WORKING DAY. IF THE CONTRACTOR FAILS TO COMPLY, RADNOR TOWNSHIP HAS THE RIGHT TO HAVE THE SITE CLEANED AT THE CONTRACTOR'S EXPENSE.
 - IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS BEFORE WORK COMMENCES. THE CONTRACTOR MUST BRING TO THE ATTENTION OF THE ENGINEER ANY DISCREPANCIES BETWEEN FIELD CONDITIONS AND DRAWINGS PRIOR TO BEGINNING WORK. FIELD CONDITION DISCREPANCIES SHALL NOT BE USED AS THE BASIS FOR CHANGE ORDER CLAIMS ONCE CONSTRUCTION ACTIVITIES AVE COMMENCED.



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West Wayne Preserve & Friends of Radnor Trail Park



EXISTING CONDITIONS LEGEND

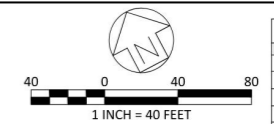
| | | | |
|-----|-------------------------|-----|------------------------------|
| --- | EXISTING CONTOUR | ○ | DECIDUOUS TREE & TRUNK SIZE |
| --- | OVERHEAD WIRES | ○ | CONIFEROUS TREE & TRUNK SIZE |
| --- | DEPRESSED CURB | ○ | PARKING SPACE COUNT |
| --- | HYDRANT | ○ | EDGE OF WOODS |
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| ○ | DRAINAGE/STORM MANHOLE | --- | PROPERTY BOUNDARY |
| ○ | SANITARY/SEWER MANHOLE | --- | GAS LINE |
| ○ | CLEAN OUT | --- | WATER LINE |
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| ○ | SIGN | --- | STORM SEWER |
| ○ | BOLLARD | --- | SANITARY SEWER |
| ○ | U-BOLLARD | --- | WETLAND BOUNDARY |
| | | --- | WETLAND |
| | | --- | DITCH |

LEGEND

| | |
|-----|----------------------------------------|
| --- | LIMIT OF DISTURBANCE/ PROJECT BOUNDARY |
| □ | JUNCTION STRUCTURE |
| □ | ENDWALL |
| □ | OUTLET CONTROL STRUCTURE |
| □ | INLET |
| --- | PROPOSED CONTOUR |
| --- | SOLID PIPE |
| --- | SUBSURFACE STORAGE |
| --- | OUTFALL PROTECTION |
| --- | PERMANENT STABILIZATION |

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 WWW.MELIORADDESIGN.COM

PROJECT TITLE:
 WEST WAYNE PRESERVE

SCALE:

SUBMISSION:
 DESIGN DOCUMENTS

DRAWING TITLE:
 STORMWATER & GRADING PLAN

| | |
|---------------------------|------------------------------|
| DATE: 08/05/20 | DRAWING NO.: C1.30 |
| SCALE: 1" = 40' | |
| DRAWN BY: MPB | |
| CHECKED BY: MBH | |

SHEET #####



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West Wayne Preserve & Friends of Radnor Trail Park



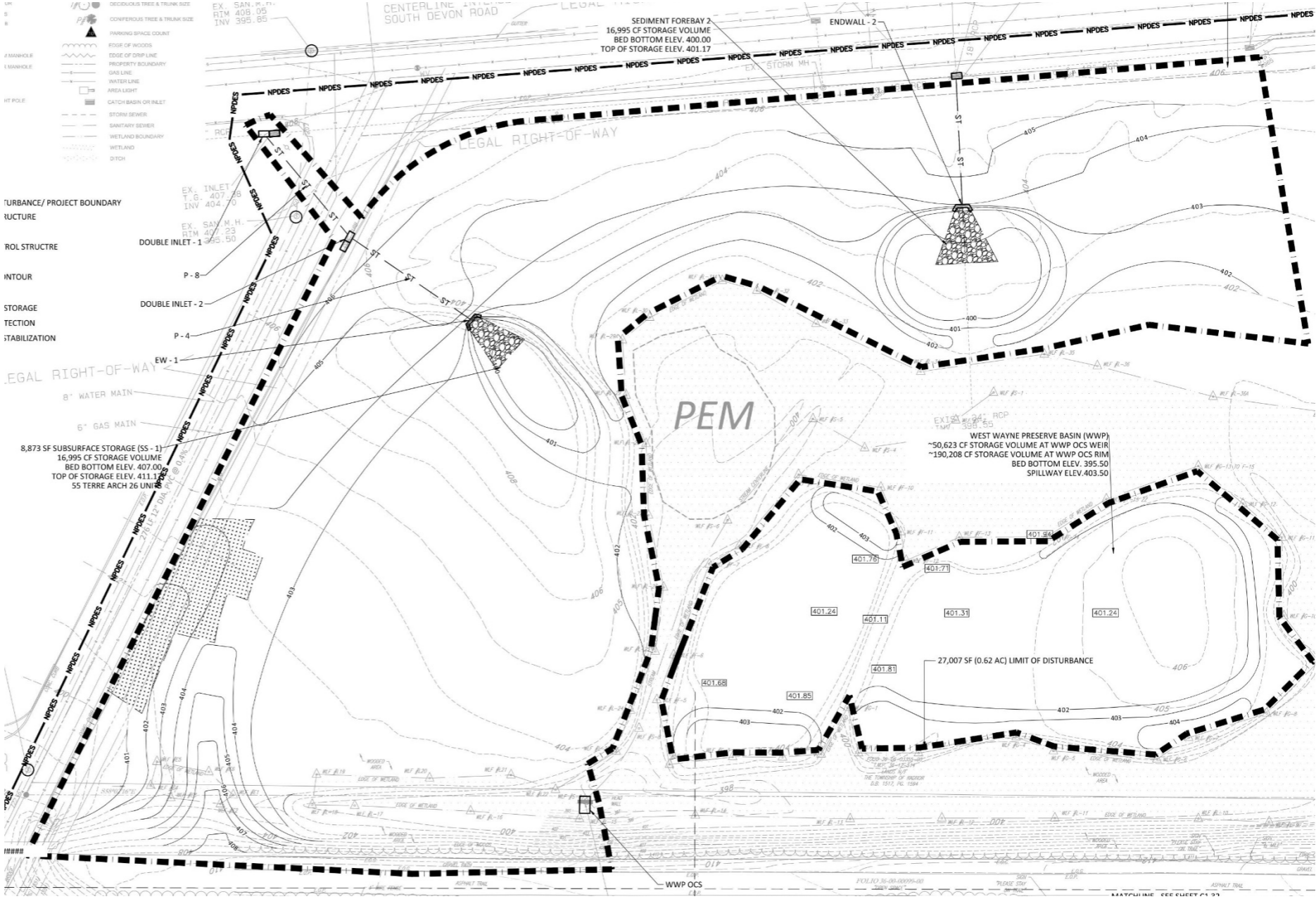
Perennial Plugs



Shrub Tubelings



Tree Whips



West Wayne Preserve & Friends of Radnor Trail Park

— LIMIT OF DISTURBANCE/ PROJECT BOUNDARY

LEGEND

| | | | | |
|-------------------------------------------------------------------------------------|--------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------|----------------------------|
|  | CONIFER TREE |  | FORESTED WETLAND SEEDING | 3.6 ACRES |
|  | DECIDUOUS TREE |  | FORESTED WETLAND CONTAINER/BAREROOT WOODY TREES AND SHRUBS 8' ON CENTER | 31,482 SF 568 PLANTS |
|  | MULTI-STEMMED TREE |  | LIVE STAKES 3' ON CENTER | 37,385 SF 4,800 PLANTS |
|  | SHRUB |  | BIOSWALE SEEDING & PLUGGING 12" ON CENTER | 12,200 SF 14,100 PLANTS |
| | |  | UPLAND SEEDING | 3.5 ACRES |

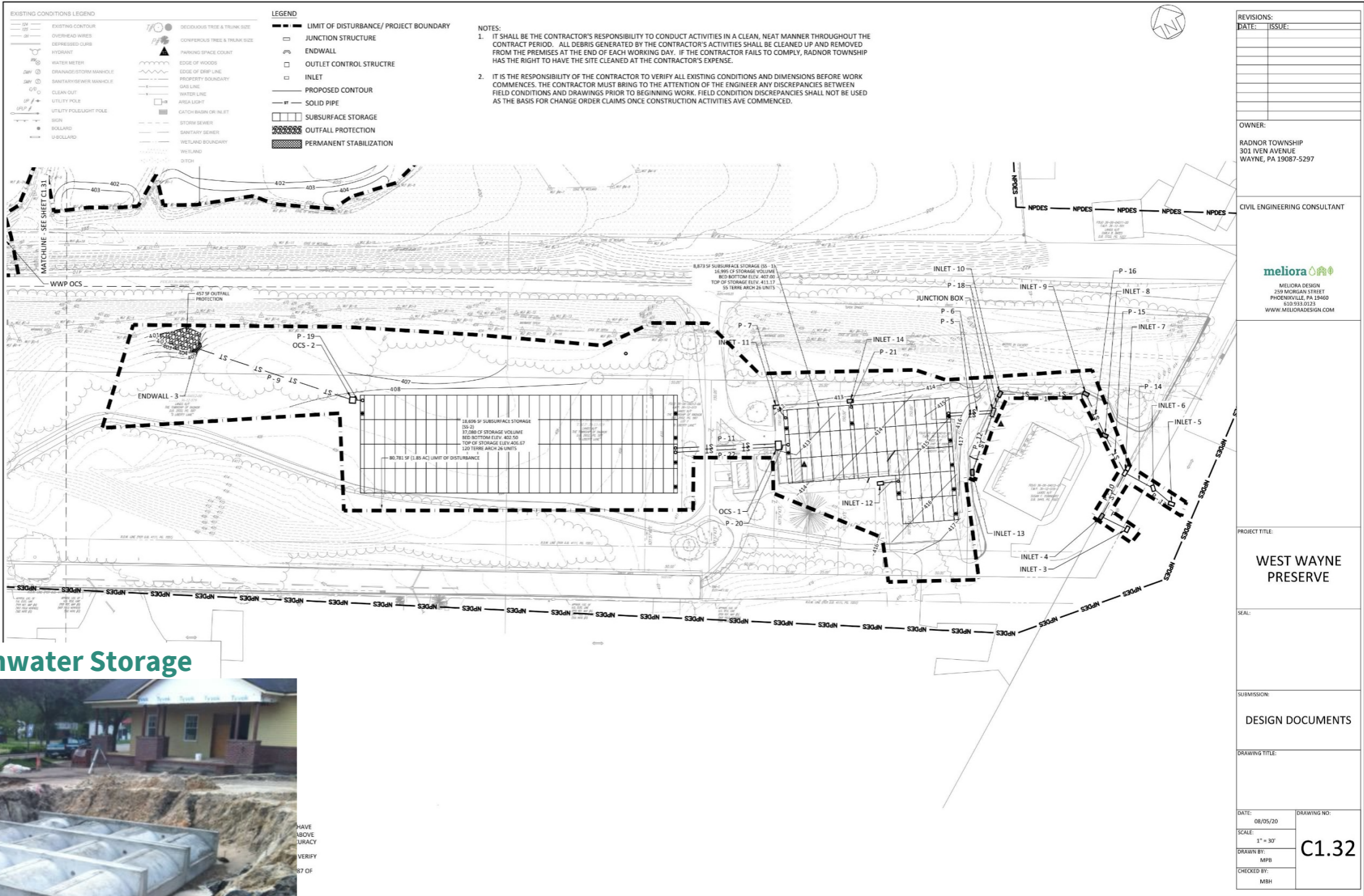


viridian
landscape studio

meliora 

design guided by nature

West Wayne Preserve & Friends of Radnor Trail Park



Subsurface Stormwater Storage



HAVE ABOVE URACY VERIFY 37 OF

Flood Analysis: 10-yr 1-hr Existing Conditions



Legend

- ▲ Area of Flooding Concern
- Radnor Inlets
- SEPTA Train Station
- Radnor Storm Pipes
- SEPTA Regional Rail
- PADEP Impaired Streams (2016)
- Little Darby Creek Watershed
- Municipal Boundaries
- Radnor Township Boundary

MAX DEPTH

- 0.00 - 0.01
- 0.01 - 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- > 1.00

West Wayne Preserve Stormwater Management Project

Existing Conditions

9-9-2020

Radnor Township
Delaware Co. Pennsylvania

meliora

1 inch = 435 feet

0 225 450 Feet

Flood Analysis: 10-yr 1-hr Scenario 1 Implementation

West Wayne Preserve & Friends of Radnor Trail BMPs



Legend

- ▲ Area of Flooding Concern
- Radnor Inlets
- SEPTA Train Station
- Radnor Storm Pipes
- SEPTA Regional Rail
- PADEP Impaired Streams (2016)
- ▭ Little Darby Creek Watershed
- ▭ Municipal Boundaries
- ▭ Radnor Township Boundary

MAX DEPTH

- 0.00 - 0.01
- 0.01 - 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- > 1.00

Proposed BMP Area

- ★ Friends of Radnor Trail
- ★ West Wayne Preserve

West Wayne Preserve Stormwater Management Project

Scenario 1

9-9-2020

Radnor Township
Delaware Co. Pennsylvania

meliora

1 inch = 435 feet

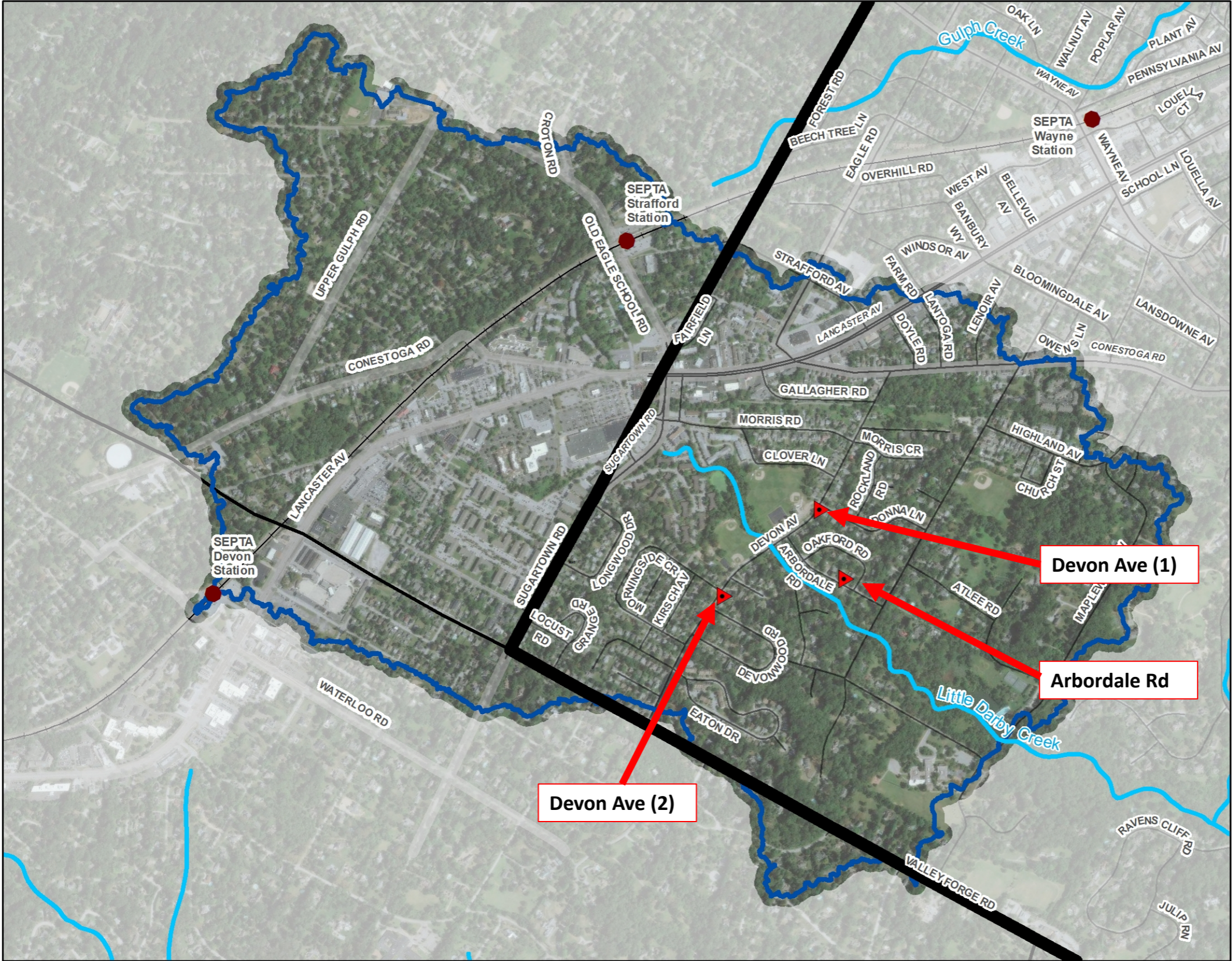
0 225 450 Feet

Flood Reduction Options for Little Darby Creek Watershed

1. Where?
2. When – high intensity rainfalls?
3. When – large storms and hurricanes?
4. How often?



Areas of Concern within Little Darby Creek Watershed



Legend

- Area of Flooding Concern
- SEPTA Train Station
- SEPTA Regional Rail
- PADEP Impaired Streams (2016)
- Little Darby Creek Watershed
- Municipal Boundaries
- Radnor Township Boundary

West Wayne Preserve Stormwater Management Project

Existing Conditions

9-9-2020

Radnor Township
Delaware Co. Pennsylvania

meliora

1 inch = 1,119 feet
0 250 500 1,000 Feet

2020 Major Storm Events To Date



Steven Sosna
@SteveSosnaNBC

#BREAKING: Line of storms that knocked out power to hundreds of thousands of people & left wide d path across **#NJ** & **#PA** classified as "DERECHO" one to impact area was back in 2012 down at s Washington DC. [@NWS_MountHolly](#) & [@NWS](#) [@NBCPhiladelphia](#) [@KYWNNewsradio](#)



4:10 PM · Jun 3, 2020

24 See Steven Sosna's other Tweets

June 3rd: Derecho



Greg Diamond
@gdimeweather

Top rainfall totals (among major observing site Tropical Storm Fay

Ocean City, MD: 5.48"
Dover, DE: 4.81"
Philadelphia, PA: 4.15"
Cape May, NJ: 3.84"
Georgetown, DE 3.63"



8:38 PM · Jul 10, 2020

58 28 people are Tweeting about this

July 10th: Tropical Storm Fay



Radnor Township

August 4 at 10:06 AM ·

[https://www.instagram.com/p/CDeWdHtjRw7/...](https://www.instagram.com/p/CDeWdHtjRw7/)

Water Rescue at Darby Paoli Road/ Goshen Road. Road impassible. Use alternative routes. Stay safe, Radnor!



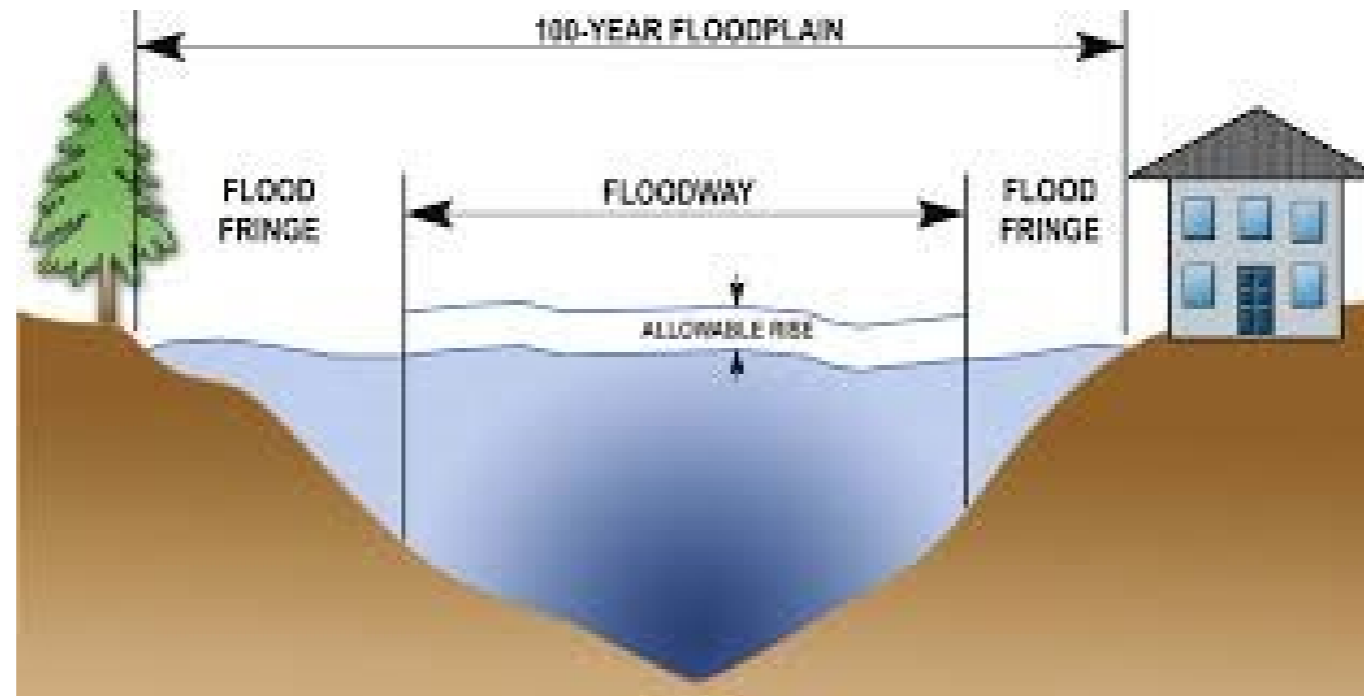
Instagram Post by Radnor Township · August 4, 2020 at 09:33AM PDT

via [instagram.com](#)

August 4th: Tropical Storm Isaias

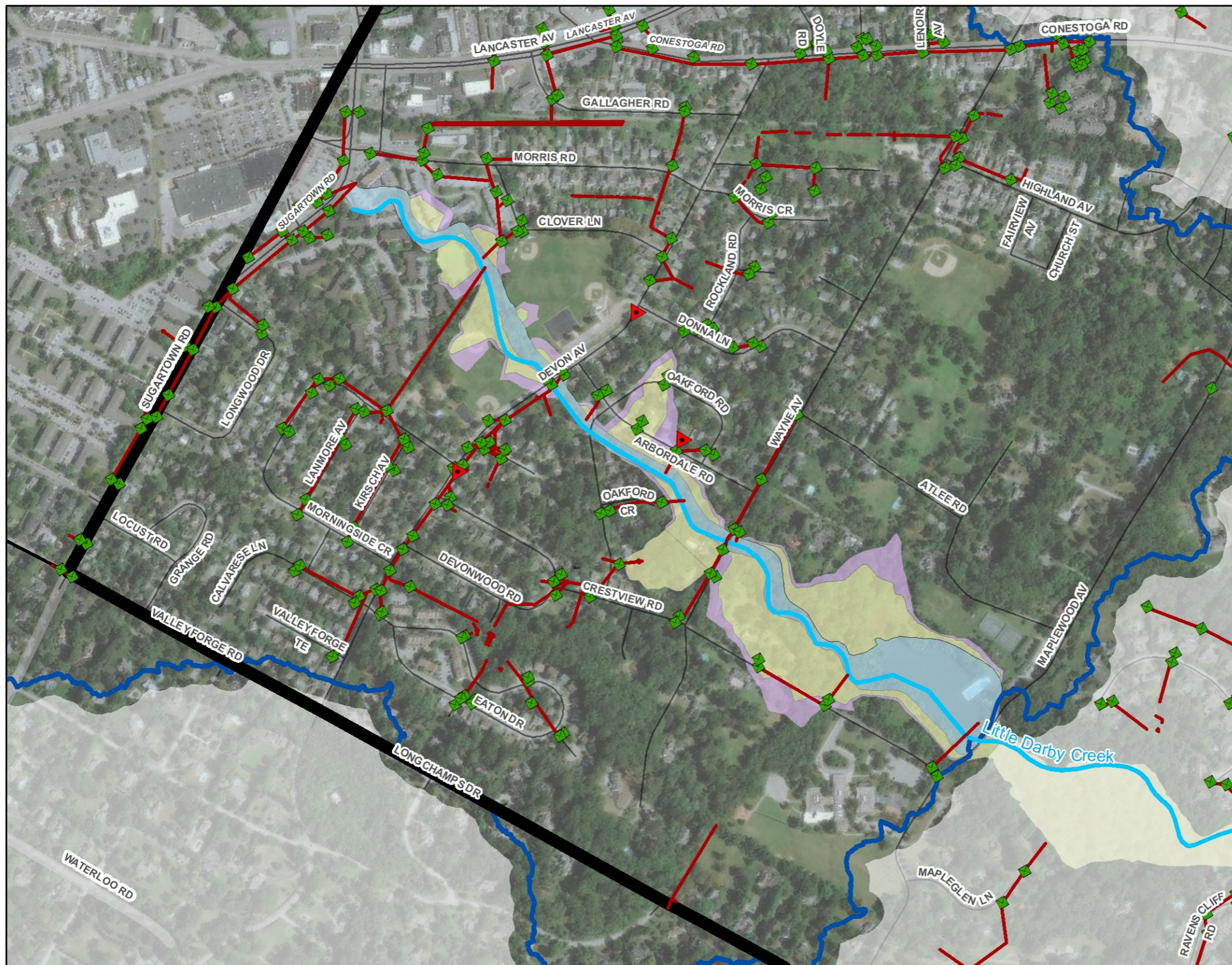
meliora
design guided by nature

FEMA Flood Profile for Little Darby Creek



- 100-Year Floodplain
 - 1% Chance of occurring in a given year
- 500-Year Floodplain
 - 0.2% Chance of occurring in a given year

FEMA Flood Profile for Little Darby Creek



Legend

- ▲ Area of Flooding Concern
- Radnor Inlets
- SEPTA Train Station
- Radnor Storm Pipes
- SEPTA Regional Rail
- PADEP Impaired Streams (2016)
- Little Darby Creek Watershed
- Municipal Boundaries
- Radnor Township Boundary

FEMA Flood Hazards

- AE, FLOODWAY
- A, FLOODPLAIN
- AE, FLOODPLAIN
- AO, FLOODPLAIN
- X/0.2 PCT ANNUAL CHANGE FLOOD HAZARD

West Wayne Preserve Stormwater Management Project

Existing Conditions

9-9-2020

Radnor Township
Delaware Co. Pennsylvania

meliora

1 inch = 608 feet

0 250 500 Feet

FEMA Flood Profile for Little Darby Creek at Arbordale



Legend

- Area of Flooding Concern
- Radnor Inlets
- SEPTA Train Station
- Radnor Storm Pipes
- SEPTA Regional Rail
- PADEP Impaired Streams (2016)
- Little Darby Creek Watershed
- Municipal Boundaries
- Radnor Township Boundary

FEMA Flood Hazards

- AE, FLOODWAY
- A, FLOODPLAIN
- AE, FLOODPLAIN
- AO, FLOODPLAIN
- X/0.2 PCT ANNUAL CHANGE FLOOD HAZARD

West Wayne Preserve Stormwater Management Project

Existing Conditions

9-9-2020

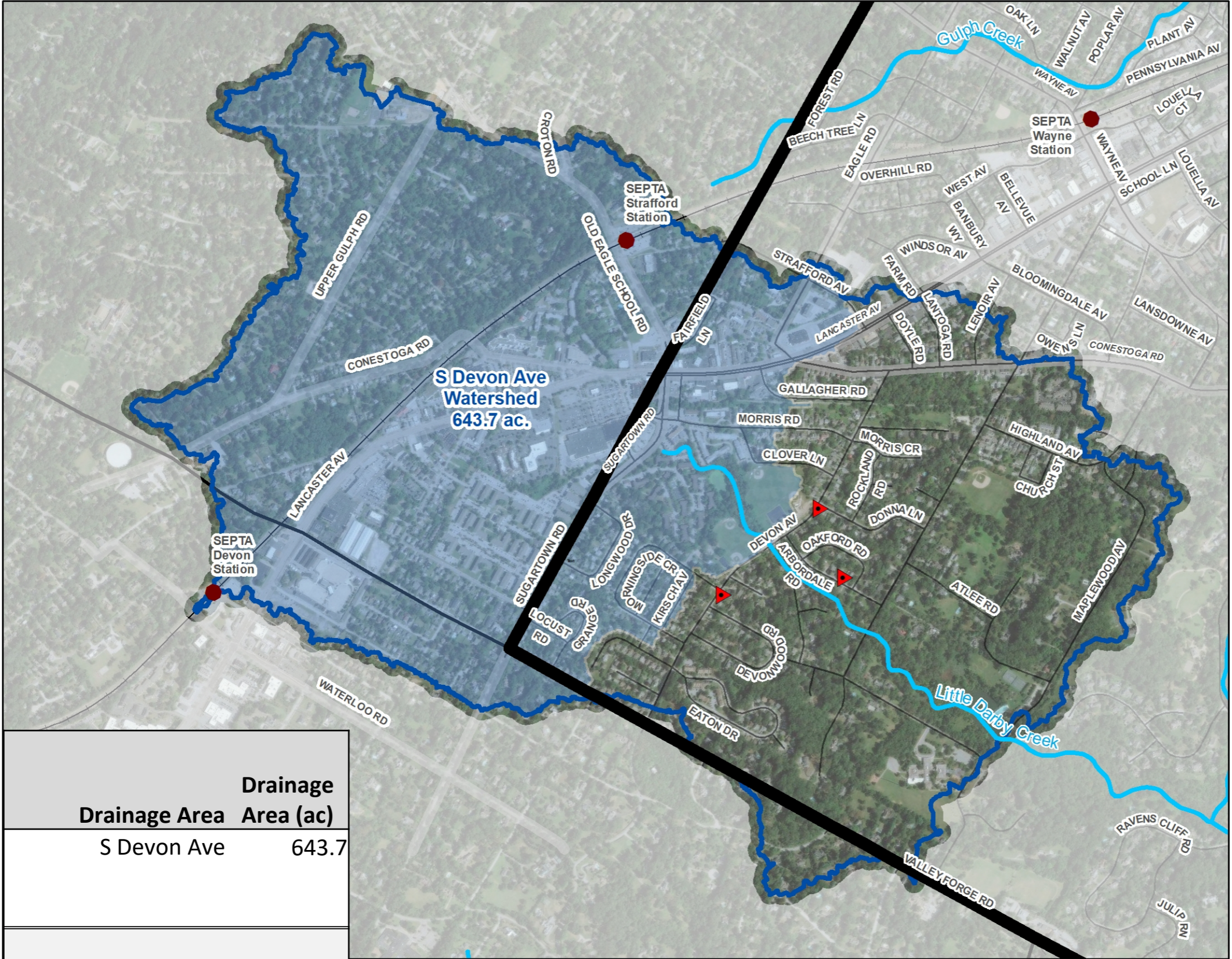
Radnor Township
Delaware Co. Pennsylvania

meliora

1 inch = 258 feet

0 130 260 Feet

Little Darby Creek Watershed Extents



Legend

- ▲ Area of Flooding Concern
- SEPTA Train Station
- SEPTA Regional Rail
- PADEP Impaired Streams (2016)
- ▭ Little Darby Creek Watershed
- ▭ Drains to S Devon Ave
- ▭ Municipal Boundaries
- ▭ Radnor Township Boundary

West Wayne Preserve Stormwater Management Project

Existing Conditions

9-9-2020

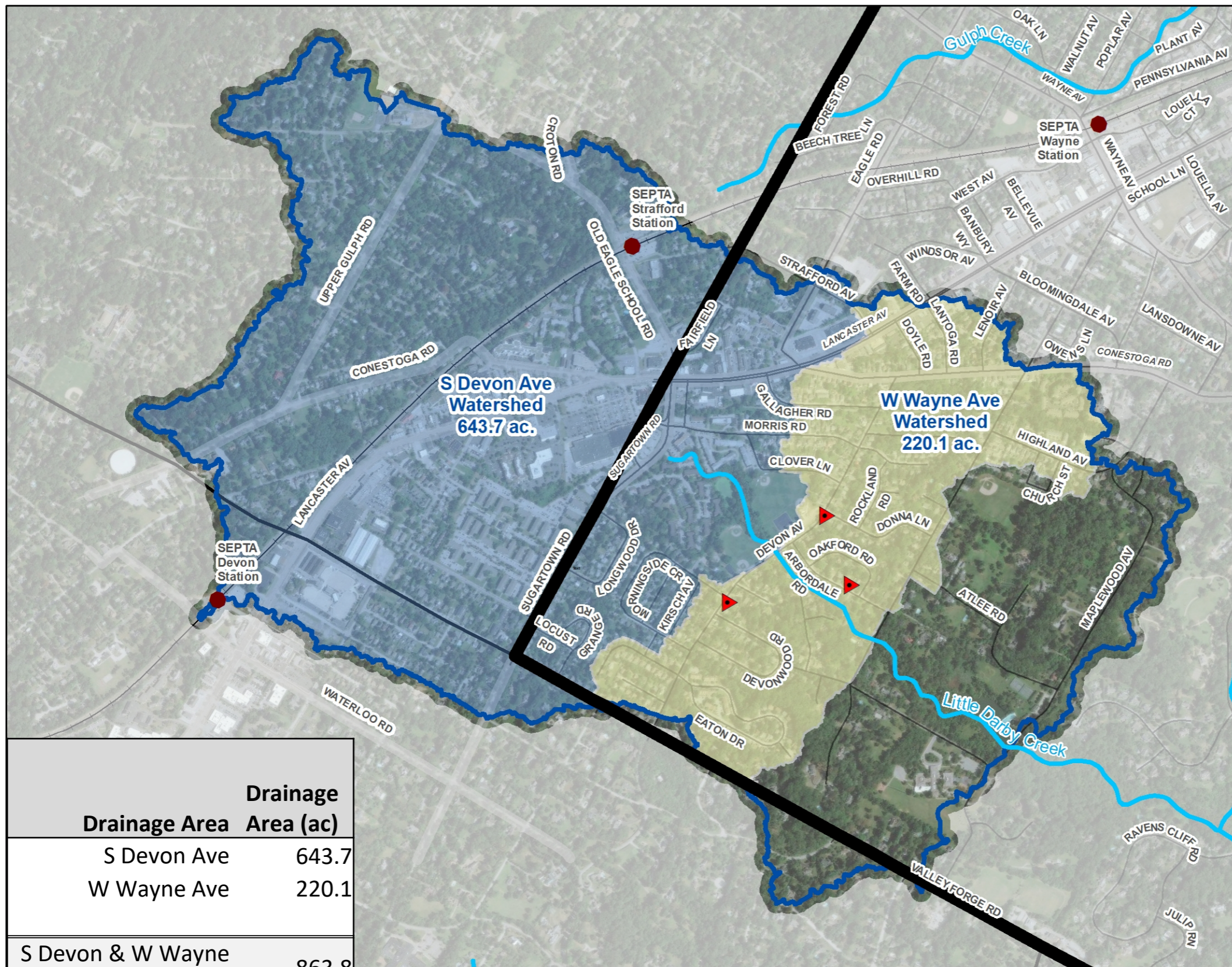
Radnor Township
Delaware Co. Pennsylvania

meliora

1 inch = 1,119 feet
0 250 500 1,000 Feet

| Drainage Area | Drainage Area (ac) |
|---------------|--------------------|
| S Devon Ave | 643.7 |

Little Darby Creek Watershed Extents



- Legend**
- ▲ Area of Flooding Concern
 - SEPTA Train Station
 - SEPTA Regional Rail
 - PADEP Impaired Streams (2016)
 - ▭ Little Darby Creek Watershed
 - ▭ Drains to S Devon Ave
 - ▭ Drains to W Wayne Ave
 - ▭ Municipal Boundaries
 - ▭ Radnor Township Boundary

West Wayne Preserve Stormwater Management Project

Existing Conditions

9-9-2020

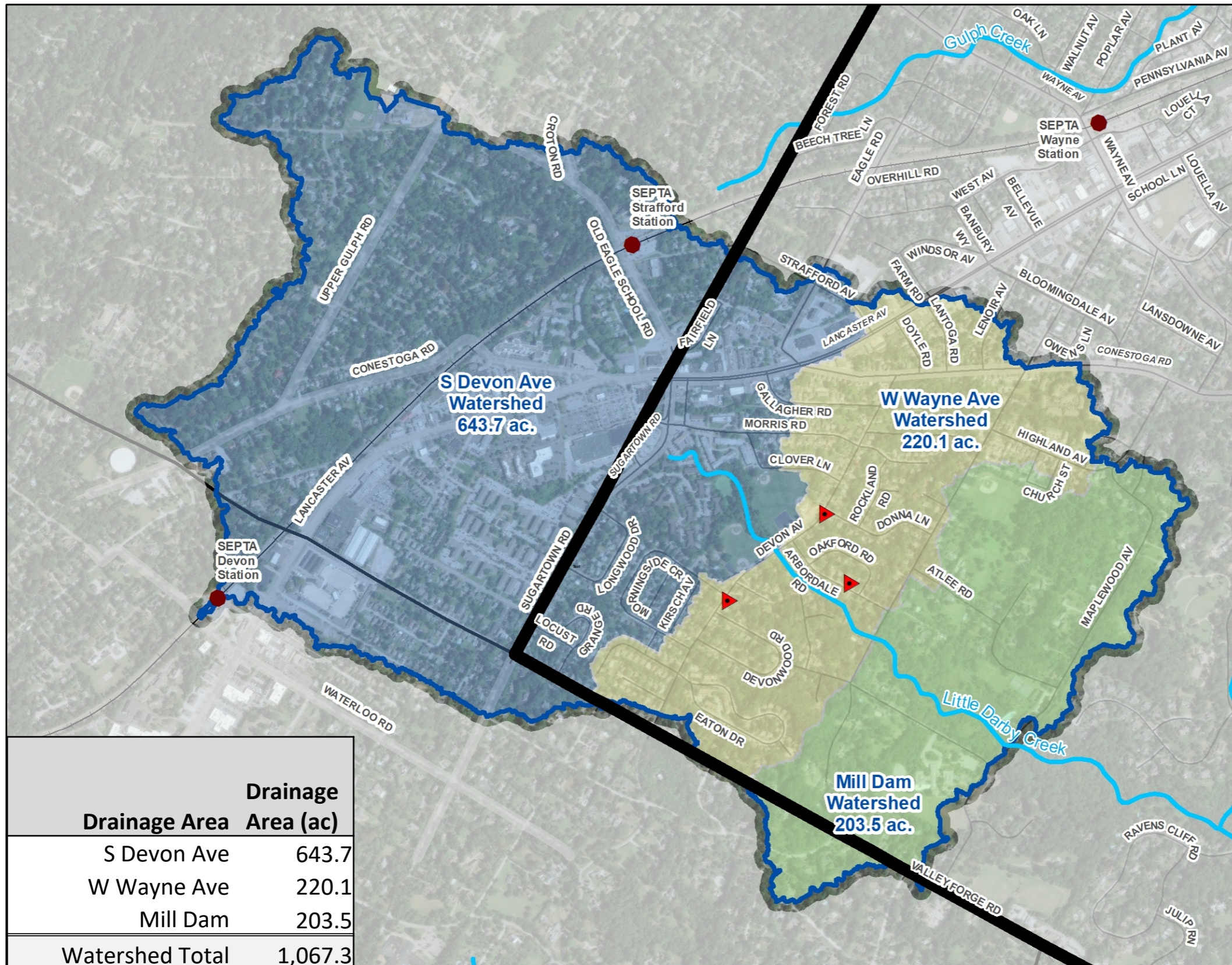
Radnor Township
Delaware Co. Pennsylvania

meliora

1 inch = 1,119 feet
0 250 500 1,000 Feet

| Drainage Area | Drainage Area (ac) |
|---------------------------------------|--------------------|
| S Devon Ave | 643.7 |
| W Wayne Ave | 220.1 |
| S Devon & W Wayne Subtotal | 863.8 |

Little Darby Creek Watershed Extents



Legend

- Area of Flooding Concern
- SEPTA Train Station
- SEPTA Regional Rail
- PADEP Impaired Streams (2016)
- Little Darby Creek Watershed
- Drains to S Devon Ave
- Drains to W Wayne Ave
- Drains to Mill Dam
- Municipal Boundaries
- Radnor Township Boundary

West Wayne Preserve Stormwater Management Project

Existing Conditions

9-9-2020

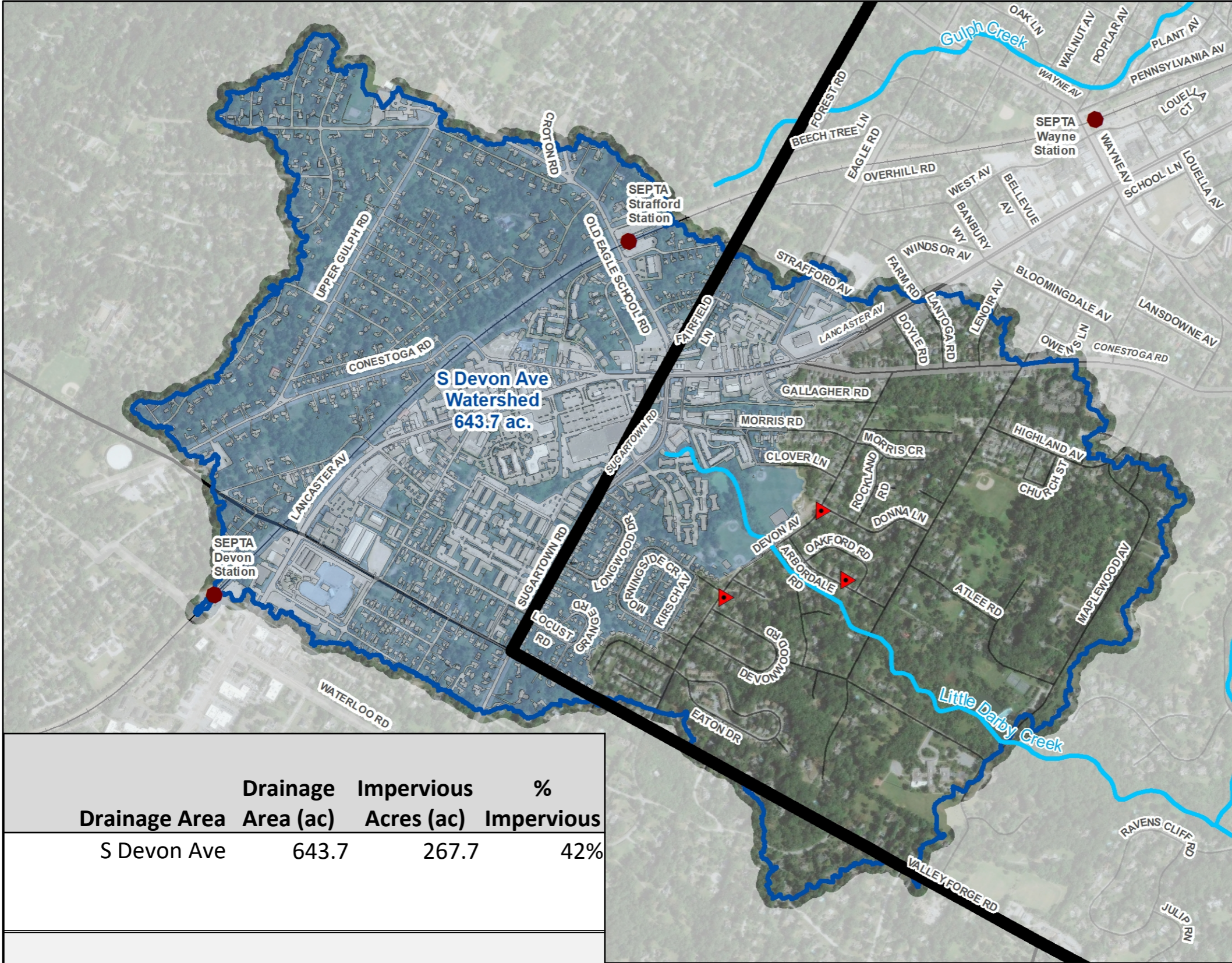
Radnor Township
Delaware Co. Pennsylvania

meliora

1 inch = 1,119 feet
0 250 500 1,000 Feet

| Drainage Area | Drainage Area (ac) |
|------------------------|--------------------|
| S Devon Ave | 643.7 |
| W Wayne Ave | 220.1 |
| Mill Dam | 203.5 |
| Watershed Total | 1,067.3 |

Little Darby Creek Watershed - Imperviousness



Legend

- ▲ Area of Flooding Concern
- SEPTA Train Station
- SEPTA Regional Rail
- PADEP Impaired Streams (2016)
- ▭ Little Darby Creek Watershed
- ▭ Impervious Area
- ▭ Drains to S Devon Ave
- ▭ Municipal Boundaries
- ▭ Radnor Township Boundary

West Wayne Preserve Stormwater Management Project

Existing Conditions

9-9-2020

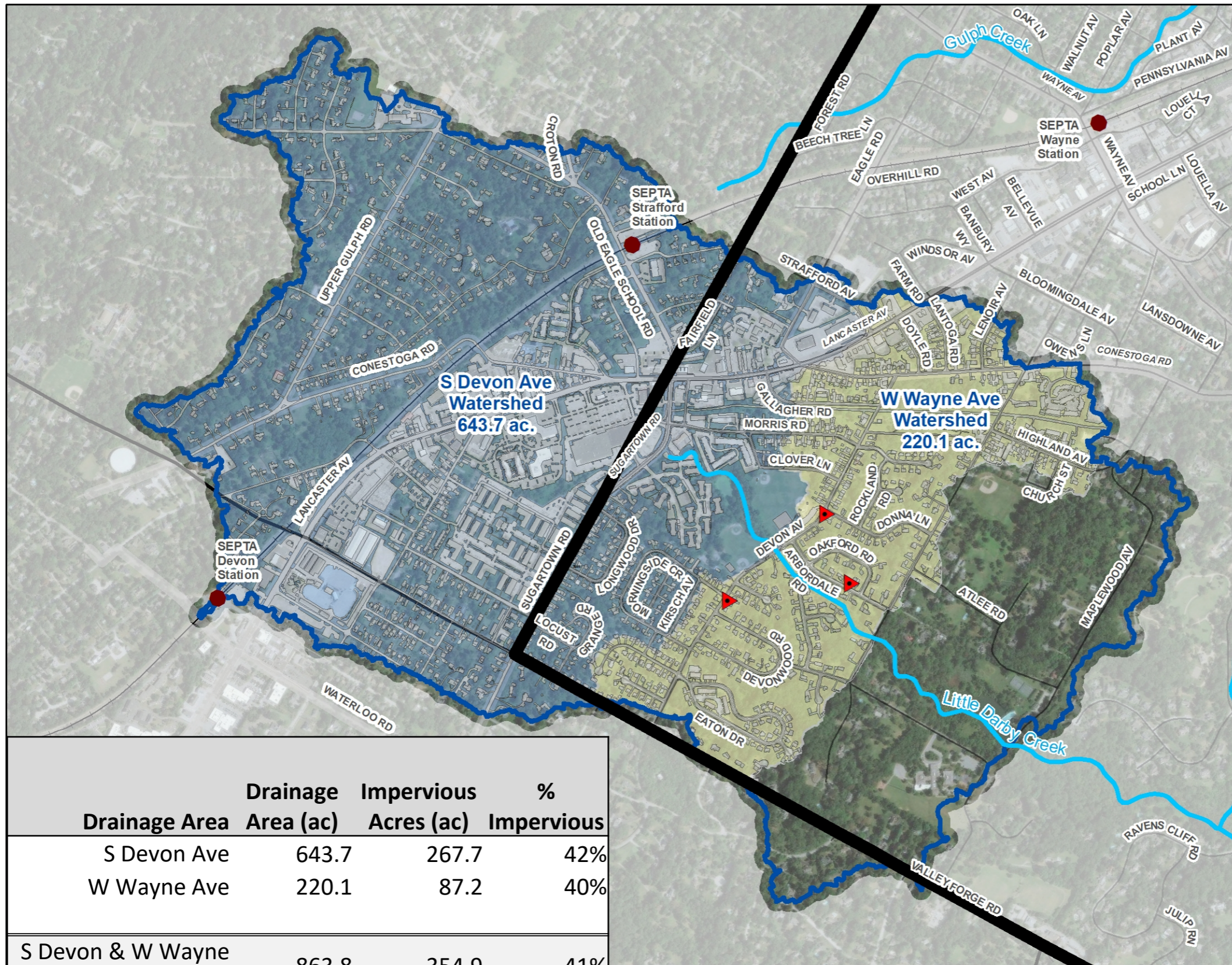
Radnor Township
Delaware Co. Pennsylvania

meliora

1 inch = 1,119 feet
0 250 500 1,000 Feet

| Drainage Area | Drainage Area (ac) | Impervious Acres (ac) | % Impervious |
|---------------|--------------------|-----------------------|--------------|
| S Devon Ave | 643.7 | 267.7 | 42% |

Little Darby Creek Watershed - Imperviousness



- Legend**
- ▲ Area of Flooding Concern
 - SEPTA Train Station
 - SEPTA Regional Rail
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Existing Conditions

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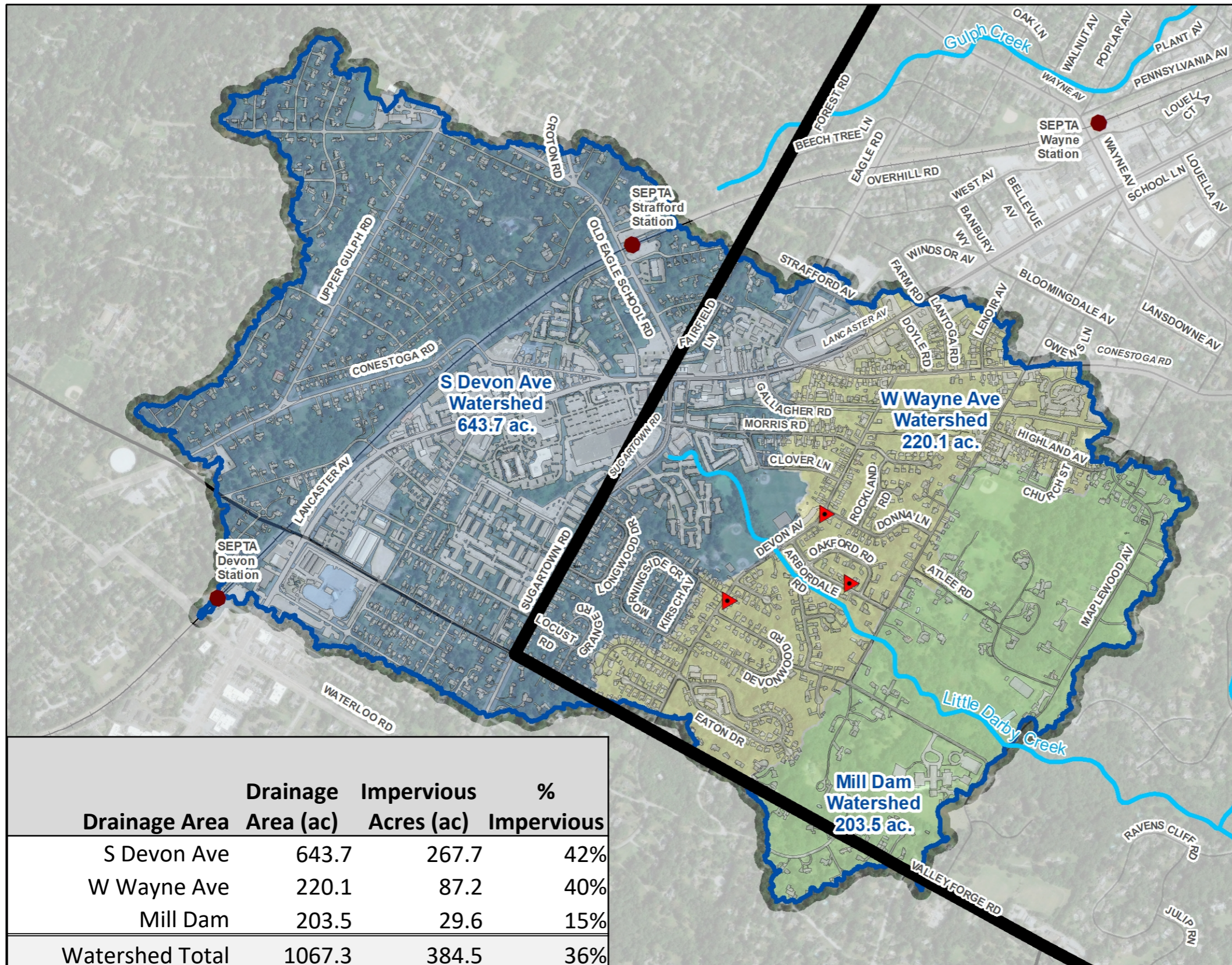
Radnor Township
Delaware Co. Pennsylvania

meliora

1 inch = 1,119 feet
0 250 500 1,000 Feet

| Drainage Area | Drainage Area (ac) | Impervious Acres (ac) | % Impervious |
|---------------------------------------|--------------------|-----------------------|--------------|
| S Devon Ave | 643.7 | 267.7 | 42% |
| W Wayne Ave | 220.1 | 87.2 | 40% |
| S Devon & W Wayne Subtotal | 863.8 | 354.9 | 41% |

Little Darby Creek Watershed - Imperviousness



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- ▲ Area of Flooding Concern
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- SEPTA Regional Rail
- PADEP Impaired Streams (2016)
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- ▭ Drains to S Devon Ave
- ▭ Drains to W Wayne Ave
- ▭ Drains to Mill Dam
- ▭ Municipal Boundaries
- ▭ Radnor Township Boundary

West Wayne Preserve Stormwater Management Project

Existing Conditions

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Delaware Co. Pennsylvania

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1 inch = 1,119 feet
0 250 500 1,000 Feet

Flood Analysis Modeling Results: Implementing Park BMP Projects

Scenario 1: West Wayne Preserve &
Friends of Radnor Trail Park
BMPs

Scenario 2: West Wayne Preserve &
Friends of Radnor Trail Park
BMPs

add: Bo Connor Park &
Warren Filipone Park BMPs



Flood Analysis: 10-yr 1-hr Existing Conditions



Legend

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- Radnor Inlets
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0 225 450 Feet

Flood Analysis: 10-yr 1-hr Scenario 1 Implementation

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- 0.50 - 0.75
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- > 1.00

Proposed BMP Area

- ★ Friends of Radnor Trail
- ★ West Wayne Preserve

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Scenario 1

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meliora

1 inch = 435 feet

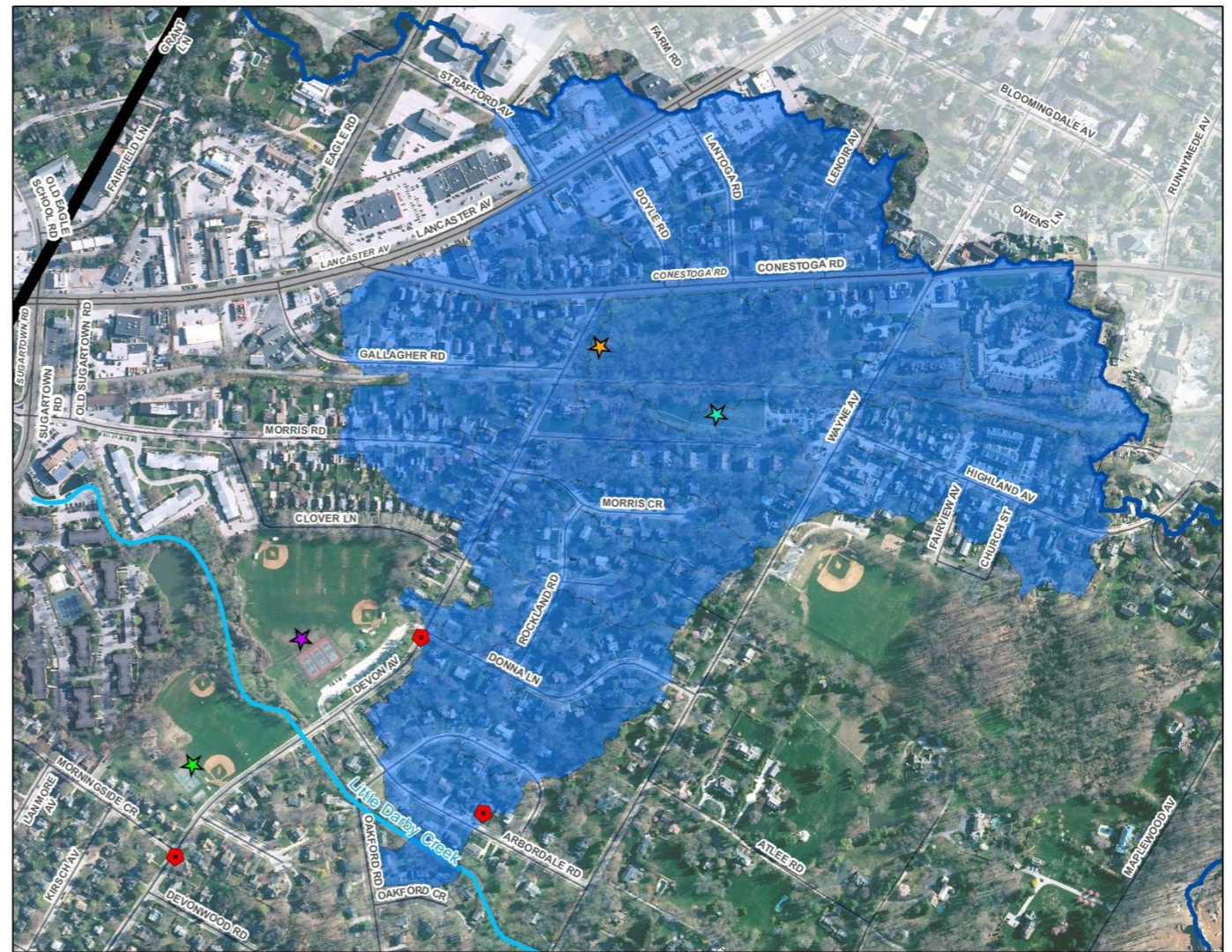
0 225 450 Feet

Modeling Summary

Volume reduction benefits from the 10-year, 1-hour storm event within Arbordale tributary with implementing:

1. West Wayne Preserve BMP
2. Friends of Radnor Trail Park BMP

| | |
|-------------------------------------------|---------|
| Volume from Tributary Drainage Area (CF): | 637,658 |
| Volume Captured by BMPs (CF): | 147,870 |
| Volume Reduction to Creek: | 23% |



Flood Analysis: 10-yr 1-hr Existing Conditions



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- PADEP Impaired Streams (2016)
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- Radnor Township Boundary

MAX DEPTH

- 0.00 - 0.01
- 0.01 - 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- > 1.00

West Wayne Preserve Stormwater Management Project

Existing Conditions

9-9-2020

Radnor Township
Delaware Co. Pennsylvania

meliora

1 inch = 435 feet

0 225 450 Feet

Flood Analysis: 10-yr 1-hr Scenario 2 Implementation

West Wayne Preserve, Friends of Radnor Trail, Bo Connor Park, Warren Filipone Park BMPs



Legend

- ▲ Area of Flooding Concern
- Radnor Inlets
- SEPTA Train Station
- Radnor Storm Pipes
- SEPTA Regional Rail
- PADEP Impaired Streams (2016)
- Little Darby Creek Watershed
- Municipal Boundaries
- Radnor Township Boundary

MAX DEPTH

- 0.00 - 0.01
- 0.01 - 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- > 1.00

Proposed BMP Area

- ★ Friends of Radnor Trail
- ★ West Wayne Preserve
- ★ Warren Filipone Memorial Park
- ★ Bo Connor Park

West Wayne Preserve Stormwater Management Project

Scenario 2

9-9-2020

Radnor Township
Delaware Co. Pennsylvania

meliora

1 inch = 435 feet

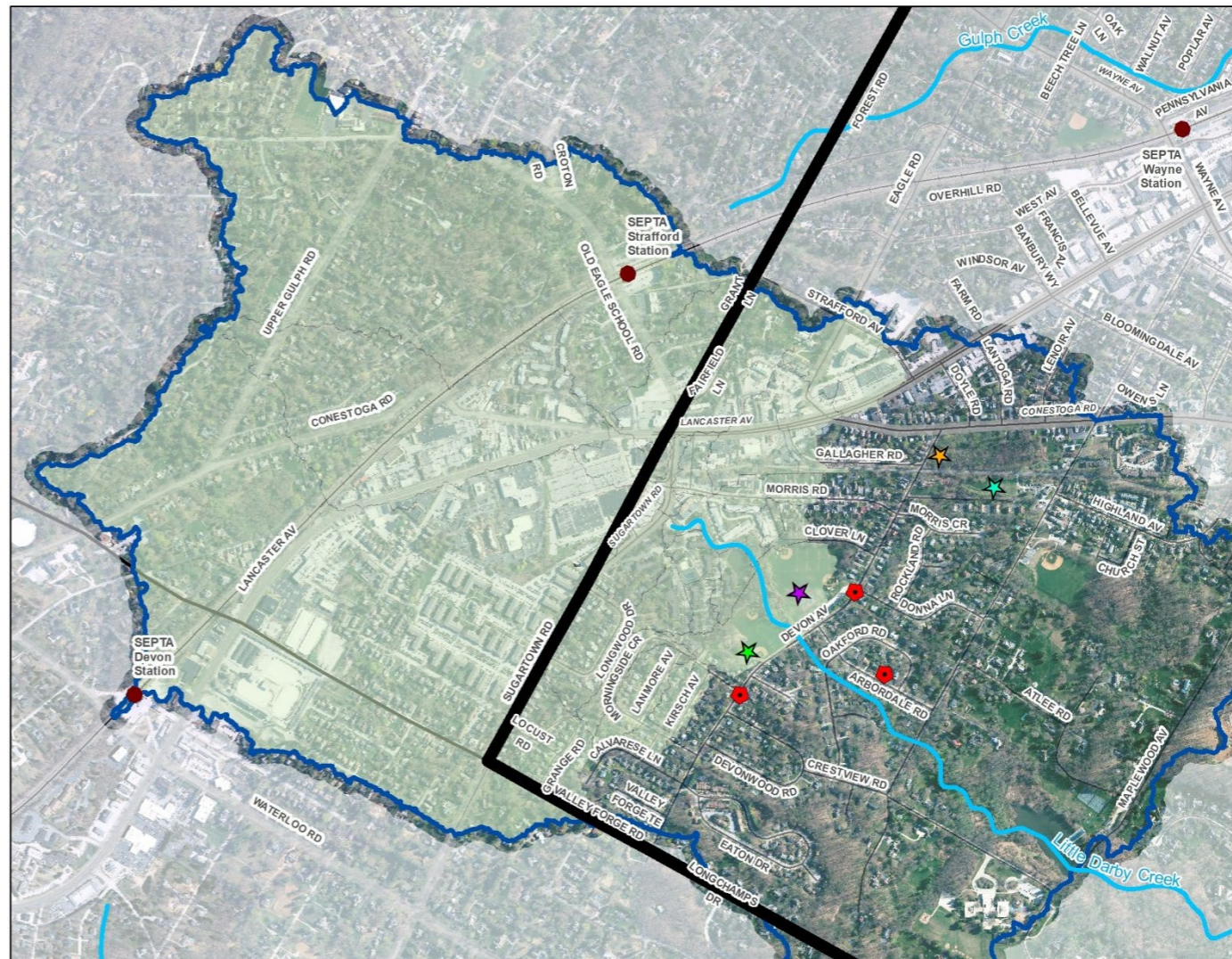
0 225 450 Feet

Modeling Summary

Volume reduction benefits from the 10-year, 1-hour storm event to S Devon Avenue Bridge:

1. Warren Fillipone Park BMP
2. Bo Connor Park BMP

| | |
|-------------------------------------------|-----------|
| Volume from Tributary Drainage Area (CF): | 3,473,032 |
| Volume Captured by WFP/BCP BMPs (CF): | 117,870 |
| Volume Reduction to Creek: | 3% |



Modeling Summary



- NOTES:
- IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CONDUCT ACTIVITIES IN A CLEAN, NEAT MANNER THROUGHOUT THE CONTRACT PERIOD. ALL DEBRIS GENERATED BY THE CONTRACTOR'S ACTIVITIES SHALL BE CLEANED UP AND REMOVED FROM THE PREMISES AT THE END OF EACH WORKING DAY. IF THE CONTRACTOR FAILS TO COMPLY, RADNOR TOWNSHIP HAS THE RIGHT TO HAVE THE SITE CLEANED AT THE CONTRACTOR'S EXPENSE.
 - IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS BEFORE WORK COMMENCES. THE CONTRACTOR MUST BRING TO THE ATTENTION OF THE ENGINEER ANY DISCREPANCIES BETWEEN FIELD CONDITIONS AND DRAWINGS PRIOR TO BEGINNING WORK. FIELD CONDITION DISCREPANCIES SHALL NOT BE USED AS THE BASIS FOR CHANGE ORDER CLAIMS ONCE CONSTRUCTION ACTIVITIES AVE COMMENCED.



ALL LOCATIONS OF EXISTING UTILITIES SHOWN ON THIS PLAN HAVE BEEN DEVELOPED FROM EXISTING UTILITY RECORDS AND/OR ABOVE GROUND EXAMINATION OF THE SITE. COMPLETENESS OR ACCURACY OF LOCATION AND DEPTH OF UNDERGROUND UTILITIES OR STRUCTURES CANNOT BE GUARANTEED. CONTRACTOR MUST VERIFY LOCATION AND DEPTH OF ALL UNDERGROUND UTILITIES AND FACILITIES BEFORE START OF WORK PER PENNSYLVANIA ACT 287 OF 1974 AS AMENDED BY ACT 199 OF 2004 OR LATER.

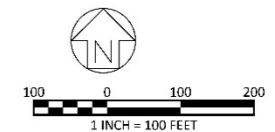
LEGEND

- DRAINAGE AREA 1
- DRAINAGE AREA 2
- DRAINAGE AREA 3
- INFILTRATION BASIN
- EXISTING INLET
- PROPOSED MANHOLE
- PROPOSED OUTLET STRUCTURE
- EXISTING PIPE
- PROPOSED PIPE

LEGEND

- HYDROLOGIC GROUP D SOILS
- 100 YR FLOODWAY EXTENT

CONTRIBUTING DRAINAGE AREA: 15.74 AC (39% IMPERVIOUS)
5:1 IMPERVIOUS LOADING RATIO
55,000 CF APPROX. STORAGE VOLUME



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OWNER:
RADNOR TOWNSHIP
301 IVEN AVENUE
WAYNE, PA 19087-5297

CIVIL ENGINEERING CONSULTANT



PROJECT TITLE:
RADNOR TOWNSHIP MS4

SEAL:

SUBMISSION:
CONCEPT SUBMISSION

DRAWING TITLE:
DRAINAGE AREA PLAN - BO CONNOR PARK

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|---------------------|--------------|
| DATE: 07/11/2019 | DRAWING NO.: |
| SCALE: 1" = 100' | C2.00 |
| DRAWN BY: | |
| CHECKED BY: | |

Modeling Summary



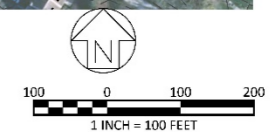
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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| LEGEND | LEGEND |
| DRAINAGE AREA 1 | DRAINAGE AREA 2 |
| DRAINAGE AREA 3 | HYDROLOGIC GROUP D SOILS |
| INFILTRATION BASIN | 100 YR FLOODWAY EXTENT |
| EXISTING INLET | PROPOSED MANHOLE |
| PROPOSED OUTLET STRUCTURE | EXISTING PIPE |
| EXISTING PIPE | PROPOSED PIPE |

CONTRIBUTING DRAINAGE AREA: 25.44 AC (70% IMPERVIOUS)
 5:1 IMPERVIOUS LOADING RATIO
 160,000 CF APPROX. STORAGE VOLUME



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OWNER:
 RADNOR TOWNSHIP
 301 IVEN AVENUE
 WAYNE, PA 19087-5297

CIVIL ENGINEERING CONSULTANT



PROJECT TITLE:
RADNOR TOWNSHIP MS4

SEAL:

SUBMISSION:
CONCEPT SUBMISSION

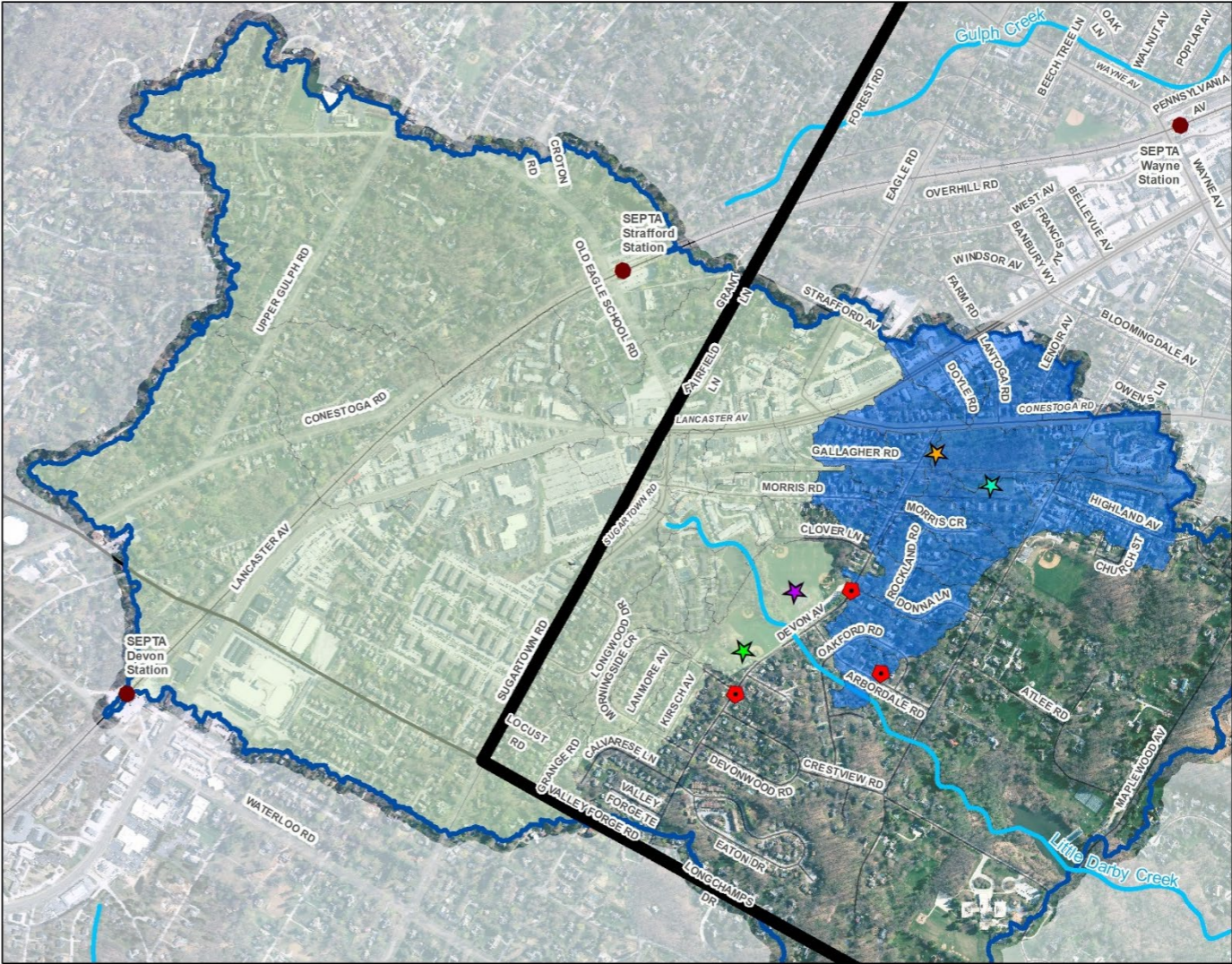
DRAWING TITLE:
DRAINAGE AREA PLAN - FILIPONE MEMORIAL PARK

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| DATE: 07/11/2019 | DRAWING NO: |
| SCALE: 1" = 100' | C2.01 |
| DRAWN BY: | |
| CHECKED BY: | |

Modeling Summary

- Volume reduction benefits from the 10-year, 1-hour storm event with West Wayne Preserve, Friends of Radnor Trail Park, WF Park, & Bo Connor Park BMPs:

| | |
|---------------------------------------|-----------|
| Total Watershed Volume (CF): | 5,126,666 |
| Volume Captured by WWP/FRT BMPs (CF): | 147,870 |
| Volume Captured by WFP/BCP BMPs (CF): | 117,870 |
| Volume Reduction to Creek: | 5% |



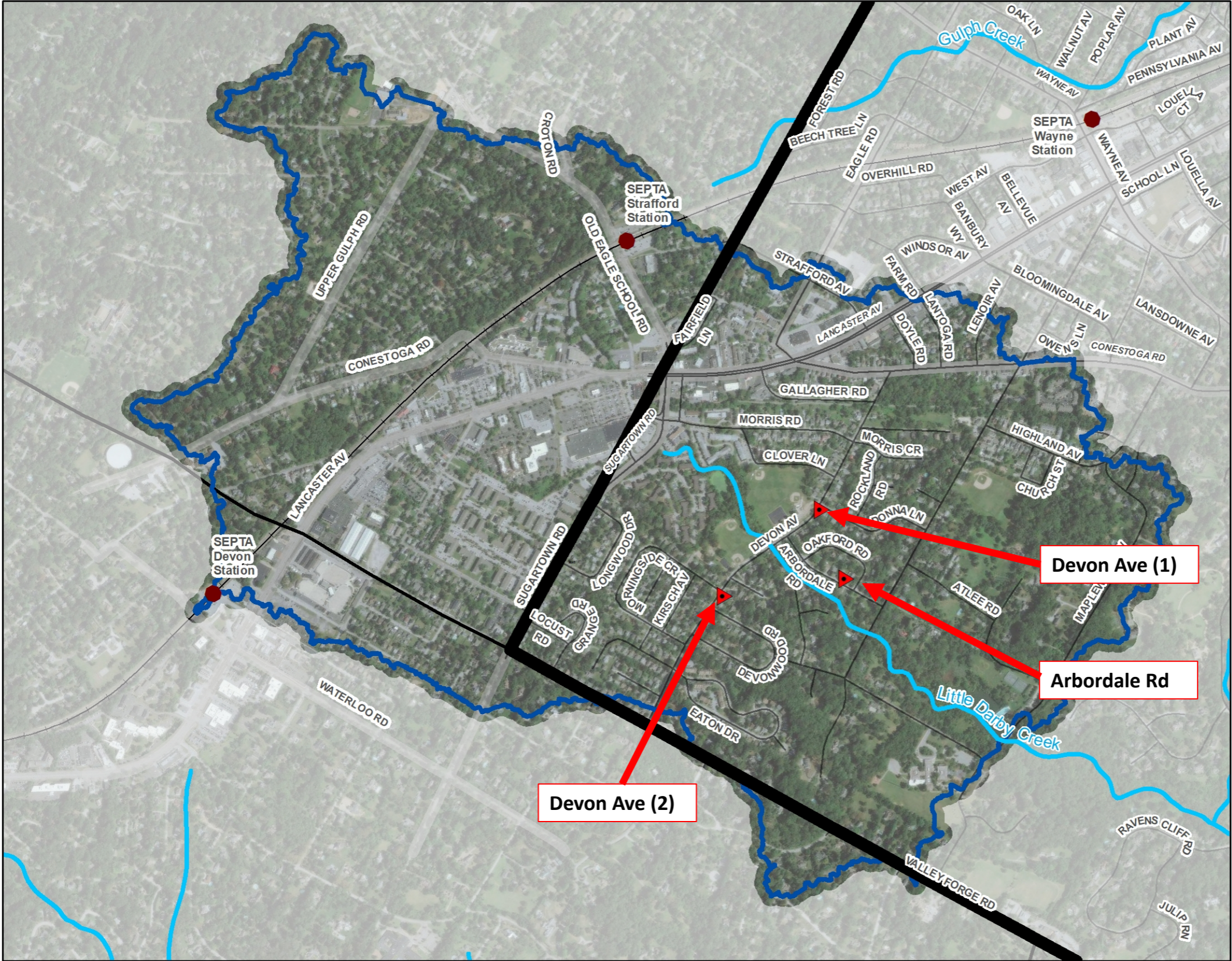
Modeling Summary

- Because modeling of the watershed shows such high runoff volumes and large drainage areas contributing to Little Darby Creek prior to residential neighborhoods, we recommend:
 - Targeted, site-specific evaluation of areas that experience flooding not caused by direct out of bank channel flooding.
 - Limited survey to identify root causes
 - Small projects that increase drainage in ways that will not impact downstream neighbors while providing relief
 - This could include but is not limited to inlet improvements, culvert improvements, grading, SWM targeted at relieving ponding/inundation.
 - These interventions wouldn't impact the main channel of Little Darby Creek but would address specific issues like an inlet that has not capacity to accept water, a low area in topography that does not drain in a storm etc.

Public Feedback:

- Where issues are seen?
- To what extent?

Areas of Concern within Little Darby Creek Watershed



Legend

- Area of Flooding Concern
- SEPTA Train Station
- SEPTA Regional Rail
- PADEP Impaired Streams (2016)
- Little Darby Creek Watershed
- Municipal Boundaries
- Radnor Township Boundary

West Wayne Preserve Stormwater Management Project

Existing Conditions

9-9-2020

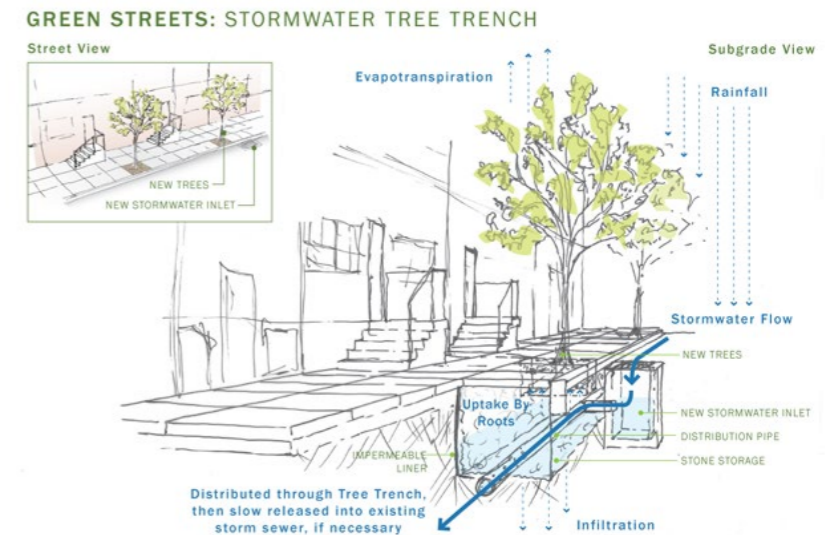
Radnor Township
Delaware Co. Pennsylvania

meliora

1 inch = 1,119 feet
0 250 500 1,000 Feet

Flood Analysis Modeling Results: Runoff Volume Removal in All Subwatersheds Draining to Little Darby Creek

- A 25% Runoff Reduction is approximately 1,300,000 Cu. Ft. of runoff.
 - Various management approaches have different costs per cubic foot of volume capture.
 - Tree Trenches - \$96 / CF
 - 10 Tree trenches captures approximately 10,300 CF – Cost \$992,000
 - Subsurface Storage - \$36 / CF
 - One 60 car parking lot could include 34,000 CF of subsurface storage – Cost \$1,230,000



Flood Analysis Modeling Results: Runoff Volume Removal in All Subwatersheds Draining to Little Darby Creek

- A 25% Runoff Reduction is approximately 1,300,000 Cu. Ft. of runoff.
 - Various management approaches have different costs per cubic foot of volume capture.
 - Rain Garden- \$16 / CF
 - A 3,300 SF rain garden can have approximately 5,000 CF of storage – Cost \$80,000



Flood Analysis Modeling Results: Runoff Volume Removal in All Subwatersheds Draining to Little Darby Creek

- While Raingardens have a low cost per cubic foot of runoff managed, they take up a large surface footprint and may displace other beneficial land uses such as active recreation or parking
- Subsurface systems are more expensive but allow users to maintain the use of the surface for a separate purpose beyond stormwater management.
- A 1,300,000 cubic foot volume reduction would require the following
 - 858,000 SF of Raingarden costing \$20,800,000
 - 841,000 SF of Subsurface Storage costing \$46,800,000
 - 1,363,106 SF of Tree Trench costing \$124,800,000