Borough of Shoemakersville

MS4 Program

Pollutant Reduction Plan (PRP)

For

UNT to Schuylkill River (Appendix E)

2018 – 2023 MS4 Permit

June 2017

ARRO Project No. 10099.00

ARRO Consulting, Inc.
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TABLE OF CONTENTS

1. INTRODUCTION

Shoemakersville Borough, Berks County was classified as an urbanized area per the 2010 U.S. Census. The Pennsylvania Department of Environmental Protection (PA DEP) has notified the Borough that they are required to renew the National Pollutant Discharge Elimination System (NPDES) Small Municipal Separate Storm Sewer Systems (MS4) permit. The requirements for Shoemakersville Borough are defined by the PA DEP Ms4 requirements as:

MS4 Name	NPDES ID	Individual Permit Required?	Reason	Impaired Downstream Waters or Applicable TMDL Name	Requirement(s)	Other Cause(s) of Impairment
Berks County						
SHOEMAKERSVILLE BORO		No		Schuylkill River PCB TMDL	Appendix C-PCB (4a)	
				Unnamed Tributaries to Schuylkill River	Appendix E-Siltation (5)	

This Pollutant Reduction Plan (PRP) has been developed to satisfy the requirements of: PRP for UNT to Schuylkill River. All of the storm sewer sheds identified in this plan are tributary to the Schuylkill River.

2. POLLUTANT REDUCTION PLAN (PRP)

A. Public Participation

Shoemakersville Borough encouraged a plan that included public participation and buy in. The Borough publicly advertised notice of public review, 30 day comment period and public meeting. A copy of the advertisement is located in Appendix A.

The Borough posted a copy of the complete draft Pollutant Reduction Plan on the Borough Website prior to the public notice. A hard copy was also made available at the Borough office during normal business hours.

The Borough received written comment from July 1, 2017 to July 31, 2017; a copy of all written comments is provided in Appendix B. A public meeting was held on August 1, 2017 at 7:00 PM; a summary of comments received is provided in Appendix C.

The Borough would like to acknowledge the valuable input received from the public and Borough Staff in the development of the PRP. The Borough's record of consideration for all timely comments received is provided in Appendix D. This PRP reflects careful planning of Shoemakersville with respect to the impaired waters of the commonwealth, local flooding, erosion problems, and the financial impact to the residents.

B. Map

In accordance with PA DEP guidelines for development of the PRP, Shoemakersville Borough has completed mapping of the regulated MS4 Storm Sewer Sheds; the required mapping is provided in Appendix E. Mapping of the Borough was broken out into a series of mapping, consistent with the design process for the development of the PRP. This methodology also provides for clarity of the data being presented. The mapping includes the following:

- Shoemakersville Borough MS4 Conveyance System – includes collection and conveyance to the regulated outfalls, identifies outfall, outfall location with latitude and longitude, and waters of the commonwealth and Chapter 93 designation.
- Shoemakersville Borough Attaining/Non-Attaining Streams – defines streams attainment status and associated impairment.
- Shoemakersville Borough MS4 Drainage Area Land Use – defines land use based upon zoning to assist in determination of land use contribution to local impairments.
- Shoemakersville Borough MS4 Drainage Area Analysis – provides topographic map utilized in determining storm sewer shed to outfalls.
- Shoemakersville Borough MS4 Drainage Area Impervious/Pervious Analysis – provides aerial mapping utilizing Geographic Information System (GIS) data to identify the drainage area and amount of impervious area within each storm sewer shed.
- Shoemakersville Borough MS4 Drainage Area Runoff Rate and Volume Analysis – provides rate and volume of runoff per storm sewer shed to identify potential local flooding issues.
- Shoemakersville Borough Municipal Storm Sewer Shed – provides a comparison of the 2010 Census Urbanized Area boundary to define regulated MS4 outfalls and the portion of the storm sewer sheds that the Borough is responsible for.
- Shoemakersville Borough Existing BMP Structures – identifies existing Best Management Practices accounted for in the reduction of the base pollutant loading.
- Shoemakersville Borough Geology – in combination with NRCS soils data, geology is evaluated for the suitability for potential BMP implementation.
- Shoemakersville Borough Potential BMP Structures – provides identification of potential BMPs identified by the Borough that were evaluated.
- Shoemakersville Borough Proposed BMP Structures – provides identification of the selected BMPs identified by the Borough for implementation.

C. Pollutants of Concern

Shoemakersville Borough, in accordance with the PA DEP Municipal requirements table and the impaired waters mapping provided herein, is subject to Appendix D and Appendix E of the MS4 permit.

Appendix E – UNT to Schuylkill River

Appendix E is the requirement for development of a Pollutant Reduction Plan (PRP) for the identified impaired waterway. Shoemakersville Borough is responsible for developing a PRP for UNT to Schuylkill River to address siltation. In accordance with the PRP guidelines, the goal of the PRP is for the following reductions:

- 3% reduction of Total Nitrogen (TN)
- 5% reduction of Total Phosphorous (TP)
- 10% reduction of Sediment (TSS)

Furthermore, the PA DEP PRP instructions state: "If the impairment is based on siltation only, a minimum 10% sediment reduction is required. If the impairment is based on nutrients only or other surrogates for nutrients (e.g., "Excessive Algal Growth" and "Organic Enrichment/Low D.O."), a minimum 5% TP reduction is required. If the impaired is due to both siltation and nutrients, both sediment (10% reduction) and TP (5% reduction) must be addressed." The PRP has been prepared to meet the required 10% reduction of sediment.

D. Existing Loading for Pollutants of Concern

Based upon the storm sewer shed delineation, the existing loading for TSS, TP and TN was calculated for each storm sewer shed. Pollutant loadings were calculated based upon PA DEP's "Developed Land Loading Rates for PA Counties" (Attachment B of the PRP instructions) for Berks County; the calculated pollutant loadings are provided in Appendix F. The calculations are summarized below:

Base Pollutant Loading (No Existing BMPs) Summary:

Appendix E - UNT to Schuylkill River

	Drainage Area (Ac)			PA DEP Land Loading		
Drainage Area ID	**Impervious**	**Pervious**	**Total**	**TN (lbs/year)**	**TP (lbs/year)**	**TSS (lbs/year)**
UNT to Schuylkill River	12.41	16.99	29.39	1,034.51	44.68	28,380.73
				1,034.51	**44.68**	**28,380.73**
Required Reduction Percent				3%	5%	10%
Required Reduction (Lbs/Year)				**31.04**	**2.23**	**2,838.07**

D.1. Existing BMP Load Reductions

Based upon the mapping (see Attachment E), Shoemakersville Borough identified existing BMPs that would reduce the existing pollutant loading. Attachment E provides a summary of the existing BMPs, along with ownership, operation and maintenance requirements. The percent of pollutant reductions for each BMP was determined based upon the recommendation reports of the Chesapeake Bay Expert Panel. The existing BMP pollutant load reduction calculations are provided in Attachment G. The existing loading for TSS, TP and TN was re-calculated for each storm sewer shed accounting for the pollutant load reduction from the existing BMPs, see Attachment H. The design base pollutant loading and required pollutant reduction goal is summarized below:

Base Pollutant Loading With Existing BMPs Summary:

	Drainage Area (Ac)			PA DEP Land Loading		
Drainage Area ID	**Impervious**	**Pervious**	**Total**	**TN (lbs/year)**	**TP (lbs/year)**	**TSS (lbs/year)**
UNT to Schuylkill River	12.41	16.99	29.39	1,034.51	44.68	28,380.73
BMP Reductions				45.81	3.37	2,494.11
				988.70	**41.32**	**25,886.63**
Reequired Reduction Percent:				3%	5%	10%
Adjusted Required Reduction (Lbs.):				**29.66**	**2.07**	**2,588.66**

E. Selected BMP's

Shoemakersville Borough developed a potential BMP concept plan to identify potential BMPs to be implemented, see Attachment E. The associated pollutant loading reductions for each BMP were calculated and are provided in Attachment I; a summary description of the potential BMPs evaluated is also provided in Attachment I. The percent of pollutant reductions for each BMP

were determined based upon the recommendation reports of the Chesapeake Bay Expert Panel, PA DEP BMP Effectiveness Value table, and manufacture literature including independent laboratory testing (appropriate manufacture data is provided in Attachment J).

Shoemakersville Borough evaluated the following factors in selection of the BMPs to be implemented achieve the required pollutant load reduction. These factors included:

- Return-on-investment for dollar per pound of pollutant removed (See Appendix M)
- Overall BMP cost (see Appendix L)
- Secured grant funding
- Availability of land to implement BMPs
- Local flooding and erosion problems
- Drainage areas associated with identified waterways
- Consistency with Economic Development initiatives

Based upon the potential BMP evaluation, Shoemakersville Borough developed the proposed BMPs to be implemented under the MS4 permit from 2018 – 2023. The proposed BMPs are identified on Map 11: Shoemakersville Borough Proposed BMP Structures. The proposed BMP pollutant reduction is summarized below and in attachment K:

Selected BMPs Option:
Option 1:

				Pollutant Reduction		
	Drainage Area ID	Prop. BMP ID	BMP Description	TN (lbs/year)	TP (lbs/year)	TSS (lbs/year)
UNT to Schuylkill River						
	OF-001	BMP 001-BS1	Bioswale	370.77	18.20	13,150.38
				370.77	**18.20**	**13,150.38**
Required Reduction (Lbs/Year)				**29.66**	**2.07**	**2,588.66**
Net Reduction:				341.11	16.14	10,561.72

F. Funding Mechanism

Shoemakersville Borough, through the planning phase, evaluated the cost associated with the selected plan; the selected BMP implementation cost is summarized below:

Selected BMPs Option:
Option 1:

	Drainage Area ID	Prop. BMP ID	BMP Description	Project Cost
UNT to Schuylkill River				
	OF-001	BMP 001-BS1	Bioswale	$40,634.10
				$40,634.10

The required funding identified above will be funded through the Borough's Stormwater Budget, as established through the General Fund. The General Fund revenues are based upon the Borough's tax base, as regulated under the Borough Code.

G. Responsible Parties for Operation and Maintenance (O&M) of BMPs

Shoemakersville Borough will own and operate the BMPs identified in the PRP. Specific requirements for each BMP are identified below:

BMP 001-BS1: Bioswale:

Location:	Approximately 1004 Main Street in public property.
Responsible Party:	Shoemakersville Borough
O&M Activities:	Monitor storm sewer discharge areas and swale banks for scouring and erosion, immediately stabilized any areas of erosion. Maintain vegetation in natural state, where appropriate. Remove any invasive species that may develop.
Frequency of O&M Activities:	Complete inspection of the restored corridor a minimum of once a year. Complete restoration and/or selective vegetation management as needed based upon inspections.

H. PRP Implementation Schedule

Task	Implementation Date
MS4 Permit Authorization	March 2018
BMP 001-BS1: Bioswale	November 2022
MS4 Permit Expiration	March 2023

ATTACHMENT A

PUBLIC NOTICE

NOTICE OF PUBLIC COMMENT PERIOD AND PUBLIC MEETING FOR NPDES STORMWATER DISCHARGE POLLUTANT REDUCTION PLAN

Borough of Shoemakersville is hereby giving notice of the 30-day public comment period for its National Pollutant Discharge Elimination (NPDES) Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4) Pollutant Reduction Plan (PRP). The Plan proposes best management practices to satisfy the PRP requirements for the following impaired waterways: Schuylkill River (Appendix C – PCB), Unnamed Tributaries to Schuylkill River (Appendix E – Siltation).

The plans are available for public examination as noted below. The public is invited to review these documents and provide written comments to the individual listed below:

Pollutant Reduction Plan: Borough of Shoemakersville
115 East Ninth Street
Shoemakersville, PA 19555
Phone: 610-562-8030
Comments to: Melissa Wagner, Borough Secretary

Visit times are Monday through Friday, between 8:00 a.m. and 4:30 p.m., or visit the Borough website at http://shoeyboro.org.

The minimum 30-day public comment period will begin July 6, 2017, and end August 5, 2017.

A public meeting for the Plan will be held on August 1, 2017 during the regularly scheduled Borough Council meeting. Borough Council meeting is held beginning at 7:00 p.m.

BOROUGH OF SHOEMAKERSVILLE

ATTACHMENT B

WRITTEN PUBLIC COMMENTS

WRITTEN COMMENTS TO BE INCORPERATED AT CLOSE OF PUBLIC COMMENT PERIOD

ATTACHMENT C

PUBLIC MEETING COMMENTS

ATTACHMENT D

RECORD OF CONSIDERATION OF ALL TIMELY COMMENTS RECEIVED

ATTACHMENT E

MAPPING

MAP INDEX

Shoemakersville Borough

MS4 Conveyance System

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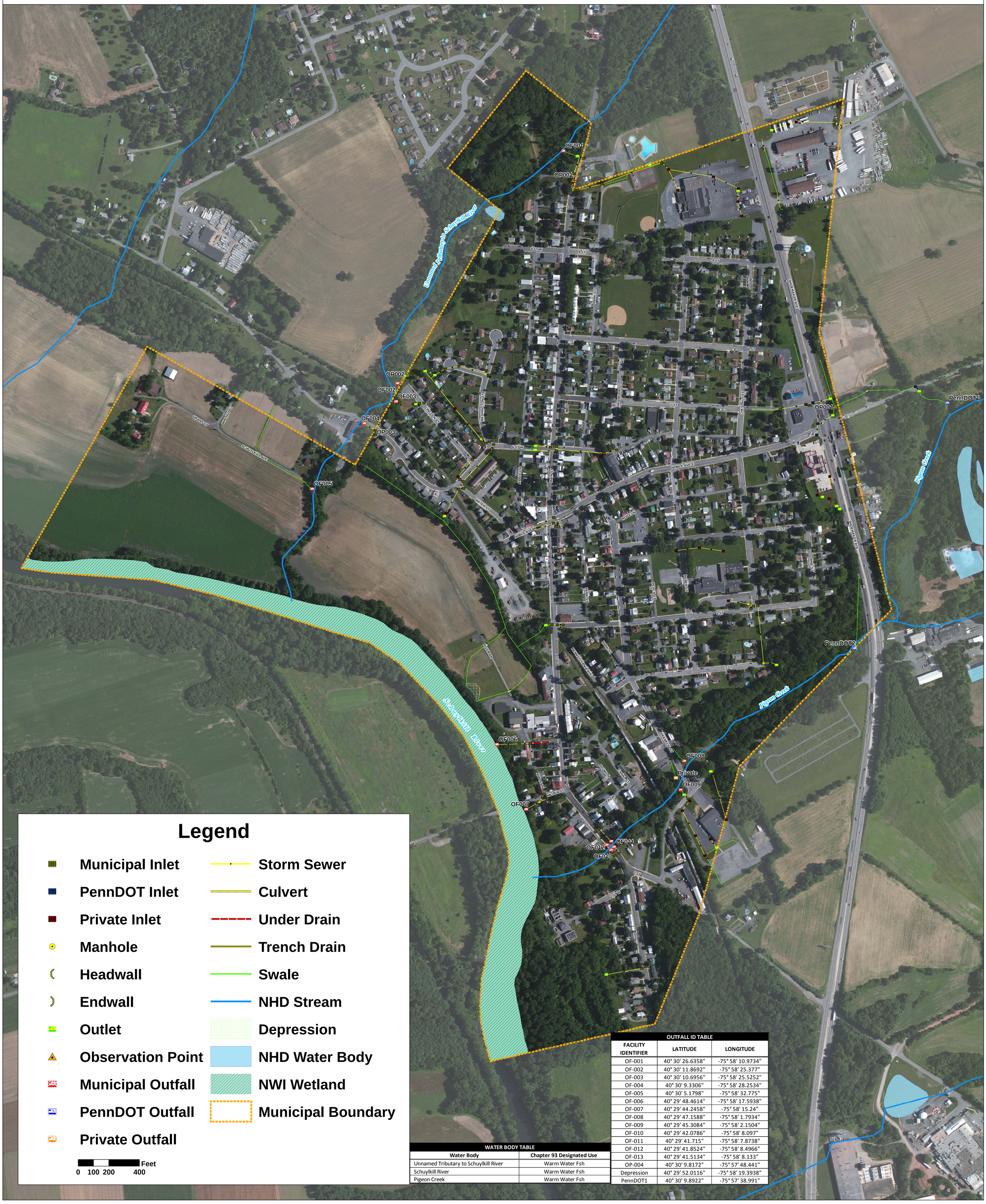

Legend

- Municipal Inlet
- PennDOT Inlet
- Private Inlet
- Manhole
- Headwall
- Endwall
- Outlet
- Observation Point
- Municipal Outfall
- PennDOT Outfall
- Private Outfall
- Storm Sewer
- Culvert
- Under Drain
- Trench Drain
- Swale
- NHD Stream
- Depression
- NHD Water Body
- NWI Wetland
- Municipal Boundary

0 100 200 400 Feet

WATER BODY TABLE

Water Body	Chapter 93 Designated Use
Unnamed Tributary to Schuylkill River	Warm Water Fsh
Schuylkill River	Warm Water Fsh
Pigeon Creek	Warm Water Fsh

OUTFALL ID TABLE

FACILITY IDENTIFIER	LATITUDE	LONGITUDE
OF-001	40° 30' 26.6358"	-75° 58' 10.9734"
OF-002	40° 30' 11.8692"	-75° 58' 25.377"
OF-003	40° 30' 10.6956"	-75° 58' 25.5252"
OF-004	40° 30' 9.3306"	-75° 58' 28.2534"
OF-005	40° 30' 5.1798"	-75° 58' 32.775"
OF-006	40° 29' 48.4614"	-75° 58' 17.5938"
OF-007	40° 29' 44.2458"	-75° 58' 15.24"
OF-008	40° 29' 47.1588"	-75° 58' 1.7934"
OF-009	40° 29' 45.3084"	-75° 58' 2.1504"
OF-010	40° 29' 42.0786"	-75° 58' 8.097"
OF-011	40° 29' 41.715"	-75° 58' 7.8738"
OF-012	40° 29' 41.8524"	-75° 58' 8.4966"
OF-013	40° 29' 41.5134"	-75° 58' 8.133"
OP-004	40° 30' 9.8172"	-75° 57' 48.441"
Depression	40° 29' 52.0116"	-75° 58' 19.3938"
PennDOT1	40° 30' 9.8922"	-75° 57' 38.991"

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Shoemakersville Borough

Attaining/Non-Attaining Streams

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Legend

- Municipal Inlet
- PennDOT Inlet
- Private Inlet
- Manhole
- Headwall
- Endwall
- Outlet
- Observation Point
- Municipal Outfall
- PennDOT Outfall
- Private Outfall
- Storm Sewer
- Culvert
- Under Drain
- Trench Drain
- Swale
- MS3 Drainage Area
- Depression
- Attaining Streams
- Non-Attaining Streams
- NHD Stream
- NHD Water Body
- NWI Wetland
- Municipal Boundary

0 100 200 400 Feet

Water Body	Attaining	Non-Attaining	Impairment
Pigeon Creek	Yes	No	-
Schuylkill River	Yes	No	PCB
Unnamed Tributary to Schuylkill River	No	Yes	Golf Courses - Siltation

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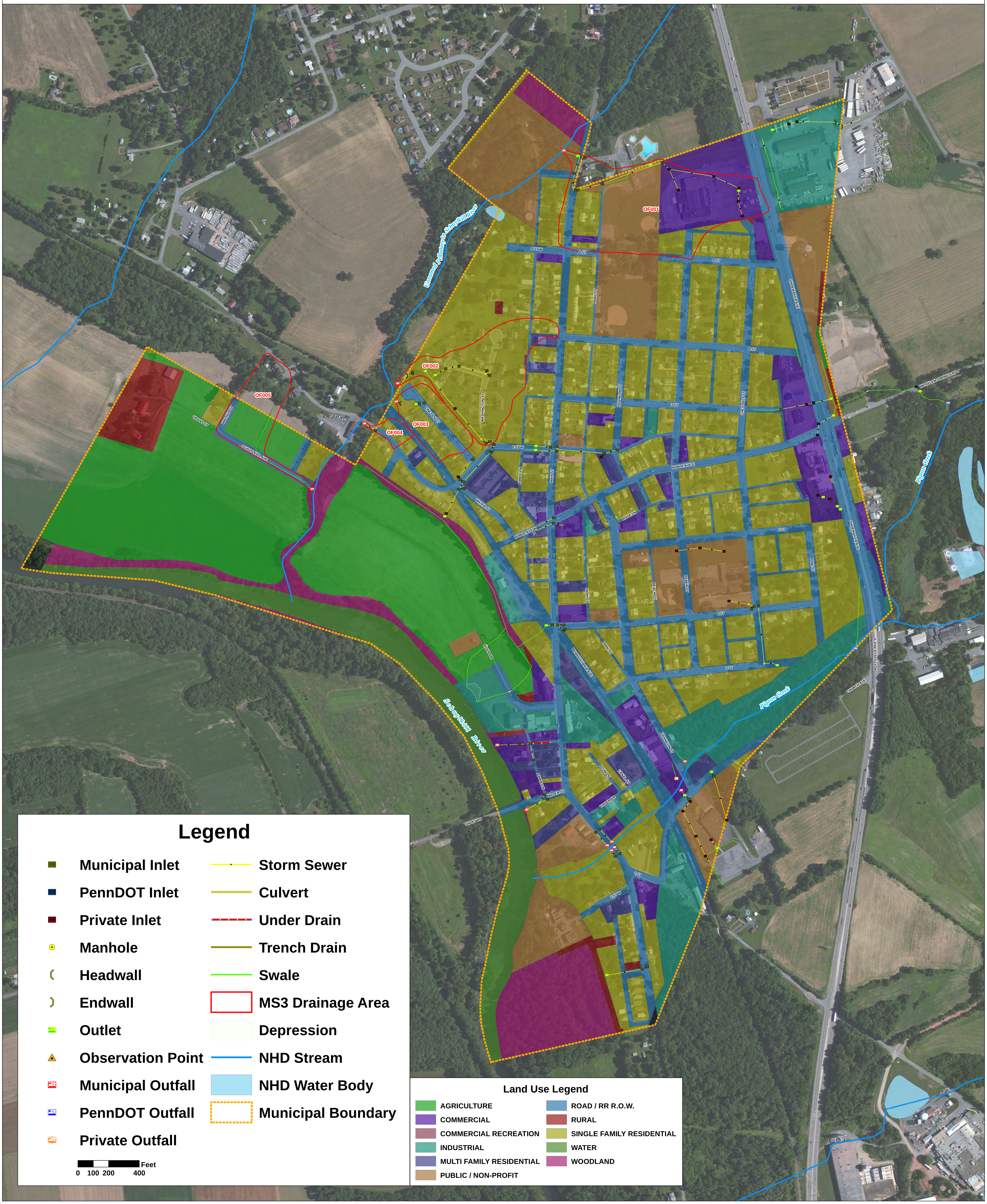
Shoemakersville Borough

MS4 Drainage Area & Land Use



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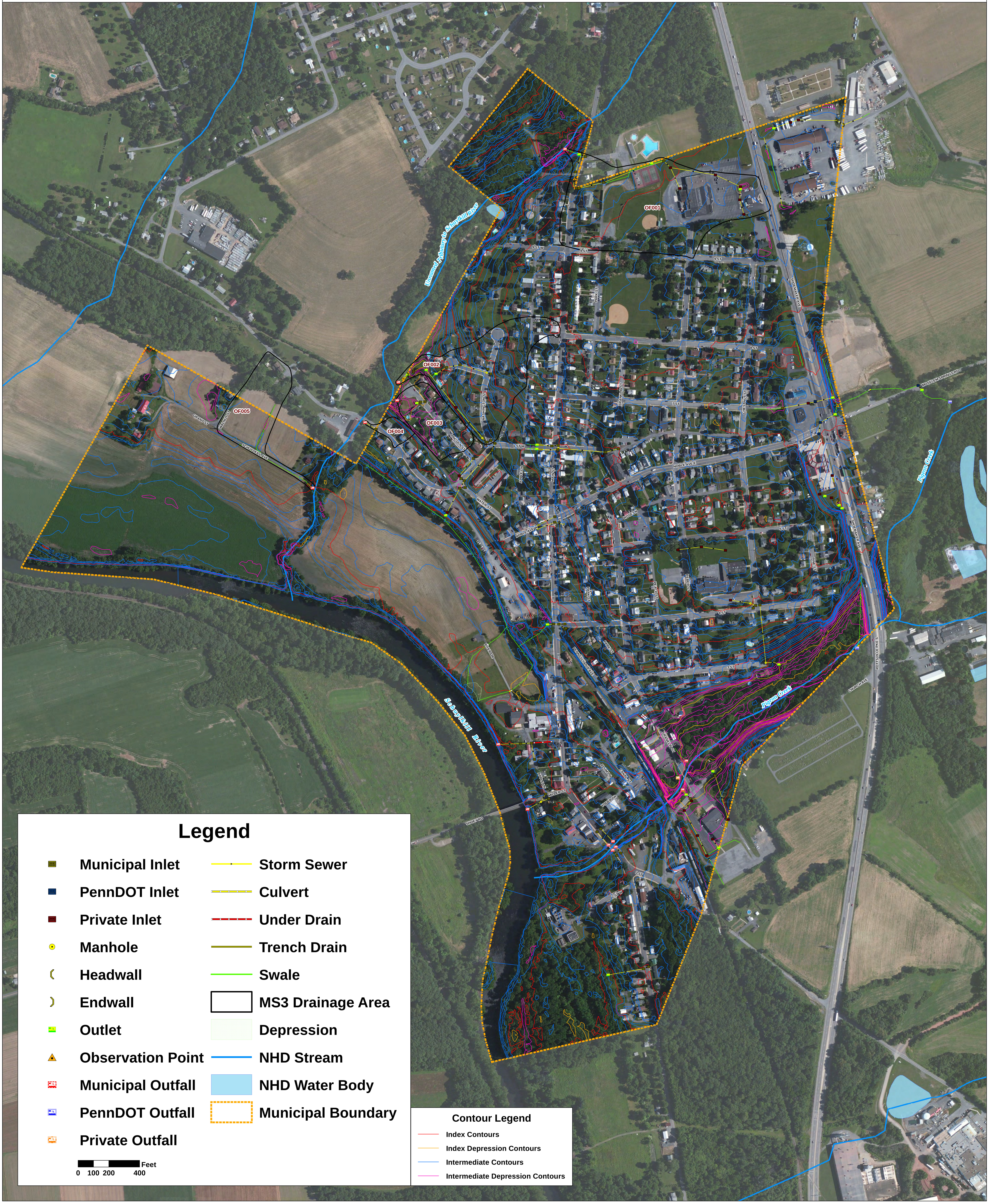
Shoemakersville Borough
MS4 Drainage Area Analysis



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Shoemakersville Borough

MS4 Drainage Area
Impervious/Pervious Analysis

N

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OF001
OF002
OF003
OF004
OF005

Unnamed Tributary to Schuylkill River

Schuylkill River

Pigeon Creek

Legend

- Municipal Inlet
- PennDOT Inlet
- Private Inlet
- Manhole
- Headwall
- Endwall
- Outlet
- Observation Point
- Municipal Outfall
- PennDOT Outfall
- Private Outfall
- Storm Sewer
- Culvert
- Under Drain
- Trench Drain
- Swale
- MS3 Drainage Area
- Depression
- NHD Stream
- NHD Water Body
- NWI Wetland
- Municipal Boundary

0 100 200 400 Feet

Drainage Area ID	Drainiage Area (SF)			Drainage Area (AC)			%
	Impervious	Pervious	Total	Impervious	Pervious	Total	Impervious
OF-001	309838.86	366131.21	675970.07	7.113	8.405	15.518	46%
OF-002	128876.17	246921.30	375797.47	2.959	5.669	8.627	34%
OF-003	62785.83	78293.84	141079.67	1.441	1.797	3.239	45%
OF-004	16705.57	12770.77	29476.35	0.384	0.293	0.677	57%
OF-005	25026.07	165244.96	190271.03	0.575	3.794	4.368	13%

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Shoemakersville Borough

MS4 Drainage Area Runoff Rate and Volume Analysis

N

OF001
OF002
OF003
OF004
OF005

Unnamed Tributary to Schuylkill River
Schuylkill River
Pigeon Creek

Legend

- Municipal Inlet
- PennDOT Inlet
- Private Inlet
- Manhole
- Headwall
- Endwall
- Outlet
- Observation Point
- Municipal Outfall
- PennDOT Outfall
- Private Outfall
- Storm Sewer
- Culvert
- Under Drain
- Trench Drain
- Swale
- MS3 Drainage Area
- Depression
- NHD Stream
- NHD Water Body
- NWI Wetland
- Municipal Boundary

Feet
0 100 200 400

Drainage Area ID	Runoff Rate (Cfs)			Runoff Volume (CF)
	2-year, 24 hour	25-year, 24 hour	100-year, 24 hour	2-year, 24 hour
OF-001	19.7	28.7	33.1	115,497
OF-002	11.4	16.5	19.1	57,823
OF-003	8.1	11.7	13.6	23,828
OF-004	2.0	2.9	3.4	5,507
OF-005	4.2	6.1	7.0	23,354

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Shoemakersville Borough

Municipal Storm Sewer Sheds

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OF001
OF002
OF003
OF004
OF005

Unnamed Tributary to Schuylkill River

Schuylkill River

Pigeon Creek

9 ST W
9 ST
8 ST
7 ST
6 ST W
5 ST
4 ST
3 ST
2 ST W

PARK ST
WASHINGTON ST
FRANKLIN ST
CHESTNUT ST
LINCOLN ST
APPLE LN
MAPLE ST
WATER ST
ROSE LN
NOBLE AVE W
NOBLE AVE E
PEACH ST
REED ST
PINE ST
RIVER RUN
PENNSYLVANIA AVE
MILLER ST
YODER DR
SHOEMAKER AVE
MOSELEM SPRINGS RD
POTTSVILLE PKE S
CHURCH AVE
SHOESY RD
GRANT ST
WALNUT ST
SCHUYLKILL AVE

Legend

Municipal Inlet	Storm Sewer
PennDOT Inlet	Culvert
Private Inlet	Under Drain
Manhole	Trench Drain
Headwall	Swale
Endwall	NHD Stream
Outlet	Depression
Observation Point	NHD Water Body
Municipal Outfall	NWI Wetland
PennDOT Outfall	Urbanized Area
Private Outfall	Municipal Boundary

0 100 200 400 Feet

Drainage Area Legend

- OF001
- OF002
- OF003
- OF004
- OF005

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Shoemakersville Borough

Existing Best Management Practice Structures

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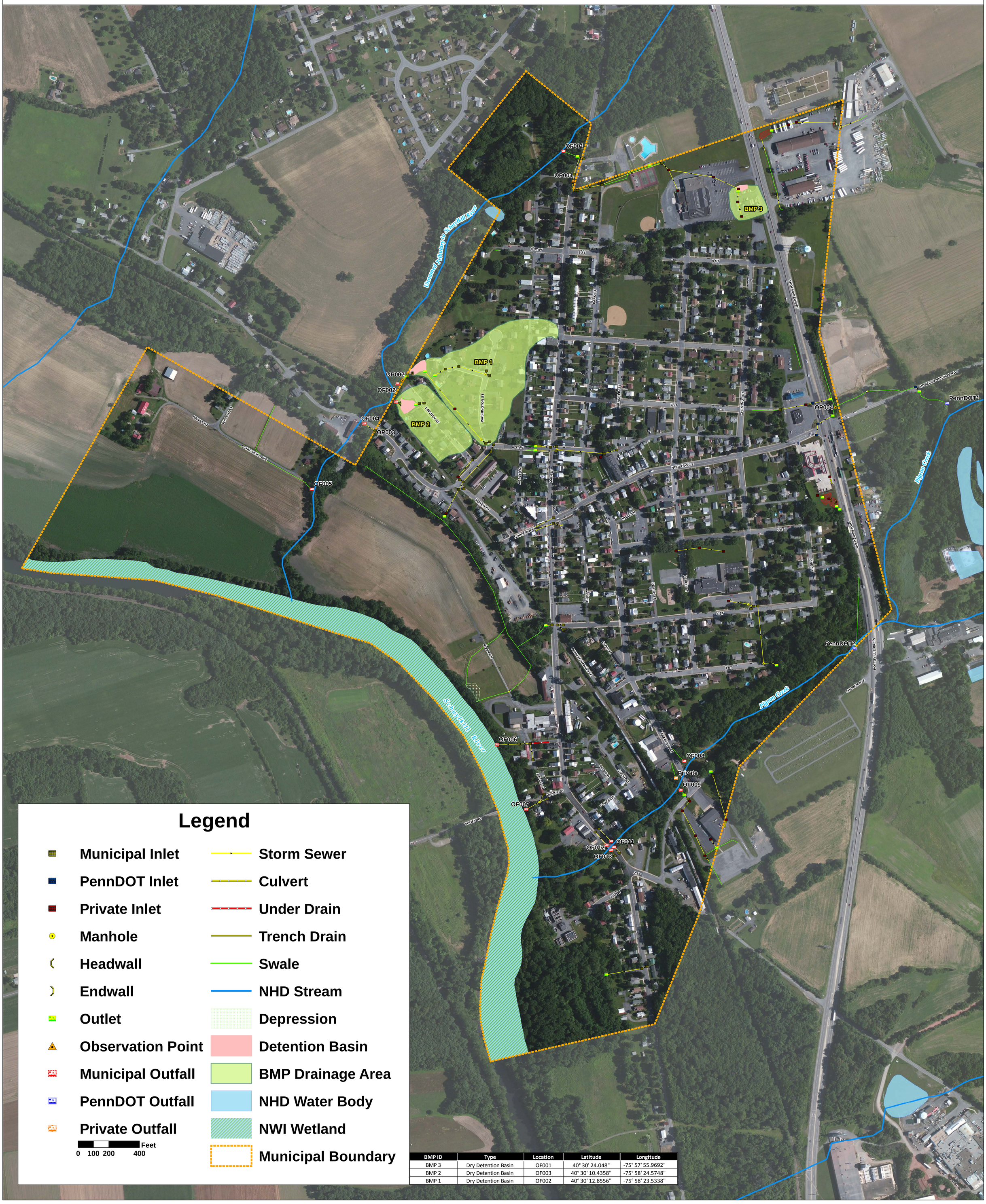

Legend

Municipal Inlet	Storm Sewer
PennDOT Inlet	Culvert
Private Inlet	Under Drain
Manhole	Trench Drain
Headwall	Swale
Endwall	NHD Stream
Outlet	Depression
Observation Point	Detention Basin
Municipal Outfall	BMP Drainage Area
PennDOT Outfall	NHD Water Body
Private Outfall	NWI Wetland
	Municipal Boundary

Feet
0 100 200 400

BMP ID	Type	Location	Latitude	Longitude
BMP 3	Dry Detention Basin	OF001	40° 30' 24.048"	-75° 57' 55.9692"
BMP 2	Dry Detention Basin	OF003	40° 30' 10.4358"	-75° 58' 24.5748"
BMP 1	Dry Detention Basin	OF002	40° 30' 12.8556"	-75° 58' 23.5338"

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Shoemakersville Borough

Geology

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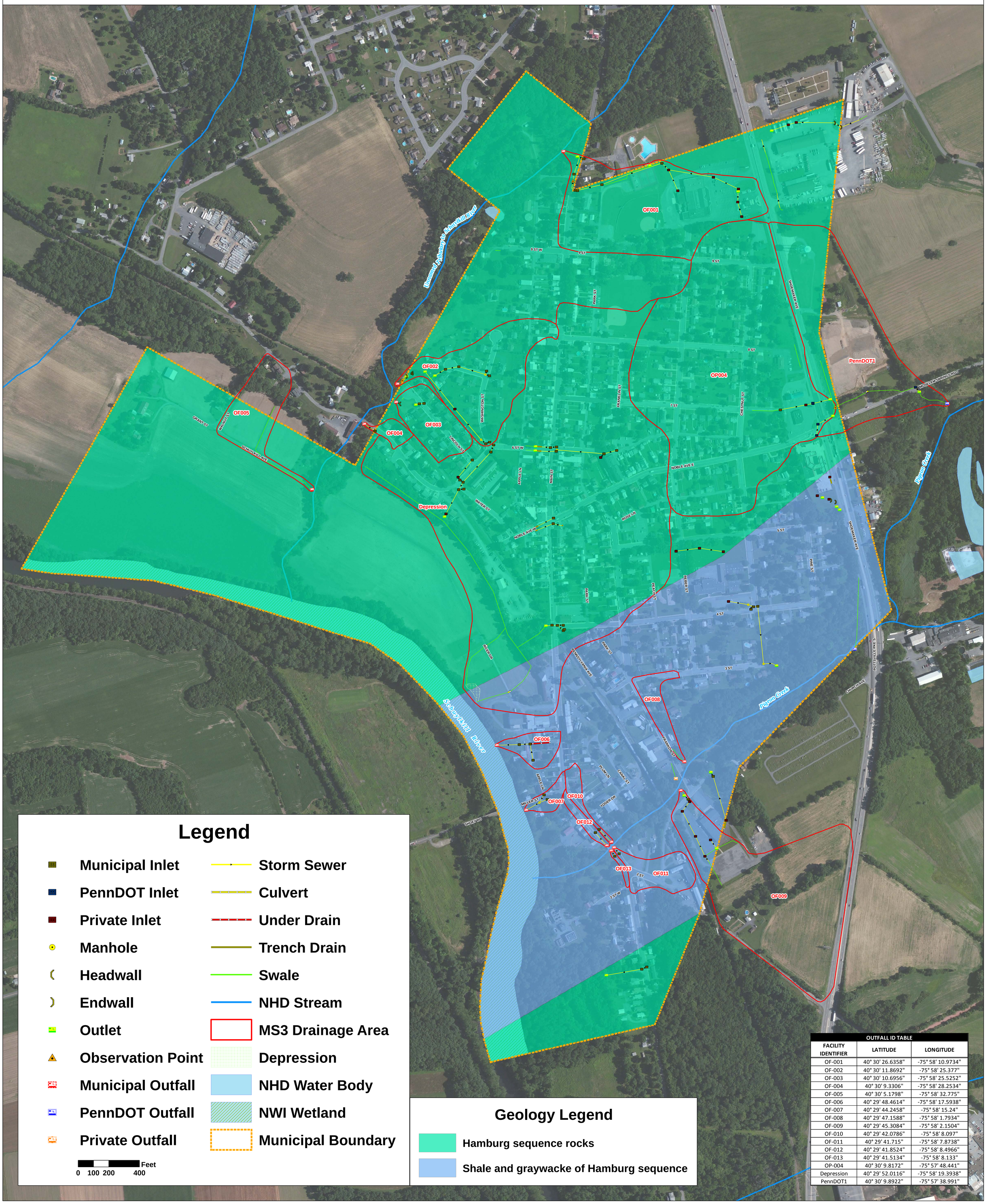

Legend

- Municipal Inlet
- PennDOT Inlet
- Private Inlet
- Manhole
- Headwall
- Endwall
- Outlet
- Observation Point
- Municipal Outfall
- PennDOT Outfall
- Private Outfall
- Storm Sewer
- Culvert
- Under Drain
- Trench Drain
- Swale
- NHD Stream
- MS3 Drainage Area
- Depression
- NHD Water Body
- NWI Wetland
- Municipal Boundary

0 100 200 400 Feet

Geology Legend

- Hamburg sequence rocks
- Shale and graywacke of Hamburg sequence

OUTFALL ID TABLE

FACILITY IDENTIFIER	LATITUDE	LONGITUDE
OF-001	40° 30' 26.6358"	-75° 58' 10.9734"
OF-002	40° 30' 11.8692"	-75° 58' 25.377"
OF-003	40° 30' 10.6956"	-75° 58' 25.5252"
OF-004	40° 30' 9.3306"	-75° 58' 28.2534"
OF-005	40° 30' 5.1798"	-75° 58' 32.775"
OF-006	40° 29' 48.4614"	-75° 58' 17.5938"
OF-007	40° 29' 44.2458"	-75° 58' 15.24"
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OP-004	40° 30' 9.8172"	-75° 57' 48.441"
Depression	40° 29' 52.0116"	-75° 58' 19.3938"
PennDOT1	40° 30' 9.8922"	-75° 57' 38.991"

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Shoemakersville Borough

Potential Best Management Practice Structures

N

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Legend

- Municipal Inlet
- PennDOT Inlet
- Private Inlet
- Manhole
- Headwall
- Endwall
- Outlet
- Observation Point
- Municipal Outfall
- PennDOT Outfall
- Private Outfall
- Storm Sewer
- Culvert
- Under Drain
- Trench Drain
- Swale
- NHD Stream
- Depression
- Potential BMP
- BMP Drainage Area
- NHD Water Body
- NWI Wetland
- Municipal Boundary

Feet
0 100 200 400

POTENTIAL BMP STRUCTURES

FACILITY IDENTIFIER	TYPE	LOCATION	LATITUDE	LONGITUDE
BMP 001-BS1	Bioswale	OF-001	40° 30' 26.4666"	-75° 58' 10.4226"
BMP 002-BR1	Wet Pond - Basin Retrofit	OF-002	40° 30' 12.8556"	-75° 58' 23.5338"
BMP 002-BS1	Bioswale	OF-005	40° 30' 12.2688"	-75° 58' 22.3818"
BMP 003-BR1	Wet Pond - Basin Retrofit	OF-003	40° 30' 10.4358"	-75° 58' 24.5748"
BMP 005-VS1	Vegetated Swale	OF005	40° 30' 6.1596"	-75° 58' 34.737"

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Shoemakersville Borough

Proposed Best Management Practice Structures

N

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Legend

- Municipal Inlet
- PennDOT Inlet
- Private Inlet
- Manhole
- Headwall
- Endwall
- Outlet
- Observation Point
- Municipal Outfall
- PennDOT Outfall
- Private Outfall
- Storm Sewer
- Culvert
- Under Drain
- Trench Drain
- Swale
- NHD Stream
- Depression
- Proposed BMP
- BMP Drainage Area
- NHD Water Body
- NWI Wetland
- Municipal Boundary

Feet
0 100 200 400

PROPOSED BMP STRUCTURES				
FACILITY IDENTIFIER	TYPE	LOCATION	LATITUDE	LONGITUDE
BMP 001-BS1	Bioswale	OF-001	40° 30' 26.4666"	-75° 58' 10.4226"

\\Lancfile4\gis\Shoemakersville\MS4 Master\Map Documents\11_Shoe_ProposedBMPstructures.mxd

ATTACHMENT F

EXISTING LOADING FOR POLLUTANTS OF CONCERN

1. UNT to Schuylkill River (Appendix E)

EXISTING LOADING FOR POLLUTANTS OF CONCERN

UNT to Schuylkill River (Appendix E)

Shoemakersville Borough
Pollutant Reduction Plan (PRP)
ARRO No.: 10099.00

Base Pollutant Loading (No Existing BMPs) Summary:

Appendix E - UNT to Schuylkill River

	Drainage Area (Ac)			PA DEP Land Loading		
Drainage Area ID	**Impervious**	**Pervious**	**Total**	**TN (lbs/year)**	**TP (lbs/year)**	**TSS (lbs/year)**
UNT to Schuylkill River	12.41	16.99	29.39	1,034.51	44.68	28,380.73
				1,034.51	**44.68**	**28,380.73**
Required Reduction Percent				3%	5%	10%
Required Reduction (Lbs/Year)				**31.04**	**2.23**	**2,838.07**

Shoemakersville Borough
Pollutant Reduction Plan (PRP)
ARRO No.: 10099.00

Land Use: MS4 Regulated Area
Watershed Description: UNT to Schuylkill River

OF-001

Description	Area (SF)	Area (Ac.)
Pervious	300,715	6.903
Impervious	314,801	7.227
		14.130

OF-002

Description	Area (SF)	Area (Ac.)
Pervious	244,239	5.607
Impervious	128,876	2.959
		8.566

OF-003

Description	Area (SF)	Area (Ac.)
Pervious	78,294	1.797
Impervious	62,786	1.441
		3.239

OF-004

Description	Area (SF)	Area (Ac.)
Pervious	11,672	0.268
Impervious	15,661	0.360
		0.627

OF-005

Description	Area (SF)	Area (Ac.)
Pervious	104,964	2.410
Impervious	18,288	0.420
		2.829

Shoemakersville Borough
Pollutant Reduction Plan (PRP)
ARRO No.: 10099.00

Worksheet 4:
Drainage Area: UNT to Schuylkill River
2-year Rainfall: 3.24 in

OF-001

Cover/Type/Condition	Soil Type	Area (SF)	Area (Ac)	CN	S	Ia (0.2*S)	Q Runoff (in)	Runoff Volume (CF)
Pervious	C	366,131	8.405	77	2.99	0.60	1.24	37,847.67
Impervious	C	309,839	7.113	98	0.20	0.04	3.01	77,649.24
		675,970	15.518					115,496.91

OF-002

Cover/Type/Condition	Soil Type	Area (SF)	Area (Ac)	CN	S	Ia (0.2*S)	Q Runoff (in)	Runoff Volume (CF)
Pervious	C	246,921	5.669	77	2.99	0.60	1.24	25,524.72
Impervious	C	128,876	2.959	98	0.20	0.04	3.01	32,297.87
		375,797	8.627					57,822.59

OF-003

Cover/Type/Condition	Soil Type	Area (SF)	Area (Ac)	CN	S	Ia (0.2*S)	Q Runoff (in)	Runoff Volume (CF)
Pervious	C	78,294	1.797	77	2.99	0.60	1.24	8,093.38
Impervious	C	62,786	1.441	98	0.20	0.04	3.01	15,734.86
		141,080	3.239					23,828.24

OF-004

Cover/Type/Condition	Soil Type	Area (SF)	Area (Ac)	CN	S	Ia (0.2*S)	Q Runoff (in)	Runoff Volume (CF)
Pervious	C	12,771	0.293	77	2.99	0.60	1.24	1,320.14
Impervious	C	16,706	0.384	98	0.20	0.04	3.01	4,186.61
		29,476	0.677					5,506.75

OF-005

Cover/Type/Condition	Soil Type	Area (SF)	Area (Ac)	CN	S	Ia (0.2*S)	Q Runoff (in)	Runoff Volume (CF)
Pervious	C	165,245	3.794	77	2.99	0.60	1.24	17,081.68
Impervious	C	25,026	0.575	98	0.20	0.04	3.01	6,271.82
		190,271	4.368					23,353.51

Shoemakersville Borough
Pollutant Reduction Plan (PRP)
ARRO No.: 10099.00
Base Pollutant Loading (No Existing BMPs)

PA DEP Land Loading:		TN (lbs/acre/year)	TP (lbs/acre/year)	TSS (lbs/acre/year)
Berks	Impervious	36.81	2.26	1925.79
	Pervious	34.02	0.98	264.29
	Undeveloped	10	0.33	234.6

MS4 Regulated Area Watershed Description: UNT to Schuylkill River

	Drainage Area (SF)			Drainage Area (Ac)			PA DEP Land Loading								
Drainage Area ID	Impervious	Pervious	Total	Impervious	Pervious	Total	TN - Impervious Area (lbs/year)	TN - Pervious Area (lbs/year)	TN (lbs/year)	TP - Impervious Area (lbs/year)	TP - Pervious Area (lbs/year)	TP (lbs/year)	TSS - Impervious Area (lbs/year)	TSS - Pervious Area (lbs/year)	TSS (lbs/year)
OF-001	314,801	300,715	615,516	7.2	6.9	14.1	266.02	234.86	500.88	16.33	6.77	23.10	13,917.4	1,824.5	15,741.9
OF-002	128,876	244,239	373,115	3.0	5.6	8.6	108.91	190.75	299.65	6.69	5.49	12.18	5,697.6	1,481.9	7,179.5
OF-003	62,786	78,294	141,080	1.4	1.8	3.2	53.06	61.15	114.20	3.26	1.76	5.02	2,775.8	475.0	3,250.8
OF-004	15,661	11,672	27,333	0.4	0.3	0.6	13.23	9.12	22.35	0.81	0.26	1.08	692.4	70.8	763.2
OF-005	18,288	104,964	123,252	0.4	2.4	2.8	15.45	81.98	97.43	0.95	2.36	3.31	808.5	636.8	1,445.4
				12.4	**17.0**	**29.4**			**1,034.51**			**44.68**			**28,380.73**
Required Reduction Percent									**3%**			**5%**			**10%**
Required Reduction (Lbs/Year)									**31.04**			**2.23**			**2,838.07**
Required Reduction (Tons/Year)									0.02			0.00			1.42

Shoemakersville Borough
Pollutant Reduction Plan (PRP)
ARRO No.: 10099.00
Base Pollutant Loading (No Existing BMPs) Summary

Shoemakersville Borough

Base Pollutant Loading (No Existing BMPs) Summary: UNT to Schuylkill River

	Drainage Area (Ac)			PA DEP Land Loading		
Drainage Area ID	**Impervious**	**Pervious**	**Total**	**TN (lbs/year)**	**TP (lbs/year)**	**TSS (lbs/year)**
UNT to Schuylkill River	12.41	16.99	29.39	1,034.51	44.68	28,380.73

ATTACHMENT G

EXISTING BMP POLLUTANT REDUCTIONS

1. Existing BMP Summary
2. UNT to Schuylkill River (Appendix E)

EXISTING BMP POLLUTANT REDUCTIONS

Existing BMP Summary

Shoemakersville Borough
10099.00
Existing BMP Summary

				Total Area							
BMP No.	MS3	Type	Watershed	SqFt	Acres	Pervious SqFt	Impervious SqFt	% Pervious	% Impervious	Latitude	Longitude
1	OF003	Dry Detention Basin	UNT to Schuylkill River	365,424.90	8.39	233,006.14	132,418.76	63.76	36.24	40.503571	-75.973204
2	OF002	Dry Detention Basin	UNT to Schuylkill River	141,079.68	3.24	74,346.26	66,733.42	52.70	47.30	40.502899	-75.973493
3	OF001	Dry Detention Basin	UNT to Schuylkill River	46,212.80	1.06	9,020.15	37,192.65	19.52	80.48	40.50668	-75.965547

EXISTING BMP POLLUTANT REDUCTIONS

UNT to Schuylkill River (Appendix D)

Shoemakersville Borough
Pollutant Reduction Plan (PRP)
ARRO No.: 10099.00

Base Pollutant Loading With Existing BMPs Summary:

	Drainage Area (Ac)			PA DEP Land Loading		
Drainage Area ID	**Impervious**	**Pervious**	**Total**	**TN (lbs/year)**	**TP (lbs/year)**	**TSS (lbs/year)**
UNT to Schuylkill River	12.41	16.99	29.39	1,034.51	44.68	28,380.73
BMP Reductions				45.81	3.37	2,494.11
				988.70	**41.32**	**25,886.63**
Reequired Reduction Percent:				3%	5%	10%
Adjusted Required Reduction (Lbs.):				**29.66**	**2.07**	**2,588.66**

Shoemakersville Borough
Pollutant Reduction Plan (PRP)
ARRO No.: 10099.00
Existing BMPs

Worksheet 4:
Drainage Area: UNT to Schuylkill River
2-year Rainfall: 3.24 in

Existing BMP Calculations:

Cover/Type/Condition	Soil Type	Area (SF)	Area (Ac)	CN	S	Ia (0.2*S)	Q Runoff (in)	Runoff Volume (CF)	Acre-Ft
BMP 001	**Dry Detention Basin**								
Pre-Development									
Pervious	C	0	0.000	77	2.99	0.60	1.24	0.00	
Meadow	C	365,425	8.389	71	4.08	0.82	0.90	27,475.01	
Impervious	C	0	0.000	98	0.20	0.04	3.01	0.00	
		365,425	8.389					27,475.01	0.63
Post-Development									
Pervious	C	233,006	5.349	77	2.99	0.60	1.24	24,086.28	
Impervious	C	132,419	3.040	98	0.20	0.04	3.01	33,185.69	
		365,425	8.389					57,271.97	1.31
						Net Increase:		29,796.96	0.68
BMP 002	**Dry Detention Basin**								
Pre-Development									
Pervious	C	0	0.000	77	2.99	0.60	1.24	0.00	
Meadow	C	141,080	3.239	71	4.08	0.82	0.90	10,607.28	
Impervious	C	0	0.000	98	0.20	0.04	3.01	0.00	
		141,080	3.239					10,607.28	0.24
Post-Development									
Pervious	C	74,346	1.707	77	2.99	0.60	1.24	7,685.31	
Impervious	C	66,733	1.532	98	0.20	0.04	3.01	16,724.17	
		141,080	3.239					24,409.49	0.56
						Net Increase:		13,802.20	0.32

Shoemakersville Borough
Pollutant Reduction Plan (PRP)
ARRO No.: 10099.00
Existing BMPs

Worksheet 4:
Drainage Area: UNT to Schuylkill River
2-year Rainfall: 3.24 in

Existing BMP Calculations:

Cover/Type/Condition	Soil Type	Area (SF)	Area (Ac)	CN	S	Ia (0.2*S)	Q Runoff (in)	Runoff Volume (CF)	Acre-Ft
BMP 003	**Dry Detention Basin**								
Pre-Development									
Pervious	C	0	0.000	77	2.99	0.60	1.24	0.00	
Meadow	C	46,213	1.061	71	4.08	0.82	0.90	3,474.58	
Impervious	C	0	0.000	98	0.20	0.04	3.01	0.00	
		46,213	1.061					3,474.58	0.08
Post-Development									
Pervious	C	9,020	0.207	77	2.99	0.60	1.24	932.43	
Impervious	C	37,193	0.854	98	0.20	0.04	3.01	9,320.91	
		46,213	1.061					10,253.34	0.24
							Net Increase:	6,778.76	0.16

Shoemakersville Borough
Pollutant Reduction Plan (PRP)
ARRO No.: 10099.00

Expert Panel Pollutant Reduction Efficiency Calculations:
UNT to Schuylkill River
x = (12 x Ep)/IA
Ep = Post - Predevelopment volume increase
IA = Impervious Area (Ac)

					Pollutant % Removal - RR			Pollutant % Removal - ST		
BMP ID	**BMP Description**	**EP**	**IA**	**x**	**TN**	**TP**	**TSS**	**TN**	**TP**	**TSS**
BMP 001	Dry Detention Basin	0.68	3.040	2.70	5%	10%	10%			
BMP 002	Dry Detention Basin	0.32	1.532	2.48	5%	10%	10%			
BMP 003	Dry Detention Basin	0.16	0.854	2.19	66%	77%	84%			

Shoemakersville Borough
Pollutant Reduction Plan (PRP)
ARRO No.: 10099.00
Existing BMP Pollutant Reduction

PA DEP Land Loading:		TN (lbs/acre/year)	TP (lbs/acre/year)	TSS (lbs/acre/year)
Berks	Impervious	36.81	2.26	1925.79
	Pervious	34.02	0.98	264.29
	Undeveloped	10	0.33	234.6

UNT to Schuylkill River

OF-003

BMP 001 Dry Detention Basin

	Drainage Area (SF)			Drainage Area (Ac)			PA DEP Land Loading								
BMP ID	**Impervious**	**Pervious**	**Total**	**Impervious**	**Pervious**	**Total**	**TN - Impervious Area (lbs/year)**	**TN - Pervious Area (lbs/year)**	**TN (lbs/year)**	**TP - Impervious Area (lbs/year)**	**TP - Pervious Area (lbs/year)**	**TP (lbs/year)**	**TSS - Impervious Area (lbs/year)**	**TSS - Pervious Area (lbs/year)**	**TSS (lbs/year)**
BMP 001	132,419	233,006	365,425	3.0	5.3	8.4	111.90	181.98	**293.88**	6.87	5.24	**12.11**	5,854.2	1,413.7	**7,268.0**
Expert Panel Performance Standards									5%			10%			10%
Pollutant Reduction									**14.69**			**1.21**			**726.80**

OF-002

BMP 002 Dry Detention Basin

	Drainage Area (SF)			Drainage Area (Ac)			PA DEP Land Loading								
BMP ID	**Impervious**	**Pervious**	**Total**	**Impervious**	**Pervious**	**Total**	**TN - Impervious Area (lbs/year)**	**TN - Pervious Area (lbs/year)**	**TN (lbs/year)**	**TP - Impervious Area (lbs/year)**	**TP - Pervious Area (lbs/year)**	**TP (lbs/year)**	**TSS - Impervious Area (lbs/year)**	**TSS - Pervious Area (lbs/year)**	**TSS (lbs/year)**
BMP 002	66,733	74,346	141,080	1.5	1.7	3.2	56.39	58.06	**114.46**	3.46	1.67	**5.13**	2,950.3	451.1	**3,401.4**
Expert Panel Performance Standards									5%			10%			10%
Pollutant Reduction									**5.72**			**0.51**			**340.14**

OF-001

BMP 003 Dry Detention Basin

	Drainage Area (SF)			Drainage Area (Ac)			PA DEP Land Loading								
BMP ID	**Impervious**	**Pervious**	**Total**	**Impervious**	**Pervious**	**Total**	**TN - Impervious Area (lbs/year)**	**TN - Pervious Area (lbs/year)**	**TN (lbs/year)**	**TP - Impervious Area (lbs/year)**	**TP - Pervious Area (lbs/year)**	**TP (lbs/year)**	**TSS - Impervious Area (lbs/year)**	**TSS - Pervious Area (lbs/year)**	**TSS (lbs/year)**
BMP 003	37,193	9,020	46,213	0.9	0.2	1.1	31.43	7.04	**38.47**	1.93	0.20	**2.13**	1,644.3	54.7	**1,699.0**
Expert Panel Performance Standards									66%			77%			84%
Pollutant Reduction									**25.39**			**1.64**			**1,427.17**

ATTACHMENT H

EXISTING LOADING WITH BMPs FOR POLLUTANTS OF CONCERN

1. UNT to Schuylkill River (Appendix E)

EXISTING LOADING WITH BMPs FOR POLLUTANTS OF CONCERN

UNT to Schuylkill River (Appendix E)

Shoemakersville Borough
Pollutant Reduction Plan (PRP)
ARRO No.: 10099.00

Base Pollutant Loading With Existing BMPs Summary:

	Drainage Area (Ac)			PA DEP Land Loading		
Drainage Area ID	**Impervious**	**Pervious**	**Total**	**TN (lbs/year)**	**TP (lbs/year)**	**TSS (lbs/year)**
UNT to Schuylkill River	12.41	16.99	29.39	1,034.51	44.68	28,380.73
BMP Reductions				45.81	3.37	2,494.11
				988.70	**41.32**	**25,886.63**
Reequired Reduction Percent:				3%	5%	10%
Adjusted Required Reduction (Lbs.):				**29.66**	**2.07**	**2,588.66**

ATTACHMENT I

POTENTIAL BMP POLLUTANT LOADING REDUCTION

1. Potential BMP Description
2. UNT to Schuylkill River (Appendix E)
3. Street Sweeping Analysis

POTENTIAL BMP POLLUTANT LOADING REDUCTION

Potential BMP Description

UNT to Schuylkill River:

BMP 001-BS1: Bioswale
The analysis evaluated the construction of a bioswale. The BMP would be constructed approximately 1004 Main Street in public property. The BMP would be approximately 100 feet long. Construction activities include: Construction activities include: Re-grading/expanding channel; installing ballast and amended soils; bioswale plantings; and stabilization of existing storm outlets.

BMP 002-BR1: Wet Pond - Basin Retrofit
The analysis evaluated the conversion of the existing dry detention basin to a wet pond. The pond is located on private property approximately between 651 Lincoln Street and 120 Karen Court. Construction activities include: excavation to provide wet storage area; modification of the outlet structure; installation of amended soils to promote infiltration; and installation of wet plantings to promote nutrient removal.

BMP 002-BS1: Bioswale
The analysis evaluated the construction of a bioswale. The BMP would be constructed across private property between 114 Karen Court and 120 Karen court. The BMP would be approximately 30 feet long. Construction activities include: Construction activities include: Re-grading/expanding channel; installing ballast and amended soils; bioswale plantings; and stabilization of existing storm outlets.

BMP 003-BR1: Wet Pond – Basin Retrofit
The analysis evaluated the conversion of the existing dry detention basin, located at 644 Lincoln Street. The pond is located on private property. Construction activities include: excavation to provide wet storage area; modification of the outlet structure; installation of amended soils to promote infiltration; and installation of wet plantings to promote nutrient removal.

BMP 062-VS1: Vegetated Swale
The analysis evaluated the construction of a vegetated swale. The BMP would be constructed within road right-of-way at approximately 2 Schuylkill Ave. The BMP will be approximately 380 feet long. Construction activities include: Re-grading/expanding channel; finish grading, seeding and matting; and stabilization of existing storm outlets.

POTENTIAL BMP POLLUTANT LOADING REDUCTION

UNT to Schuylkill River (Appendix E)

Shoemakersville Borough
Pollutant Reduction Plan (PRP)
ARRO No.: 10099.00

Potential BMP Summary:

				Pollutant Reduction		
	Drainage Area ID	**Prop. BMP ID**	**BMP Description**	**TN (lbs/year)**	**TP (lbs/year)**	**TSS (lbs/year)**
UNT to Schuylkill River						
	OF-001	BMP 001-BS1	Bioswale	370.77	18.20	13,150.38
	OF-002	BMP 002-BR1	Wet Pond - Basin Retrofit	44.08	4.24	3,633.98
	OF-002	BMP 002-BS1	Bioswale	191.41	8.49	5,460.70
	OF-003	BMP 003-BR1	Wet Pond - Basin Retrofit	17.17	1.80	1,700.68
	OF-005	BMP 005-VS1	Vegetated Swale	8.15	0.28	650.55
				631.59	**33.01**	**24,596.29**

Shoemakersville Borough
Pollutant Reduction Plan (PRP)
ARRO No.: 10099.00
Proposed BMPs

Worksheet 4:
Drainage Area: Urbanized MS4 Regulated Area
2-year Rainfall: 3.24 in

Proposed BMP Calculations:

Cover/Type/Condition	Soil Type	Area (SF)	Area (Ac)	CN	S	Ia (0.2*S)	Q Runoff (in)	Runoff Volume (CF)	Acre-Ft
BMP 001-BS1	**Bioswale**								
Pre-Development									
Pervious	C	0	0.000	77	2.99	0.60	1.24	0.00	
Meadow	C	651,363	14.953	71	4.08	0.82	0.90	48,973.71	
Impervious	C	0	0.000	98	0.20	0.04	3.01	0.00	
		651,363	14.953					48,973.71	1.12
Post-Development									
Pervious	C	324,015	7.438	77	2.99	0.60	1.24	33,494.03	
Impervious	C	327,348	7.515	98	0.20	0.04	3.01	82,037.35	
		651,363	14.953					115,531.38	2.65
							Net Increase:	66,557.67	1.53
BMP 002-BR1	**Wet Pond - Basin Retrofit**								
Pre-Development									
Pervious	C	0	0.000	77	2.99	0.60	1.24	0.00	
Meadow	C	365,425	8.389	71	4.08	0.82	0.90	27,475.01	
Impervious	C	0	0.000	98	0.20	0.04	3.01	0.00	
		365,425	8.389					27,475.01	0.63
Post-Development									
Pervious	C	233,006	5.349	77	2.99	0.60	1.24	24,086.28	
Impervious	C	132,419	3.040	98	0.20	0.04	3.01	33,185.69	
		365,425	8.389					57,271.97	1.31
							Net Increase:	29,796.96	0.68
BMP 002-BS1	**Bioswale**								
Pre-Development									
Pervious	C	0	0.000	77	2.99	0.60	1.24	0.00	
Meadow	C	339,889	7.803	71	4.08	0.82	0.90	25,555.05	
Impervious	C	0	0.000	98	0.20	0.04	3.01	0.00	
		339,889	7.803					25,555.05	0.59
Post-Development									
Pervious	C	214,998	4.936	77	2.99	0.60	1.24	22,224.76	
Impervious	C	124,891	2.867	98	0.20	0.04	3.01	31,299.08	
		339,889	7.803					53,523.84	1.23
							Net Increase:	27,968.79	0.64

BMP 003-BR1	**Wet Pond - Basin Retrofit**								
Pre-Development									
Pervious	C	0	0.000	77	2.99	0.60	1.24	0.00	
Meadow	C	141,080	3.239	71	4.08	0.82	0.90	10,607.28	
Impervious	C	0	0.000	98	0.20	0.04	3.01	0.00	
		141,080	3.239					10,607.28	0.24
Post-Development									
Pervious	C	74,346	1.707	77	2.99	0.60	1.24	7,685.31	
Impervious	C	66,733	1.532	98	0.20	0.04	3.01	16,724.17	
		141,080	3.239					24,409.49	0.56
						Net Increase:		13,802.20	0.32
BMP 005-VS1	**Vegetated Swale**								
Pre-Development									
Pervious	C	0	0.000	77	2.99	0.60	1.24	0.00	
Meadow	C	102,953	2.363	71	4.08	0.82	0.90	7,740.64	
Impervious	C	0	0.000	98	0.20	0.04	3.01	0.00	
		102,953	2.363					7,740.64	0.18
Post-Development									
Pervious	C	85,218	1.956	77	2.99	0.60	1.24	8,809.12	
Impervious	C	17,735	0.407	98	0.20	0.04	3.01	4,444.55	
		102,953	2.363					13,253.67	0.30
						Net Increase:		5,513.03	0.13

Shoemakersville Borough
Pollutant Reduction Plan (PRP)
ARRO No.: 10099.00

Expert Panel Pollutant Reduction Efficiency Calculations:

x = (12 x Ep)/IA
Ep = Post - Predevelopment volume increase
IA = Impervious Area (Ac)

					PA DEP BMP Effectiveness Values Pollutant % Removal			Existing BMP Efficiency Pollutant % Removal			Adjusted BMP Effectiveness Values Pollutant % Removal		
BMP ID	**BMP Description**	**EP**	**IA**	**x**	**TN**	**TP**	**TSS**	**TN**	**TP**	**TSS**	**TN**	**TP**	**TSS**
BMP 001-BS1	Bioswale	1.53	7.515	2.44	70%	75%	80%				70%	75%	80%
BMP 002-BR1	Wet Pond - Basin Retrofit	0.68	3.040	2.70	20%	45%	60%	5%	10%	10%	15%	35%	50%
BMP 002-BS1	Bioswale	0.64	2.867	2.69	70%	75%	80%				70%	75%	80%
BMP 003-BR1	Wet Pond - Basin Retrofit	0.32	1.532	2.48	20%	45%	60%	5%	10%	10%	15%	35%	50%
BMP 005-VS1	Vegetated Swale	0.13	0.407	3.73	10%	10%	50%				10%	10%	50%

Shoemakersville Borough
Pollutant Reduction Plan (PRP)
ARRO No.: 10099.00
Proposed BMP Pollutant Reduction

PA DEP Land Loading:		TN (lbs/acre/year)	TP (lbs/acre/year)	TSS (lbs/acre/year)
Berks	Impervious	36.81	2.26	1925.79
	Pervious	34.02	0.98	264.29
	Undeveloped	10	0.33	234.6

OF-001
Bioswale

	Drainage Area (SF)			Drainage Area (Ac)			PA DEP Land Loading								
BMP ID	Impervious	Pervious	Total	Impervious	Pervious	Total	TN - Impervious Area (lbs/year)	TN - Pervious Area (lbs/year)	TN (lbs/year)	TP - Impervious Area (lbs/year)	TP - Pervious Area (lbs/year)	TP (lbs/year)	TSS - Impervious Area (lbs/year)	TSS - Pervious Area (lbs/year)	TSS (lbs/year)
BMP 001-BS1	327,348	324,015	651,363	7.5	7.4	15.0	276.62	253.05	**529.68**	16.98	7.29	**24.27**	14,472.1	1,965.9	**16,438.0**
BMP Effectiveness Value (3800-PM-BCW0100m) & Manufacture Literature									70%			75%			80%
Pollutant Reduction									**370.77**			**18.20**			**13,150.38**

OF-002
Wet Pond - Basin Retrofit

	Drainage Area (SF)			Drainage Area (Ac)			PA DEP Land Loading								
BMP ID	Impervious	Pervious	Total	Impervious	Pervious	Total	TN - Impervious Area (lbs/year)	TN - Pervious Area (lbs/year)	TN (lbs/year)	TP - Impervious Area (lbs/year)	TP - Pervious Area (lbs/year)	TP (lbs/year)	TSS - Impervious Area (lbs/year)	TSS - Pervious Area (lbs/year)	TSS (lbs/year)
BMP 002-BR1	132,419	233,006	365,425	3.0	5.3	8.4	111.90	181.98	**293.88**	6.87	5.24	**12.11**	5,854.2	1,413.7	**7,268.0**
BMP Effectiveness Value (3800-PM-BCW0100m) & Manufacture Literature									15%			35%			50%
Pollutant Reduction									**44.08**			**4.24**			**3,633.98**

OF-002
Bioswale

	Drainage Area (SF)			Drainage Area (Ac)			PA DEP Land Loading								
BMP ID	Impervious	Pervious	Total	Impervious	Pervious	Total	TN - Impervious Area (lbs/year)	TN - Pervious Area (lbs/year)	TN (lbs/year)	TP - Impervious Area (lbs/year)	TP - Pervious Area (lbs/year)	TP (lbs/year)	TSS - Impervious Area (lbs/year)	TSS - Pervious Area (lbs/year)	TSS (lbs/year)
BMP 002-BS1	124,891	214,998	339,889	2.9	4.9	7.8	105.54	167.91	**273.45**	6.48	4.84	**11.32**	5,521.4	1,304.5	**6,825.9**
BMP Effectiveness Value (3800-PM-BCW0100m) & Manufacture Literature									70%			75%			80%
Pollutant Reduction									**191.41**			**8.49**			**5,460.70**

OF-003

Wet Pond - Basin Retrofit

	Drainage Area (SF)			Drainage Area (Ac)			PA DEP Land Loading								
BMP ID	**Impervious**	**Pervious**	**Total**	**Impervious**	**Pervious**	**Total**	**TN - Impervious Area (lbs/year)**	**TN - Pervious Area (lbs/year)**	**TN (lbs/year)**	**TP - Impervious Area (lbs/year)**	**TP - Pervious Area (lbs/year)**	**TP (lbs/year)**	**TSS - Impervious Area (lbs/year)**	**TSS - Pervious Area (lbs/year)**	**TSS (lbs/year)**
BMP 003-BR1	66,733	74,346	141,080	1.5	1.7	3.2	56.39	58.06	**114.46**	3.46	1.67	**5.13**	2,950.3	451.1	**3,401.4**
BMP Effectiveness Value (3800-PM-BCW0100m) & Manufacture Literature									15%			35%			50%
Pollutant Reduction									**17.17**			**1.80**			**1,700.68**

OF-005

Vegetated Swale

	Drainage Area (SF)			Drainage Area (Ac)			PA DEP Land Loading								
BMP ID	**Impervious**	**Pervious**	**Total**	**Impervious**	**Pervious**	**Total**	**TN - Impervious Area (lbs/year)**	**TN - Pervious Area (lbs/year)**	**TN (lbs/year)**	**TP - Impervious Area (lbs/year)**	**TP - Pervious Area (lbs/year)**	**TP (lbs/year)**	**TSS - Impervious Area (lbs/year)**	**TSS - Pervious Area (lbs/year)**	**TSS (lbs/year)**
BMP 005-VS1	17,735	85,218	102,953	0.4	2.0	2.4	14.99	66.55	**81.54**	0.92	1.92	**2.84**	784.1	517.0	**1,301.1**
BMP Effectiveness Value (3800-PM-BCW0100m) & Manufacture Literature									10%			10%			50%
Pollutant Reduction									**8.15**			**0.28**			**650.55**

Shoemakersville Borough
Pollutant Reduction Plan (PRP)
ARRO No.: 10099.00
Proposed BMP Pollutant Reduction

Drainage Area ID	Prop. BMP ID	BMP Description	Pollutant Reduction		
			TN (lbs/year)	TP (lbs/year)	TSS (lbs/year)
OF-001	BMP 001-BS1	Bioswale	370.77	18.20	13,150.38
OF-002	BMP 002-BR1	Wet Pond - Basin Retrofit	44.08	4.24	3,633.98
OF-002	BMP 002-BS1	Bioswale	191.41	8.49	5,460.70
OF-003	BMP 003-BR1	Wet Pond - Basin Retrofit	17.17	1.80	1,700.68
OF-005	BMP 005-VS1	Vegetated Swale	8.15	0.28	650.55
			631.59	**33.01**	**24,596.29**

REQUIRED POLLUTANT REDUCTION (Lbs/Year)	**29.66**	**2.07**	**2,588.66**
Maximum Permitted Reduction for Storm Sewer System Solids Ren	14.83	1.03	1,294.33

POTENTIAL BMP POLLUTANT LOADING REDUCTION

Street Sweeping Analysis

Shoemakersville Borough
Pollutant Reduction Plan (PRP)
ARRO No.: 10099.00
Street Sweeping

PA DEP Land Loading:		TN (lbs/acre/year)	TP (lbs/acre/year)	TSS (lbs/acre/year)
Berks	Impervious	36.81	2.26	1925.79
	Pervious	34.02	0.98	264.29
	Undeveloped	10	0.33	234.6

Street Sweeping Pollutant Loading Reduction

All Streets - AST-S4: Spring and Fall - one pass every other week; monthly otherwise (Aprox. 20 passes/yr).

	Street Length		Drainage Area (Ac)		PA DEP Land Loading								
BMP ID	Length (Ft)	Length (Mi)	Impervious (Ac/mi)	Total	TN - Impervious Area (lbs/year)	TN - Pervious Area (lbs/year)	TN (lbs/year)	TP - Impervious Area (lbs/year)	TP - Pervious Area (lbs/year)	TP (lbs/year)	TSS - Impervious Area (lbs/year)	TSS - Pervious Area (lbs/year)	TSS (lbs/year)
All Streets - AST-S4	34,742	6.58	2.0	13.2	484.42	0.00	**484.42**	29.74	0.00	**29.74**	25,343.4	0.0	**25,343.4**
Expert Panel Performance Standards							2%			5%			10%
Pollutant Reduction							**9.69**			**1.49**			**2,534.34**

All Streets - AST1P2W - one pass every 2 weeks (Aprox. 25 passes/yr)

	Street Length		Drainage Area (Ac)		PA DEP Land Loading								
BMP ID	Length (Ft)	Length (Mi)	Impervious (Ac/mi)	Total	TN - Impervious Area (lbs/year)	TN - Pervious Area (lbs/year)	TN (lbs/year)	TP - Impervious Area (lbs/year)	TP - Pervious Area (lbs/year)	TP (lbs/year)	TSS - Impervious Area (lbs/year)	TSS - Pervious Area (lbs/year)	TSS (lbs/year)
All Streets - AST1P2W	34,742	6.58	2.0	13.2	484.42	0.00	**484.42**	29.74	0.00	**29.74**	25,343.4	0.0	**25,343.4**
Expert Panel Performance Standards							2%			5%			11%
Pollutant Reduction							**9.69**			**1.49**			**2,787.77**

All Streets - AST1P4W - one pass every 4 weeks (Aprox. 10 passes/yr)

	Street Length		Drainage Area (Ac)		PA DEP Land Loading								
BMP ID	Length (Ft)	Length (Mi)	Impervious (Ac/mi)	Total	TN - Impervious Area (lbs/year)	TN - Pervious Area (lbs/year)	TN (lbs/year)	TP - Impervious Area (lbs/year)	TP - Pervious Area (lbs/year)	TP (lbs/year)	TSS - Impervious Area (lbs/year)	TSS - Pervious Area (lbs/year)	TSS (lbs/year)
All Streets - AST1P4W	34,742	6.58	2.0	13.2	484.42	0.00	**484.42**	29.74	0.00	**29.74**	25,343.4	0.0	**25,343.4**
Expert Panel Performance Standards							1%			3%			6%
Pollutant Reduction							**4.84**			**0.89**			**1,520.60**

All Streets - AST1P12W - one pass every 12 weeks.

	Street Length		Drainage Area (Ac)		PA DEP Land Loading								
BMP ID	Length (Ft)	Length (Mi)	Impervious (Ac/mi)	Total	TN - Impervious Area (lbs/year)	TN - Pervious Area (lbs/year)	TN (lbs/year)	TP - Impervious Area (lbs/year)	TP - Pervious Area (lbs/year)	TP (lbs/year)	TSS - Impervious Area (lbs/year)	TSS - Pervious Area (lbs/year)	TSS (lbs/year)
Borough Streets - AST1P12W	34,742	6.58	2.0	13.2	484.42	0.00	**484.42**	29.74	0.00	**29.74**	25,343.4	0.0	**25,343.4**
Expert Panel Performance Standards							0%			1%			2%
Pollutant Reduction							**0.00**			**0.30**			**506.87**

Table 17. Pollutant Reductions Associated with Different Street Cleaning Practices					
Practice #	Description [1]	Approx Passes/Yr [2]	TSS Removal (%)	TN Removal (%)	TP Removal (%)
SCP-1	AST- 2 PW	~100	21	4	10
SCP-2	AST- 1 PW	~50	16	3	8
SCP-3	AST- 1 P2W	~25	11	2	5
SCP-4	AST- 1 P4W	~10	6	1	3
SCP-5	AST- 1 P8W	~6	4	0.7	2
SCP-6	AST- 1 P12W	~4	2	0	1
SCP-7	AST- S1 or S2	~15	7	1	4
SCP-8	AST- S3 or S4	~20	10	2	5
SCP-9	MBT- 2PW	~100	1.0	0	0
SCP-10	MBT- 1 PW	~50	0.5	0	0
SCP-11	MBT- 1 P4W	~10	0.1	0	0

AST: Advanced Sweeping Technology MBT: Mechanical Broom Technology
[1] See Table 15 for the codes used to define street cleaning frequency
[2] Depending on the length of the winter shutdown, the number of passes/yr may be lower than shown

Table 15. Adapting the WINSLAMM Model for the Chesapeake Bay Watershed	
Three different sweeping start/stop dates to reflect regional differences in climate across the watershed: Sweeping occurs over the entire year Sweeping suspended December 1, restarts March 15 Sweeping suspended December 15, restarts February 15	
Six different fixed sweeping schedules	
2PW = 2 passes per week 1PW = 1 pass every week 1P2W = 1 pass every 2 weeks	1P4W = 1 pass every 4 weeks 1P8W = 1 pass every 8 weeks 1P12W = 1 pass every 12 weeks
Four seasonal sweeping schedules (more intensive in Spring or Fall)	
S1: Spring – One pass every week from March to April. Monthly otherwise S2: Spring – One pass every other week from March to April. Monthly otherwise S3: Spring and fall – One pass every week (March to April, October to November). Monthly otherwise S4: Spring and fall – One pass every other week during the season. Monthly otherwise	
Two Levels of Sweeper Technology	
MBC = Mechanical broom cleaning	VAC = Vacuum assisted cleaning
Four Options for Street Parking Density and No Parking Enforcement	
For more details, consult the technical memo (Tetra Tech, Inc., 2015)	

ATTACHMENT J

SELECTED BMP POLLUTANT LOADING REDUCTION

1. BMP Description

2. BMP Pollutant Loading Reduction

SELECTED BMP POLLUTANT LOADING REDUCTION

BMP Description

UNT to Schuylkill River – Appendix E

BMP 001-BS1: Bioswale

The analysis evaluated the construction of a bioswale. The BMP would be constructed approximately 1004 Main Street in public property. The BMP would be approximately 100 feet long. Construction activities include: Construction activities include: Re-grading/expanding channel; installing ballast and amended soils; bioswale plantings; and stabilization of existing storm outlets.

SELECTED BMP POLLUTANT LOADING REDUCTION

BMP Pollutant Loading Reduction

Shoemakersville Borough
Pollutant Reduction Plan (PRP)
ARRO No.: 10099.00

Selected BMPs Option:
Option 1:

	Drainage Area ID	Prop. BMP ID	BMP Description	Pollutant Reduction TN (lbs/year)	TP (lbs/year)	TSS (lbs/year)
UNT to Schuylkill River						
	OF-001	BMP 001-BS1	Bioswale	370.77	18.20	13,150.38
				370.77	**18.20**	**13,150.38**
Required Reduction (Lbs/Year)				**29.66**	**2.07**	**2,588.66**
Net Reduction:				341.11	16.14	10,561.72

ATTACHMENT K

PLANNING ESTIMATES OF OPINION OF PROBABLE COST

The ARRO Group, Inc.
50 Berkshire Court, Suite 209
Wyomissing, PA 19610

OPINION OF PROBABLE CONSTRUCTION COST

Date: May 3, 2017
Project Number: 10099.00
Project Name: Pollutant Reduction Plan (PRP)

Checked By: MRK

BMP 001-BS1: Bioswale

Item No.	Description	Qty.	Unit	Unit Price	Total Cost
	Miscellaneous/Site Work Payment Items				
1	Mobilization	1	LS	$10,000.00	$10,000.00
2	Excavation	140	CY	$30.00	$4,200.00
3	Erosion control matting	0	SY	$15.00	$0.00
4	Finish grading and seeding - Bioswale	175	SY	$10.00	$1,750.00
5	Finish grading and seeding - Basin	0	SY	$6.00	$0.00
6	12" Gravel	60	Ton	$20.00	$1,200.00
7	6" Amended soils	30	Ton	$25.00	$750.00
8	Plantings	100	Ea	$25.00	$2,500.00
9	Rip Rap	25	Ton	$90.00	$2,250.00
	Subtotal				$22,650.00
	Contingency (30%)				$6,795.00
	Construction Sub-Total				$29,445.00
	Engineering (30%)				$8,833.50
	Right-of-Way (5%)				$1,472.25
	Legal (3%)				$883.35
	TOTAL				**$40,634.10**

The ARRO Group, Inc.
50 Berkshire Court, Suite 209
Wyomissing, PA 19610

OPINION OF PROBABLE CONSTRUCTION COST

Date: May 3, 2017 | Checked By: MRK
Project Number: 10099.00
Project Name: Pollutant Reduction Plan (PRP)

BMP 002-BR1: Wet Pond - Basin Retrofit

Item No.	Description	Qty.	Unit	Unit Price	Total Cost
	Miscellaneous/Site Work Payment Items				
1	Mobilization	1	LS	$10,000.00	$10,000.00
2	M&P	1	LS	$1,500.00	$1,500.00
3	Erosion and Sedimentation Control	1	LS	$1,500.00	$1,500.00
4	Finish Grading and Seeding	295	SY	$6.00	$1,770.00
5	Excavation	115	CY	$30.00	$3,450.00
6	Rip Rap	30	Ton	$90.00	$2,700.00
7	Outlet Structure Modification	1	LS	$2,500.00	$2,500.00
8	Soil Amendment	50	CY	$25.00	$1,250.00
9	Wet Plantings	75	Ea	$18.00	$1,350.00
	Subtotal				$26,020.00
	Contingency (30%)				$7,806.00
	Construction Sub-Total				$33,826.00
	Engineering (30%)				$10,147.80
	Right-of-Way (5%)				$1,691.30
	Legal (3%)				$1,014.78
	TOTAL				**$46,679.88**

The ARRO Group, Inc.
50 Berkshire Court, Suite 209
Wyomissing, PA 19610

OPINION OF PROBABLE CONSTRUCTION COST

Date: May 3, 2017
Project Number: 10099.00
Project Name: Pollutant Reduction Plan (PRP)

Checked By: MRK

BMP 002-BS1: Bioswale

Item No.	Description	Qty.	Unit	Unit Price	Total Cost
	Miscellaneous/Site Work Payment Items				
1	Mobilization	1	LS	$10,000.00	$10,000.00
2	Excavation	150	CY	$30.00	$4,500.00
3	Erosion control matting	0	SY	$15.00	$0.00
4	Finish grading and seeding - Bioswale	130	SY	$10.00	$1,300.00
5	Finish grading and seeding - Basin	0	SY	$6.00	$0.00
6	12" Gravel	40	Ton	$20.00	$800.00
7	6" Amended soils	20	Ton	$25.00	$500.00
8	Plantings	75	Ea	$25.00	$1,875.00
9	Rip Rap	20	Ton	$90.00	$1,800.00
	Subtotal				$20,775.00
	Contingency (30%)				$6,232.50
	Construction Sub-Total				$27,007.50
	Engineering (30%)				$8,102.25
	Right-of-Way (5%)				$1,350.38
	Legal (3%)				$810.23
					.
	TOTAL				**$37,270.35**

The ARRO Group, Inc.
50 Berkshire Court, Suite 209
Wyomissing, PA 19610

OPINION OF PROBABLE CONSTRUCTION COST

Date: May 3, 2017 | Checked By: MRK
Project Number: 10099.00
Project Name: Pollutant Reduction Plan (PRP)

BMP 003-BR1: Wet Pond - Basin Retrofit

Item No.	Description	Qty.	Unit	Unit Price	Total Cost
	Miscellaneous/Site Work Payment Items				
1	Mobilization	1	LS	$10,000.00	$10,000.00
2	M&P	1	LS	$1,500.00	$1,500.00
3	Erosion and Sedimentation Control	1	LS	$1,500.00	$1,500.00
4	Finish Grading and Seeding	355	SY	$6.00	$2,130.00
5	Excavation	210	CY	$30.00	$6,300.00
6	Rip Rap	30	Ton	$90.00	$2,700.00
7	Outlet Structure Modification	1	LS	$2,500.00	$2,500.00
8	Soil Amendment	75	CY	$25.00	$1,875.00
9	Wet Plantings	150	Ea	$18.00	$2,700.00
	Subtotal				$31,205.00
	Contingency (30%)				$9,361.50
	Construction Sub-Total				$40,566.50
	Engineering (30%)				$12,169.95
	Right-of-Way (5%)				$2,028.33
	Legal (3%)				$1,217.00
					.
	TOTAL				**$55,981.77**

The ARRO Group, Inc.
50 Berkshire Court, Suite 209
Wyomissing, PA 19610

OPINION OF PROBABLE CONSTRUCTION COST

Date: May 3, 2017 | Checked By: MRK
Project Number: 10099.00
Project Name: Pollutant Reduction Plan (PRP)

BMP 005-VS1: Vegetated Swale

Item No.	Description	Qty.	Unit	Unit Price	Total Cost
	Miscellaneous/Site Work Payment Items				
1	Mobilization	1	LS	$10,000.00	$10,000.00
2	Excavation	425	CY	$30.00	$12,750.00
3	Erosion control matting	525	SY	$15.00	$7,875.00
4	Finish grading and seeding - Bioswale	0	SY	$10.00	$0.00
5	Finish grading and seeding	525	SY	$6.00	$3,150.00
6	12" Gravel	0	Ton	$20.00	$0.00
7	6" Amended soils	0	Ton	$25.00	$0.00
8	Plantings	0	Ea	$25.00	$0.00
9	Rip Rap	35	Ton	$90.00	$3,150.00
	Subtotal				$36,925.00
	Contingency (30%)				$11,077.50
	Construction Sub-Total				$48,002.50
	Engineering (30%)				$14,400.75
	Right-of-Way (5%)				$2,400.13
	Legal (3%)				$1,440.08
					.
	TOTAL				**$66,243.45**

ATTACHMENT L

RETURN ON INVESTMENT ANALYSIS

Pollutant Reduction Plan (PRP)
ARRO No.: 10099.00
Proposed BMP Return-on-Investment Calculation

			Pollutant Reduction						
Drainage Area ID	**Prop. BMP ID**	**BMP Description**	**TN (lbs/year)**	**TP (lbs/year)**	**TSS (lbs/year)**	**Estimate Project Total**	**$ per lbs of TN Removed**	**$ per lbs of TP Removed**	**$ per lbs of TSS Removed**
OF-001	BMP 001-BS1	Bioswale	370.77	18.20	13,150.38	$40,634.10	$ 109.59	$ 2,232.04	$ 3.09
OF-002	BMP 002-BR1	Wet Pond - Basin Retrofit	44.08	4.24	3,633.98	$46,679.88	$ 1,058.95	$ 11,011.20	$ 12.85
OF-002	BMP 002-BS1	Bioswale	191.41	8.49	5,460.70	$37,270.35	$ 194.71	$ 4,391.23	$ 6.83
OF-003	BMP 003-BR1	Wet Pond - Basin Retrofit	17.17	1.80	1,700.68	$55,981.77	$ 3,260.74	$ 31,149.09	$ 32.92
OF-005	BMP 005-VS1	Vegetated Swale	8.15	0.28	650.55	$66,243.45	$ 8,123.94	$ 233,471.13	$ 101.83