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**Borough of Marietta**

**MS4 Program**

**Pollutant Reduction Plan (PRP)**

**For**

**UNT to Susquehanna River (Appendix E) &**

**Chesapeake Bay (Appendix D)**

**2018 – 2023 MS4 Permit**

June 2017

Rev. August 2022

ARRO Project No. 5823.13



ARRO Consulting, Inc.  
108 West Airport Road  
Lititz, PA 17543  
717-569-7021

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## 1. INTRODUCTION

Marietta Borough, Lancaster 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 Marietta 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
<b>Lancaster County</b>						
MARIETTA BORO	PAG133552	No		Unnamed Tributaries to Susquehanna River	Appendix E - Nutrients, Siltation (5)	Other Habitat Alterations (4c)
				Chesapeake Bay Nutrients/Sediment	Appendix D - Nutrients, Siltation (4a)	Cause Unknown (5)
				Susquehanna River	Appendix B- Pathogens (5), Appendix C - PCB (5)	

PA DEP has published the Pollutant Aggregation Suggestions for MS4 municipal requirements table; per the aggregation instructions, the aggregate total required reduction may be analyzed and BMP's may be implemented in the identified watersheds, tributary to the same HUC 12 watershed. The aggregated requirements for Marietta Borough are:

MS4 Name	NPDES ID	HUC 12 Name	Impaired Downstream Waters or Applicable TMDL Name	Requirement(s)
<b>Lancaster County</b>				
MARIETTA BORO	PAG133552	Cabin Creek-Susquehanna River, Hartman Run-Susquehanna River	Chesapeake Bay Nutrients\Sediment, Susquehanna River, Unnamed Tributaries to Susquehanna River, Susquehanna River	Appendix E - Nutrients, Siltation (5), Appendix D - Nutrients, Siltation (4a), Appendix C - PCB (5)
		Cabin Creek-Susquehanna River	Susquehanna River	Appendix B- Pathogens (5)

This combined Pollutant Reduction Plan (PRP) has been developed to satisfy the aggregated requirements, as put forward by the PA DEP, of: 1) Chesapeake Bay Pollutant Reduction Plan (CBPRP); and 2) PRP for the Unnamed Tributary (UNT) to Susquehanna River. All of the storm sewersheds identified in this plan are tributaries to the Chesapeake Bay.

## 2. POLLUTANT REDUCTION PLAN (PRP)

### A. Public Participation

Marietta 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 in the local paper on June 23, 2017; 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.

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The Borough received written comment from June 23, 2017 to July 28, 2017; a copy of all written comments is provided in Appendix B. A public meeting was held on August 8, 2017 at 7:00 PM; a summary of comments received is provided in Appendix C.

A revision to the 2017 PRP was made in August 2022, after which the Borough advertised the update on the municipal website, in print at the municipal offices, and in a public Borough Council meeting held on 09/13/2022. No public comments were received after these advertisements.

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

- Marietta 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.
- Marietta Borough Attaining/Non-Attaining Streams – defines streams attainment status and associated impairment.
- Marietta Borough MS3 Drainage Area and Land Use – defines land use based upon zoning to assist in determination of land use contribution to local impairments.
- Marietta Borough MS3 Drainage Area Analysis – provides topographic map utilized in determining storm sewershed to outfalls.
- Marietta Borough MS3 Drainage Area Pervious/Impervious Analysis – provides aerial mapping utilizing Geographic Information System (GIS) data to identify the drainage area and amount of impervious area within each storm sewershed.
- Marietta Borough MS3 Drainage Area Runoff Rate/Volume Analysis – provides rate and volume of runoff per storm sewershed to identify potential local flooding issues.
- Marietta Borough Municipal Storm Sewershed – provides a comparison of the 2010 Census Urbanized Area boundary to define regulated MS4 outfalls and the portion of the storm sewersheds that the Borough is responsible for.
- Marietta Borough Geology – in combination with NRCS soils data, geology is evaluated for the suitability for potential BMP implementation.
- Marietta Borough Potential BMP Structures – provides identification of potential BMPs identified by the Borough that were evaluated.
- Marietta Borough Proposed BMP Structures – provides identification of the selected BMPs identified by the Borough for implementation.

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### **C. Pollutants of Concern**

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

#### Appendix D – Chesapeake Bay

Appendix D is the requirement for development of a Chesapeake Bay Pollutant Reduction Plan (CBPRP). In accordance with the PRP guidelines, the goal of the CBPRP 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: “Permittees are encouraged to select appropriate BMPs to achieve the 10% sediment loading reduction objective, as it is expected that, overall within the Bay watershed, the TP (5%) and TN (3%) goals will be achieved when a 10% reduction in sediment is achieved.” The PRP has been prepared to meet the required 10% reduction of sediment.

#### Appendix E – UNT to Susquehanna River

Appendix E is the requirement for development of a Pollutant Reduction Plan (PRP) for the identified impaired waterway. Marietta Borough is responsible for developing a PRP for the UNT to Susquehanna 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.

#### Aggregate Analysis

In accordance with the pollutant aggregation table, the Borough may evaluate the aggregate total of the watershed’s tributary to the Chesapeake Bay and UNT to Susquehanna River. In accordance with the PRP guidelines, the aggregated goal of the PRP is for the following reduction:

- 10% reduction of Sediment (TSS)

## D. Existing Loading for Pollutants of Concern

Based upon the storm sewershed delineation, the existing loading for TSS, TP and TN were calculated for each storm sewershed. Since Marietta Borough is subject to the requirements of Appendix E, the pollutant loading for the storm sewersheds tributary to the UNT to the Susquehanna River were calculated separately. The pollutant loading for the remaining storm sewersheds tributary to the Chesapeake Bay were calculated. The total pollutant loading to the Chesapeake Bay is the sum of loads calculated for Appendix E and the loads calculated for the remainder of Appendix D; the pollutant loads calculated also represent the aggregated pollutant loading. Pollutant loadings were calculated based upon PA DEP's "Developed Land Loading Rates for PA Counties" (Attachment B of the PRP instructions) for Lancaster County; the calculated pollutant loadings are provided in Appendix F. The calculations are summarized below:

Base Pollutant Loading (No Existing BMPs) Summary:

### Appendix D - Chesapeake Bay

Drainage Area ID	Drainage Area (Ac)			PA DEP Land Loading		
	Impervious	Pervious	Total	TN (lbs/year)	TP (lbs/year)	TSS (lbs/year)
Susquehanna River	84.00	188.53	272.53	7,429.50	198.08	160,356.62
Unnamed Tributary to Chiques Creek	1.08	3.93	5.01	128.96	3.09	2,346.37
				7,558.45	201.16	162,703.00

Required Reduction Percent 3% 5% 10%

Required Reduction (Lbs/Year) 226.75 10.06 16,270.30

### Appendix E - UNT to Susquehanna River

Drainage Area ID	Drainage Area (Ac)			PA DEP Land Loading		
	Impervious	Pervious	Total	TN (lbs/year)	TP (lbs/year)	TSS (lbs/year)
Unnamed Tributary to Susquehanna River	2.31	2.84	5.15	152.00	4.60	3,956.04
				152.00	4.60	3,956.04

Required Reduction Percent 3% 5% 10%

Required Reduction (Lbs/Year) 4.56 0.23 395.60

<b>TOTAL COMBINED REQUIRED REDUCTION:**</b>	<b>231.31</b>	<b>10.29</b>	<b>16,665.90</b>
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## D.1. Existing BMP Load Reductions

Based upon the mapping (see Attachment V), Marietta Borough identified no existing BMPs that would reduce the existing pollutant loading.

## E. Selected BMP's

Marietta Borough developed a potential BMP concept plan to identify potential BMPs to be implemented, see Attachment V. The associated pollutant loading reductions for each BMP were calculated and are provided in Attachment IX; a summary description of the potential

BMPs evaluated is also provided in Attachment IX. The percent of pollutant reductions for each BMP were determined based, PADEP BMP Effectiveness Value table.

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

- Return-on-investment for dollar per pound of pollutant removed (See Appendix L)
- Overall BMP cost (see Appendix K)
- 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, Marietta Borough developed the proposed BMPs to be implemented under the MS4 permit from 2018 – 2023. The proposed BMPs are identified on Map 11: Marietta Borough Proposed BMP Structures. The proposed BMP pollutant reduction is summarized below and in Attachment X:

Selected BMPs: Based upon PA DEP Pollutant Aggregation Table

	Drainage Area ID	Prop. BMP ID	BMP Description	TN(lbs./year)	TP (lbs./year)	TSS (lbs./year)
Unnamed Trib to Chickies Creak						
		BMP OF000-RG1	Rain Garden	31.79	1.15	1093.38
		BMP OF000-RG2	Rain Garden	14.17	0.52	498.98
		BMP OF000-RG23	Rain Garden	112.80	4.53	4493.53
Unnamed Trib to Susquehanna River						
		BMP OF000-SBR1	Stream Bank Restoration	75	68	44880
<b>Pollutant Reduction:</b>				<b>233.76</b>	<b>74.19</b>	<b>50965.89</b>
<b>Required Reduction:</b>				<b>231.31</b>	<b>10.29</b>	<b>16665.9</b>
<b>Net Reduction:</b>				<b>2.45</b>	<b>63.90</b>	<b>34299.99</b>

## F. Funding Mechanism

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

	Drainage Area ID	Prop. BMP ID	BMP Description	Estimate Project Total
Unnamed Trib to Chickies Creak				
	OF-000	BMP OF000-RG1, RG2 & RG3	Rain Garden	\$25,305.30
Unnamed Trib to Susquehanna River				
	OF-000	BMP OF000-SBR1	Streambank Restoration	\$20,000
				<b>\$45,305.30</b>

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The Borough has received funding through the Growing Greener Grant Program for the Streambank Restoration the estimated project cost outlined above is the cost to the Borough after the grant. 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**

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

BMP OF000-RS1: Rain Garden:

Location:	Southwest corner of Donegal Pl. and Furnace Rd.
Responsible Party:	Marietta Borough
O&M Activities:	<ul style="list-style-type: none"><li>-Pruning and weeding while vegetation is being established.</li><li>-Remove detritus and cut down perennial plantings.</li><li>-Spread mulch along areas of erosion and replace mulch for whole area as needed.</li></ul>
Frequency of O&M Activities:	<ul style="list-style-type: none"><li>-Complete inspections of the restored corridor at a minimum of twice a year.</li><li>-Complete restoration and/or selective vegetation management as needed based upon inspections.</li></ul>

BMP OF000-RS2: Rain Garden:

Location:	Northwest of Furnace Rd. before the bend and south of Furnace Rd. after the bend.
Responsible Party:	Marietta Borough
O&M Activities:	<ul style="list-style-type: none"><li>-Pruning and weeding while vegetation is being established.</li><li>-Remove detritus and cut down perennial plantings.</li><li>-Spread mulch along areas of erosion and replace mulch for whole area as needed.</li></ul>
Frequency of O&M Activities:	<ul style="list-style-type: none"><li>-Complete inspection of the restored corridor a minimum of twice a year.</li><li>-Complete restoration and/or selective vegetation management as needed based upon inspections.</li></ul>

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#### BMP OF000-RS3: Rain Garden:

Location:	North of Furnace Rd. and West of the Chickies Rock County Park Parking lot.
Responsible Party:	Marietta Borough
O&M Activities:	<ul style="list-style-type: none"><li>-Pruning and weeding while vegetation is being established.</li><li>-Remove detritus and cut down perennial plantings.</li><li>-Spread mulch along areas of erosion and replace mulch for whole area as needed.</li></ul>
Frequency of O&M Activities:	<ul style="list-style-type: none"><li>-Complete inspection of the restored corridor a minimum of twice a year.</li><li>-Complete restoration and/or selective vegetation management as needed based upon inspections.</li></ul>

#### BMP OF000-SBR1: Stream Bank Restoration

Location:	Section of stream that flows between River Rd. and N Waterford Ave.
Responsible Party:	Marietta Borough
O&M Activities:	<ul style="list-style-type: none"><li>-Identify areas of instability along the streambank and consult with a design professional on methods to remedy if found.</li><li>-Check for increased development of natural vegetation and use a combination of mowing and/or spot spraying to remove invasive species.</li></ul>
Frequency of O&M Activities:	<ul style="list-style-type: none"><li>-The project will be monitored for 3 years; twice annually.</li><li>-Annual monitoring will occur during the growing season and will include photo documentation, visual channel inspection, and visual riparian vegetation inspection.</li></ul>

## **H. PRP Implementation Schedule**

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<u>Task</u>	<u>Implementation Date</u>
MS4 Permit Authorization	March 2018
BMP OF000-RG1	November 2021
BMP OF000-RG2	November 2021
BMP OF000-RG3	November 2021
BMP OF000-SBR1	November 2022
MS4 Permit Expiration	March 2023



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**ATTACHMENT I**

**PUBLIC NOTICE**



108 West Airport Road  
Lititz, PA 17543  
T 717.569.7021  
F 717.560.2778

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## MEMORANDUM

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TO: Marietta Borough  
FROM: Andrew Tuleya, ARRO Consulting  
RE: MS4 Ordinance/Pollution Reduction Plan (PRP) Update  
DATE: 08/25/2022

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On September 13, 2022, Andrew Tuleya of ARRO Consulting (ARRO) will provide a public update during the Marietta Borough Council Meeting regarding the Borough's MS4/Stormwater Permit requirements. This update will include public information regarding the new stormwater management ordinance and updates to the Borough's Pollutant Reduction Plan (PRP).

### Marietta's Stormwater Permit

Marietta Borough is categorized as an MS4 designated by the Pennsylvania Department of the Environment (PA DEP) under the Clean Water Act (CWA) and associated regulations. MS4 owners and operators covered under this general permit must manage, implement, and enforce management programs for controlling all stormwater discharges.

### Stormwater Ordinance Update

By September 30, 2022, the Borough's stormwater ordinance must comply with PA DEP's 2022 ordinance requirements. ARRO has provided the Borough and its solicitor with a draft ordinance. A summary of modifications from the existing stormwater ordinance are summarized below:

1. Adding the concept of Low Impact Development (LID) into the possibilities for stormwater management site design. This is not a requirement at this time, but this allows developers to utilize the techniques.
2. Standardizes stormwater rate controls across municipalities. Many municipalities already meet or exceed minimum rate controls. For these municipalities, their standards will remain unchanged.
3. Codifies owner responsibility for maintenance of stormwater BMPs and allows municipalities to perform operations and maintenance, if needed, at the property owner's expense.
4. Specific stormwater design criteria present in existing ordinances have been migrated to the new, draft ordinance.
5. Specific definitions present in existing ordinances have been migrated to the new, draft ordinance.

At this time no additional comments or inclusions have been received by ARRO. ARRO recommends that the Borough adopt the ordinance in full.

### Pollution Reduction Plan

The Borough is required to implement a pollution reduction plan as outlined below to meet its 2018-2023 MS4 permit requirements.

Appendix D – Nutrients, Siltation (4a) – Chesapeake Bay Nutrients/Sediment  
Appendix E-Nutrients, Siltation (5) - Unnamed Tributaries to Susquehanna River,  
Cause Unknown (5), Other Habitat Alterations (4c)

To fulfill these requirements, the Borough submitted a Pollution Reduction Plan in 2017 to PA DEP. In June 2022, Marietta Borough council approved ARRO to revise the plan to claim credit for the following projects:

- Construction of a rain garden at the southwest corner of Donegal Place and Furnace Road. This would include re-grading to direct stormwater into rain garden, installing ballast and amended soils, and rain garden plantings.

- Construction of a rain garden northwest of Furnace Road before the bend and south of Furnace Road after the bend. This would include re-grading to direct stormwater into rain garden, installing ballast and amended soils, and rain garden plantings.

- Construction of a rain garden north of Furnace Road and west of the Chickies Rock County Park parking lot. This would include re-grading to direct stormwater into rain garden, installing ballast and amended soils, and rain garden plantings.

- Restoration of a stream bank at the section of stream that flows between River Road and North Waterford Avenue. This would include developing monitoring schedule to determine frequency for removing accumulated sediment in accordance with manufacturer's recommendations, removing accumulated sediment with vacuum truck and properly dispose of materials, performing maintenance on box components in accordance with manufacturer's recommendations, and removing collected debris in trash rack monthly.

The revised plan is available for public review and comment through the Borough Office, and is also available on the Borough website. All comments will be received and considered 30 days from today's date. Pending any revisions based on public comment, ARRO will submit the revised PRP to PA DEP for final approval.

### Public Comment Advertisement

Marietta Borough will be holding a public meeting on September 13<sup>th</sup> at 7:00PM at the Borough Office pertaining to the following items:

- Adoption of a new stormwater ordinance – This ordinance will replace the Borough’s existing stormwater ordinance (Ch. 294 Ord. No. 2014-01). A copy of the ordinance is available through the Borough Office as well as on the Borough website.
- Advertisement of the updated Pollutant Reduction Plan – This will be available for public comment through the Borough Office, as well as on the Borough website. The revised plan is available for public review and comment through the Borough Office, and is also available on the Borough website. All comments will be received and considered 30 days from today’s date. Pending any revisions based on public comment, ARRO will submit the revised PRP to PA DEP for final approval.

# **MARIETTA BOROUGH COUNCIL**

## **AGENDA**

**September 13, 2022**

- I. Call to order, moment of silence, and pledge of allegiance to the flag**
- II. PUBLIC HEARING – Andrew Tuleya - Stormwater Ordinance**
- III. PUBLIC COMMENT (3 minutes/individuals, 12 minutes/represented groups)**
- IV. MINUTES FOR APPROVAL – August 9<sup>th</sup> – Sept. 1<sup>st</sup>**
- V. ANNOUNCEMENTS**
- VI. REPORTS**
  - a. Fire Police/EMA- Steve Bailey**
  - b. Fire Company – Brandon Smith, Fire Chief**
  - c. Fire Company Financial Report – Jeffery Marsh**
  - d. Sewer & Recycling- Freddy States**
  - e. Treasurer – Sharon Bradnick**
  - f. Secretary- Sharon Bradnick**
  - g. Vesta Furnace – Dave Haneman**
  - h. Mayor – Rebecca Carroll-Baltozer**
- VII. STANDING COMMITTEE REPORTS**
  - a. Administrative- President Jeff Hudson**
    - 1. Committee report**
    - 2. Motion to adopt the new Stormwater Ordinance 02-2022**
    - 3. Motion to appoint someone to serve on the EMS Authority**
    - 4. Motion to advertise the ordinance of the EMS Authority to join**

5. Motion to setup new checking account named  
Recreation Fund

6. Motion to accept MMO obligation 2023

b. Planning/Zoning/Environmental – Council member Bill Dalzell

1. Committee report

c. Public Outreach – Council member Steven DeBottis

1. Committee report

d. Public Safety – Council member Jeffery Marsh

1. Committee report

e. Public Works – Council member Freddy States

1. Committee Report

2. Motion to have A+ Masonry reappoint building this  
year west end \$8,800 and next year start front of building  
\$19,700

#### **VIII. SPECIAL COMMITTEE REPORTS**

a. JOINT SEWER AUTHORITY – Jeffery Marsh

b. NWRT- Jeffrey Hudson

c. Shadetree Committee – Bill Dalzell

d. WAR MEMORIAL PARK – Freddy States

#### **IX. OLD BUSINESS**

#### **X. NEW BUSINESS**

1. DCNR Grant – Due by October 27<sup>th</sup>

#### **XI. PUBLIC COMMENT (3 minutes/individuals, 12 minutes/represented groups)**

#### **XII. ADJOURNMENT**

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

Marietta Borough 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: Chesapeake Bay (Appendix D – Nutrients and Siltation); UNT to Susquehanna River (Appendix E – Nutrients and 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:     Marietta Borough  
                                      111 East Market Street  
                                      Marietta, PA 17547  
                                      Phone: 717-426-4143  
                                      Comments to: Sharon Bradnick, Secretary

Visit times are: Monday through Thursday, between 8:00 am and 4:30 pm, or visit the Borough website at <http://boroughofmarietta.com/>.

The minimum 30-day public comment period will begin June 28, 2017 and end July 28, 2017.

A public meeting for the Plan will be held on August 8, 2017 during the regularly scheduled Borough Council meeting. Borough Council meeting is held at 111 East Market Street, Marietta, PA 17547, beginning at 7:00 PM.

MARIETTA BOROUGH

Please Publish:             June 23, 2017

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## INVOICE

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### AMOUNT DUE UPON RECEIPT

MARIETTA BOROUGH  
SHARON BRADNICK  
111 E MARKET ST BOX 167  
MARIETTA PA 17547

Sales Rep CARNESEN

AD #	CLASS	DESCRIPTION	START	STOP	TIMES	UNITS	AMOUNT	BALANCE
3791961	107	NOTICE OF PUBLIC COMMENT PO# SHARON BRADNICK IJ	6/23/17	6/23/17	1	57L	292.72	292.72

When you provide a check payment, you authorize us either to use the information from your check to make a one-time electronic fund transfer from your account or to process the payment as a check transaction.

JUN 28 2017

tation.

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:

Marietta Borough  
111 East Market Street  
Marietta, PA 17547  
Phone: 717-426-4143  
Comments to: Sharon  
Bradnick, Secretary

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MARIETTA BOROUGH



**PROOF OF PUBLICATION NOTICE IN**

State of Pennsylvania}  
 } ss:  
 County of Lancaster}

An Affiant of the County and State aforesaid, being duly sworn, deposes and says that the LNP, a daily newspaper of general circulation published at Lancaster, County and State aforesaid, was established 1794-1877 since which date said daily newspaper has been regularly issued in said county, and that a copy of the printed notice or publication is attached hereto exactly the same as was printed and published in the regular editions and issues of said daily newspaper on the following dates:

23<sup>RD</sup> DAY OF JUNE 2017

Affiant further deposes that he/she is the Clerk duly authorized by the LNP Media Group, Inc., a corporation, publisher of said LNP, a newspaper of general circulation, to verify the foregoing statement under oath, and also declares that affiant is not interested in the subject matter of the aforesaid notice or advertisement and that all allegations in the foregoing statement as to time, place and character of publication are true.

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

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The minimum 30-day public comment period will begin June 28, 2017, and end July 28, 2017.

A public meeting for the Plan will be held on August 8, 2017, during the regularly scheduled Borough Council meeting. Borough Council meeting is held at 111 East Market Street, Marietta, PA 17547, beginning at 7:00 PM.  
**MARIETTA BOROUGH**

*Carole A. Hood*

(Affiant's Signature)

**COPY OF NOTICE OF PUBLICATION**

Sworn and subscribed to before me this  
 23<sup>RD</sup> DAY OF JUNE 2017

*Jeffrey J. Hollinger*  
 Notary Public

COMMONWEALTH OF PENNSYLVANIA

NOTARIAL SEAL

Jeffrey J. Hollinger, Notary Public

City of Lancaster, Lancaster County

My Commission Expires June 10, 2021

MEMBER, PENNSYLVANIA ASSOCIATION OF NOTARIES

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## **ATTACHMENT II**

### **WRITTEN PUBLIC COMMENTS**

There were no written public comments received during the 2022 comment period.



August 28, 2017

ARRO Consulting, Inc.  
Attn: Mike Knouse, P.E.  
4750 Delbrook Road, Suite 101  
Mechanicsburg, PA 17050

Borough of Marietta  
MS4 Program  
**Pollutant Reduction Plan**

Dear Mr. Knouse:

This letter is written to confirm that the Borough of Marietta did not receive any written comments from the public regarding the above referenced plan during the public comment period of July 17, 2017 to August 16, 2017.

Sincerely,

*Sharon L. Bradnick*

Sharon L. Bradnick  
Secretary/Treasurer

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**ATTACHMENT III**

**PUBLIC MEETING COMMENTS**

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## **2017 PUBLIC MEETING COMMENTS**

1.

Comment: Are sediment load reductions being handled like nutrient trading credits?

Response: No, they are not.

2.

Comment: I think this program sounds like a good idea for the environment.

Response: None required.

3.

Comment: Can you explain how a riparian buffer is installed?

Response: It involves establishing specific planting in zones at specified distances from the stream embankment.

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## **ATTACHMENT IV**

### **RECORD OF CONSIDERATION OF ALL TIMELY COMMENTS RECEIVED**

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## **RECORD OF CONSIDERATION OF ALL TIMELY COMMENTS RECEIVED**

1.

Comment: Are sediment load reductions being handled like nutrient trading credits?

Actions taken: Question answered.

2.

Comment: I think this program sounds like a good idea for the environment.

Actions taken: None required.

3.

Comment: Can you explain how a riparian buffer is installed?

Actions taken: Question answered.

---

## **ATTACHMENT V**

### **MAPPING**

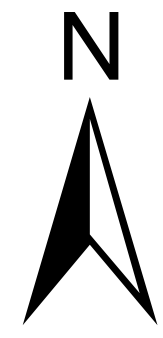


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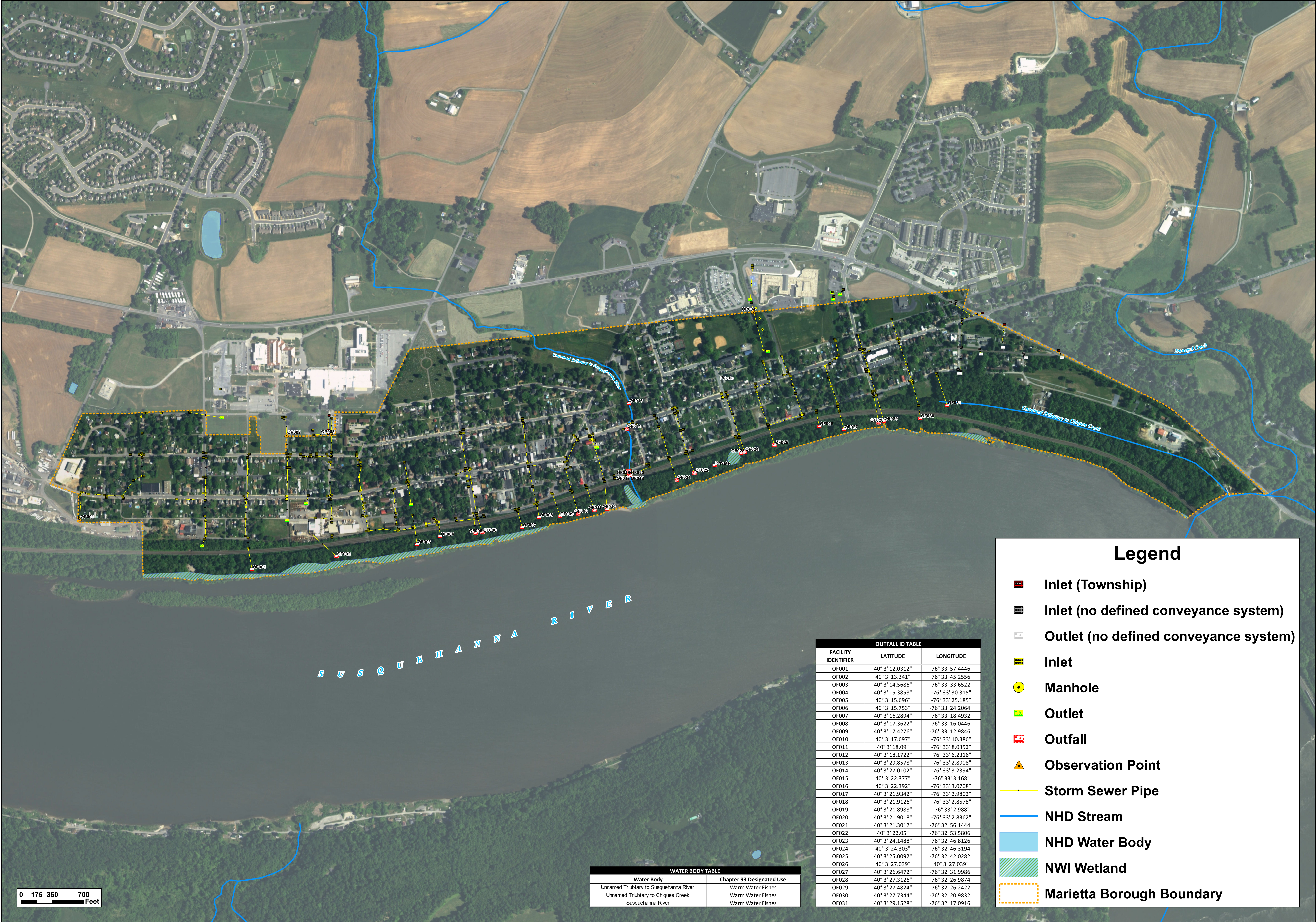
## MAP INDEX

<b>Map 1:</b>	Marietta Borough MS4 Conveyance System
<b>Map 2:</b>	Marietta Borough Attaining/Non-Attaining Streams
<b>Map 3:</b>	Marietta Borough MS3 Drainage Area and Land Use
<b>Map 4:</b>	Marietta Borough MS3 Drainage Area Analysis
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<b>Map 6:</b>	Marietta Borough MS3 Drainage Area Runoff Rate/Volume Analysis
<b>Map 7:</b>	Marietta Borough Municipal Storm Sewershed
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# Marietta Borough MS4 Conveyance System



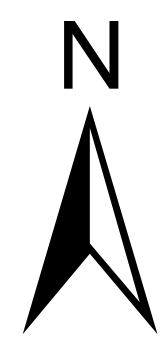
## Legend

- Inlet (Township)
- Inlet (no defined conveyance system)
- Outlet (no defined conveyance system)
- Inlet
- Manhole
- Outlet
- Outfall
- Observation Point
- Storm Sewer Pipe
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- NHD Water Body
- NWI Wetland
- Marietta Borough Boundary

FACILITY IDENTIFIER	OUTFALL ID TABLE	
	LATITUDE	LONGITUDE
OF001	40° 3' 12.0312"	-76° 33' 57.4446"
OF002	40° 3' 13.341"	-76° 33' 45.2556"
OF003	40° 3' 14.5686"	-76° 33' 33.6522"
OF004	40° 3' 15.3858"	-76° 33' 30.315"
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OF021	40° 3' 21.3012"	-76° 32' 56.1444"
OF022	40° 3' 22.05"	-76° 32' 53.5806"
OF023	40° 3' 24.1488"	-76° 32' 46.8126"
OF024	40° 3' 24.303"	-76° 32' 46.3194"
OF025	40° 3' 25.0092"	-76° 32' 42.0282"
OF026	40° 3' 27.039"	40° 3' 27.039"
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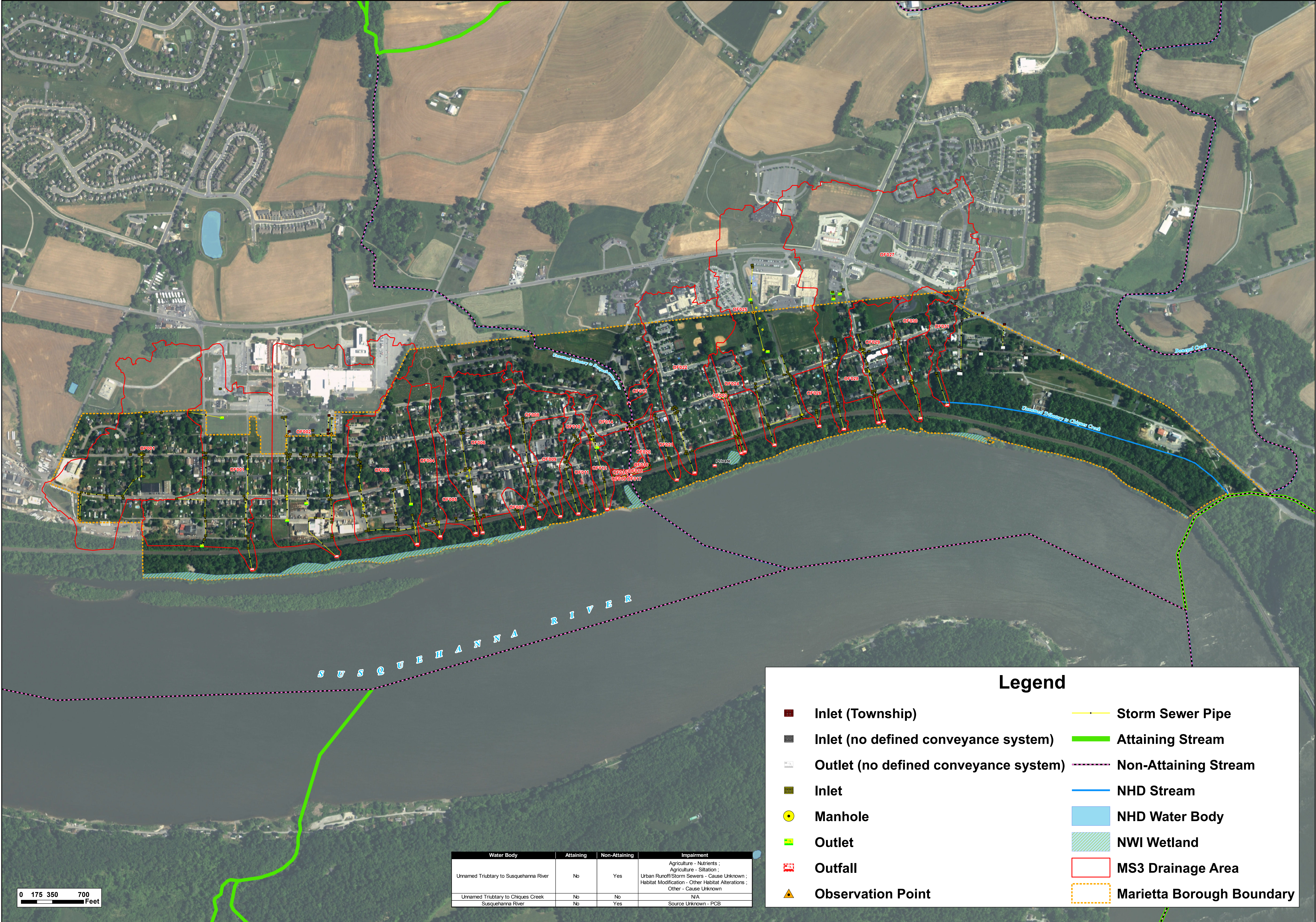
WATER BODY TABLE	
Water Body	Chapter 93 Designated Use
Unnamed Tributary to Susquehanna River	Warm Water Fishes
Unnamed Tributary to Chiques Creek	Warm Water Fishes
Susquehanna River	Warm Water Fishes





# Marietta Borough

## Attaining/Non-Attaining Streams

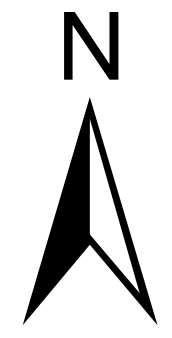


Water Body	Attaining	Non-Attaining	Impairment
Unnamed Tributary to Susquehanna River	No	Yes	Agriculture - Nutrients ; Agriculture - Siltation ; Urban Runoff/Storm Sewers - Cause Unknown ; Habitat Modification - Other Habitat Alterations ; Other - Cause Unknown
Unnamed Tributary to Chiques Creek	No	No	N/A
Susquehanna River	No	Yes	Source Unknown - PCB

### Legend

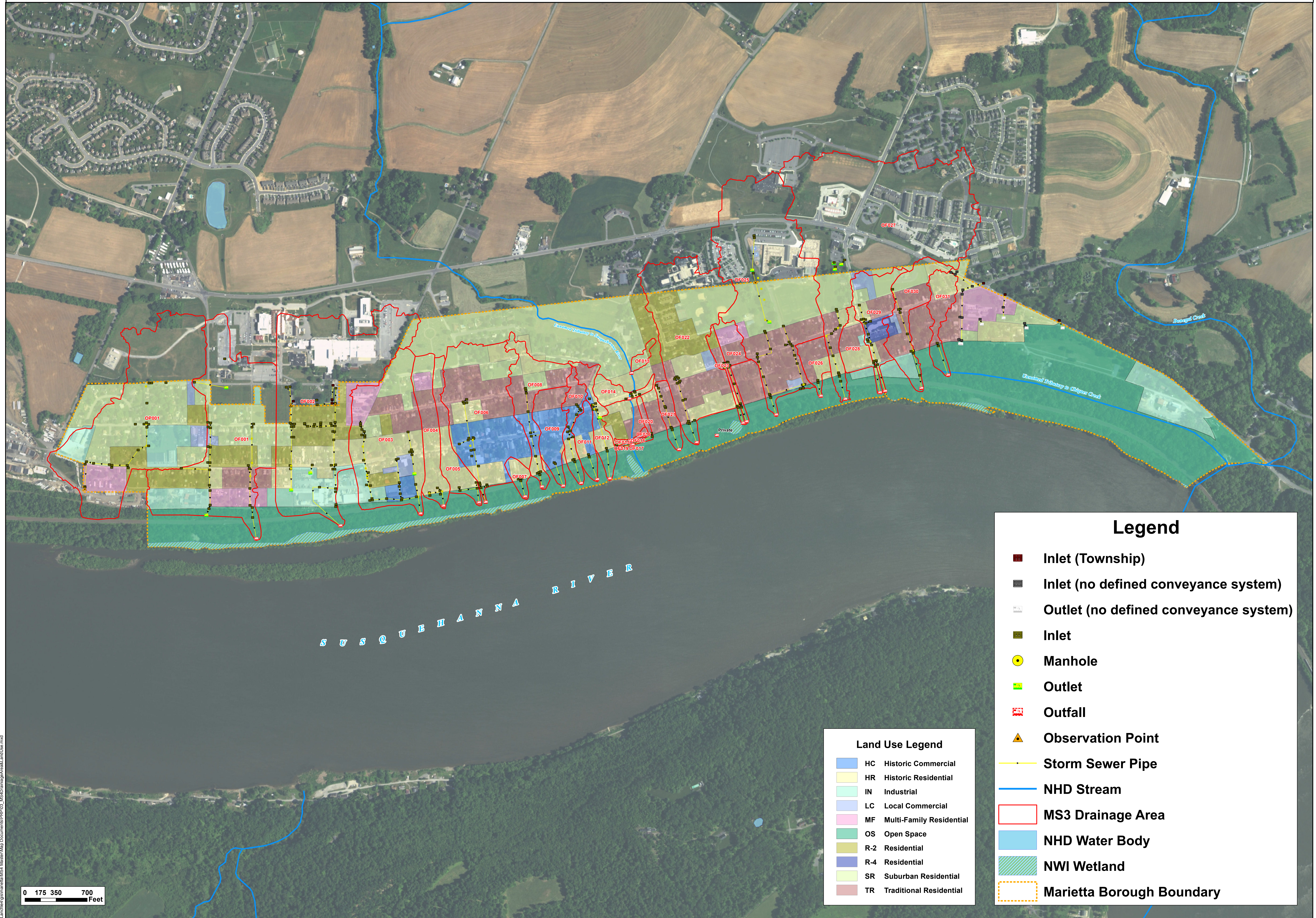
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- Non-Attaining Stream
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- MS3 Drainage Area
- Marietta Borough Boundary



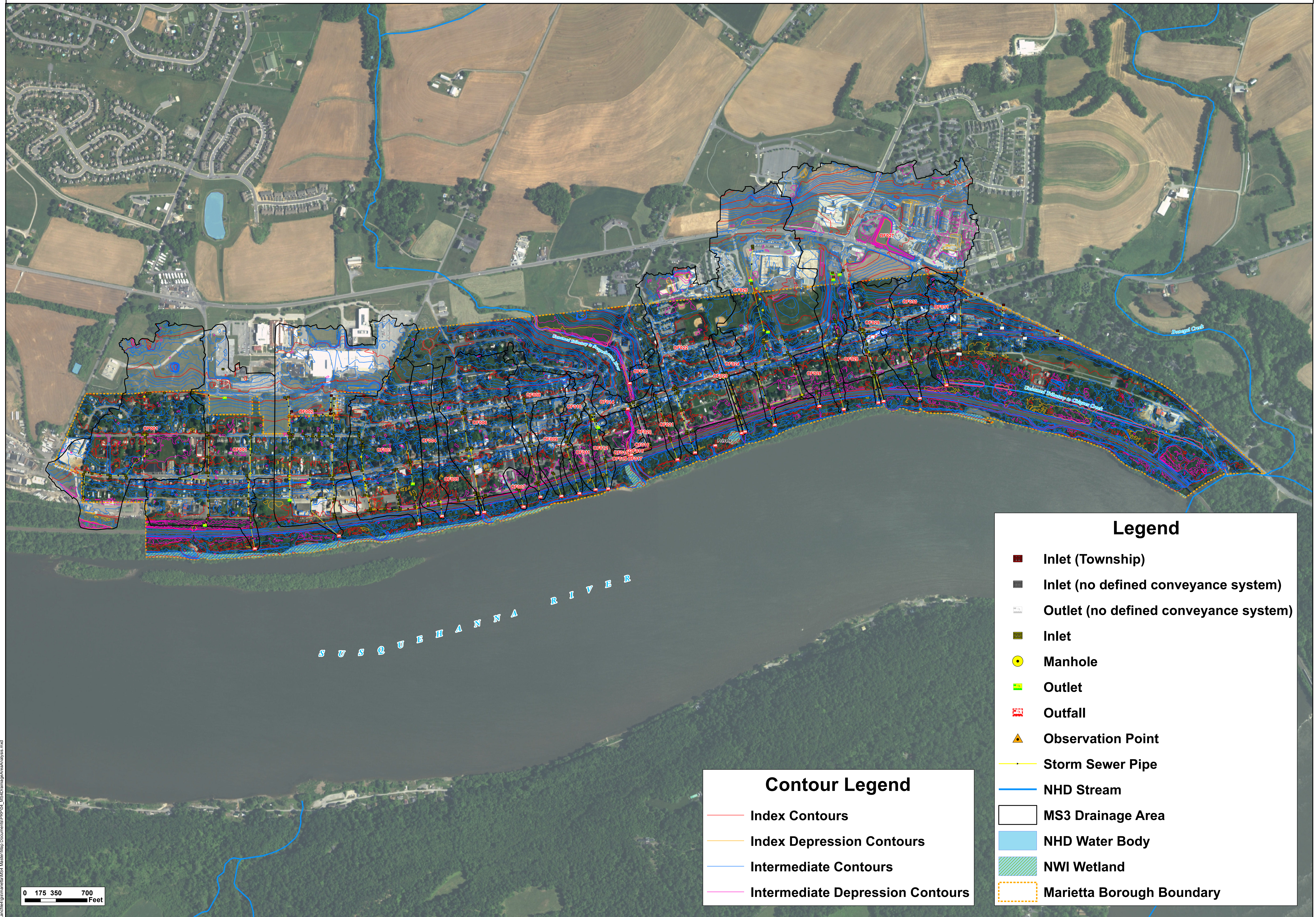


# Marietta Borough

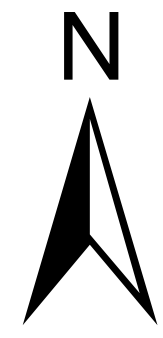
## MS3 Drainage Area & Land Use





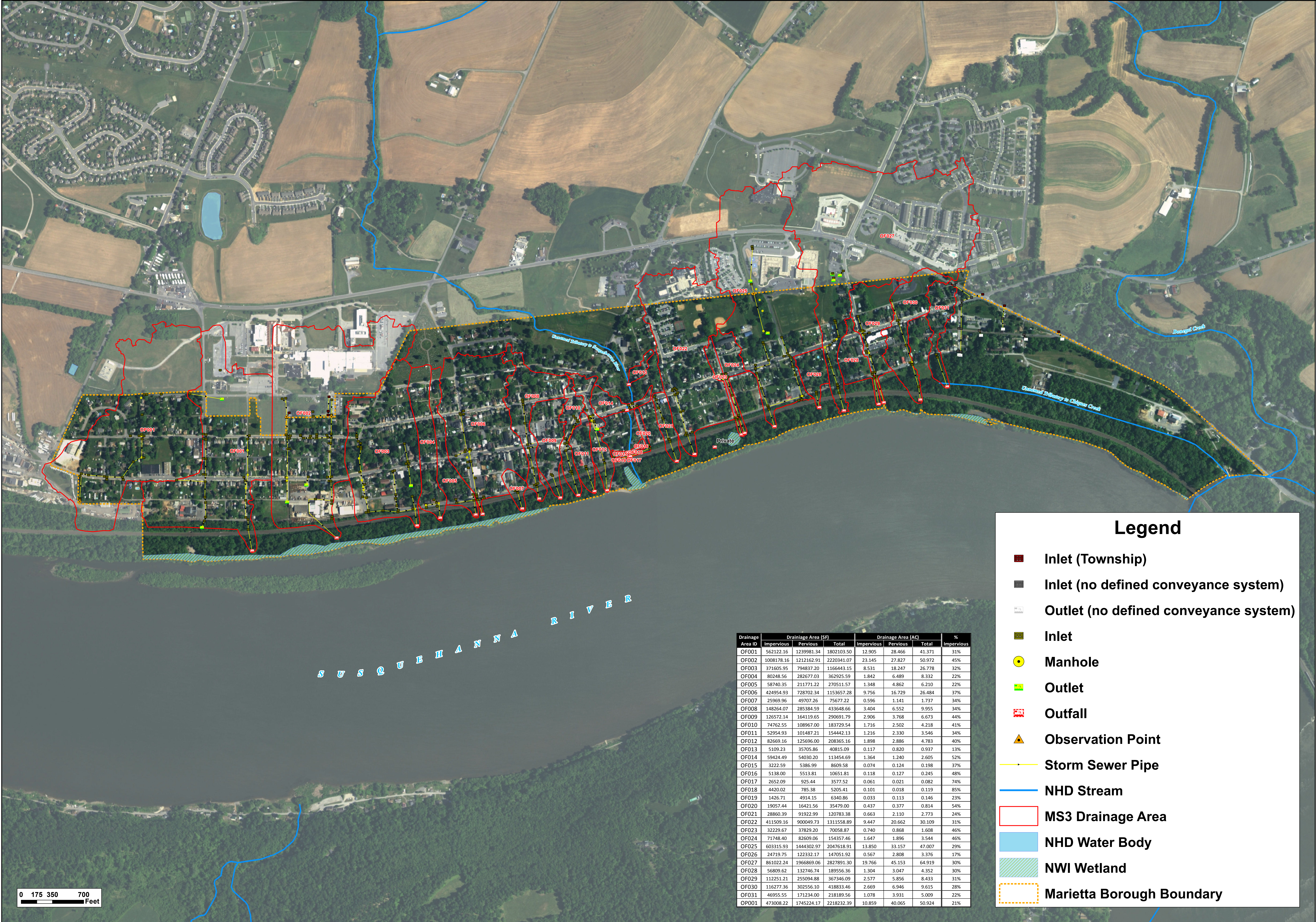






# Marietta Borough

## MS3 Drainage Area Pervious/Impervious Analysis

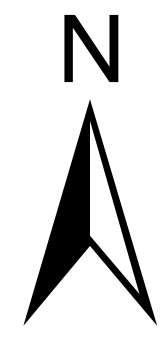


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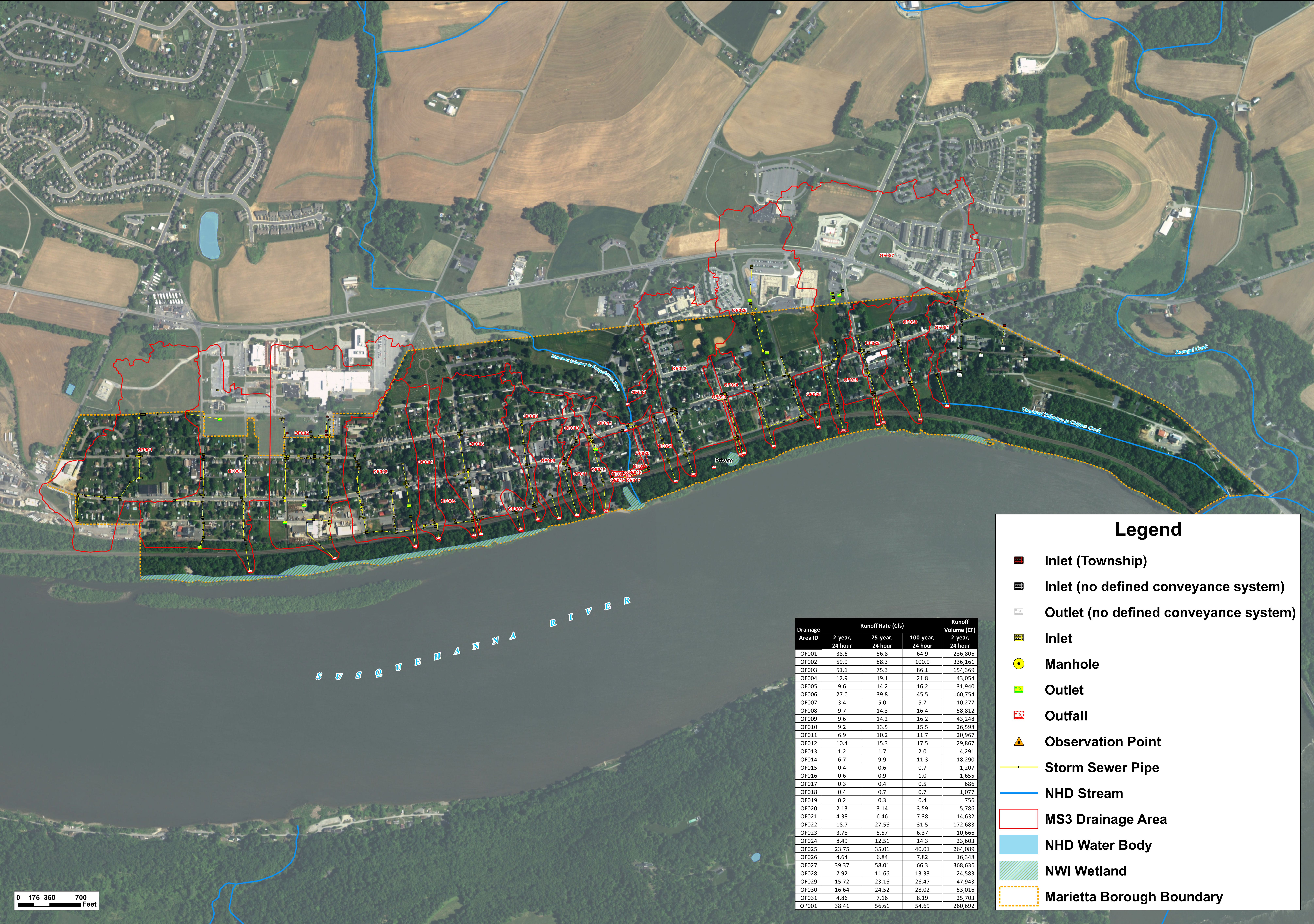
Drainage Area ID	Drainage Area (SF)			Drainage Area (AC)			%
	Impervious	Pervious	Total	Impervious	Pervious	Total	
OF001	562122.16	1239981.34	1802103.50	12.905	28.466	41.371	31%
OF002	1008178.16	1212162.91	2220341.07	23.145	27.827	50.972	45%
OF003	371605.95	794837.20	1166443.15	8.531	18.247	26.778	32%
OF004	80248.56	282677.03	362925.59	1.842	6.489	8.332	22%
OF005	58740.35	211771.22	270511.57	1.348	4.862	6.210	22%
OF006	424954.93	728702.34	1153657.28	9.756	16.729	26.484	37%
OF007	25969.96	49707.26	75677.22	0.596	1.141	1.737	34%
OF008	148264.07	285384.59	433648.66	3.404	6.552	9.955	34%
OF009	126572.14	164119.65	290691.79	2.906	3.768	6.673	44%
OF010	74762.55	108967.00	183729.54	1.716	2.502	4.218	41%
OF011	52954.93	101487.21	154442.13	1.216	2.330	3.546	34%
OF012	82669.16	125696.00	208365.16	1.898	2.886	4.783	40%
OF013	5109.23	35705.86	40815.09	0.117	0.820	0.937	13%
OF014	59424.49	54030.20	113454.69	1.364	1.240	2.605	52%
OF015	3222.59	5386.99	8609.58	0.074	0.124	0.198	37%
OF016	5138.00	5513.81	10651.81	0.118	0.127	0.245	48%
OF017	2652.09	925.44	3577.52	0.061	0.021	0.082	74%
OF018	4420.02	785.38	5205.41	0.101	0.018	0.119	85%
OF019	1426.71	4914.15	6340.86	0.033	0.113	0.146	23%
OF020	19057.44	16421.56	35479.00	0.437	0.377	0.814	54%
OF021	28860.39	91922.99	120783.38	0.663	2.110	2.773	24%
OF022	411509.16	900049.73	1311558.89	9.447	20.662	30.109	31%
OF023	32229.67	37829.20	70058.87	0.740	0.868	1.608	46%
OF024	71748.40	82609.06	154357.46	1.647	1.896	3.544	46%
OF025	603315.93	1444302.97	2047618.91	13.850	33.157	47.007	29%
OF026	24719.75	122332.17	147051.92	0.567	2.808	3.376	17%
OF027	861022.24	1966869.06	2827891.30	19.766	45.153	64.919	30%
OF028	56809.62	132746.74	189556.36	1.304	3.047	4.352	30%
OF029	112251.21	255094.88	367346.09	2.577	5.856	8.433	31%
OF030	116277.36	302556.10	418833.46	2.669	6.946	9.615	28%
OF031	46955.55	171234.00	218189.56	1.078	3.931	5.009	22%
OP001	473008.22	1745224.17	2218232.39	10.859	40.065	50.924	21%





# Marietta Borough

## MS3 Drainage Area Runoff Rate/Volume Analysis

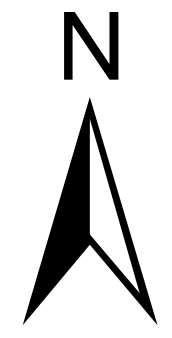


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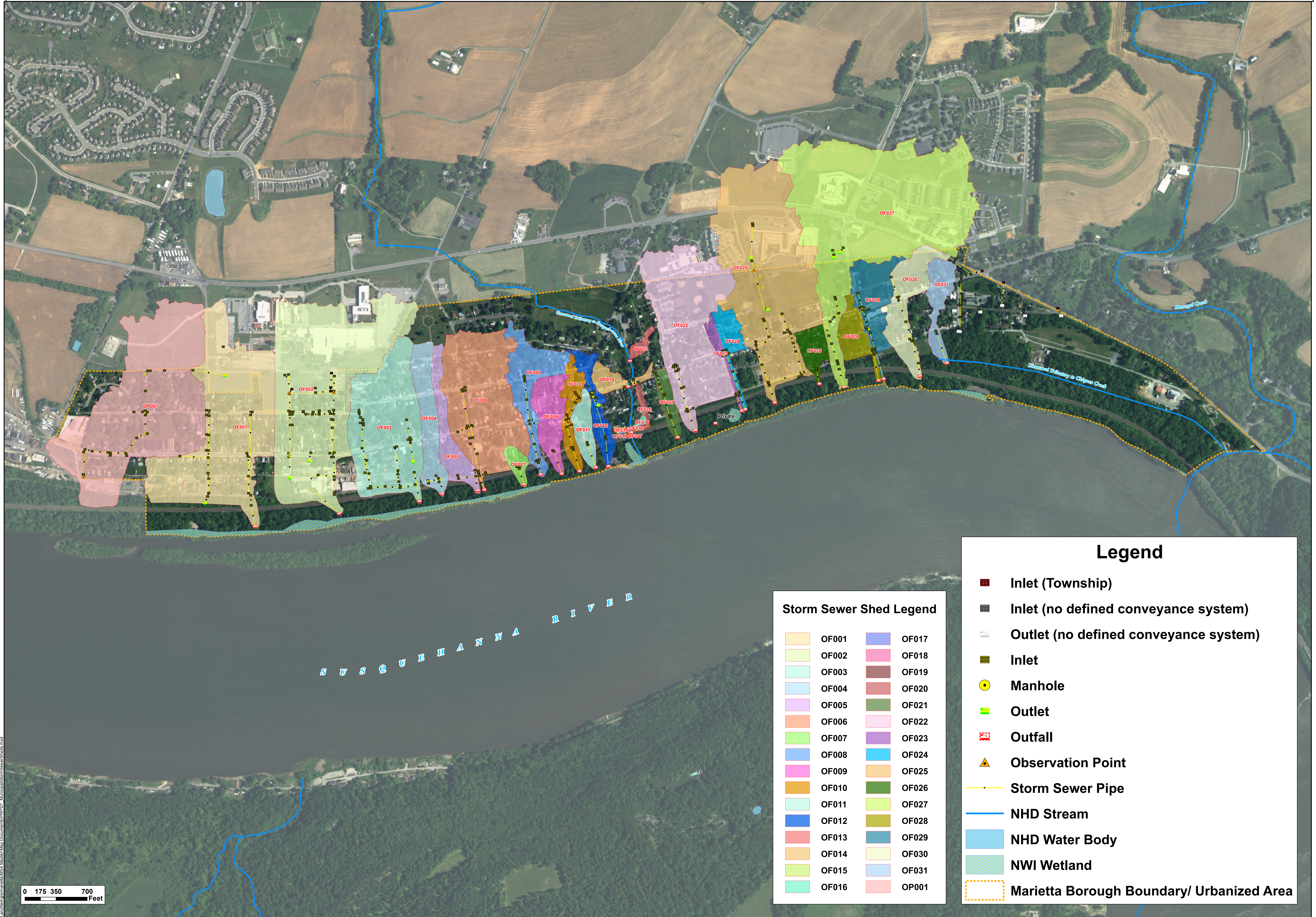
Drainage Area ID	Runoff Rate (Cfs)			Runoff Volume (CF)
	2-year, 24 hour	25-year, 24 hour	100-year, 24 hour	2-year, 24 hour
OF001	38.6	56.8	64.9	236,806
OF002	59.9	88.3	100.9	336,161
OF003	51.1	75.3	86.1	154,369
OF004	12.9	19.1	21.8	43,054
OF005	9.6	14.2	16.2	31,940
OF006	27.0	39.8	45.5	160,754
OF007	3.4	5.0	5.7	10,277
OF008	9.7	14.3	16.4	58,812
OF009	9.6	14.2	16.2	43,248
OF010	9.2	13.5	15.5	26,598
OF011	6.9	10.2	11.7	20,967
OF012	10.4	15.3	17.5	29,867
OF013	1.2	1.7	2.0	4,291
OF014	6.7	9.9	11.3	18,290
OF015	0.4	0.6	0.7	1,207
OF016	0.6	0.9	1.0	1,655
OF017	0.3	0.4	0.5	686
OF018	0.4	0.7	0.7	1,077
OF019	0.2	0.3	0.4	756
OF020	2.13	3.14	3.59	5,786
OF021	4.38	6.46	7.38	14,632
OF022	18.7	27.56	31.5	172,683
OF023	3.78	5.57	6.37	10,666
OF024	8.49	12.51	14.3	23,603
OF025	23.75	35.01	40.01	264,089
OF026	4.64	6.84	7.82	16,348
OF027	39.37	58.01	66.3	368,636
OF028	7.92	11.66	13.33	24,583
OF029	15.72	23.16	26.47	47,943
OF030	16.64	24.52	28.02	53,016
OF031	4.86	7.16	8.19	25,703
OP001	38.41	56.61	54.69	260,692



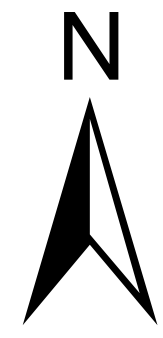


# Marietta Borough

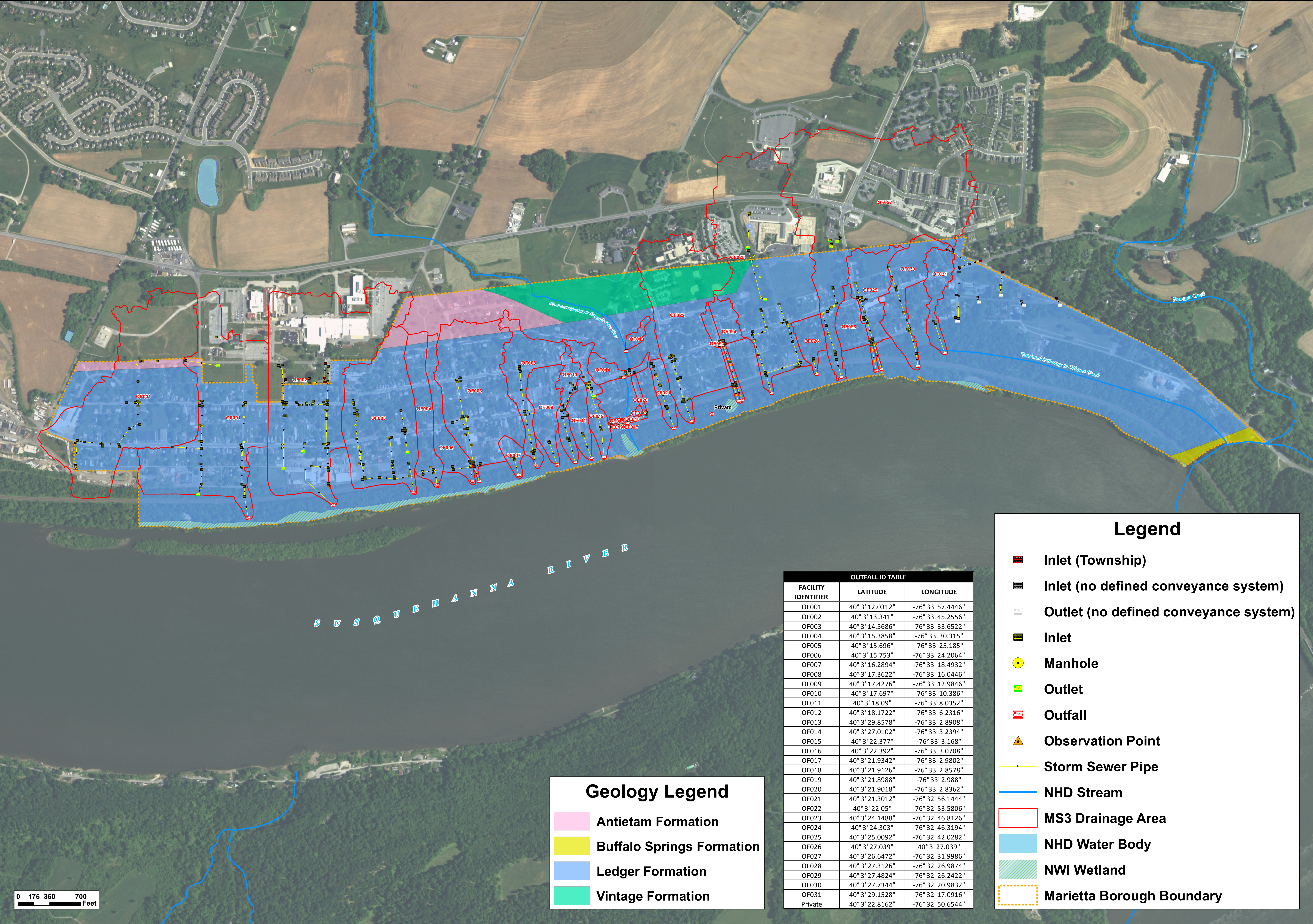
## Municipal Storm Sewer Sheds







# Marietta Borough Geology



0 175 350 700  
Feet

### Geology Legend

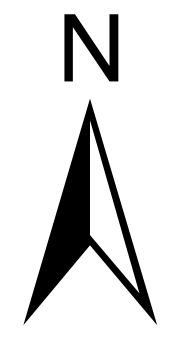
- Antietam Formation
- Buffalo Springs Formation
- Ledger Formation
- Vintage Formation

OUTFALL ID TABLE		
FACILITY IDENTIFIER	LATITUDE	LONGITUDE
OF001	40° 3' 12.0312"	-76° 33' 57.4446"
OF002	40° 3' 13.341"	-76° 33' 45.2556"
OF003	40° 3' 14.5686"	-76° 33' 33.6522"
OF004	40° 3' 15.3858"	-76° 33' 30.315"
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OF029	40° 3' 27.4824"	-76° 32' 26.2422"
OF030	40° 3' 27.7344"	-76° 32' 20.9832"
OF031	40° 3' 29.1528"	-76° 32' 17.0916"
Private	40° 3' 22.8162"	-76° 32' 50.6544"

### Legend

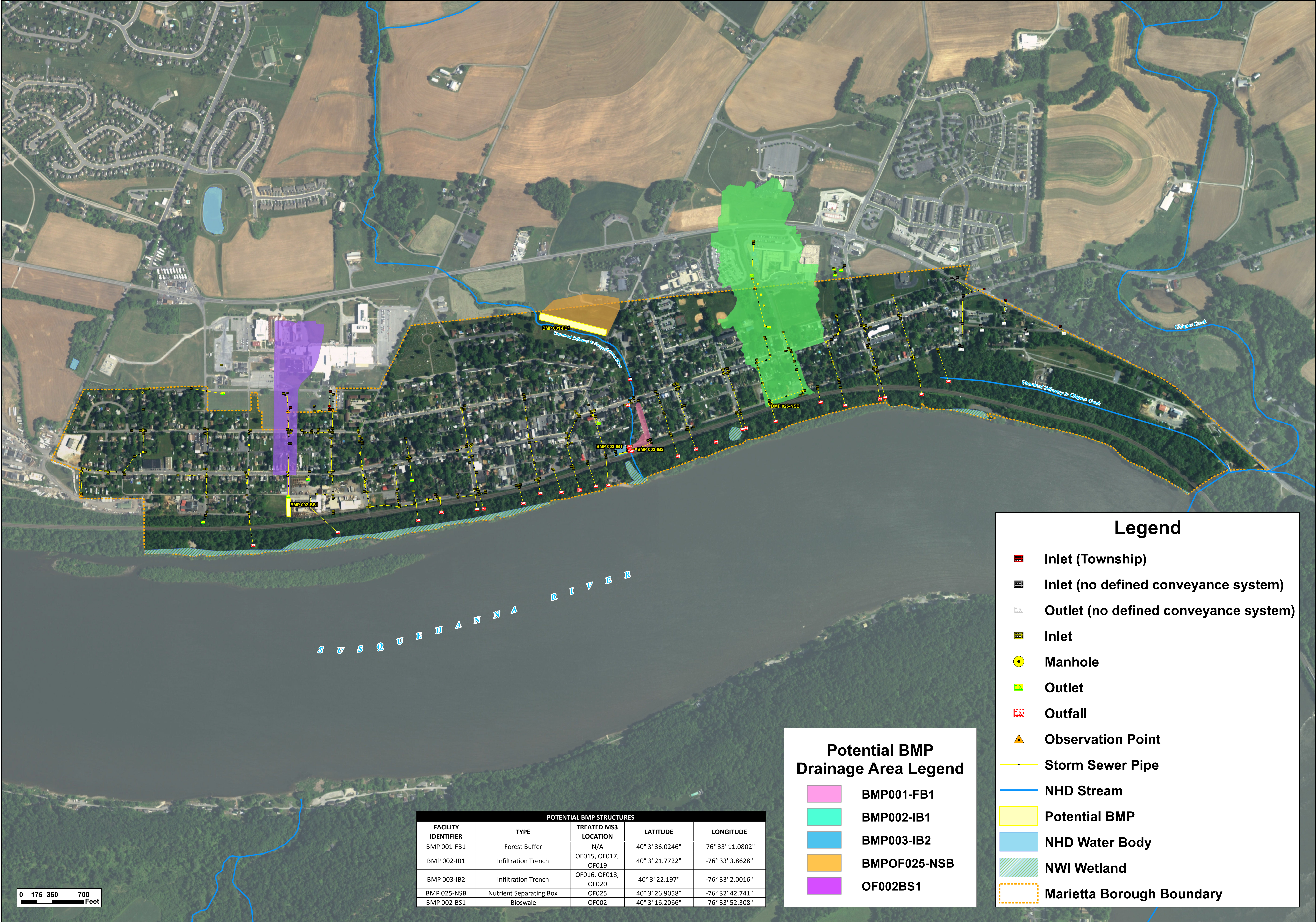
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# Marietta Borough

## Potential Stormwater Best Management Practice Structures

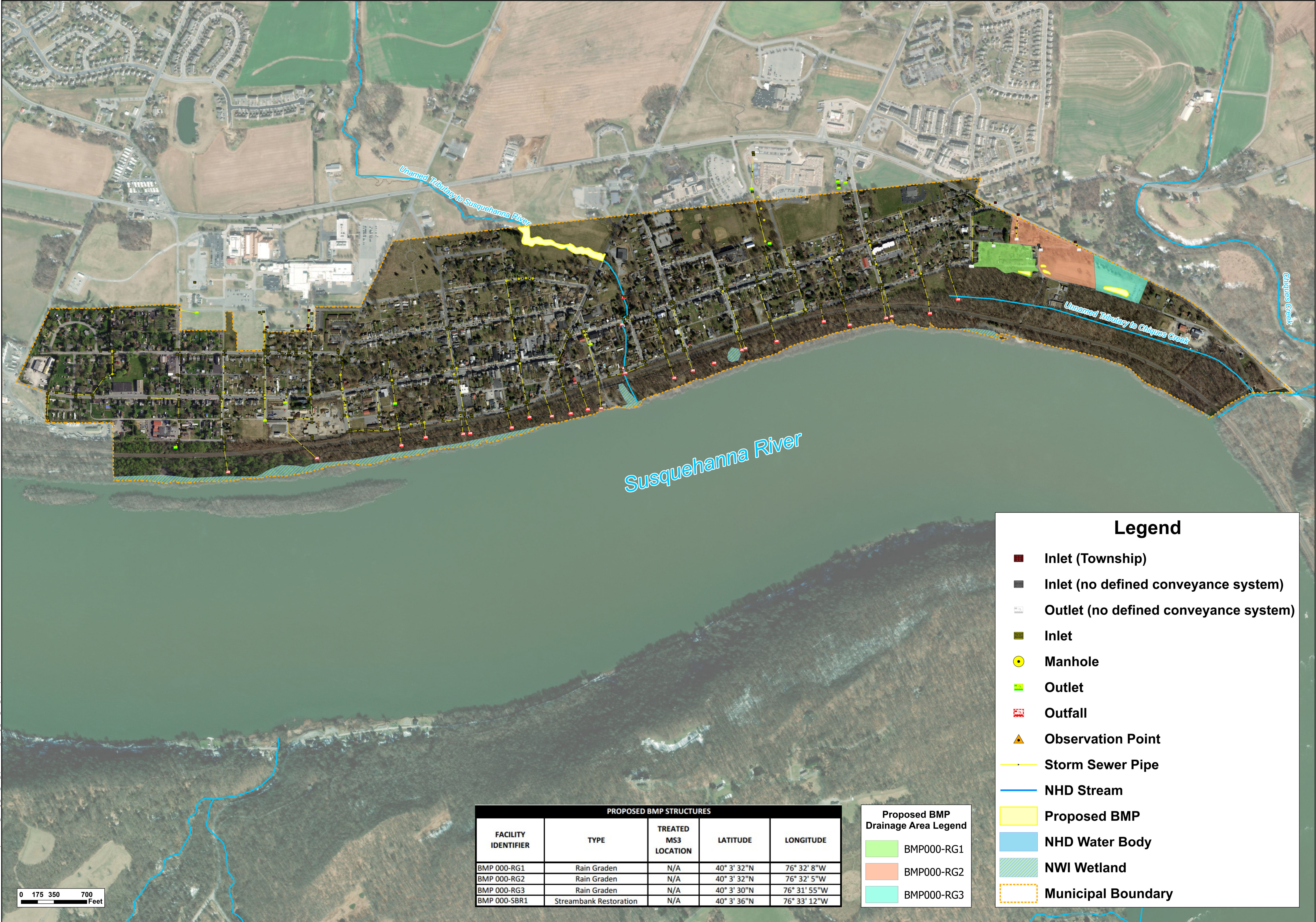






# Marietta Borough

## Proposed Stormwater Best Management Practice Structures



PROPOSED BMP STRUCTURES				
FACILITY IDENTIFIER	TYPE	TREATED MS3 LOCATION	LATITUDE	LONGITUDE
BMP 000-RG1	Rain Graden	N/A	40° 3' 32"N	76° 32' 8"W
BMP 000-RG2	Rain Graden	N/A	40° 3' 32"N	76° 32' 5"W
BMP 000-RG3	Rain Graden	N/A	40° 3' 30"N	76° 31' 55"W
BMP 000-SBR1	Streambank Restoration	N/A	40° 3' 36"N	76° 33' 12"W

Proposed BMP Drainage Area Legend	
	BMP000-RG1
	BMP000-RG2
	BMP000-RG3

Legend	
	Inlet (Township)
	Inlet (no defined conveyance system)
	Outlet (no defined conveyance system)
	Inlet
	Manhole
	Outlet
	Outfall
	Observation Point
	Storm Sewer Pipe
	NHD Stream
	Proposed BMP
	NHD Water Body
	NWI Wetland
	Municipal Boundary



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## **ATTACHMENT VI**

### **EXISTING LOADING FOR POLLUTANTS OF CONCERN**

1. Aggregated Re-cap (Chesapeake Bay (Appendix D) – Combined)
2. Chesapeake Bay (Appendix D) – Remaining Storm Sewersheds
3. UNT to Susquehanna River (Appendix E)

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## **EXISTING LOADING FOR POLLUTANTS OF CONCERN**

Aggregated Re-cap (Chesapeake Bay (Appendix D) – Combined)

Marietta Borough  
Pollutant Reduction Plan (PRP)  
ARRO No.: 5823.13

Base Pollutant Loading (No Existing BMPs) Summary:

Appendix D - Chesapeake Bay

Drainage Area ID	Drainage Area (Ac)			PA DEP Land Loading		
	Impervious	Pervious	Total	TN (lbs./year)	TP (lbs./year)	TSS (lbs./year)
Susquehanna River	84.00	188.53	272.53	7,429.50	198.08	160,356.62
Unnamed Tributary to Chiques Creek	1.08	3.93	5.01	128.96	3.09	2,346.37
				7,558.45	201.16	162,703.00

Required Reduction Percent3%5%10%

Required Reduction (Lbs./Year)226.7510.0616,270.30

Appendix E - UNT to Susquehanna River

Drainage Area ID	Drainage Area (Ac)			PA DEP Land Loading		
	Impervious	Pervious	Total	TN (lbs./year)	TP (lbs./year)	TSS (lbs./year)
Unnamed Tributary to Susquehanna River	2.31	2.84	5.15	152.00	4.60	3,956.04
				152.00	4.60	3,956.04

Required Reduction Percent3%5%10%

Required Reduction (Lbs./Year)4.560.23395.60

TOTAL COMBINED REQUIRED REDUCTION:**	231.31	10.29	16,665.90
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\*Maximum Permitted Reduction for Storm Sewer System Solids Removal (50%)115.665.148,332.95

\*\* Per PA DEP Pollutant Aggregation Table and Instructions, the aggregate total required reduction may be analyzed and BMPs may be implemented in the identified watersheds to meet the required 10% Sediment Reduction. Reduction in specific watershed is not required when identified in the same HUC 12 watershed.

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## **EXISTING LOADING FOR POLLUTANTS OF CONCERN**

Chesapeake Bay (Appendix D) – Remaining Storm Sewersheds

## Appendix D - Chesapeake Bay

Required Reduction Percent	3%	5%	10%
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Marietta Borough  
 Pollutant Reduction Plan (PRP)  
 ARRO No.: 5823.13

# **Land Use: MS4 Regulated Area**

Watershed Description: Susquehanna River

## **OF-001**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	914,658	20.998
Impervious	340,781	7.823
		<hr/> 28.821

## **OF-002**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	658,469	15.116
Impervious	371,295	8.524
		<hr/> 23.640

## **OF-003**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	794,837	18.247
Impervious	371,606	8.531
		<hr/> 26.778

## **OF-004**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	282,677	6.489
Impervious	80,249	1.842
		<hr/> 8.332

## **OF-005**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	211,771	4.862
Impervious	58,740	1.348
		<hr/> 6.210

**OF-006**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	336,746	7.731
Impervious	251,743	5.779
		<hr/> 13.510

**OF-007**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	49,707	1.141
Impervious	25,970	0.596
		<hr/> 1.737

**OF-008**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	285,385	6.552
Impervious	148,264	3.404
		<hr/> 9.955

**OF-009**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	164,120	3.768
Impervious	126,572	2.906
		<hr/> 6.673

**OF-010**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	108,967	2.502
Impervious	74,763	1.716
		<hr/> 4.218

**OF-011**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	101,487	2.330
Impervious	52,955	1.216
		<hr/> 3.546

**OF-012**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	125,657	2.885
Impervious	82,669	1.898
		<hr/> 4.783

**OF-021**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	91,923	2.110
Impervious	28,860	0.663
		<hr/> 2.773

**OF-022**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	756,153	17.359
Impervious	291,429	6.690
		<hr/> 24.049

**OF-023**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	37,829	0.868
Impervious	32,230	0.740
		<hr/> 1.608

**OF-024**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	82,609	1.896
Impervious	71,748	1.647
		<hr/> 3.544

**OF-025**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	808,834	18.568
Impervious	205,862	4.726
		<hr/> 23.294

**OF-026**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	122,332	2.808
Impervious	24,720	0.567
		<hr/> 3.376

**OF-027**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	337,376	7.745
Impervious	49,605	1.139
		<hr/> 8.884

**OF-028**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	132,747	3.047
Impervious	56,810	1.304
		<hr/> 4.352

**OF-029**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	255,095	5.856
Impervious	112,251	2.577
		<hr/> 8.433

**OF-030**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	297,175	6.822
Impervious	110,400	2.534
		<hr/> 9.357

**OP-001**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	1,003,950	23.048
Impervious	352,920	8.102
		<hr/> 31.149

Marietta Borough  
 Pollutant Reduction Plan (PRP)  
 ARRO No.: 5823.13

**Worksheet 4:**

Drainage Area: Susquehanna River  
 2-year Rainfall: 2.97 in

**OF-001**

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	1,239,981	28.466	77	2.99	0.60	1.05	108,529.75
Impervious	C	562,122	12.905	98	0.20	0.04	2.74	128,276.03
		1,802,104	41.371					236,805.77

**OF-002**

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	1,212,163	27.827	77	2.99	0.60	1.05	106,094.93
Impervious	C	1,008,178	23.145	98	0.20	0.04	2.74	230,065.81
		2,220,341	50.972					336,160.74

**OF-003**

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	794,837	18.247	77	2.99	0.60	1.05	69,568.37
Impervious	C	371,606	8.531	98	0.20	0.04	2.74	84,800.31
		1,166,443	26.778					154,368.68

**OF-004**

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	282,677	6.489	77	2.99	0.60	1.05	24,741.39
Impervious	C	80,249	1.842	98	0.20	0.04	2.74	18,312.69
		362,926	8.332					43,054.08

**OF-005**

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	211,771	4.862	77	2.99	0.60	1.05	18,535.34
Impervious	C	58,740	1.348	98	0.20	0.04	2.74	13,404.52
		270,512	6.210					31,939.86

**OF-006**

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	728,702	16.729	77	2.99	0.60	1.05	63,779.90
Impervious	C	424,955	9.756	98	0.20	0.04	2.74	96,974.53
		1,153,657	26.484					160,754.42

## OF-007

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	49,707	1.141	77	2.99	0.60	1.05	4,350.64
Impervious	C	25,970	0.596	98	0.20	0.04	2.74	5,926.33
		75,677	1.737					10,276.98

## OF-008

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	285,385	6.552	77	2.99	0.60	1.05	24,978.37
Impervious	C	148,264	3.404	98	0.20	0.04	2.74	33,833.79
		433,649	9.955					58,812.17

## OF-009

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	164,120	3.768	77	2.99	0.60	1.05	14,364.62
Impervious	C	126,572	2.906	98	0.20	0.04	2.74	28,883.71
		290,692	6.673					43,248.33

## OF-010

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	108,967	2.502	77	2.99	0.60	1.05	9,537.37
Impervious	C	74,763	1.716	98	0.20	0.04	2.74	17,060.78
		183,730	4.218					26,598.15

## OF-011

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	101,487	2.330	77	2.99	0.60	1.05	8,882.70
Impervious	C	52,955	1.216	98	0.20	0.04	2.74	12,084.29
		154,442	3.546					20,966.99

**OF-012**

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	125,696	2.886	77	2.99	0.60	1.05	11,001.58
Impervious	C	82,669	1.898	98	0.20	0.04	2.74	18,865.06
		208,365	4.783					29,866.65

**OF-021**

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	91,923	2.110	77	2.99	0.60	1.05	8,045.59
Impervious	C	28,860	0.663	98	0.20	0.04	2.74	6,585.93
		120,783	2.773					14,631.52

**OF-022**

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	900,050	20.662	77	2.99	0.60	1.05	78,777.13
Impervious	C	411,509	9.447	98	0.20	0.04	2.74	93,906.21
		1,311,559	30.109					172,683.34

**OF-023**

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	37,829	0.868	77	2.99	0.60	1.05	3,311.01
Impervious	C	32,230	0.740	98	0.20	0.04	2.74	7,354.80
		70,059	1.608					10,665.81

**OF-024**

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	82,609	1.896	77	2.99	0.60	1.05	7,230.38
Impervious	C	71,748	1.647	98	0.20	0.04	2.74	16,372.95
		154,357	3.544					23,603.34

**OF-025**

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	1,444,303	33.157	77	2.99	0.60	1.05	126,413.06
Impervious	C	603,316	13.850	98	0.20	0.04	2.74	137,676.43
		2,047,619	47.007					264,089.49

**OF-026**

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	122,332	2.808	77	2.99	0.60	1.05	10,707.16
Impervious	C	24,720	0.567	98	0.20	0.04	2.74	5,641.04
		147,052	3.376					16,348.20

**OF-027**

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	1,966,869	45.153	77	2.99	0.60	1.05	172,150.82
Impervious	C	861,022	19.766	98	0.20	0.04	2.74	196,484.89
		2,827,891	64.919					368,635.71

**OF-028**

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	132,747	3.047	77	2.99	0.60	1.05	11,618.70
Impervious	C	56,810	1.304	98	0.20	0.04	2.74	12,963.93
		189,556	4.352					24,582.63

**OF-029**

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	255,095	5.856	77	2.99	0.60	1.05	22,327.26
Impervious	C	112,251	2.577	98	0.20	0.04	2.74	25,615.68
		367,346	8.433					47,942.93

**OF-030**

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	302,556	6.946	77	2.99	0.60	1.05	26,481.32
Impervious	C	116,277	2.669	98	0.20	0.04	2.74	26,534.44
		418,833	9.615					53,015.76

**OP-001**

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	1,745,224	40.065	77	2.99	0.60	1.05	152,751.28
Impervious	C	473,008	10.859	98	0.20	0.04	2.74	107,940.27
		2,218,232	50.924					260,691.54



Marietta Borough  
Pollutant Reduction Plan (PRP)  
ARRO No.: 5823.13  
Base Pollutant Loading (No Existing BMPs)

PA DEP Land Loading:		TN (lbs/acre/year)	TP (lbs/acre/year)	TSS (lbs/acre/year)
Lancaster	Impervious	38.53	1.55	1480.43
	Pervious	22.24	0.36	190.93
	Undeveloped	10	0.33	234.6

MS4 Regulated Area      Watershed Description:    Susquehanna River

Drainage Area ID	Drainage Area (SF)			Drainage Area (Ac)			PA DEP Land Loading								
	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	340,781	914,658	1,255,439	7.8	21.0	28.8	301.43	466.99	768.42	12.13	7.56	19.69	11,581.8	4,009.1	15,590.9
OF-002	371,295	658,469	1,029,763	8.5	15.1	23.6	328.42	336.19	664.61	13.21	5.44	18.65	12,618.8	2,886.2	15,505.0
OF-003	371,606	794,837	1,166,443	8.5	18.2	26.8	328.70	405.81	734.51	13.22	6.57	19.79	12,629.4	3,483.9	16,113.3
OF-004	80,249	282,677	362,926	1.8	6.5	8.3	70.98	144.32	215.31	2.86	2.34	5.19	2,727.3	1,239.0	3,966.3
OF-005	58,740	211,771	270,512	1.3	4.9	6.2	51.96	108.12	160.08	2.09	1.75	3.84	1,996.3	928.2	2,924.6
OF-006	336,746	251,743	588,489	7.7	5.8	13.5	297.86	128.53	426.39	11.98	2.08	14.06	11,444.7	1,103.4	12,548.1
OF-007	25,970	49,707	75,677	0.6	1.1	1.7	22.97	25.38	48.35	0.92	0.41	1.33	882.6	217.9	1,100.5
OF-008	148,264	285,385	433,649	3.4	6.6	10.0	131.14	145.71	276.85	5.28	2.36	7.63	5,038.9	1,250.9	6,289.8
OF-009	126,572	164,120	290,692	2.9	3.8	6.7	111.96	83.79	195.75	4.50	1.36	5.86	4,301.7	719.4	5,021.0
OF-010	74,763	108,967	183,730	1.7	2.5	4.2	66.13	55.63	121.76	2.66	0.90	3.56	2,540.9	477.6	3,018.5
OF-011	52,955	101,487	154,442	1.2	2.3	3.5	46.84	51.82	98.66	1.88	0.84	2.72	1,799.7	444.8	2,244.6
OF-012	82,669	125,657	208,326	1.9	2.9	4.8	73.12	64.16	137.28	2.94	1.04	3.98	2,809.6	550.8	3,360.4
OF-021	28,860	91,923	120,783	0.7	2.1	2.8	25.53	46.93	72.46	1.03	0.76	1.79	980.9	402.9	1,383.8
OF-022	291,429	756,153	1,047,581	6.7	17.4	24.0	257.78	386.06	643.84	10.37	6.25	16.62	9,904.5	3,314.3	13,218.8
OF-023	32,230	37,829	70,059	0.7	0.9	1.6	28.51	19.31	47.82	1.15	0.31	1.46	1,095.4	165.8	1,261.2
OF-024	71,748	82,609	154,357	1.6	1.9	3.5	63.46	42.18	105.64	2.55	0.68	3.24	2,438.4	362.1	2,800.5
OF-025	205,862	808,834	1,014,696	4.7	18.6	23.3	182.09	412.96	595.05	7.33	6.68	14.01	6,996.4	3,545.2	10,541.7
OF-026	24,720	122,332	147,052	0.6	2.8	3.4	21.87	62.46	84.32	0.88	1.01	1.89	840.1	536.2	1,376.3
OF-027	49,605	337,376	386,981	1.1	7.7	8.9	43.88	172.25	216.13	1.77	2.79	4.55	1,685.9	1,478.8	3,164.7
OF-028	56,810	132,747	189,556	1.3	3.0	4.4	50.25	67.78	118.02	2.02	1.10	3.12	1,930.7	581.8	2,512.6
OF-029	112,251	255,095	367,346	2.6	5.9	8.4	99.29	130.24	229.53	3.99	2.11	6.10	3,815.0	1,118.1	4,933.1
OF-030	110,400	297,175	407,576	2.5	6.8	9.4	97.65	151.73	249.38	3.93	2.46	6.38	3,752.1	1,302.6	5,054.6
OP-001	352,920	1,003,950	1,356,870	8.1	23.0	31.1	312.17	512.58	824.74	12.56	8.30	20.86	11,994.3	4,400.5	16,394.8
				84.0	188.5	272.5			7,429.50			198.08			160,356.62

Required Reduction Percent	3%	5%	10%
Required Reduction (Lbs/Year)	222.88	9.90	16,035.66
Required Reduction (Tons/Year)	0.11	0.00	8.02

Marietta Borough  
Pollutant Reduction Plan (PRP)  
ARRO No.: 5823.13

**Land Use: MS4 Regulated Area**

Watershed Description: Unnamed Tributary to Chiques Creek

**OF-031**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	171,234	3.931
Impervious	46,956	1.078
		<hr/> 5.009

Marietta Borough  
Pollutant Reduction Plan (PRP)  
ARRO No.: 5823.13  
Base Pollutant Loading (No Existing BMPs)

PA DEP Land Loading:		TN (lbs/acre/year)	TP (lbs/acre/year)	TSS (lbs/acre/year)
Lancaster	Impervious	38.53	1.55	1480.43
	Pervious	22.24	0.36	190.93
	Undeveloped	10	0.33	234.6

MS4 Regulated Area                      Watershed Description:    Unnamed Tributary to Chiques Creek

Drainage Area ID	Drainage Area (SF)			Drainage Area (Ac)			PA DEP Land Loading								
	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-031	46,956	171,234	218,190	1.1	3.9	5.0	41.53	87.43	128.96	1.67	1.42	3.09	1,595.8	750.5	2,346.4
				1.1	3.9	5.0			128.96			3.09			2,346.37

Required Reduction Percent	3%	5%	10%
Required Reduction (Lbs/Year)	3.87	0.15	234.64
Required Reduction (Tons/Year)	0.00	0.00	0.12

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## **EXISTING LOADING FOR POLLUTANTS OF CONCERN**

UNT to Susquehanna River (Appendix E)

Marietta Borough  
Pollutant Reduction Plan (PRP)  
ARRO No.: 5823.13

Base Pollutant Loading (No Existing BMPs) Summary:

Appendix E - UNT to Susquehanna River

Drainage Area ID	Drainage Area (Ac)			PA DEP Land Loading		
	Impervious	Pervious	Total	TN (lbs/year)	TP (lbs/year)	TSS (lbs/year)
Unnamed Tributary to Susquehanna River	2.31	2.84	5.15	152.00	4.60	3,956.04
				152.00	4.60	3,956.04
Required Reduction Percent				3%	5%	10%
Required Reduction (Lbs/Year)				4.56	0.23	395.60

Marietta Borough  
 Pollutant Reduction Plan (PRP)  
 ARRO No.: 5823.13

**Land Use: MS4 Regulated Area**

Watershed Description: Unnamed Tributary to Susquehanna River

**OF-013**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	35,706	0.820
Impervious	5,109	0.117
		<hr/> 0.937

**OF-014**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	54,030	1.240
Impervious	59,424	1.364
		<hr/> 2.605

**OF-015**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	5,387	0.124
Impervious	3,223	0.074
		<hr/> 0.198

**OF-016**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	5,514	0.127
Impervious	5,138	0.118
		<hr/> 0.245

**OF-017**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	925	0.021
Impervious	2,652	0.061
		<hr/> 0.082

**OF-018**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	785	0.018
Impervious	4,420	0.101
		<hr/> 0.119

**OF-019**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	4,914	0.113
Impervious	1,427	0.033
		<hr/> 0.146

**OF-020**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	16,422	0.377
Impervious	19,057	0.437
		<hr/> 0.814

Marietta Borough  
 Pollutant Reduction Plan (PRP)  
 ARRO No.: 5823.13

**Land Use: MS4 Regulated Area**

Watershed Description: Unnamed Tributary to Susquehanna River

**OF-013**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	35,706	0.820
Impervious	5,109	0.117
		<u>0.937</u>

**OF-014**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	54,030	1.240
Impervious	59,424	1.364
		<u>2.605</u>

**OF-015**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	5,387	0.124
Impervious	3,223	0.074
		<u>0.198</u>

**OF-016**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	5,514	0.127
Impervious	5,138	0.118
		<u>0.245</u>

**OF-017**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	925	0.021
Impervious	2,652	0.061
		<u>0.082</u>

**OF-018**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	785	0.018
Impervious	4,420	0.101
		<u>0.119</u>



**OF-019**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	4,914	0.113
Impervious	1,427	0.033
		<hr/> 0.146

**OF-020**

<u>Description</u>	<u>Area (SF)</u>	<u>Area (Ac.)</u>
Pervious	16,422	0.377
Impervious	19,057	0.437
		<hr/> 0.814

Marietta Borough  
 Pollutant Reduction Plan (PRP)  
 ARRO No.: 5823.13

**Worksheet 4:**

Drainage Area: Unnamed Tributary to Susquehanna River

2-year Rainfall: 2.97 in

**OF-013**

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	35,706	0.820	77	2.99	0.60	1.05	3,125.17
Impervious	C	5,109	0.117	98	0.20	0.04	2.74	1,165.92
		40,815	0.937					4,291.09

**OF-014**

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	54,030	1.240	77	2.99	0.60	1.05	4,729.01
Impervious	C	59,424	1.364	98	0.20	0.04	2.74	13,560.64
		113,455	2.605					18,289.65

**OF-015**

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	5,387	0.124	77	2.99	0.60	1.05	471.50
Impervious	C	3,223	0.074	98	0.20	0.04	2.74	735.39
		8,610	0.198					1,206.89

**OF-016**

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	5,514	0.127	77	2.99	0.60	1.05	482.60
Impervious	C	5,138	0.118	98	0.20	0.04	2.74	1,172.49
		10,652	0.245					1,655.09

**OF-017**

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	925	0.021	77	2.99	0.60	1.05	81.00
Impervious	C	2,652	0.061	98	0.20	0.04	2.74	605.21
		3,578	0.082					686.20

**OF-018**

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	785	0.018	77	2.99	0.60	1.05	68.74
Impervious	C	4,420	0.101	98	0.20	0.04	2.74	1,008.65
		5,205	0.119					1,077.39

**OF-019**

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	4,914	0.113	77	2.99	0.60	1.05	430.11
Impervious	C	1,427	0.033	98	0.20	0.04	2.74	325.57
		6,341	0.146					755.69

**OF-020**

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>
Pervious	C	16,422	0.377	77	2.99	0.60	1.05	1,437.30
Impervious	C	19,057	0.437	98	0.20	0.04	2.74	4,348.90
		35,479	0.814					5,786.20

Marietta Borough  
Pollutant Reduction Plan (PRP)  
ARRO No.: 5823.13  
Base Pollutant Loading (No Existing BMPs)

PA DEP Land Loading:		TN (lbs/acre/year)	TP (lbs/acre/year)	TSS (lbs/acre/year)
Lancaster	Impervious	38.53	1.55	1480.43
	Pervious	22.24	0.36	190.93
	Undeveloped	10	0.33	234.6

MS4 Regulated Area Watershed Description: Unnamed Tributary to Susquehanna River

Drainage Area ID	Drainage Area (SF)			Drainage Area (Ac)			PA DEP Land Loading								
	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-013	5,109	35,706	40,815	0.1	0.8	0.9	4.52	18.23	22.75	0.18	0.30	0.48	173.6	156.5	330.1
OF-014	59,424	54,030	113,455	1.4	1.2	2.6	52.56	27.59	80.15	2.11	0.45	2.56	2,019.6	236.8	2,256.4
OF-015	3,223	5,387	8,610	0.1	0.1	0.2	2.85	2.75	5.60	0.11	0.04	0.16	109.5	23.6	133.1
OF-016	5,138	5,514	10,652	0.1	0.1	0.2	4.54	2.82	7.36	0.18	0.05	0.23	174.6	24.2	198.8
OF-017	2,652	925	3,578	0.1	0.0	0.1	2.35	0.47	2.82	0.09	0.01	0.10	90.1	4.1	94.2
OF-018	4,420	785	5,205	0.1	0.0	0.1	3.91	0.40	4.31	0.16	0.01	0.16	150.2	3.4	153.7
OF-019	1,427	4,914	6,341	0.0	0.1	0.1	1.26	2.51	3.77	0.05	0.04	0.09	48.5	21.5	70.0
OF-020	19,057	16,422	35,479	0.4	0.4	0.8	16.86	8.38	25.24	0.68	0.14	0.81	647.7	72.0	719.7
				2.3	2.8	5.1			152.00			4.60			3,956.04

Required Reduction Percent	3%	5%	10%
Required Reduction (Lbs/Year)	4.56	0.23	395.60
Required Reduction (Tons/Year)	0.00	0.00	0.20

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## **ATTACHMENT VII**

### **EXISTING BMP POLLUTANT REDUCTIONS**

No Existing BMP's

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## **ATTACHMENT VIII**

### **EXISTING LOADING WITH BMPs FOR POLLUTANTS OF CONCERN**

No existing BMP reductions.

See Attachment VI- Existing loading for pollutants of concern.

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## **ATTACHMENT IX**

### **POTENTIAL BMP POLLUTANT LOADING REDUCTION**

1. Potential BMP Description
2. Chesapeake Bay (Appendix D) – Remaining Storm Sewersheds
3. UNT to Susquehanna River (Appendix E)
4. Street Sweeping Analysis

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## POTENTIAL BMP POLLUTANT LOADING REDUCTION

### Potential BMP Description

#### **UNT to Susquehanna River Watershed:**

##### BMP 001-FB1: Forest Buffer

The analysis evaluated the construction of a forest buffer. The BMP would be constructed across private property from approximately North Waterford Ave. to 98 Longenecker Ave.

Construction activities include: re-grading; seeding and planting; tree and shrub planting, and removal of invasive species.

##### BMP 002-IB1: Infiltration Trench

The analysis evaluated the construction of an infiltration trench. The BMP would be constructed across right-of-way from approximately 104 East Front St. to Strawberry Ave. Construction activities include: re-direction of storm sewer; and construction of infiltration trench.

##### BMP 003-IB2: Infiltration Trench

The analysis evaluated the stabilization/construction of an infiltration trench. The BMP would be constructed across right-of-way from approximately 130 East Front St. to Strawberry Ave.

Construction activities include: re-direction of storm sewer; and construction of infiltration trench.

##### BMP 002-BS1: Bioswale

The analysis evaluated the construction of a bioswale. The BMP parallels Jones St. on private property. Limits are from West Hazel Ave. to the end of Jones St. Construction activities include: re-grading; installing ballast and amended soils; bioswale plantings; and stabilization of existing storm outlets.

#### **Chesapeake Bay – Remaining Storm Sewersheds**

##### BMP 008-NSB1: Nutrient Sediment Box

The analysis evaluated the installation of a nutrient sediment box on a segment of storm sewer prior to OF-025. The box would be located within the road right-of-way. The nutrient sediment box is a proprietary storm sewer solids removal device that collects sediments, reduces nutrients, and also collects trash, while allowing functionality of storm sewer system.



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## **POTENTIAL BMP POLLUTANT LOADING REDUCTION**

Chesapeake Bay (Appendix D) – Remaining Storm Sewersheds

	Acres			Square Feet												
BMP ID	Impervious	Pervious	Total	Impervious	Pervious	Total	Linerar Feet	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)
OF000-RG1	0.76	0.47	1.23	33105.6	20473.2	53578.8		23.42624	8.36224	31.78848	1.0013	0.14382	1.14512	1012.61412	80.76339	1093.37751
OF000-RG2	0.35	0.19	0.54	15246	8276.4	23522.4		10.7884	3.38048	14.16888	0.461125	0.05814	0.519265	466.33545	32.64903	498.98448
OF000-RG-3	3.29	0.64	3.93	143312.4	27878.4	171190.8		101.41096	11.38688	112.79784	4.334575	0.19584	4.530415	4383.55323	109.97568	4493.52891
OF000-SR-1							1000			75			68			44880

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## **POTENTIAL BMP POLLUTANT LOADING REDUCTION**

UNT to Susquehanna River (Appendix E)

Marietta Borough  
 Pollutant Reduction Plan (PRP)  
 ARRO No.: 5823.13  
 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-FB1	Forest Buffer	38.98	1.42	863.69
OF-015	BMP OF015-IB1	Infiltration Bed	4.76	0.14	126.48
OF 017	BMP OF017-IB1	Infiltration Bed	2.40	0.09	89.48
OF 019	BMP OF019-IB1	Infiltration Bed	3.21	0.08	66.53
OF 016	BMP OF016-IB2	Infiltration Bed	6.26	0.19	188.85
OF 018	BMP OF018-IB2	Infiltration Bed	3.66	0.14	145.98
OF-020	BMP OF020-IB2	Infiltration Bed	21.45	0.69	683.68
			<b>80.72</b>	<b>2.74</b>	<b>2,164.68</b>

<b>REQUIRED POLLUTANT REDUCTION (Lbs/Year)</b>	<b>4.56</b>	<b>0.23</b>	<b>395.60</b>
Maximum Permitted Reduction for Storm Sewer System Solids Re	2.28	0.11	197.80

Marietta Borough  
 Pollutant Reduction Plan (PRP)  
 ARRO No.: 5823.13  
**Proposed BMPs**

**Worksheet 4:**

Drainage Area: Urbanized MS4 Regulated Area  
 2-year Rainfall: 2.97 in

**Proposed BMP Calculations:**

<u>Cover/Type/Condition</u>	<u>Soil Type</u>	<u>Area (SF)</u>	<u>Area (Ac)</u>	<u>CN</u>	<u>S</u>	<u>Ia (0.2*S)</u>	<u>Q Runoff (in)</u>	<u>Runoff Volume (CF)</u>	<u>Acre-Ft</u>
<b>BMP 001-FB1 Forest Buffer</b>									
<u>Pre-Development</u>									
Pervious	C	0	0.000	77	2.99	0.60	1.05	0.00	
Meadow	C	294,610	6.763	71	4.08	0.82	0.74	18,246.35	
Impervious	C	0	0.000	98	0.20	0.04	2.74	0.00	
		294,610	6.763					18,246.35	0.42
<u>Post-Development</u>									
Pervious	C	279,879	6.425	77	2.99	0.60	1.05	24,496.52	
Impervious	C	14,730	0.338	98	0.20	0.04	2.74	3,361.49	
		294,610	6.763					27,858.02	0.64
Net Increase:								9,611.67	0.22
<b>BMP OF015-IB1 Infiltration Bed</b>									
<u>Pre-Development</u>									
Pervious	C	0	0.000	77	2.99	0.60	1.05	0.00	
Meadow	C	8,610	0.198	71	4.08	0.82	0.74	533.23	
Impervious	C	0	0.000	98	0.20	0.04	2.74	0.00	
		8,610	0.198					533.23	0.01
<u>Post-Development</u>									
Pervious	C	5,387	0.124	77	2.99	0.60	1.05	471.50	
Impervious	C	3,223	0.074	98	0.20	0.04	2.74	735.39	
		8,610	0.198					1,206.89	0.03
Net Increase:								673.67	0.02
<b>BMP OF017-IB1 Infiltration Bed</b>									
<u>Pre-Development</u>									
Pervious	C	0	0.000	77	2.99	0.60	1.05	0.00	
Meadow	C	3,577	0.082	71	4.08	0.82	0.74	221.54	
Impervious	C	0	0.000	98	0.20	0.04	2.74	0.00	
		3,577	0.082					221.54	0.01
<u>Post-Development</u>									
Pervious	C	925	0.021	77	2.99	0.60	1.05	80.96	
Impervious	C	2,652	0.061	98	0.20	0.04	2.74	605.19	
		3,577	0.082					686.15	0.02
Net Increase:								464.61	0.01

**BMP OF019-IB1****Infiltration Bed**Pre-Development

Pervious	C	0	0.000	77	2.99	0.60	1.05	0.00	
Meadow	C	6,341	0.146	71	4.08	0.82	0.74	392.71	
Impervious	C	0	0.000	98	0.20	0.04	2.74	0.00	
		6,341	0.146					392.71	0.01

Post-Development

Pervious	C	4,914	0.113	77	2.99	0.60	1.05	430.11	
Impervious	C	1,427	0.033	98	0.20	0.04	2.74	325.57	
		6,341	0.146					755.69	0.02

Net Increase: 362.97 0.01

**BMP OF016-IB2****Infiltration Bed**Pre-Development

Pervious	C	0	0.000	77	2.99	0.60	1.05	0.00	
Meadow	C	10,652	0.245	71	4.08	0.82	0.74	659.71	
Impervious	C	0	0.000	98	0.20	0.04	2.74	0.00	
		10,652	0.245					659.71	0.02

Post-Development

Pervious	C	5,514	0.127	77	2.99	0.60	1.05	482.60	
Impervious	C	5,138	0.118	98	0.20	0.04	2.74	1,172.49	
		10,652	0.245					1,655.09	0.04

Net Increase: 995.38 0.02

**BMP OF018-IB2****Infiltration Bed**Pre-Development

Pervious	C	0	0.000	77	2.99	0.60	1.05	0.00	
Meadow	C	5,205	0.119	71	4.08	0.82	0.74	322.39	
Impervious	C	0	0.000	98	0.20	0.04	2.74	0.00	
		5,205	0.119					322.39	0.01

Post-Development

Pervious	C	785	0.018	77	2.99	0.60	1.05	68.74	
Impervious	C	4,420	0.101	98	0.20	0.04	2.74	1,008.65	
		5,205	0.119					1,077.39	0.02

Net Increase: 755.00 0.02

**BMP OF020-IB2****Infiltration Bed**Pre-Development

Pervious	C	0	0.000	77	2.99	0.60	1.05	0.00	
Meadow	C	35,479	0.814	71	4.08	0.82	0.74	2,197.35	
Impervious	C	0	0.000	98	0.20	0.04	2.74	0.00	
		35,479	0.814					2,197.35	0.05

Post-Development

Pervious	C	16,422	0.377	77	2.99	0.60	1.05	1,437.30	
Impervious	C	19,057	0.437	98	0.20	0.04	2.74	4,348.90	
		35,479	0.814					5,786.20	0.13

Net Increase: 3,588.85 0.08

Marietta Borough  
Pollutant Reduction Plan (PRP)  
ARRO No.: 5823.13

Expert Panel Pollutant Reduction Efficiency Calculations:

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

BMP ID	BMP Description	EP	IA	x	PA DEP BMP Effectiveness Values			Existing BMP Efficiency			Adjusted BMP Effectiveness Values		
					Pollutant % Removal			Pollutant % Removal			Pollutant % Removal		
					TN	TP	TSS	TN	TP	TSS	TN	TP	TSS
BMP 001-FB1	Forest Buffer	0.22	0.338	7.83	25%	50%	50%				25%	50%	50%
BMP OF015-IB1	Infiltration Bed	0.02	0.074	2.51	85%	85%	95%				85%	85%	95%
BMP OF017-IB1	Infiltration Bed	0.01	0.061	2.10	85%	85%	95%				85%	85%	95%
BMP OF019-IB1	Infiltration Bed	0.01	0.033	3.05	85%	85%	95%				85%	85%	95%
BMP OF016-IB2	Infiltration Bed	0.02	0.118	2.32	85%	85%	95%				85%	85%	95%
BMP OF018-IB2	Infiltration Bed	0.02	0.101	2.05	85%	85%	95%				85%	85%	95%
BMP OF020-IB2	Infiltration Bed	0.08	0.437	2.26	85%	85%	95%				85%	85%	95%

Marietta Borough  
Pollutant Reduction Plan (PRP)  
ARRO No.: 5823.13  
**Proposed BMP Pollutant Reduction**

PA DEP Land Loading:		TN (lbs/acre/year)	TP (lbs/acre/year)	TSS (lbs/acre/year)
Lancaster	Impervious	38.53	1.55	1480.43
	Pervious	22.24	0.36	190.93
	Undeveloped	10	0.33	234.6

**OF-001**  
Forest Buffer

BMP ID	Drainage Area (SF)			Drainage Area (Ac)			PA DEP Land Loading								
	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-FB1	14,730	279,879	294,610	0.3	6.4	6.8	13.03	142.90	155.92	0.52	2.31	2.84	500.6	1,226.8	1,727.4

BMP Effectiveness Value (3800-PM-BCW0100m) & Manufacture Literature	25%	50%	50%
<b>Pollutant Reduction</b>	<b>38.98</b>	<b>1.42</b>	<b>863.69</b>

**OF-015**  
Infiltration Bed

BMP ID	Drainage Area (SF)			Drainage Area (Ac)			PA DEP Land Loading								
	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 OF015-IB1	3,223	5,387	8,610	0.1	0.1	0.2	2.85	2.75	5.60	0.11	0.04	0.16	109.5	23.6	133.1

BMP Effectiveness Value (3800-PM-BCW0100m) & Manufacture Literature	85%	85%	95%
<b>Pollutant Reduction</b>	<b>4.76</b>	<b>0.14</b>	<b>126.48</b>

**OF 017**  
Infiltration Bed

BMP ID	Drainage Area (SF)			Drainage Area (Ac)			PA DEP Land Loading								
	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 OF017-IB1	2,652	925	3,577	0.1	0.0	0.1	2.35	0.47	2.82	0.09	0.01	0.10	90.1	4.1	94.2

BMP Effectiveness Value (3800-PM-BCW0100m) & Manufacture Literature	85%	85%	95%
<b>Pollutant Reduction</b>	<b>2.40</b>	<b>0.09</b>	<b>89.48</b>



OF 019  
Infiltration Bed

BMP ID	Drainage Area (SF)			Drainage Area (Ac)			PA DEP Land Loading								
	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 OF019-IB1	1,427	4,914	6,341	0.0	0.1	0.1	1.26	2.51	3.77	0.05	0.04	0.09	48.5	21.5	70.0

BMP Effectiveness Value (3800-PM-BCW0100m) & Manufacture Literature

85%

85%

95%

Pollutant Reduction

3.21

0.08

66.53

OF 016  
Infiltration Bed

BMP ID	Drainage Area (SF)			Drainage Area (Ac)			PA DEP Land Loading								
	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 OF016-IB2	5,138	5,514	10,652	0.1	0.1	0.2	4.54	2.82	7.36	0.18	0.05	0.23	174.6	24.2	198.8

BMP Effectiveness Value (3800-PM-BCW0100m) & Manufacture Literature

85%

85%

95%

Pollutant Reduction

6.26

0.19

188.85

OF 018  
Infiltration Bed

BMP ID	Drainage Area (SF)			Drainage Area (Ac)			PA DEP Land Loading								
	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 OF018-IB2	4,420	785	5,205	0.1	0.0	0.1	3.91	0.40	4.31	0.16	0.01	0.16	150.2	3.4	153.7

BMP Effectiveness Value (3800-PM-BCW0100m) & Manufacture Literature

85%

85%

95%

Pollutant Reduction

3.66

0.14

145.98

OF-020  
Infiltration Bed

BMP ID	Drainage Area (SF)			Drainage Area (Ac)			PA DEP Land Loading								
	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 OF020-IB2	19,057	16,422	35,479	0.4	0.4	0.8	16.86	8.38	25.24	0.68	0.14	0.81	647.7	72.0	719.7

BMP Effectiveness Value (3800-PM-BCW0100m) & Manufacture Literature

85%

85%

95%

Pollutant Reduction

21.45

0.69

683.68

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# **POTENTIAL BMP POLLUTANT LOADING REDUCTION**

## **Street Sweeping Analysis**

Marietta Borough  
Pollutant Reduction Plan (PRP)  
ARRO No.: 5823.13  
Street Sweeping

PA DEP Land Loading:		TN (lbs/acre/year)	TP (lbs/acre/year)	TSS (lbs/acre/year)
Lancaster	Impervious	38.53	1.55	1480.43
	Pervious	22.24	0.36	190.93
	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).

BMP ID	Street Length		Drainage Area (Ac)		PA DEP Land Loading								
	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	64,997	12.31	2.0	24.6	948.61	0.00	948.61	38.16	0.00	38.16	36,448.2	0.0	36,448.2

Expert Panel Performance Standards 2% 5% 10%

Pollutant Reduction 18.97 1.91 3,644.82

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

BMP ID	Street Length		Drainage Area (Ac)		PA DEP Land Loading								
	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	64,997	12.31	2.0	24.6	948.61	0.00	948.61	38.16	0.00	38.16	36,448.2	0.0	36,448.2

Expert Panel Performance Standards 2% 5% 11%

Pollutant Reduction 18.97 1.91 4,009.30

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

BMP ID	Street Length		Drainage Area (Ac)		PA DEP Land Loading								
	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	64,997	12.31	2.0	24.6	948.61	0.00	948.61	38.16	0.00	38.16	36,448.2	0.0	36,448.2

Expert Panel Performance Standards 1% 3% 6%

Pollutant Reduction 9.49 1.14 2,186.89

All Streets - AST1P12W - one pass every 12 weeks.

BMP ID	Street Length		Drainage Area (Ac)		PA DEP Land Loading								
	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	64,997	12.31	2.0	24.6	948.61	0.00	948.61	38.16	0.00	38.16	36,448.2	0.0	36,448.2

Expert Panel Performance Standards 0% 1% 2%

Pollutant Reduction 0.00 0.38 728.96

<b>Table 17. Pollutant Reductions Associated with Different Street Cleaning Practices</b>					
Practice #	Description <sup>1</sup>	Approx Passes/Yr <sup>2</sup>	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					
<sup>1</sup> See Table 15 for the codes used to define street cleaning frequency					
<sup>2</sup> Depending on the length of the winter shutdown, the number of passes/yr may be lower than shown					

<b>Table 15. Adapting the WINSLamm Model for the Chesapeake Bay Watershed</b>	
<b>Three different sweeping start/stop dates</b> 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	
<b>Six different fixed sweeping schedules</b>	
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
<b>Four seasonal sweeping schedules</b> (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	
<b>Two Levels of Sweeper Technology</b>	
MBC = Mechanical broom cleaning	VAC = Vacuum assisted cleaning
<b>Four Options for Street Parking Density and No Parking Enforcement</b>	
For more details, consult the technical memo (Tetra Tech, Inc., 2015)	

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## **ATTACHMENT X**

### **SELECTED BMP POLLUTANT LOADING REDUCTION**

1. BMP Description
2. BMP Pollutant Loading Reduction

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## SELECTED BMP POLLUTANT LOADING REDUCTION

### BMP Description

#### UNT to Susquehanna River – Appendix E

##### BMP OF000-RG1: Rain Garden

The analysis evaluated the construction of a Rain Garden receiving water from existing and proposed impervious surface. The BMP would be constructed adjacent to the intersection of Furnace Rd. and Donegal Pl. Construction activities include: re-grading to direct stormwater into rain garden; installing ballast and amended soils; rain garden plantings.

##### BMP OF000-RG2: Rain Garden

The analysis evaluated the construction of a Rain Garden receiving water from existing and proposed impervious surface. The BMP would be constructed east of Furnace Rd. before the bend and south of Furnace Rd. after the bend. Construction activities include: re-grading to direct stormwater into rain garden; installing ballast and amended soils; rain garden plantings.

##### BMP OF000-RG3: Rain Garden

The analysis evaluated the construction of a Rain Garden receiving water from existing and proposed impervious surface. The BMP would be constructed along Furnace Rd. west of the parking area for Chikees Park. Construction activities include: re-grading to direct stormwater into rain garden; installing ballast and amended soils; rain garden plantings.

##### BMP OF000-SBR1: Streambank Restoration

The analysis evaluated a Stream Restoration project and buffer within the Evans Run tributary located between State Route 441-River Rd., and Waterford Ave. Construction activities include: 1,300 liner feet of streambank restoration; vegetative stabilization; establishment of 2,150 liner feet of riparian buffer.

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## **SELECTED BMP POLLUTANT LOADING REDUCTION**

BMP Pollutant Loading Reduction



Selected BMPs: Based upon PA DEP Pollutant Aggregation Table

	Drainage Area ID	Prop. BMP ID	BMP Description	TN(lbs./year)	TP (lbs/year)	TSS (lbs./year)
Unnambed Trib to Chickies Creak						
		BMP OF000-RG1	Rain Garden	31.79	1.15	1093.38
		BMP OF000-RG2	Rain Garden	14.17	0.52	498.98
		BMP OF000-RG23	Rain Garden	112.80	4.53	4493.53
Unnamed Trib to Susquehanna River						
		BMP OF000-SBR1	Stream Bank Restoration	75	68	44880

**Pollutant Reduction:** **233.76** **74.19** **50965.89**

**Required Reduction:** **231.31** **10.29** **16665.9**

Net Reduction: 2.45 63.90 34299.99

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## **ATTACHMENT XI**

### **PLANNING ESTIMATES OF OPINION OF PROBABLE COST**



The ARRO Group, Inc.  
107 West Airport Road  
Lititz, PA 17542

### OPINION OF PROBABLE CONSTRUCTION COST

Date: 17-Apr-17  
Project Number: 5823.13  
Project Name: Pollutant Reduction Plan (PRP)

Checked By: MRK

#### BMP 002-BS1 - Bioswale

Item No.	Description	Qty.	Unit	Unit Price	Total Cost
<b>Miscellaneous/Site Work Payment Items</b>					
1	Mobilization	1	LS	\$10,000.00	\$10,000.00
2	Excavation	110	CY	\$30.00	\$3,300.00
3	Finish Grading and Seeding - Bioswale	215	SY	\$10.00	\$2,150.00
4	12" Gravel	65	Ton	\$25.00	\$1,625.00
5	6" Ammended soils	35	Ton	\$258.00	\$9,030.00
<b>Misc Payment Items</b>					
6	Plantings	25	Ea	\$30.00	\$750.00
	Subtotal				\$26,855.00
	Contingency (30%)				\$8,056.50
	Contstruction Sub-Total				\$34,911.50
	Engineering				\$20,000.00
	Right-of-Way (10%)				\$3,491.15
	Legal (3%)				\$1,047.35
	<b>TOTAL</b>				<b>\$59,450.00</b>



The ARRO Group, Inc.  
107 West Airport Road  
Lititz, PA 17542

### OPINION OF PROBABLE CONSTRUCTION COST

Date: 17-Apr-17  
Project Number: 5823.13  
Project Name: Pollutant Reduction Plan (PRP)

Checked By: MRK

#### BMP 025-NSB - Nutrient Seperating Box

Item No.	Description	Qty.	Unit	Unit Price	Total Cost
<b>Miscellaneous/Site Work Payment Items</b>					
1	Mobilization	1	LS	\$10,000.00	\$10,000.00
2	Erosion and sedimentation control	1	LS	\$2,500.00	\$2,500.00
3	Excavation	1	LS	\$10,000.00	\$10,000.00
4	Crane Rental	1	LS	\$7,500.00	\$7,500.00
5	Finish grading and seeding	50	SY	\$8.00	\$400.00
<b>Storm Sewer Payment Items</b>					
6	Nutrient Seperating Baffle Box - Materials	1	LS	\$60,000.00	\$60,000.00
7	Nutrient Seperating Baffle Box - Installation	1	LS	\$15,000.00	\$15,000.00
	Subtotal				\$105,400.00
	Contingency (30%)				\$31,620.00
	Constuction Sub-Total				\$137,020.00
	Engineering (15%)				\$20,553.00
	Right-of-Way (5%)				\$6,851.00
	Legal (3%)				\$4,110.60
	<b>TOTAL</b>				<b>\$168,534.60</b>

**The ARRO Group, Inc.**  
**107 West Airport Road**  
**Lititz, PA 17542**

## OPINION OF PROBABLE CONSTRUCTION COST

Date: 4/17/17  
Project Number: 5823.13  
Project Name: Pollutant Reduction Plan (PRP)

Checked By: MRK

**BMP 001-FB1 - Forest Buffer**

Item No.	Description	Qty.	Unit	Unit Price	Total Cost
	<b>Miscellaneous/Site Work Payment Items</b>				
1	Mobilization	1	LS	\$10,000.00	\$10,000.00
2	Trees	75	Ea	\$500.00	\$37,500.00
3	Misc. Plantings	500	Ea	\$125.00	\$62,500.00
	Subtotal				\$110,000.00
	Contingency (30%)				\$33,000.00
	Constuction Sub-Total				\$143,000.00
	Engineering (15%)				\$21,450.00
	Right-of-Way (5%)				\$7,150.00
	Legal (3%)				\$4,290.00
	<b>TOTAL</b>				<b>\$175,890.00</b>



The ARRO Group, Inc.  
107 West Airport Road  
Lititz, PA 17542

### OPINION OF PROBABLE CONSTRUCTION COST

Date: 4/17/17  
Project Number: 5823.13  
Project Name: Pollutant Reduction Plan (PRP)

Checked By: MRK

#### BMP 002-IB1 - Infiltration Bed

Item No.	Description	Qty.	Unit	Unit Price	Total Cost
<b>Miscellaneous/Site Work Payment Items</b>					
1	Mobilization	1	LS	\$10,000.00	\$10,000.00
2	Excavation	55	CY	\$30.00	\$1,650.00
3	Geotextile	155	SY	\$10.00	\$1,550.00
4	Stone	105	Ton	\$25.00	\$2,625.00
5	Overflow Pipe	20	LF	\$30.00	\$600.00
6	Finish Grading and Seeding	120	SY	\$8.00	\$960.00
7	Connection to existing storm sewer	1	LS	\$12,000.00	\$12,000.00
8	Perforated Storm Sewer	50	LF	\$45.00	\$2,250.00
9	Type M Inlet	1	Ea	\$3,000.00	\$3,000.00
	Subtotal				\$34,635.00
	Contingency (30%)				\$10,390.50
	Construction Sub-Total				\$45,025.50
	Engineering (30%)				\$13,507.65
	Right-of-Way (5%)				\$2,251.28
	Legal (3%)				\$1,350.77
	<b>TOTAL</b>				<b>\$62,135.19</b>





The ARRO Group, Inc.  
107 West Airport Road  
Lititz, PA 17542

## OPINION OF PROBABLE CONSTRUCTION COST

Date: 4/17/17  
Project Number: 5823.13  
Project Name: Pollutant Reduction Plan (PRP)

Checked By: MRK

### BMP 003-IB2 - Infiltration Bed

Item No.	Description	Qty.	Unit	Unit Price	Total Cost
<b>Miscellaneous/Site Work Payment Items</b>					
1	Mobilization	1	LS	\$15,000.00	\$15,000.00
2	Excavation	115	CY	\$30.00	\$3,450.00
3	Geotextile	300	SY	\$10.00	\$3,000.00
4	Stone	205	Ton	\$25.00	\$5,125.00
5	Overflow Pipe	20	LF	\$30.00	\$600.00
6	Finish Grading and Seeding	240	SY	\$8.00	\$1,920.00
7	Connection to existing storm sewer	1	LS	\$18,000.00	\$18,000.00
8	Perforated Storm Sewer	100	LF	\$45.00	\$4,500.00
9	Type M Inlet	1	Ea	\$3,000.00	\$3,000.00
	Subtotal				\$54,595.00
	Contingency (30%)				\$16,378.50
	Construction Sub-Total				\$70,973.50
	Engineering (30%)				\$21,292.05
	Right-of-Way (5%)				\$3,548.68
	Legal (3%)				\$2,129.21
	<b>TOTAL</b>				<b>\$97,943.43</b>

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## **ATTACHMENT XII**

### **RETURN ON INVESTMENT ANALYSIS**



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
OF000	BMP OF000- RG1, RG2, RG3	Rain Gardens	158.76	6.19	6085.89	\$25,305.30	\$159.40	\$4,084.93	\$4.16
OF000	BMP OF000-SBR1	Streambank Restoration	75	68	44880	\$20,000	\$266.67	\$294.12	\$0.45