**Borough of Camp Hill, Cumberland County**
**Pennsylvania**

# Pollution Reduction Plan

Gannett Fleming

*Excellence Delivered* ***As Promised***

July 2017

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## 1.0 Introduction

The Pennsylvania Department of Environmental Protection (PADEP) requires all municipalities and most non-municipal entities in Pennsylvania with regulated small Municipal Separate Storm Sewer systems (MS4s) to apply for National Pollutant Discharge Elimination System (NPDES) PAG-13 permit coverage. A Pollution Reduction Plan (PRP) is required for any MS4 that discharges stormwater to any waterways that are considered "impaired" according to PADEP's latest Integrated Water Quality Monitoring and Assessment Report. PADEP sent a letter dated July 6, 2016 notifying the Borough of Camp Hill (Borough) that their current PADEP PAG-13 General Permit expires in March 2018 and are required to follow the guidelines to submit for continued NPDES permit coverage. A copy of the letter is in Appendix A. The MS4 Requirements for the Borough as defined by PADEP can be found in Appendix B.

## 2.0 Public Participation

Camp Hill Borough (Borough) accepted a Pollutant Reduction Plan (PRP) draft on *July°28, 2017 for* review. This draft was then posted to the Borough website with a hard copy available at the Borough Office for public review from August 2nd, *2017* to *August 31st, 2017*. An advertisement was published on *July 23, 2017* in the Harrisburg Patriot News (a newspaper of local circulation) to notify the public of relative background information and identify where the draft PRP could be found to review and offer comment. The PRP draft was also discussed during a public meeting held on August 9th, *2017*. A copy of the advertisements and a screenshot of the Borough's website are located in Appendix C.

No comments were made during the public comment period nor during the August 9th meeting.

## 3.0 Map

### 3.1 Sewersheds

The Borough is located in eastern Cumberland County, 2 miles southwest of Harrisburg, bounded on the south by Lower Allen Township, on the west by Hampden Township, on the north by the Conodoguinet Creek and East Pennsboro Township, and to the east by Lemoyne Borough. The total area of the Borough is approximately 2.2 square miles (1,343.8 acres).

The Borough has three sewersheds, all of which are a part of the larger Susquehanna River drainage basin which flows into the Chesapeake Bay. A map of the Borough's stormwater system, its outfalls, and storm sewersheds are displayed in Exhibit 1. The northern portion of the Borough drains to the Conodoguinet Creek, which makes up the northwest boundary of the Borough, at Outfalls 6 through 10 and 12 through 15. The Conodoguinet Creek flows into the Susquehanna River approximately 3 miles downstream of the Borough. The central, western, and southern portions of the Borough drain south to an unnamed tributary that leaves the Borough at Outfalls 2 and 3 before flowing into Cedar Run in neighboring Lower Allen Township. Cedar Run travels approximately two miles from the unnamed tributary to its confluence with the Yellow Breeches Creek. The Yellow Breeches Creek then flows approximately 4 miles before it reaches the Susquehanna River.

The remaining sewersheds discharge into a neighboring municipality's stormsewer system. Portions of the far eastern and southeastern area of the Borough drain to the neighboring Lemoyne Borough stormwater drainage system at Outfalls 1, 4, and 17. The Lemoyne Borough stormwater drainage system then discharge into the Susquehanna River. The northeast portion of the system discharge to East

Pennsboro Township at Outlets 5 and 16 which also discharge to the Susquehanna River. The southwestern portion of the Borough discharge to PennDOTs stormsewer system within the right-of-way of State Route 581. PennDOTs stormsewer then discharge into Lower Allen Township. Since Outfalls 1, 4, 5, 11, 16, and 17 discharge to neighboring stormwater systems and not a waterway. Per PADEPs definition, these are observation points.

The majority of soils in the Borough are characterized as Hydrologic Group B, though small areas of Hydrologic Groups C and D are found near floodplains. A map of the hydrological soil groups can be found in Appendix D.

### 3.2 Planning Area

All of the Borough's 1,344 acres are within the urbanized area (UA). Some areas have been parsed out of the planning area including all PennDOT right-of-ways and three (3) properties located south of SR 581 and west of US Route 15. These three (3) properties are located in both the Borough and neighboring Lower Allen Township but they drain solely into Lower Allen Township. A map of the planning area is shown in Exhibit 2.

## 4.0 Pollutants of Concern

As seen in the MS4 Requirements Table found in Appendix B, pollutants of concern for the Borough include pathogens in the Yellow Breaches Creek and Cedar Run, PCBs in the Susquehanna River, and nutrients and siltation in the Chesapeake Bay. For the purposes of the Pollutant Reduction Plan (PRP) the Chesapeake Bay requirements govern the pollutant reduction requirements. The Chesapeake Bay PRP pollutants of concern are sediment (10% reduction requirement), total phosphorus (5% reduction requirement), and total nitrogen (3% reduction requirement). Since PADEP acknowledges as a surrogate approach that by achieving the sediment reduction requirement, the total phosphorus and total nitrogen reduction requirement will be met; therefore, the Borough's only reduction requirement is 10% of the sediment within the Borough's Planning area.

## 5.0 Existing Loads

### 5.1 Base Loads

Three different methodologies were considered relative to establishing existing loadings within the Borough.

1. The Borough's Chesapeake Bay Pollutant Reduction Plan submitted to PADEP in 2015 used a parcel map of the Borough in GIS to assign percent impervious based on zoning districts. Using TR-55 – Urban Hydrology for Small Watersheds as a reference. Orthoimagery was then used to make minor adjustments to the percent impervious assigned to each parcel
    a. Calculated Borough's impervious area as 46% of the planning area.
2. The simplified method provided by PADEP
    a. Provided Borough's impervious area as 53% of the planning area.

3. The Borough's GIS parcel map assigned the 2011 National Land Cover Database impervious cover percentages to the Borough's zoning map. The 2011 National Land Cover Database is suggested to be used to calculate impervious coverage when using Wiki Watershed. From the zoning map, park/open spaces was assigned based on aerial photography of the Borough which showed where these features are located.
    a. Calculated Borough's impervious area as 64% of the planning area.

The simplified method's rate of 53% was chosen for the purposes of base existing loads. The Borough's GIS zoning map was assigned a percent impervious coverage per zoning area to achieve the 53% planning area by adjusting the 2011 National Land Cover Database impervious coverage values based on the values from the 2015 Chesapeake Bay Pollutant Reduction Plan. Parks/open space was assigned by aerial photography. A table of the percent impervious assignments, a map of the percent impervious assigned to the Borough's zoning districts, and the Borough's zoning map are found in Table 5.1, Exhibit 3, and Appendix E respectively.

5.1 Percent Impervious per Camp Hill Zoning District

| Zoning Districts | Zoning District Code(1) | % Impervious |
|---|---|---|
| Low Density Residential | LDR | 40% |
| Medium Density Residential | MDR | 55% |
| High Density Residential/Office | HDRO | 75% |
| Medium Density Residential Office | MDRO | 65% |
| Downtown | DT | 85% |
| Commercial Neighborhood | CN | 65% |
| Commercial General | CG | 85% |
| Commercial Highway Office | CHO | 65% |
| Commercial Shopping Center | CS | 95% |
| Light Industrial | LIN | 85% |
| Streets/Roads | | 95% |
| Parks/Open Spaces | | 5% |
| Camp Hill Borough Total | | 53% |

(1) Zoning District Code is used on the Camp Hill Borough Zoning Map in Appendix E

According to Attachment B of the PRP Instructions, Cumberland County's developed and undeveloped land loading rates for sediment are as follows:

Table 5.2: PADEP Developed Land Loading Rates for Cumberland County

| Category | Sediment Loading Rate (pounds/acre/year) |
|---|---|
| Impervious developed | 2,065.1 |
| Pervious developed | 306.95 |

## 5.2 Parsed-Out Area

Portions of the planning area were parsed-out for one of two reasons: PennDOT road or the property is on the Borough's border and it drains to another municipality. The area of the PennDOT roads were determined by Right-of-Way plans information or by using the Borough's GIS property map. A summary of the parsed out area is shown in Table 5.3.

Table 5.3: Parsed-out Area Summary

| Address | Acres in Camp Hill | % Impervious | Impervious Acres | Pervious Acres |
|---|---|---|---|---|
| Parsed Out Properties | | | | |
| 451 FREIGHT STREET | 3.64 | 0.85 | 3.09 | 0.55 |
| 4410 Industrial Park Road | 0.20 | 0.85 | 0.17 | 0.03 |
| 3802 Industrial Park Road | 0.88 | 0.05 | 0.04 | 0.84 |
| **Sub-Total Parsed Out Acres** | **4.72** | | **3.31** | **1.41** |
| PennDOT ROW | | | | |
| SR 581 | 21.77 | 0.95 | 20.68 | 1.09 |
| US11/US15 | 22.98 | 0.95 | 21.83 | 1.15 |
| Trindle Road | 2.40 | 0.95 | 2.28 | 0.12 |
| Market | 10.59 | 0.95 | 10.06 | 0.53 |
| State Street | 1.09 | 0.95 | 1.03 | 0.05 |
| Center Street | 1.90 | 0.95 | 1.81 | 0.10 |
| 21st street | 4.92 | 0.95 | 4.68 | 0.25 |
| 17th Street | 1.61 | 0.95 | 1.53 | 0.08 |
| **Sub-Total Parsed Out Acres** | **67.26** | | **63.89** | **3.36** |
| **Total Parsed Out Acres** | **89.03** | | **84.58** | **4.45** |

### 5.3 Existing BMPs

The Borough currently has 21 existing BMPs on both privately developed and publicly developed land, resulting in an existing load reduction of 37,358 pounds of sediment (per year). A table of the existing BMPs and their loading reductions along with a map of their locations are found in Exhibit 4. The percent impervious for each property was assigned per the land use map and the assigned percent impervious values in Table 5.1. Loading reduction calculations were based on the BMP Effectiveness Values table in Appendix F.

### 5.4 Reduction Requirement

A summary of the Total reduction requirements for the Borough's planning area is in Table 5.4.

Table 5.4: Existing Loading Summary

| Category | % of MS4 Area | Total Acres in Borough | Parsed-Out Acres | Total Planning Area Acres | Sediment Loading Rate (pounds/ acre/year) | Sediment Loadings (pounds/ year) | Total Existing BMPs Reduction | Existing Loading (pounds/ year) | 10% Reduction Goal (pounds/ year) |
|---|---|---|---|---|---|---|---|---|---|
| Impervious Developed | 53% | 712.21 | 84.58 | 627.63 | 2,065.1 | 1,296,118.7 | | | |
| Pervious Developed | 47% | 631.59 | 4.45 | 627.14 | 306.5 | 192,218.4 | | | |
| **Total** | | 1343.80 | 89.03 | 1254.77 | | 1,488,337.1 | 37,358.1 | 1,450,979.0 | 145,097.9 |

## 6.0 BMP Selection

### 6.1 Street Sweeping

The Borough currently conducts a street sweeping program throughout the Borough. The Borough schedules to sweep all 32.25 miles of Borough owned roads and streets twice a month during non-winter months for an estimated 14 times per year. The Borough plans to continue its street sweeping program in the future. The Borough purchased a new street sweeper in 2017 compatible with the advanced sweeping technology referenced in Appendix G. The Borough consulted with PADEP to verify that the new street sweeper is advanced sweeping technology, an e-mail from DEP verifying the new sweeper is advanced technology is included in Appendix G. Utilizing the Chesapeake Bay Program Expert Panel on Street Sweeping as seen in Appendix G, a total sediment reduction of 6% is achievable by street sweeping between 10 and 25 times per year.

Table 6.1: Street Sweeping Sediment Reduction Summary

| Category | Lane Miles/Acres | Sediment Loading Rate pounds/acre/year | Sediment Loadings pounds/year |
|---|---|---|---|
| Impervious developed | 64.5 | 2,065.1 | 14,651.9 |
| Pervious developed | 0 | 307.0 | 0 |
| Total | 64.5 | | 14,651.9 |
| BMP Name | Lane Miles/Acres | BMP Effectiveness Value | Sediment Loadings pounds/year |
| Street Sweeping, SCP-4 | 64.5 | 6% | 7,991.9 |

## 6.2 Green Infrastructure Retrofits Projects

In March 2017, the Borough submitted for an application to the PADEP Local Stormwater BMP Implementation Program for a series of three projects in the Borough. The project suggests installing three (3) new BMPs:

- **Willow Park:** This project involves installing a rain garden to collect rainwater from North 25th Street that currently collects along the curb line until a gap in the curb where the water travels through a mulched area and then drops rapidly in grade to its confluence point with the Willow Park stream. This water is also causing scour in the Willow Park Stream.
    - Willow Park rain garden will reduce loads by an estimated 275.9 pounds per year.
- **Rose Maries Antique Shop:** This project involves installing a planter area in the front of the property which is currently all impervious surface. This is in an effort to revitalize the Borough's downtown area and encourage other property owners in the area to consider similar projects.
    - Rose Marie's Antique Shop planter area will reduce loads by an estimated 157.6 pounds per year.
- **Camp Hill Borough Offices:** This project involves upgrading the parking lots around the Borough office building to include a bio-filtration system and pervious pavement. Being located at the Borough office building, this project will provide community engagement as residents visit this area often.
    - Camp Hill Borough Offices parking lot improvements will reduce loads by an estimated 2,152.6 pounds per year.

Information from the Green Infrastructure Retrofits project grant application can be found in Appendix H. The loading reductions are summarized in Table 6.2.

Table 6.2: Green Infrastructure Retrofits Projects Sediment Reduction Summary

| Location | BMP | Sediment Loadings pounds/year |
|---|---|---|
| Willow Park | Raingarden | 275.9 |
| Rose Marie Antique Shop | Planter Area | 157.6 |
| Borough Office Building | Pervious pavement & Bioswale | 2,152.6 |
| Total | | 2,586.1 |

## 6.3 Willow Park Stream Restoration

This project involves restoring 1,150 feet of a natural stream channel that flows through the middle of Willow Park. It has been subject to scour, head-cutting and other destructive processes that have degraded the overall stability of the channel (both for flow and for aquatic life). The stream restoration process will seek to restore the natural geometry of the channel and allow it to function properly. PADEP notified the Borough in a November 7, 2016 letter that the Willow Park Stream Restoration project was approved for a Local Stormwater BMP Implementation Grant in the amount of $200,000.

Since the grant approval, work has continued on the Willow Park Stream project. A concept plan for the stream restoration project was discussed with Borough staff and revisions are being incorporated currently. The 30% design plans are in progress with stream details being modified to accommodate requests from the Borough as well as certain unique site conditions. A copy of the preliminary plans are found in Appendix I.

Most recently, GF employees conducted a "geomorphic assessment" of the stream itself. This will provide valuable information needed to classify and properly design the stream channel. The next stages of the process include drafting a new channel alignment and cross section that will reduce erosion, moving the channel away from adjacent property, improving the flow regime, and create instream habitat. A native planting plan is being worked on that will provide woody riparian habitat that can withstand periods of drought, inundation, and brief periods of elevated levels of salinity. This will likely be the subject of some side Borough led discussions on creating a flow bypass from Walnut Street, along North 25th Street and eliminating two outfalls. Currently, outfalls will be stabilized for the time being until funding and design is obtained to install more permanent BMPs. The area will provide an opportunity for a living classroom.

Utilizing the BMP Effective Values, the sediment reductions for the current preliminary design for the Willow Park Stream Restoration are shown in Table 6.3.

Table 6.3: Willow Park Stream Restoration Sediment Reduction Summary

| BMP Name | Willow Park Stream Length (feet) | Sediment Reduction Rate pounds/acre/year | Sediment Reduction pounds/year |
|---|---|---|---|
| Stream Restoration | 1,150 | 44.88 | 51,612.0 |

## 6.4 Schaeffer Park Development

The Schaeffer Park Development project consists of two parcels that are separated by a public street. One parcel is the site of the former Schaffer Elementary School and the other is an unused Borough owned parcel surrounded by public streets. The school was demolished in late 2016 by the Borough with the goal of developing the parcel into a new park for Borough residents. As part of the park development, a proposed raingarden will be constructed in the unused Borough owned parcel across the street from the former school site. Preliminary plans for this project have been completed and are found the in Appendix J.

With the construction of the park, some of the existing impervious areas will be removed including the parking lots, the playground area, and the building foundation. The pre-project and post-project impervious areas of the site was determined from an AutoCAD survey of the existing site before demolition work and an AutoCAD drawing of the proposed park. The areas and the loading reductions from the impervious area removal are shown in Table 6.4.

Table 6.4: Schaeffer Park Development Impervious Area Removal Sediment Reduction Summary

| Type of Area | Sediment Loading Rate pounds/acre/year | Acres | Sediment Loadings pounds/year |
|---|---|---|---|
| Pre-Park Development | | | |
| Impervious Developed | 2,065.1 | 1.01 | 2085.8 |
| Pervious Developed | 306.5 | 0 | 0 |
| Total Pre-Park Development Loading | | | 2085.8 |
| Post-Park Development | | | |
| Impervious Developed | 2,065.1 | 0.24 | 495.6 |
| Pervious Developed | 306.5 | 0.77 | 236.0 |
| Total Post-Park Development Loading | | | 731.6 |
| Total Sediment Reduction (lbs/year) | | | 1354.2 |

* Note that pervious area pre-park development will also be pervious area post-park development, thus not included in calculations.

A second loading reduction will result from this project with the raingarden that is to be constructed in the second parcel. Sediment loadings were determined using GIS mapping based on the proposed drainage area of the BMP and the land use within the drainage area. The area of the proposed Schaeffer Park was assumed to be a Park/Open Spaces land use. The drainage area for the raingarden is shown in Exhibit 5. The areas and the loading reductions from the proposed rain garden are shown in Table 6.5.

Table 6.5: Schaeffer Park Development Raingarden Sediment Reduction Summary

| Type of Area | Sediment Loading Rate pounds/acre/year | Percentage of Drainage Area | Acres | Sediment Loadings pounds/year |
|---|---|---|---|---|
| Pre-BMP Rates | | | | |
| Impervious Developed | 2,065.1 | 49% | 12.07 | 24,925.8. |
| Pervious Developed | 306.5 | 51% | 12.39 | 3,797.5 |
| Total Pre-BMP Construction Loading | | | | 28,723.3 |
| Post BMP Rates | | | | |
| Impervious Developed | 206.5 | 49% | 12.07 | 2,492.6 |
| Pervious Developed | 30.7 | 51% | 12.39 | 379.8 |
| Total Pre-BMP Construction Loading | | | | 2,872.4 |
| Total Sediment Reduction (lbs/year) | | | | 25,850.4 |

The total reductions for the Schaeffer Park Development Project is shown in Table 6.6.

Table 6.6: Schaeffer Park Development Sediment Reduction Summary

| BMP Type | Sediment Loadings pounds/year |
|---|---|
| Impervious Surface Reduction | 1,354.2 |
| Raingarden | 25,850.4 |
| **Total Sediment Reduction (lbs/year)** | **27,205.1** |

On May 30, 2017 the Borough submitted an application for a Commonwealth Financing Authority (CFA) Greenways, Trails, and Recreation Grant for the Schaeffer Park Project.

## 6.5 Beverly Park

Beverly Park is an existing 1.44 acres park in the Borough where existing stormwater tends to collect during and following rain events. Drainage studies have been performed to upgrade the storm sewers in the area around the park, collect stormwater in the park, and discharge it to the Borough's storm sewer system.

The Beverly Park Rehabilitation Project will include collecting stormwater in a proposed raingarden before discharging into a new storm sewer which will discharge to the Borough's storm sewer system. Additionally, the existing asphalt basketball court in the park will be rehabilitated with pervious pavement. The areas and the loading reductions from the rehabilitated basketball court with pervious pavement are shown in Table 6.7.

Table 6.7: Beverly Park Pervious Pavement Sediment Reduction Summary

| Type of Area | Sediment Loading Rate pounds/acre/year | Acres | Sediment Loadings pounds/year |
|---|---|---|---|
| Pre-BMP Rates | | | |
| Impervious Developed | 2,065.1 | 0.22 | 454.3 |
| Pervious Developed | 306.5 | 0 | 0 |
| Total Pre-BMP Construction Loading | | | 454.3 |
| Post-BMP Rates | | | |
| Impervious Developed | 309.8 | 0.22 | 68.5 |
| Pervious Developed | 46.1 | 0 | 0 |
| Total Post-BMP Construction Loading | | | 68.5 |
| **Total Sediment Reduction (lbs/year)** | | | **385.8** |

A second loading reduction will result from the raingarden to be constructed in the park. Sediment loadings were determined using GIS mapping based on the proposed drainage area of the BMP and the land use within the drainage area. The drainage area into the proposed raingarden is shown in Exhibit 5. The areas and the loading reductions from the proposed rain garden are shown in Table 6.8.

Table 6.8: Beverly Park Raingarden Sediment Reduction Summary

| Type of Area | Sediment Loading Rate pounds/acre/year | Percentage of Drainage Area | Acres | Sediment Loadings pounds/year |
|---|---|---|---|---|
| Pre-BMP Rates | | | | |
| Impervious Developed | 2,065.1 | 48% | 25.53 | 52,722.0 |
| Pervious Developed | 306.5 | 52% | 27.81 | 8,523.8 |
| Total Pre-BMP Construction Loading | | | | 61,245.8 |
| Post BMP Rates | | | | |
| Impervious Developed | 206.51 | 48% | 25.53 | 52,71.9 |
| Pervious Developed | 30.7 | 52% | 27.81 | 853.8 |
| Total Post-BMP Construction Loading | | | | 6,125.7 |
| **Total Sediment Reduction (lbs/year)** | | | | **55,120.1** |

The total reductions for the Beverly Park Project is shown in Table 6.9.

Table 6.9: Beverly Park Sediment Reduction Summary

| BMP Type | Sediment Loadings pounds/year |
|---|---|
| Impervious Surface Reduction | 385.8 |
| Raingarden | 55,120.1 |
| Total Beverly Park Reduction | 55,505.9 |

## 6.6 Catch Basin/Sewer Cleaning

The Borough plans on hiring contractors to perform catch basin/sewer cleaning. Currently, the Borough hires contractors to perform this work on an as needed basis. During the first half of 2017, an estimated eight (8) cubic yards of debris was removed (10 cubic yard truck approximately 80% full). It is assumed the Borough will perform catch basin cleanings on a yearly basis matching or exceeding the level of effort from the first half of 2017. For the sediment removal estimate, the volume of debris removed from the first half of 2017 was used to determine the sediment removal seen in Table 6.10.

Table 6.10: Catch Basin/Sewer Cleaning Sediment Reduction Summary

| Type of Material | Cubic yards of debris | Wet pounds/ cubic yard conversion[1] | Total wet pounds | Percent of Collected Debris[2] | Dry weight conversion[3] | Pounds of Sediment |
|---|---|---|---|---|---|---|
| Organic Material | 8 | 331 | 2,648 | 0.45 | 0.2 | 238.3 |
| Wet Sediment | | | | 0.45 | 0.7 | 834.1 |
| Trash | | | | 0.1 | 0 | 0 |
| **Total Sediment Reduction (lbs/year)** | | | | | | **1,072.4** |

(1) Conversion from Baltimore County Department of Environmental Protection and Sustainability study found in Appendix G of the Expert Panel Report.

(2) Estimated from what is typically seen in Camp Hill.

(3) From the BMP Effectiveness Values as seen in Appendix B.

## 6.7 Total Reductions

A summary of the total reductions is in Table 6.11.

Table 6.11: Camp Hill Sediment Reduction Summary

| Project | Total Sediment Reduction (pounds per year) | Project Status |
|---|---|---|
| Street Sweeping | 7,991.9 | In Progress |
| Green Infrastructure Project (Willow Park, Rose Marie, and Camp Hill Building) | 2,586.1 | In design with grant accepted |
| Willow Park Stream Restoration | 51,612.0 | In design with grant accepted |
| Schaeffer Park | 27,205.1 | In design with grant application submitted. |
| Beverly Park | 55,505.9 | Preliminary design |
| Catch Basin/Sewer Cleaning | 1,072.4 | In Progress |
| **Total Sediment Reduction (lbs/year)** | | **145,973.4** |
| 10% Sediment Reduction Requirement | | 145,097.9 |

In addition to the above referenced BMP, Camp Hill has seen success in recent year with private developments implementing their own BMPs in order to follow the Borough's stormwater management ordinance. This is exemplified in the number of existing BMPs in the Borough. Though no private BMPs are included in the reduction calculations, the Borough does expect this trend to continue.

## 7.0 Funding Mechanism

In order to seek funding for these BMPs, the Borough's primary funding mechanism will continue to be applying for grants from organizations such as PADEP, DCNR, DCED (CFA) and DEP Watershed Grants such as Growing Greener. Two (2) of the projects have already received grants from the PADEP Local stormwater BMP Implementation program; the Willow Park Stream Restoration and Green Infrastructure Program. Additionally, the Borough submitted an application for the Commonwealth Financing Authority (CFA) Greenways, Trails, and Recreation Grant for the Schaeffer Park Development project.

The secondary funding for the Borough will be from the Borough's General Fund. Beyond the General Fund, the Borough is evaluating other funding options and will revise their PRP should changes become appropriate.

## 8.0 Responsible Parties for Operation and Maintenance (O&M) of BMPs

The Borough has BMPs on both private and public properties. Section 313 of the Borough's Stormwater Management Ordinance provides guidance for how BMPs are to be maintained on private properties. This includes executing a Stormwater Facilities and BMP Maintenance and Monitoring Agreement with the municipality covering all stormwater facilities and BMPs that are to be privately owned.

# Exhibits

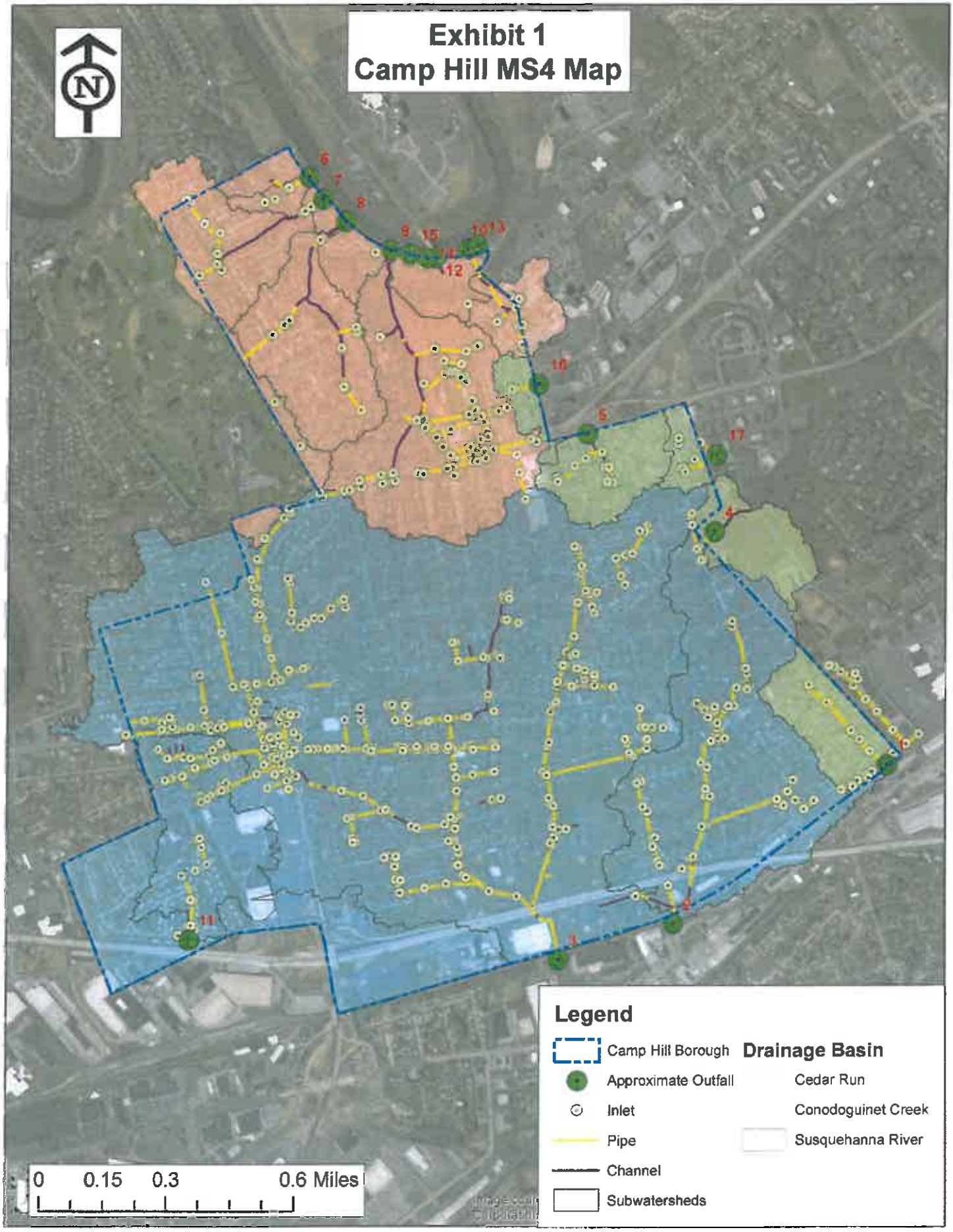


Exhibit 1
Camp Hill MS4 Map
N
Legend
Camp Hill Borough
Approximate Outfall
Inlet
Pipe
Channel
Subwatersheds
Drainage Basin
Cedar Run
Conodoguinet Creek
Susquehanna River
0 0.15 0.3 0.6 Miles

Exhibit 2
Camp Hill Planning Area Map
N
SR 1016
US 11/US 15
SR 1005
SR 1010
SR 1010
SR 2010
SR 2014
SR 0641
SR 581
SR 581
Legend
Camp Hill Borough
Planning Area
0
0.15
0.3
0.6 Miles
bing

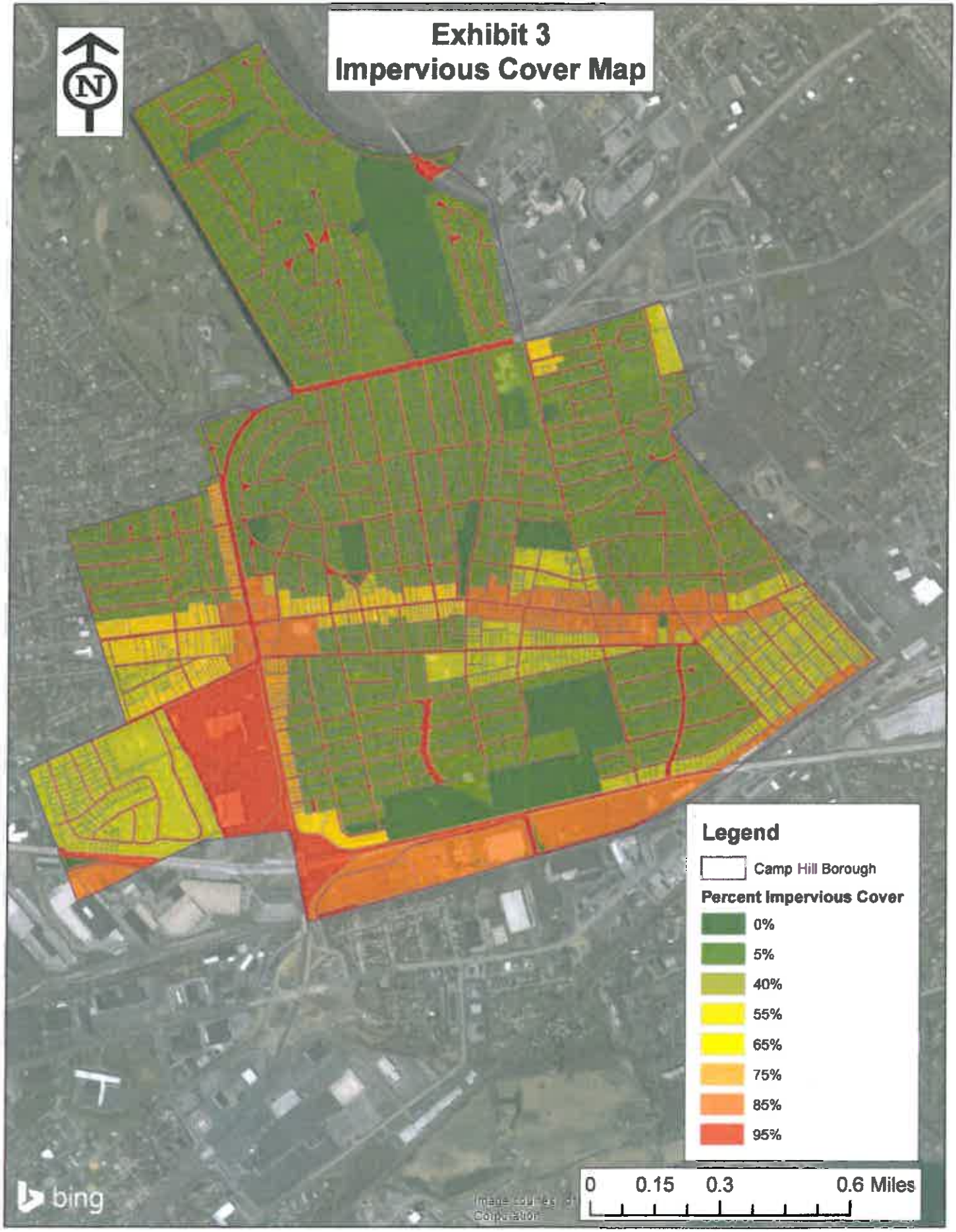


Exhibit 3
Impervious Cover Map
N
Legend
Camp Hill Borough
Percent Impervious Cover
0%
5%
40%
55%
65%
75%
85%
95%
0
0.15
0.3
0.6 Miles
bing

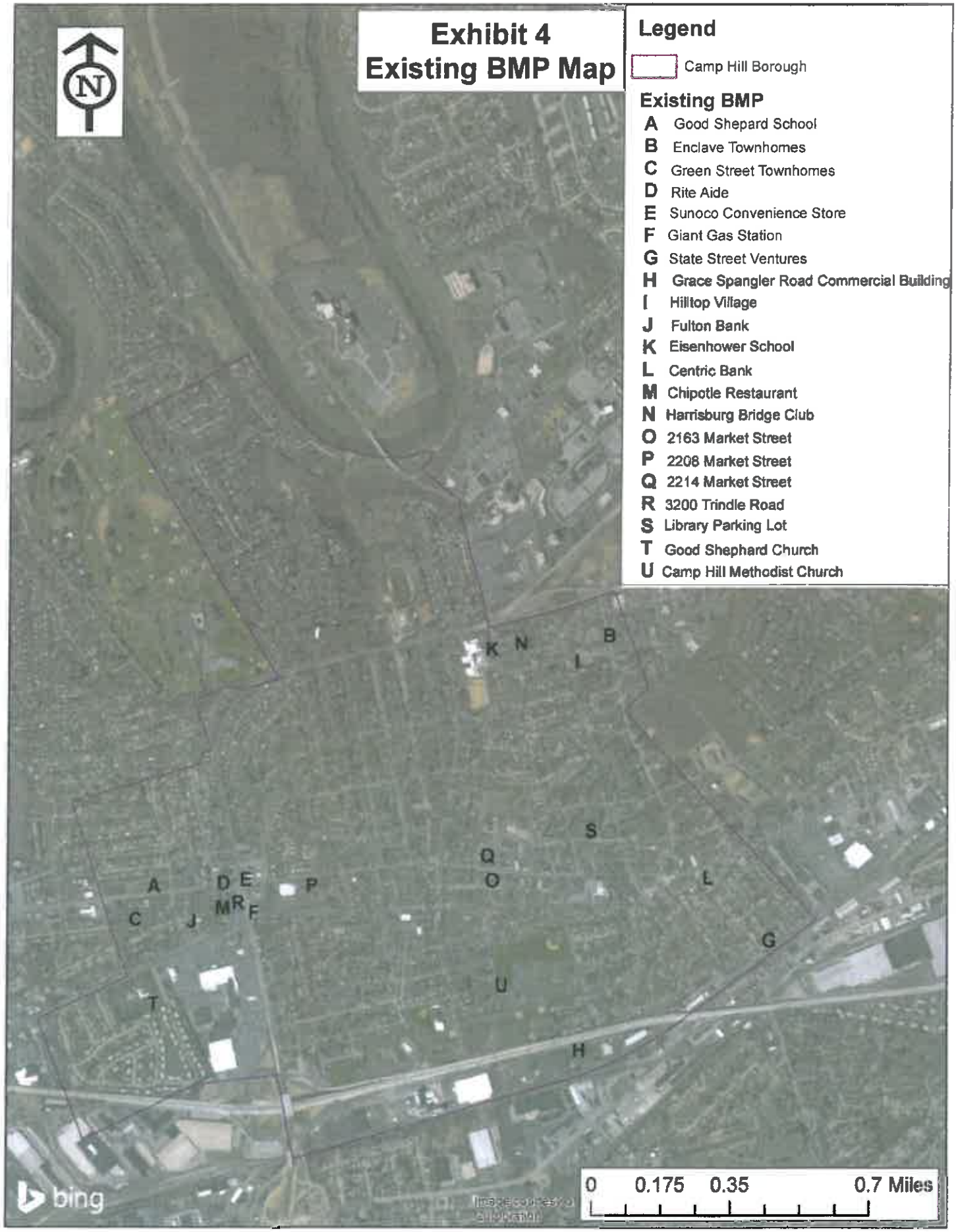


Exhibit 4
Existing BMP Map
Legend
Camp Hill Borough
Existing BMP
A Good Shepard School
B Enclave Townhomes
C Green Street Townhomes
D Rite Aide
E Sunoco Convenience Store
F Giant Gas Station
G State Street Ventures
H Grace Spangler Road Commercial Building
I Hilltop Village
J Fulton Bank
K Eisenhower School
L Centric Bank
M Chipotle Restaurant
N Harrisburg Bridge Club
O 2163 Market Street
P 2208 Market Street
Q 2214 Market Street
R 3200 Trindle Road
S Library Parking Lot
T Good Shephard Church
U Camp Hill Methodist Church
N
bing
0 0.175 0.35 0.7 Miles

Exhibit 4: Existing BMP Loadings

| Map No. | Development Name | BMP Type | | Pounds of Sediment |
|---|---|---|---|---|
| A | Good Shephard School | Filtering Practices | Pre-BMP | 652.3 |
| | | | Post-BMP | 130.5 |
| | | | **Reduction** | **521.8** |
| B | Enclave Townhomes | Vegetated Open Channels (A/B Soils) | Pre-BMP | 8,597.7 |
| | | | Post-BMP | 2,579.3 |
| | | | **Reduction** | **6,018.4** |
| C | Green Street Townhomes | Filtering Practices | Pre-BMP | 254.7 |
| | | | Post-BMP | 50.9 |
| | | | **Reduction** | **203.8** |
| D | Rite Aide | Bioretention/Raingarden (**A/B** soils w/o underdrain) | Pre-BMP | 2,882.1 |
| | | | Post-BMP | 288.2 |
| | | | **Reduction** | **2,593.9** |
| E | Sunoco Convenience Store | Dry Detention Basins and Hydrodynamic Structures | Pre-BMP | 1,351.0 |
| | | | Post-BMP | 1,215.9 |
| | | | **Reduction** | **135.1** |
| F | Giant Gas Station | Dry Detention Basins and Hydrodynamic Structures | Pre-BMP | 540.4 |
| | | | Post-BMP | 486.4 |
| | | | **Reduction** | **54.0** |
| G | State Street Ventures | Filtering Practices | Pre-BMP | 720.5 |
| | | | Post-BMP | 144.1 |
| | | | **Reduction** | **576.4** |
| H | Grace Spangler Road Commercial Building | Filtering Practices | Pre-BMP | 7,925.8 |
| | | | Post-BMP | 1,585.2 |
| | | | **Reduction** | **6,340.6** |
| I | Hilltop Village | Vegetated Open Channels (A/B Soils) | Pre-BMP | 2,928.8 |
| | | | Post-BMP | 878.6 |
| | | | **Reduction** | **2,050.2** |
| J | Fulton Bank | Bioretention Areas (A/B soils w/o underdrain) | Pre-BMP | 1,725.0 |
| | | | Post-BMP | 172.5 |
| | | | **Reduction** | **1,552.5** |
| K | Eisenhower School | Permeable Pavement w/ sand of veg (A/B soils w/ underdrain) & Bioretention/Raingarden (A/B soils w/o underdrain) | Pre-BMP | 14,820.3 |
| | | | Post-BMP | 1,393.3 |
| | | | **Reduction** | **13,427.0** |
| L | Centric Bank | Permeable Pavement w/ sand of veg (**A/B** soils w/ underdrain) & Filtering Practices | Pre-BMP | 1,139.7 |
| | | | Post-BMP | 133.0 |
| | | | **Reduction** | **1,006.7** |
| M | Chipotle Restaurant | Bioretention / Raingarden A/B soils w/o underdrain | Pre-BMP | 702.5 |
| | | | Post-BMP | 70.3 |
| | | | **Reduction** | **632.2** |

Exhibit 4: Existing BMP Loadings

| Map No. | Development Name | BMP Type | | Pounds of Sediment |
|---|---|---|---|---|
| N | Harrisburg Bridge Club | Dry Detention Basin | Pre-BMP | 1,752.0 |
| | | | Post-BMP | 1,576.8 |
| | | | **Reduction** | **175.2** |
| O | 2163 Market | Permeable Pavement w/o sand or veg. | Pre-BMP | 41.3 |
| | | | Post-BMP | 6.2 |
| | | | **Reduction** | **35.1** |
| P | 2208 Market | Permeable Pavement w/o sand or veg. | Pre-BMP | 123.9 |
| | | | Post-BMP | 18.6 |
| | | | **Reduction** | **105.3** |
| Q | 2214 Market | Permeable Pavement w/o sand or veg. | Pre-BMP | 41.3 |
| | | | Post-BMP | 6.2 |
| | | | **Reduction** | **35.1** |
| R | 3200 Trindle Road | Permeable Pavement w/o sand or veg. | Pre-BMP | 123.9 |
| | | | Post-BMP | 18.6 |
| | | | **Reduction** | **105.3** |
| S | Library Parking Lot | Permeable Pavement w/ Sand or Veg. (A/B Soils w/o underdrain) | Pre-BMP | 457.8 |
| | | | Post-BMP | 68.7 |
| | | | **Reduction** | **389.1** |
| T | Good Shephard Church | Dry Detention Basin | Pre-BMP | 9,298.2 |
| | | | Post-BMP | 8,368.4 |
| | | | **Reduction** | **929.8** |
| U | Camp Hill Methodist Church | Dry Detention Basin | Pre-BMP | 4,706.3 |
| | | | Post-BMP | 4,235.7 |
| | | | **Reduction** | **470.6** |
| **Total Pounds of Sediment Reduction** | | | | **37,358.1** |

Note: The Pre-BMP Loads were determined using using the zoning district of the property (as seen in Exhibit X), the percent impervious per Camp Hill zoning district (Table 5.1), and the area of land the BMP will reduce the sediment loading.

Note: The Post-BMP Loads are determined from the Pre-BMP Loads and the PADEP BMP Effectiveness Table (Appendix E).

Note: The reduction value is the Pre-BMP sediment loads minus the Post-BMP sediment loads.

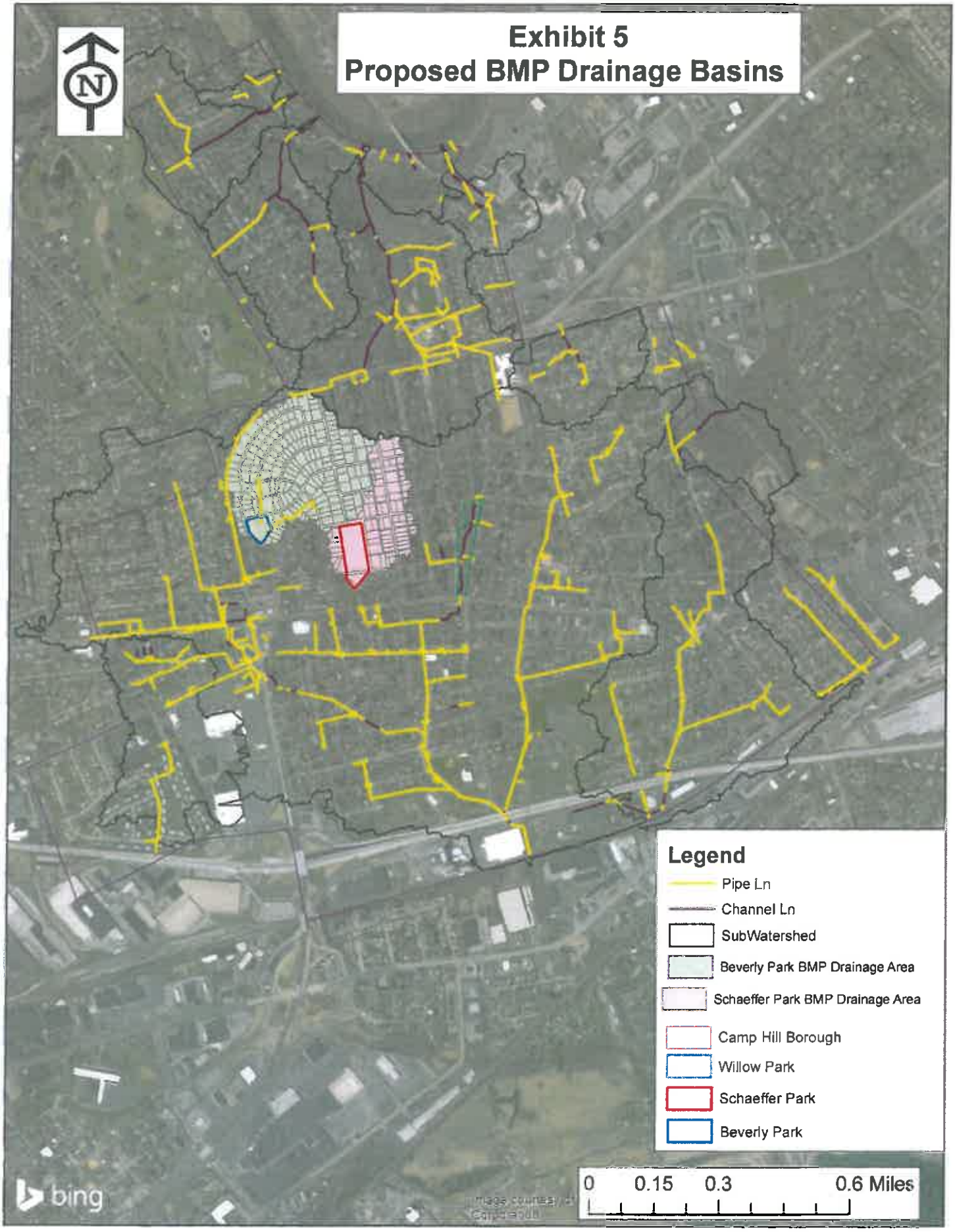


Exhibit 5
Proposed BMP Drainage Basins
N
Legend
Pipe Ln
Channel Ln
SubWatershed
Beverly Park BMP Drainage Area
Schaeffer Park BMP Drainage Area
Camp Hill Borough
Willow Park
Schaeffer Park
Beverly Park
0
0.15
0.3
0.6 Miles
bing

# APPENDIX A

## PADEP NOTICE OF EXPIRING COVERAGE TO CAMP HILL

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JUL 1 1 2016

July 6, 2016

CAMP HILL BORO
2145 WALNUT ST
CAMP HILL PA 17011-3830

Dear Permittee:

On June 4, 2016, the Department of Environmental Protection (DEP) published a final, renewed NPDES General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (PAG-13) in the *Pennsylvania Bulletin*. You are receiving this letter because, according to our records, you currently have coverage under the PAG-13 General Permit and DEP would like to explain how the renewal of the PAG-13 General Permit affects you.

A link to the PAG-13 General Permit and supporting documents are available through DEP's website, www.dep.pa.gov/MS4. You are encouraged to review these materials and direct any questions to DEP using the contact information listed below.

NOI Submission

The PAG-13 General Permit that you are currently operating under will expire on March 15, 2018. The terms and conditions of your coverage under the PAG-13 General Permit will change, effective March 16, 2018. **It is important to understand that you will be subject to those terms and conditions on March 16, 2018.** You must submit a Notice of Intent (NOI) to continue operating under the PAG-13 General Permit at least 180 days prior to the expiration date of the General Permit. **The due date for your NOI is September 16, 2017.** An NOI must be submitted by this date to comply with DEP regulations, regardless of whether the following scenarios apply:

- You may have received written "Approval of Coverage" from DEP in 2013 (or later) that specified a different expiration date of coverage than March 15, 2018.
- You may not have received written "Approval of Coverage" from DEP in 2013 (or later).
- You may have existing PAG-13 permit coverage (if coverage was approved in the past) because an individual permit application that you submitted to DEP in 2012 or later was not acted on.

In addition, **if you determine that you will be ineligible for continued coverage under the renewed PAG-13 General Permit, you will need to submit an application for an individual NPDES permit by September 16, 2017.** You will be covered by the PAG-13 General Permit until DEP issues an individual NPDES permit to you. This is also true if you choose not to pursue continued coverage under the General Permit by submitting an individual permit application.

General Permit Changes

The following highlights the significant differences between the renewed PAG-13 General Permit (2018 General Permit) and the PAG-13 General Permit you are currently operating under (2013 General Permit).

- **Renewal of Coverage** – Following DEP's issuance of written approval of coverage (in response to the receipt of your NOI by September 16, 2017), the submission of subsequent NOIs for future PAG-13 General Permit coverage is not required by the 2018 General Permit unless specifically notified by DEP. In other words, an NOI will not be due on September 16, 2022, unless DEP notifies you otherwise. Annual reports (see below) will serve as the NOI for continued coverage.

- **Annual Reports** – The 2013 General Permit required the submission of periodic reports, i.e., annual reports or progress reports, depending on the location and permit status of your MS4. The 2018 General Permit requires annual reporting (only) by September 30th of each year. The first annual report will be due September 30, 2018, and must cover activities completed during the reporting period starting from the end of the latest annual or progress report period (under the 2013 General Permit) to June 30, 2018. Thereafter, the annual reporting period is July 1 - June 30. Note that DEP anticipates that an electronic annual reporting system will be in place by September 30, 2018.

- **Annual NOI Installment Payment** – An annual NOI installment payment is due by September 30th of each year in the amount of $500 under the 2018 General Permit. This payment (check or money order) must be sent to DEP's Bureau of Clean Water (BCW). DEP BCW intends to send an invoice to you approximately three months prior to each due date. The first fee is due on September 30, 2018. If an electronic system is developed for these payments, DEP will notify you.

- **Pollutant Reduction Plans (PRPs)** – The development of a PRP is a requirement of the 2013 General Permit for MS4s in the Chesapeake Bay watershed. There were no pollutant load reduction requirements for PRPs in the 2013 General Permit. For the 2018 General Permit, submission of a (new or updated) PRP to DEP is a requirement of the NOI that is due September 16, 2017. MS4s that discharge to surface waters within the Chesapeake Bay watershed will be required to submit a PRP (Appendix D of 2018 General Permit). In addition, many MS4s discharge to local surface waters impaired by nutrients and/or sediment; these MS4s must also submit a PRP (Appendix E). The 2018 General Permit includes specific pollutant load reduction requirements. Additional information on PRPs is provided in the section describing the MS4 Requirements Table, below.

- **Pollutant Control Measures (PCMs)** – Under the 2013 General Permit, the submission of a Total Maximum Daily Load (TMDL) Strategy and Design Details is a requirement for MS4s with stormwater discharges to any surface water with a TMDL in which a wasteload allocation (WLA) is applicable. For the permit term beginning in 2018, only those MS4s with WLAs for nutrients and/or sediment are required to develop TMDL Plans, to be submitted with individual NPDES permit applications (since such MS4s are no longer eligible for PAG-13 coverage). MS4s with WLAs for other pollutants such as abandoned mine drainage (AMD) metals/pH, bacteria/pathogens, and priority organic compounds may

still be eligible for PAG-13 coverage but will not need to complete a TMDL Plan. Instead, specific activities referred to as PCMs are prescribed in the General Permit (Appendices A - C). Please see the section on the MS4 Requirements Table, below.

- **Eligibility Criteria** – The eligibility criteria for the 2018 PAG-13 General Permit have changed (see "Discharges Not Authorized By This General Permit"). For example and as noted above, MS4s that must develop TMDL Plans for nutrients and/or sediment may not use the PAG-13 General Permit. You are encouraged to review these criteria closely to determine your eligibility for the 2018 General Permit.

- **Authorized Non-Stormwater Discharges** – The list of authorized non-stormwater discharges has changed. For example, discharges from dechlorinated swimming pools are authorized to flow into MS4s under the 2013 General Permit but are not under the 2018 General Permit. Residential car wash water can be discharged to MS4s under the 2013 General Permit but cannot under the 2018 General Permit unless cleaning agents are not used. Discharges other than the authorized non-stormwater discharges are considered illicit discharges, and MS4s will have until September 30, 2022, to update ordinances (municipal permittees) or standard operating procedures (permittees who lack authority to adopt ordinances) to include the updated list of acceptable non-stormwater discharges and make other changes consistent with DEP's 2022 Model Ordinance.

- **Clarification of Erosion and Sediment Control (E&S) and Post-Construction Stormwater Management (PCSM) Requirements** – One of the eligibility requirements for the 2018 General Permit is that an MS4 must rely on the state's qualifying local program (QLP) for E&S and PCSM, i.e., 25 *Pa. Code* Chapter 102. Several of the best management practices (BMPs) that are part of the 2013 General Permit are components of Pennsylvania's QLP. To improve clarity over the E&S and PCSM tasks that are the responsibility of MS4 permittees versus DEP or delegated county conservation district, DEP has removed these BMPs from the 2018 General Permit.

Other changes are highlighted in the 2018 General Permit package (e.g., comment-response document and fact sheet).

MS4 Requirements Table

To assist MS4 applicants in understanding the applicability of General Permit requirements related to PRPs, TMDL Plans, and PCMs, DEP has developed an "MS4 Requirements Table" (Table), consisting of one table with municipal MS4s and a separate table for non-municipal MS4s. County governments with existing permit coverage are not included in the table and are not expected to develop or implement PRPs, TMDL Plans, or PCMs. This Table, which is available on DEP's website (www.dep.pa.gov/MS4), is based on DEP's best information of the applicability of these requirements to MS4s. Numerous MS4s and their consultants have provided feedback to DEP on the Table since it was posted to the website in 2015, and DEP will continue to review the feedback it receives and make corrections as necessary. DEP will generally evaluate the completeness of submitted NOIs by referencing the Table, so it is important to pursue resolving corrections you believe should be made well before NOI or application submission.

PRPs and TMDL Plans

If you have received DEP's approval of a PRP or TMDL Plan under the 2013 General Permit, DEP is nonetheless requiring the submission of a new or updated PRP with the PAG-13 NOI or individual permit application (as applicable). If you have already implemented BMPs proposed in these plans, those BMPs may be used as "credit" toward reducing the estimate of existing pollutant loading (which may reduce future obligations). If you are currently working toward developing your plans in response to deadlines established under the 2013 General Permit, DEP is by this letter announcing that you may suspend those efforts in order to focus on updating plans for the NOI or application submission deadline. For those MS4s who were developing TMDL Plans for pollutants other than nutrients and/or sediment, your efforts may be suspended in lieu of preparing to implement PCMs of the General Permit.

Waiver

DEP has published a new waiver application for the 2018 General Permit. Please review the instructions and questions to evaluate your eligibility for a waiver. In accordance with the instructions, you may submit a request for an advanced waiver approval to DEP BCW by December 31, 2016 if you would like DEP to evaluate or confirm your eligibility.

Collaboration

DEP is offering multiple options for collaboration in implementing responsibilities under the General Permit. Two or more MS4s may submit a joint NOI (or individual permit application), resulting in multiple MS4s under one permit authorization (co-permittees). Co-permittees may submit one annual report and annual NOI installment fee to cover all MS4s. MS4s may also decide to work together to develop PRPs (or TMDL Plans); this level of cooperation has many advantages and is encouraged by DEP. Finally, MS4s may choose to have a third party implement one or more components of its stormwater management program, in which case the MS4 remains responsible for failure to implement. MS4s are encouraged to develop written agreements if third party implementation is pursued.

Training and Outreach

Training on NOI (and individual permit application) requirements and development of PRPs and TMDL Plans will be hosted by DEP at several locations across Pennsylvania during the summer of 2016. Please check DEP's website (www.dep.pa.gov/MS4) for the latest schedule. Additional events may be held in 2017. DEP understands that significant work may be necessary over the next year to comply, and is offering assistance to the greatest extent it can to MS4s that request it.

Please contact DEP BCW at 717.787.5017 or RA-EPPAMS4@pa.gov or the DEP regional office that approved your coverage under the PAG-13 General Permit if you have questions.

Sincerely,

Sean M. Furjanic, P.E.
Environmental Program Manager
Division of Operations, Monitoring and Compliance

# APPENDIX B

# PADEP MS4 PERMIT REQUIREMENTS

Appendix B

From MS4 Requirments Table (Municipal)

Aniticapted Obligations for Subsequent NPDES Permit Term

| MS4 Name | NPDES ID | Individual Permit Required? | Reason | Impaired Downstream Waters or Applicable TMDL Name | Requirement(s) | Other Cause(s) of Impairment |
|---|---|---|---|---|---|---|
| **Cumberland County** | | | | | | |
| CAMP HILL BORO | PAG133549 | No | | Chesapeake Bay Nutrients/Sediment | Appendix D-Nutrients, Siltation (4a) | |
| | | | | Yellow Breeches Creek | Appendix B-Pathogens (5) | |
| | | | | Unnamed Tributaries to Cedar Run | | Cause Unknown (5) |
| | | | | Susquehanna River | Appendix C-PCB (5) | |
| | | | | Cedar Run | Appendix B-Pathogens (5) | |

# APPENDIX C

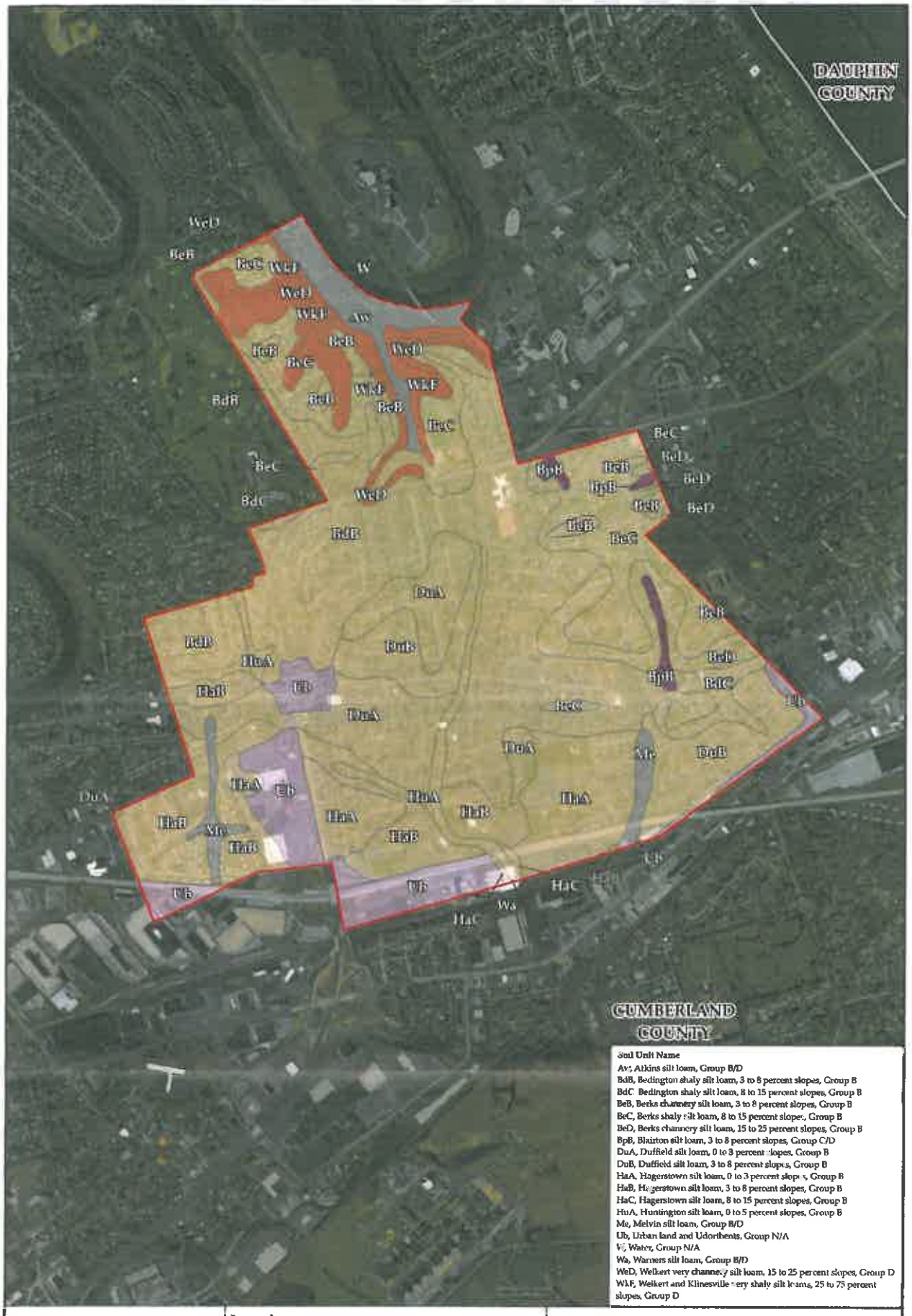
# NEWSPAPER ADVERTISEMENT

Camp Hill Advertisement
Patroit News – 7/23/2017

*The Borough of Camp Hill is required to submit a Pollutant Reduction Plan (PRP) for a National Pollutant Discharge Elimination System (NPDES) stormwater discharge permit from its Small Municipal Separated Storm Sewer System (MS4). The Borough is required to reduce its sediment discharges into local waters by 10% in the next 5 years beginning in 2018. A draft of the PRP will be available at the Camp Hill Borough Hall and on the Borough's website for public comment from August 2nd through August 31st.*

# APPENDIX D

# CAMP HILL SOILS MAP




**Soil Unit Name**

Aw, Atkins silt loam, Group B/D
BdB, Bedington shaly silt loam, 3 to 8 percent slopes, Group B
BdC Bedington shaly silt loam, 8 to 15 percent slopes, Group B
BeB, Berks channery silt loam, 3 to 8 percent slopes, Group B
BeC, Berks shaly silt loam, 8 to 15 percent slopes, Group B
BeD, Berks channery silt loam, 15 to 25 percent slopes, Group B
BpB, Blairton silt loam, 3 to 8 percent slopes, Group C/D
DuA, Duffield silt loam, 0 to 3 percent slopes, Group B
DuB, Duffield silt loam, 3 to 8 percent slopes, Group B
HaA, Hagerstown silt loam, 0 to 3 percent slopes, Group B
HaB, Hagerstown silt loam, 3 to 8 percent slopes, Group B
HaC, Hagerstown silt loam, 8 to 15 percent slopes, Group B
HuA, Huntington silt loam, 0 to 5 percent slopes, Group B
Mc, Melvin silt loam, Group B/D
Ub, Urban land and Udorthents, Group N/A
W, Water, Group N/A
Wa, Warners silt loam, Group B/D
WeD, Welkert very channery silt loam, 15 to 25 percent slopes, Group D
WkF, Welkert and Klinesville very shaly silt loams, 25 to 75 percent slopes, Group D

# Camp Hill Borough Soils
Cumberland County, PA

Gannett Fleming

**Legend:**

Counties
Camp Hill Borough

**Hydrologic Soil Group:**
B
B/D
C
C/D
D
N/A

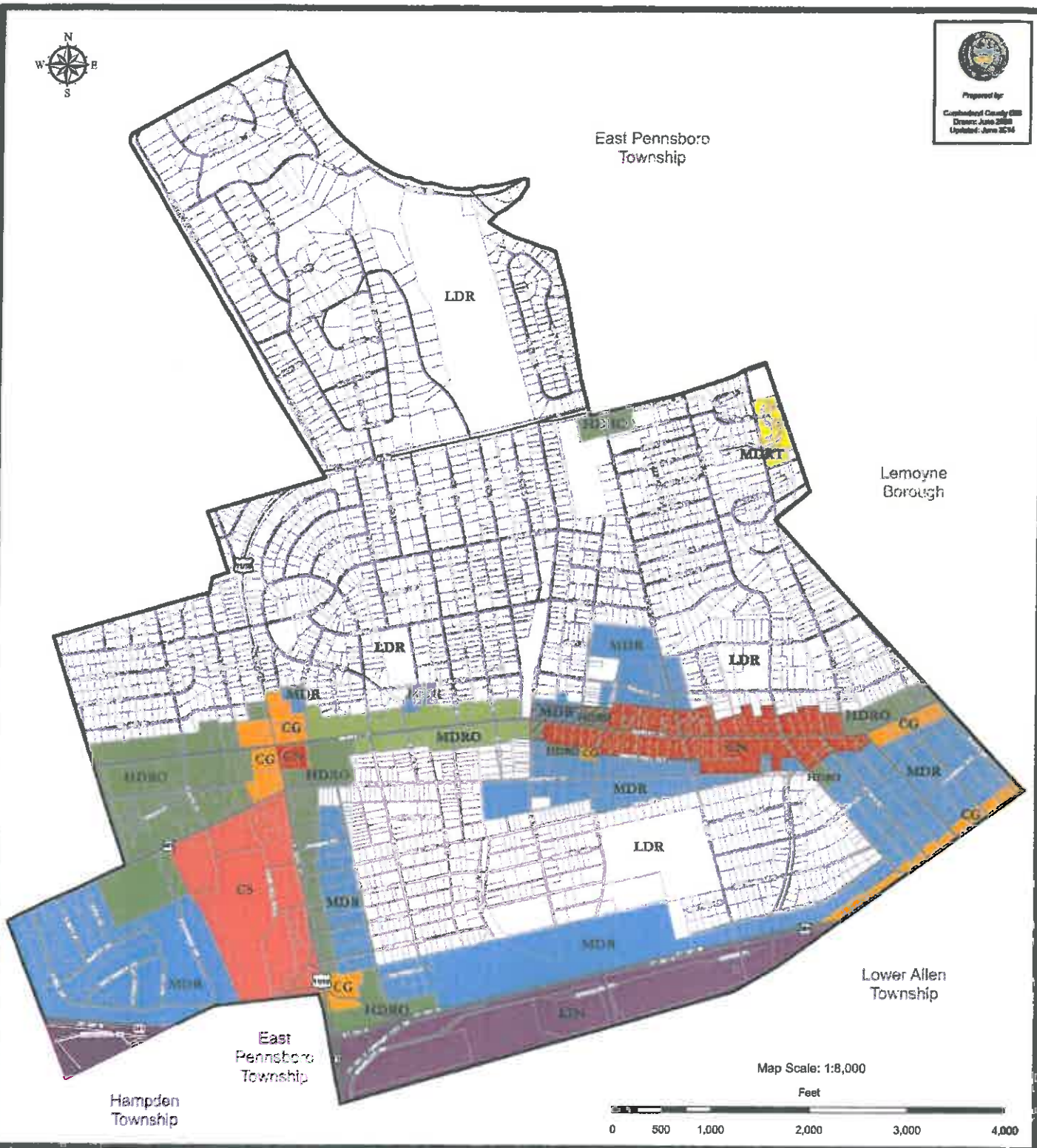
April 2015
1 in = 1,250 ft

N

0 0.125 0.25 Miles

# APPENDIX E

# CAMP HILL ZONING MAP




# Camp Hill Borough Zoning

## COUNTY DISCLAIMER

This map was digitally compiled for planning maintenance and developmental use by the Cumberland County, Pennsylvania, GIS & Planning Departments to provide an index to parcels and for other reference purposes. Parcel lines do not represent actual field surveys of premises. County of Cumberland, Pennsylvania makes no claims as to the completeness, accuracy or content of any data contained hereon, and makes no representation of any kind, including, but not limited to, the warranties of merchantability or fitness for a particular use, nor are any such warranties to be implied or inferred, with respect to the information or data furnished herein.

No part of this document may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, except as expressly permitted by the County of Cumberland and the Borough of Camp Hill.

Refer to the officially enacted "Camp Hill Borough Zoning Ordinance" for information regarding interpretation of zoning district boundaries, floodplain area boundaries, procedures for requesting amendment to this map, etc.

## Legend

**Reference**

- Municipal Boundary
- Tax Parcels
- State Roads
- Local Roads

**Zoning/Overlay Districts**

- Low Density Residential - LDR
- Medium Density Residential - MDR
- Medium Density Residential/Office - MDRO
- Medium Density Residential/Townhouse - MDRT
- Office/Apartment - HDRO
- Commercial General - CG
- Regional Shopping Center - CS
- Neighborhood Commercial - CN
- Light Industrial - LIN
- Market Street Business Overlay

# APPENDIX F

# PADEP BMP EFFECTIVENESS TABLE

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER

# NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) STORMWATER DISCHARGES FROM SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS BMP EFFECTIVENESS VALUES

This table of BMP effectiveness values (i.e., pollutant removal efficiencies) is intended for use by MS4s that are developing and implementing Pollutant Reduction Plans and TMDL Plans to comply with NPDES permit requirements. The values used in this table generally consider pollutant reductions from both overland flow and reduced downstream erosion, and are based primarily on average values within the Chesapeake Assessment Scenario Tool (CAST) (www.casttool.org). Design considerations, operation and maintenance, and construction sequences should be as outlined in the Pennsylvania Stormwater BMP Manual, Chesapeake Bay Program guidance, or other technical sources. The Department of Environmental Protection (DEP) will update the information contained in this table as new information becomes available. Interested parties may submit information to DEP for consideration in updating this table to DEP's MS4 resource account, RA-EPPAMS4@pa.gov. Where an MS4 proposes a BMP not identified in this document or in Chesapeake Bay Program expert panel reports, other technical resources may be consulted for BMP effectiveness values. Note – TN = Total Nitrogen and TP = Total Phosphorus.

| BMP Name | BMP Effectiveness Values | | | BMP Description |
|---|---|---|---|---|
| | TN | TP | Sediment | |
| Wet Ponds and Wetlands | 20% | 45% | 60% | A water impoundment structure that intercepts stormwater runoff then releases it to an open water system at a specified flow rate. These structures retain a permanent pool and usually have retention times sufficient to allow settlement of some portion of the intercepted sediments and attached nutrients/toxics. Until recently, these practices were designed specifically to meet water quantity, not water quality objectives. There is little or no vegetation living within the pooled area nor are outfalls directed through vegetated areas prior to open water release. Nitrogen reduction is minimal. |
| Dry Detention Basins and Hydrodynamic Structures | 5% | 10% | 10% | Dry Detention Ponds are depressions or basins created by excavation or berm construction that temporarily store runoff and release it slowly via surface flow or groundwater infiltration following storms. Hydrodynamic Structures are devices designed to improve quality of stormwater using features such as swirl concentrators, grit chambers, oil barriers, baffles, micropools, and absorbent pads that are designed to remove sediments, nutrients, metals, organic chemicals, or oil and grease from urban runoff. |
| Dry Extended Detention Basins | 20% | 20% | 60% | Dry extended detention (ED) basins are depressions created by excavation or berm construction that temporarily store runoff and release it slowly via surface flow or groundwater infiltration following storms. Dry ED basins are designed to dry out between storm events, in contrast with wet ponds, which contain standing water permanently. As such, they are similar in construction and function to dry detention basins, except that the duration of detention of stormwater is designed to be longer, theoretically improving treatment effectiveness. |

| BMP Name | BMP Effectiveness Values | | | BMP Description |
|---|---|---|---|---|
| | TN | TP | Sediment | |
| Infiltration Practices w/ Sand, Veg. | 85% | 85% | 95% | A depression to form an infiltration basin where sediment is trapped and water infiltrates the soil. No underdrains are associated with infiltration basins and trenches, because by definition these systems provide complete infiltration. Design specifications require infiltration basins and trenches to be built in good soil, they are not constructed on poor soils, such as C and D soil types. Engineers are required to test the soil before approval to build is issued. To receive credit over the longer term, jurisdictions must conduct yearly inspections to determine if the basin or trench is still infiltrating runoff. |
| Filtering Practices | 40% | 60% | 80% | Practices that capture and temporarily store runoff and pass it through a filter bed of either sand or an organic media. There are various sand filter designs, such as above ground, below ground, perimeter, etc. An organic media filter uses another medium besides sand to enhance pollutant removal for many compounds due to the increased cation exchange capacity achieved by increasing the organic matter. These systems require yearly inspection and maintenance to receive pollutant reduction credit. |
| Filter Strip Runoff Reduction | 20% | 54% | 56% | Urban filter strips are stable areas with vegetated cover on flat or gently sloping land. Runoff entering the filter strip must be in the form of sheet-flow and must enter at a non-erosive rate for the site-specific soil conditions. A 0.4 design ratio of filter strip length to impervious flow length is recommended for runoff reduction urban filter strips. |
| Filter Strip Stormwater Treatment | 0% | 0% | 22% | Urban filter strips are stable areas with vegetated cover on flat or gently sloping land. Runoff entering the filter strip must be in the form of sheet-flow and must enter at a non-erosive rate for the site-specific soil conditions. A 0.2 design ratio of filter strip length to impervious flow length is recommended for stormwater treatment urban filter strips. |
| Bioretention – Raingarden (C/D soils w/ underdrain) | 25% | 45% | 55% | An excavated pit backfilled with engineered media, topsoil, mulch, and vegetation. These are planting areas installed in shallow basins in which the storm water runoff is temporarily ponded and then treated by filtering through the bed components, and through biological and biochemical reactions within the soil matrix and around the root zones of the plants. This BMP has an underdrain and is in C or D soil. |
| Bioretention / Raingarden (A/B soils w/ underdrain) | 70% | 75% | 80% | An excavated pit backfilled with engineered media, topsoil, mulch, and vegetation. These are planting areas installed in shallow basins in which the storm water runoff is temporarily ponded and then treated by filtering through the bed components, and through biological and biochemical reactions within the soil matrix and around the root zones of the plants. This BMP has an underdrain and is in A or B soil. |

| BMP Name | BMP Effectiveness Values | | | BMP Description |
|---|---|---|---|---|
| | TN | TP | Sediment | |
| Bioretention / Raingarden (A/B soils w/o underdrain) | 80% | 85% | 90% | An excavated pit backfilled with engineered media, topsoil, mulch, and vegetation. These are planting areas installed in shallow basins in which the storm water runoff is temporarily ponded and then treated by filtering through the bed components, and through biological and biochemical reactions within the soil matrix and around the root zones of the plants. This BMP has no underdrain and is in A or B soil. |
| Vegetated Open Channels (C/D Soils) | 10% | 10% | 50% | Open channels are practices that convey stormwater runoff and provide treatment as the water is conveyed, includes bioswales. Runoff passes through either vegetation in the channel, subsoil matrix, and/or is infiltrated into the underlying soils. This BMP has no underdrain and is in C or D soil. |
| Vegetated Open Channels (A/B Soils) | 45% | 45% | 70% | Open channels are practices that convey stormwater runoff and provide treatment as the water is conveyed, includes bioswales. Runoff passes through either vegetation in the channel, subsoil matrix, and/or is infiltrated into the underlying soils. This BMP has no underdrain and is in A or B soil. |
| Bioswale | 70% | 75% | 80% | With a bioswale, the load is reduced because, unlike other open channel designs, there is now treatment through the soil. A bioswale is designed to function as a bioretention area. |
| Permeable Pavement w/o Sand or Veg. (C/D Soils w/ underdrain) | 10% | 20% | 55% | Pavement or pavers that reduce runoff volume and treat water quality through both infiltration and filtration mechanisms. Water filters through open voids in the pavement surface to a washed gravel subsurface storage reservoir, where it is then slowly infiltrated into the underlying soils or exits via an underdrain. This BMP has an underdrain, no sand or vegetation and is in C or D soil. |
| Permeable Pavement w/o Sand or Veg. (A/B Soils w/ underdrain) | 45% | 50% | 70% | Pavement or pavers that reduce runoff volume and treat water quality through both infiltration and filtration mechanisms. Water filters through open voids in the pavement surface to a washed gravel subsurface storage reservoir, where it is then slowly infiltrated into the underlying soils or exits via an underdrain. This BMP has an underdrain, no sand or vegetation and is in A or B soil. |
| Permeable Pavement w/o Sand or Veg. (A/B Soils w/o underdrain) | 75% | 80% | 85% | Pavement or pavers that reduce runoff volume and treat water quality through both infiltration and filtration mechanisms. Water filters through open voids in the pavement surface to a washed gravel subsurface storage reservoir, where it is then slowly infiltrated into the underlying soils or exits via an underdrain. This BMP has no underdrain, no sand or vegetation and is in A or B soil. |
| Permeable Pavement w/ Sand or Veg. (A/B Soils w/ underdrain) | 50% | 50% | 70% | Pavement or pavers that reduce runoff volume and treat water quality through both infiltration and filtration mechanisms. Water filters through open voids in the pavement surface to a washed gravel subsurface storage reservoir, where it is then slowly infiltrated into the underlying soils or exits via an underdrain. This BMP has an underdrain, has sand and/or vegetation and is in A or B soil. |

| BMP Name | BMP Effectiveness Values | | | BMP Description |
|---|---|---|---|---|
| | TN | TP | Sediment | |
| Permeable Pavement w/ Sand or Veg. (A/B Soils w/o underdrain) | 80% | 80% | 85% | Pavement or pavers that reduce runoff volume and treat water quality through both infiltration and filtration mechanisms. Water filters through open voids in the pavement surface to a washed gravel subsurface storage reservoir, where it is then slowly infiltrated into the underlying soils or exits via an underdrain. This BMP has no underdrain, has sand and/or vegetation and is in A or B soil. |
| Permeable Pavement w/ Sand or Veg. (C/D Soils w/ underdrain) | 20% | 20% | 55% | Pavement or pavers that reduce runoff volume and treat water quality through both infiltration and filtration mechanisms. Water filters through open voids in the pavement surface to a washed gravel subsurface storage reservoir, where it is then slowly infiltrated into the underlying soils or exits via an underdrain. This BMP has an underdrain, has sand and/or vegetation and is in C or D soil. |
| Stream Restoration | 0.075 lbs/ft/yr | 0.068 lbs/ft/yr | 44.88 lbs/ft/yr | An annual mass nutrient and sediment reduction credit for qualifying stream restoration practices that prevent channel or bank erosion that otherwise would be delivered downstream from an actively enlarging or incising urban stream. Applies to 0 to 3rd order streams that are not tidally influenced. If one of the protocols is cited and pounds are reported, then the mass reduction is received for the protocol. |
| Forest Buffers | 25% | 50% | 50% | An area of trees at least 35 feet wide on one side of a stream, usually accompanied by trees, shrubs and other vegetation that is adjacent to a body of water. The riparian area is managed to maintain the integrity of stream channels and shorelines, to reduce the impacts of upland sources of pollution by trapping, filtering, and converting sediments, nutrients, and other chemicals. (Note – the values represent pollutant load reductions from stormwater draining through buffers). |
| Tree Planting | 10% | 15% | 20% | The BMP effectiveness values for tree planting are estimated by DEP. DEP estimates that 100 fully mature trees of mixed species (both deciduous and non-deciduous) provide pollutant load reductions for the equivalent of one acre (i.e., one mature tree = 0.01 acre). The BMP effectiveness values given are based on immature trees (seedlings or saplings); the effectiveness values are expected to increase as the trees mature. To determine the amount of pollutant load reduction that can credited for tree planting efforts: 1) multiply the number of trees planted by 0.01; 2) multiply the acreage determined in step 1 by the pollutant loading rate for the land prior to planting the trees (in lbs/acre/year); and 3) multiply the result of step 2 by the BMP effectiveness values given. |
| Street Sweeping | 3% | 3% | 9% | Street sweeping must be conducted 25 times annually. Only count those streets that have been swept at least 25 times in a year. The acres associated with all streets that have been swept at least 25 times in a year would be eligible for pollutant reductions consistent with the given BMP effectiveness values. |

| BMP Name | BMP Effectiveness Values | | | BMP Description |
|---|---|---|---|---|
| | TN | TP | Sediment | |
| Storm Sewer System Solids Removal | 0.0027 for sediment, 0.0111 for organic matter | 0.0006 for sediment, 0.0012 for organic matter | 1 – TN and TP concentrations | This BMP (also referred to as "Storm Drain Cleaning") involves the collection or capture and proper disposal of solid material within the storm system to prevent discharge to surface waters. Examples include catch basins, stormwater inlet filter bags, end of pipe or outlet solids removal systems and related practices. Credit is authorized for this BMP only when proper maintenance practices are observed (i.e., inspection and removal of solids as recommended by the system manufacturer or other available guidelines). The entity using this BMP for pollutant removal credits must demonstrate that they have developed and are implementing a standard operating procedure for tracking the material removed from the sewer system. Locating such BMPs should consider the potential for backups onto roadways or other areas that can produce safety hazards.<br><br>To determine pollutant reductions for this BMP, these steps must be taken:<br><br>1) Measure the weight of solid/organic material collected (lbs). Sum the total weight of material collected for an annual period. Note – do not include refuse, debris and floatables in the determination of total mass collected.<br><br>2) Convert the annual wet weight captured into annual dry weight (lbs) by using site-specific measurements (i.e., dry a sample of the wet material to find its weight) or by using default factors of 0.7 (material that is predominantly wet sediment) or 0.2 (material that is predominantly wet organic matter, e.g., leaf litter).<br><br>3) Multiply the annual dry weight of material collected by default or site-specific pollutant concentration factors. The default concentrations are shown in the BMP Effectiveness Values columns. Alternatively, the material may be sampled (at least annually) to determine site-specific pollutant concentrations.<br><br>DEP will allow up to 50% of total pollutant reduction requirements to be met through this BMP. The drainage area treated by this BMP may be no greater than 0.5 acre unless it can be demonstrated that the specific system proposed is capable of treating stormwater from larger drainage areas. For planning purposes, the sediment removal efficiency specified by the manufacturer may be assumed, but no higher than 80%. |

# APPENDIX G

# STREET SWEEPING EXPERT PANELS TABLES

| 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 | 0.7 | 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 10 to 15% lower than shown

**Table 15. Adapting the WINSLAMM Model for the Chesapeake Bay Watershed**

**Bay rainfall data.** The model used the calibration period from 1995 through 2005 using Washington National Airport Station event-based rainfall data. The rainfall data was processed assuming the minimum number of hours between events is 6 hours and the minimum rainfall event depth is 0.01 inch.

**East Coast input data files** were prepared to represent street conditions across the Chesapeake Bay watershed. The particle size distribution and peak-to-average flow ratio files were set to the program default average pavement and flow ratio files

**Four different street types** were simulated to represent in different land uses that had curb and gutter drainage systems:

*Single-family residential*: Approximately 0.25-acre lots, with cul-de-sacs connecting to two-lane residential feeder roads with parallel parking on one side; light traffic; and 25 mile-per-hour (mph) speed limit. Approximately 33 houses in a 10-acre area. The driveways are simulated as draining onto the roads.

*Commercial (80 percent impervious):* Big box stores and parking lots. Feeder roads (two travel lanes and center turn lane) with no on-street parking, 35 mph speed limit, and heavy traffic.

*Ultra-urban downtown (95 percent impervious):* Multistory buildings. Two-lane urban roads with parallel parking on both sides of the street, sidewalks, and 25 mph speed limit.

*Arterial highway:* A four-lane divided road with median with barrier; high-speed traffic with turn lanes; and no on-street parking. Assumed to be commercial land use

**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 | 1P4W = 1 pass every 4 weeks |
| 1PW = 1 pass every week | 1P8W = 1 pass every 8 weeks |
| 1P2W = 1 pass every 2 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)

Steve,
I understand your client, Camp Hill Borough, is considering the purchase of new street sweeper. You have requested guidance from DEP on how the new sweeper can be used to meet the borough's MS4 pollutant reduction obligations for the upcoming permit term. You wish to use the crediting methods in the Chesapeake Bay Program's Expert Panel Report (Report). Specifically, the Report distinguishes between Mechanical Broom Technology (MBT) and Advanced Sweeper Technology (AST) sweepers and you have requested DEP guidance on the classification of the proposed model. According to materials you have provided, the proposed Dulevo 5000 Evolution sweeper, **uses** a vacuum assisted brushing action.

Based upon the manufacturer's information and guidance provided in the Report, the proposed model meets the definition of an AST sweeper. Therefore, use of this sweeper would qualify for removal efficiencies listed for practices associated with AST sweepers in the Report. For crediting purposes, the borough should track the actual number of lane miles swept per year and apply the appropriate removal efficiency. A good example of street sweeping calculations may be viewed in the "Simplified Method Narrative" document available at http://www.dep.pa.gov/Business/Water/CleanWater/StormwaterMgmt/Stormwater/Pages/PRPTMDL-Plans.aspx under Resources.

Note that this guidance applies only to the upcoming permit term (i.e., the five years after approval of coverage, 2018-2023). At this time, we cannot say what future permit terms will require for MS4 pollutant reductions. Also, we cannot say if pollutant removal efficiencies, either from DEP or the Chesapeake Bay Program, will change in the future. However, if efficiency guidance changes during the upcoming permit term, it is DEP's policy is not to require permittees to revise their 2018-2023 Pollutant Reduction Plans (unless they choose to do so).

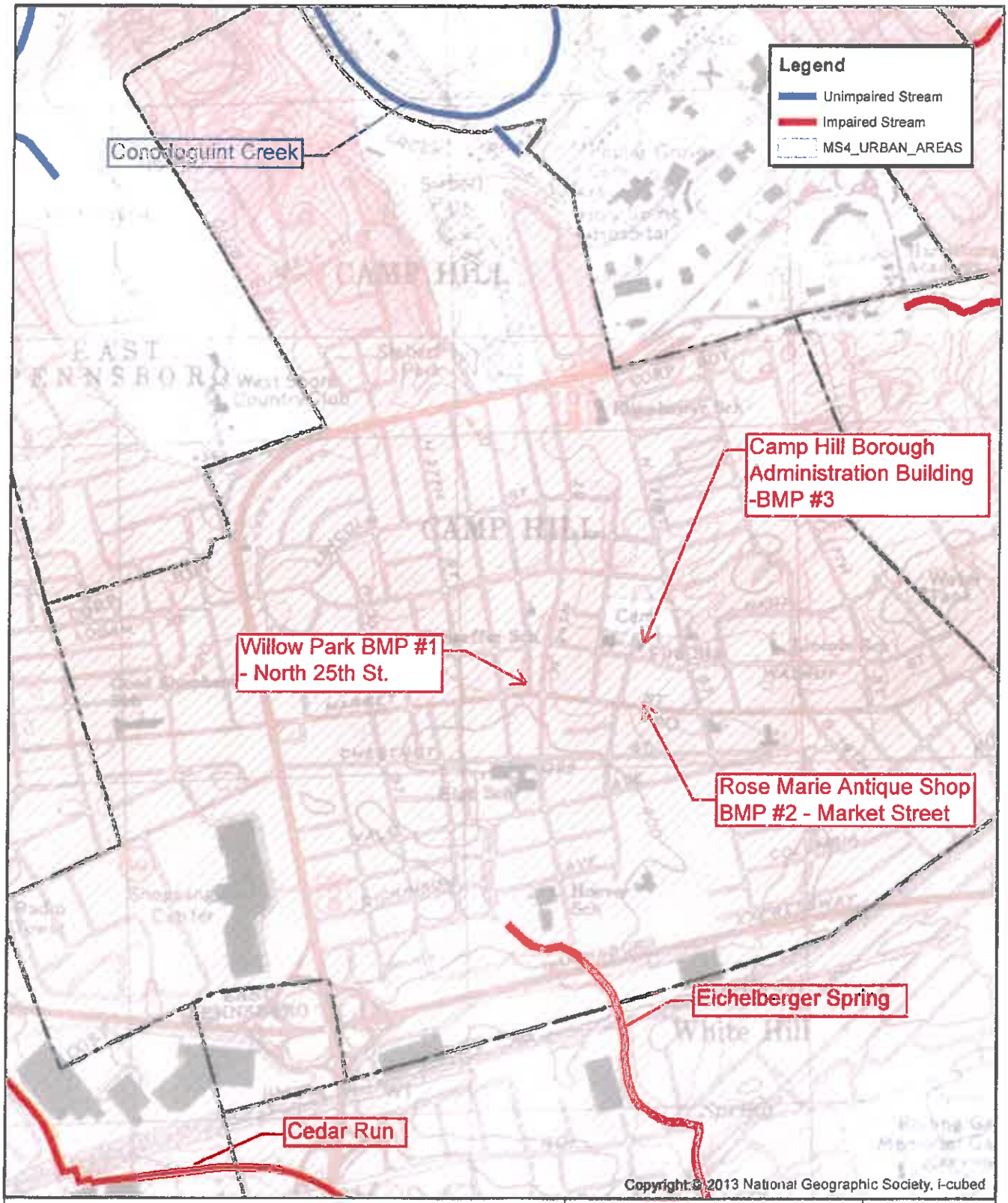
Feel free to contact me if you have additional questions or concerns.

**Scott M. Arwood, P.E.** | Environmental Engineer Manager
Department of Environmental Protection | Clean Water Program
Southcentral Regional Office
909 Elmerton Avenue | Harrisburg, PA 17110
Phone: 717.783.0368 | Fax: 717.705.4760
www.dep.pa.gov

**The 24-hour toll free Emergency Response number for SCRO is: 866-825-0208**

# APPENDIX H

# GREEN INFRASTRUCTURES PROJECTS




ATTACHMENT 1
USGS TOPOGRAPHIC LOCATION MAP
LEMOYNE, PA 7.5-MINUTE QUAD

BOROUGH OF CAMP HILL
CUMBERLAND COUNTY, PENNSYLVANIA

990 495 0 990 Feet

Gannett Fleming

N
W E
S

# Attachment B – Project Narrative

This project will focus on three separate areas within the Borough. They are as follows;

**Site No. 1 – Willow Park:** This is a community park that is bisected by a natural stream. The stream is the subject of a separate effort that is being funded jointly by the Borough and a grant (from PA DEP) to restore and stabilize the stream banks. This project, proposed as part of this grant funding application, would address a specific issue related to a scour channel that has formed. Polluted street drainage from North 25th Street is conveyed along a curb line, to a point where it then enters a break in the curbing. It flows through a mulched area and then drops rapidly in grade to its confluence point with the Willow Park stream. This is causing erosion and scour that is putting excess sediment into the stream. Even with the stabilized and restored stream, this issue will continue to occur and could jeopardize the improvements once they are completed.

Photo No. 1 – Scour Area (as looking towards Market Street and towards natural stream channel)

To resolve this issue, it is proposed to install a Rain Guardian system and Focal Point Bio-Filtration area to better capture, treat and convey the street runoff in a non-erosive manner. The Rain Guardian unit is designed to dissipate and better distribute flows so as to promote non-erosive velocities. Street runoff would enter the unit, then be directed into a shallow (bowled) area where it would be directed towards a Focal Point bio-filtration system. FocalPoint® High Performance Modular Biofiltration Systems (HPMBS) is a scalable biofiltration system which combines the efficiency of high flow rate engineered soils with the durability and modularity of a highly pervious expandable underdrain/storage/infiltration system. The modular FocalPoint HPMBS is a complete, integrated system.

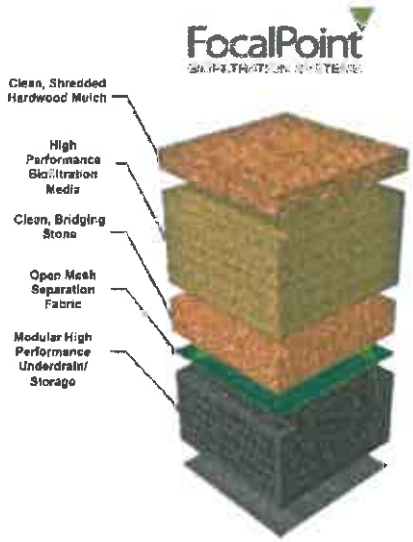



Figure 1 – Typical FocalPoint Biofiltration System & Section

Figure 2 – Concept for FocalPoint Biofiltration System, with Rain Guardian unit to convey street runoff.

**Site No. 2 – Rose Maries Antique Shop:** This site was selected for several reasons. The Borough is actively looking to revive its downtown district, and engage with the local businesses that comprise it. The front (yard) area of this particular business is entirely impervious (with concrete, asphalt and pavers). The adjacent alley and the building itself all direct runoff to and across this hard surface. The intent with this site is to develop a means to lessen runoff, collaborate with a local business for long term maintenance and contribute to improvements in water quality.

The improvements would consist of constructing a planter area, again utilizing the FocalPoint biofiltration system to ensure that the soils drain properly and that adequate filtering of the runoff occurs. It would open up the expanse of hard surface and provide a "green" area where plants could be selected by the Owner to help soften the entrance to the business. An adjacent Yoga studio would also benefit from this project. The Borough would like to develop this as a pilot project where perhaps other businesses in the future would collaborate with the Borough to engage in retrofits and stormwater green infrastructure.

Figure 3 – Rose Marie Antique Store Bio-Filtration System and Planter Area

**Site No. 3 – Camp Hill Borough Office:** This site was selected based on several merits. Primarily, there is a large opportunity to treat the sheet flow runoff from a Borough parking lot. Secondly, there is an even greater opportunity to provide community engagement with improvements that are located where all residents come to do business with the Borough. As such, the improvements made here provide a centralized location to showcase how the Borough is fulfilling its obligations as part of its MS4 Stormwater Program.

The first area of improvement would be a Focal Point Bio-Filtration system that would collect sheet flow runoff from the parking lot. Currently, this water ponds at the head end of the parking stalls until the grounds can soak it up. This causes safety and maintenance issues for the Borough and the public. In this part of the project, the biofiltration facility would have a linear channel to help collect and convey the flows to a small ponded area, where the water is filtered and infiltrates into the ground. In addition, various plantings will provide a function to help absorb runoff and evapotranspire any collected stormwater to reduce runoff volumes. This will address the nuisance ponding that is occurring now, moving it to a proper location for treatment. The benefit of this site is the physical treatment of a large volume of stormwater runoff.

The second area of this project would be the reconstruction of an existing concrete median that extends about 200 lineal feet along Walnut Street and in front of the Borough Office entrance. The proposed concept would remove existing asphalt surfacing and construct a new paved parking area and access drive that will be constructed using permeable pavers. These precast concrete units (PaveDrain®) have ¼ gaps around them to allow runoff to "soak" into the street (versus running off). At the same time, they will provide a durable parking surface for the residents who would visit the Borough Offices. The median itself would then also be completely rebuilt to include bike racks, benches and a large planter area (similar to the Antique Shop). The pollutant reduction benefit of this site is mostly aligned with the reduction in paved surface.

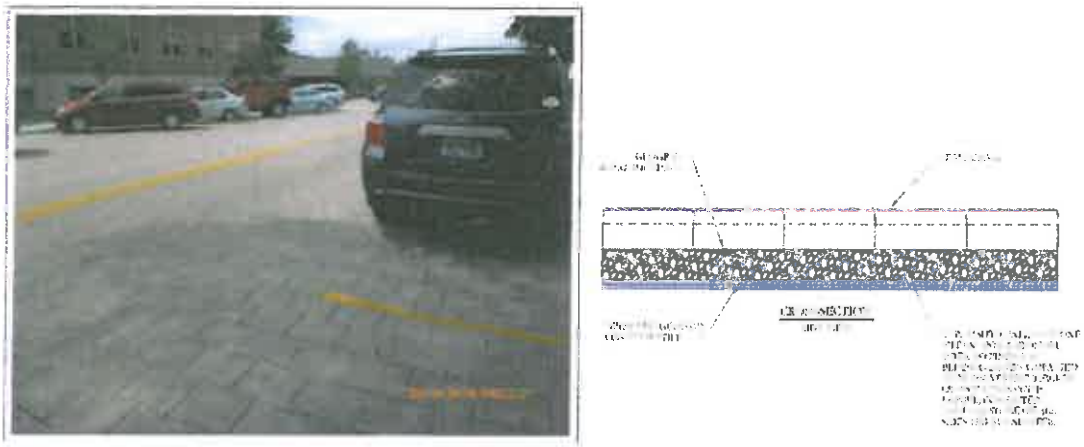


Figure 4 – Typical PaveDrain installation for parking and paver section view

Figure 5 – Concept Rendering of Median Reconstruction (to reduce impervious pavement coverage).

It is proposed to work with ACF Environmental on all of these sites as they are a supplier of the various products. They can also leverage their knowledge and expertise during design and construction. They have hundreds of installations around the country and have developed a good understanding of common construction issues, design challenges, etc. This will improve upon the success of this project. It is the Borough's overall goal to implement this project to not only reduce pollutants, but to also serve as completed project sites that can be used to educate the public and encourage use in other areas of the Borough.

# Attachment C – Project Pictures

**BMP#1 – North 25th Street**

*Photo 1: Scour Channel as seen from 25th St.*

*Photo 2: Scour Channel as seen from Willow Park Stream*

**BMP Site #2 – Rose Marie Antique Shop - Market Street**

*Photo 3 & 4: Impervious Areas in front of Rose Marie Antiques*

**BMP Site #3 – Camp Hill Borough Administration Building - Walnut Street**

*Photo 5: Camp Hill Borough Administration Building Employee Parking Lot*

*Photo 6: Median area parallel to Walnut St. and the administration building*

*Photo 7: Stormwater runoff at a low spot in the employee parking lot*

*Photo 8: Runoff ponding near the proposed entry for the rain garden*

**Drainage Area (ac.)**

| Areas | Impervious Area | Pervious Area | Total |
|---|---|---|---|
| Rosie Marie Antique Shop | 0.10 | 0 | 0.10 |
| Willow Park | 0.17 | 0 | 0.17 |
| Camp Hill Borough Office | 1.22 | 0.51 | 1.73 |
| Total | 1.48 | 0.51 | 1.99 |

**Existing Pollutant Load (lbs./yr.)**

| Areas | TN | TP | TSS |
|---|---|---|---|
| Rosie Marie Antique Shop | 2.8 | 0.1 | 197.0 |
| Willow Park | 4.8 | 0.2 | 344.9 |
| Camp Hill Borough Office | 47.0 | 1.5 | 2665.6 |
| Total | 54.6 | 1.8 | 3207.5 |

**Reduced Pollutant Load (lbs./yr.)**

| Areas | TN | TP | TSS |
|---|---|---|---|
| Rosie Marie Antique Shop | 0.8 | 0.0 | 39.4 |
| Willow Park | 1.4 | 0.0 | 69.0 |
| Camp Hill Borough Office | 13.8 | 0.4 | 513.0 |
| Total | 16.1 | 0.4 | 621.4 |

**Reduction in Pollutant Loads (lbs./yr.) by BMP's**

| Areas | TN | TP | TSS |
|---|---|---|---|
| Rosie Marie Antique Shop | 1.9 | 0.1 | 157.6 |
| Willow Park | 3.4 | 0.1 | 275.9 |
| Camp Hill Borough Office | 33.2 | 1.2 | 2152.6 |
| Total | **38.5** | **1.4** | **2586.2** |

## Means and Methods

Pollutant loading Calculations were performed using standard practices outlined by the Pennsylvania Department of Environmental Protection. Impervious and Pervious drainage areas were deteremined using GIS mapping. The Reduction of Pollutant Loads were calculated using the Cumberland County Developed Land Loading Rates and the total Drainage Area.

**Market St**

| Total Area | 0.0954 | TN | TP | TSS |
|---|---|---|---|---|
| Impervious Area | 0.0954 | 2.759922 | 0.105894 | 197.0105 |
| Pervious Area | | 0 | 0 | 0 |
| | | 2.759922 | 0.105894 | 197.0105 |

| Cumberland Co | | TN | TP | TSS |
|---|---|---|---|---|
| Impervious Area | | 28.93 | 1.11 | 2065.1 |
| Pervious Area | | 23.29 | 0.34 | 306.95 |

Bioretention Rain Garden (A/B w/ Underdrain)

| Reduction | (%) | 70% | 75% | 80% |
|---|---|---|---|---|
| Reduction | (lbs) | 1.93 | 0.08 | 157.61 |
| Total Pollutant | (lbs) | 0.83 | 0.03 | 39.40 |

**N 25th St**

| Total Area | 0.167 | TN | TP | TSS |
|---|---|---|---|---|
| Impervious Area | 0.167 | 4.83131 | 0.18537 | 344.8717 |
| Pervious Area | | 0 | 0 | 0 |
| | | 4.83 | 0.19 | 344.87 |

| Cumberland Co | | TN | TP | TSS |
|---|---|---|---|---|
| Impervious Area | | 28.93 | 1.11 | 2065.1 |
| Pervious Area | | 23.29 | 0.34 | 306.95 |

Bioretention Rain Garden (A/B w/ Underdrain)

| Reduction | (%) | 70% | 75% | 80% |
|---|---|---|---|---|
| Reduction | (lbs) | 3.38 | 0.14 | 275.90 |
| Total Pollutant | (lbs) | 1.45 | 0.05 | 68.97 |

**Walnut St**

| Total Area | 1.53 | TN | TP | TSS |
|---|---|---|---|---|
| Impervious Area | 1.02 | 29.5086 | 1.1322 | 2106.402 |
| Pervious Area | 0.51 | 11.8779 | 0.1734 | 156.5445 |
| | | 41.3865 | 1.3056 | 2262.947 |

| Cumberland Co | | TN | TP | TSS |
|---|---|---|---|---|
| Impervious Area | | 28.93 | 1.11 | 2065.1 |
| Pervious Area | | 23.29 | 0.34 | 306.95 |

Bioretention Rain Garden (A/B w/ Underdrain)

| Reduction | (%) | 70% | 75% | 80% |
|---|---|---|---|---|
| Reduction | (lbs) | 28.97 | 0.98 | 1810.36 |
| Total Pollutant | (lbs) | 12.42 | 0.33 | 452.59 |

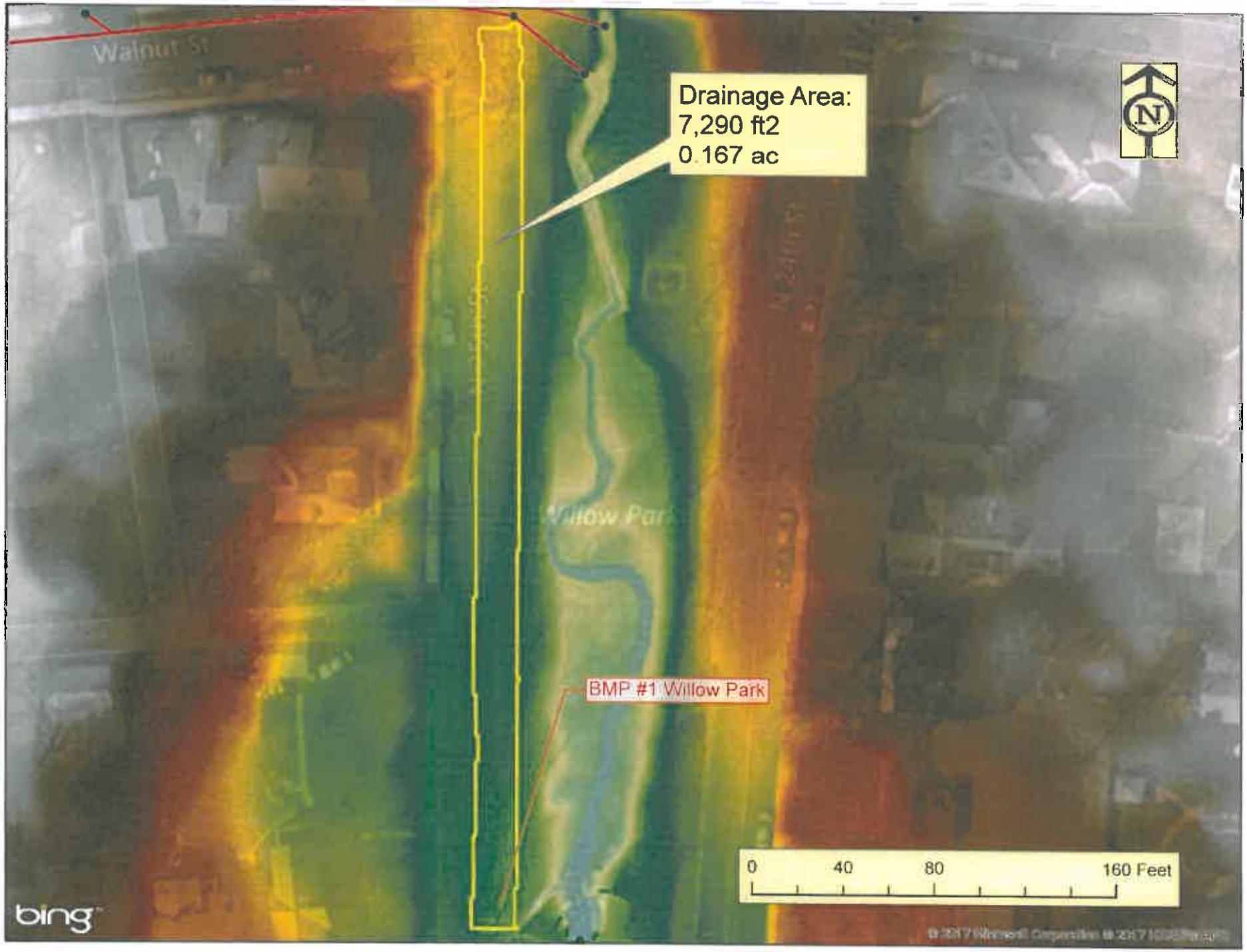
**Walnut St**

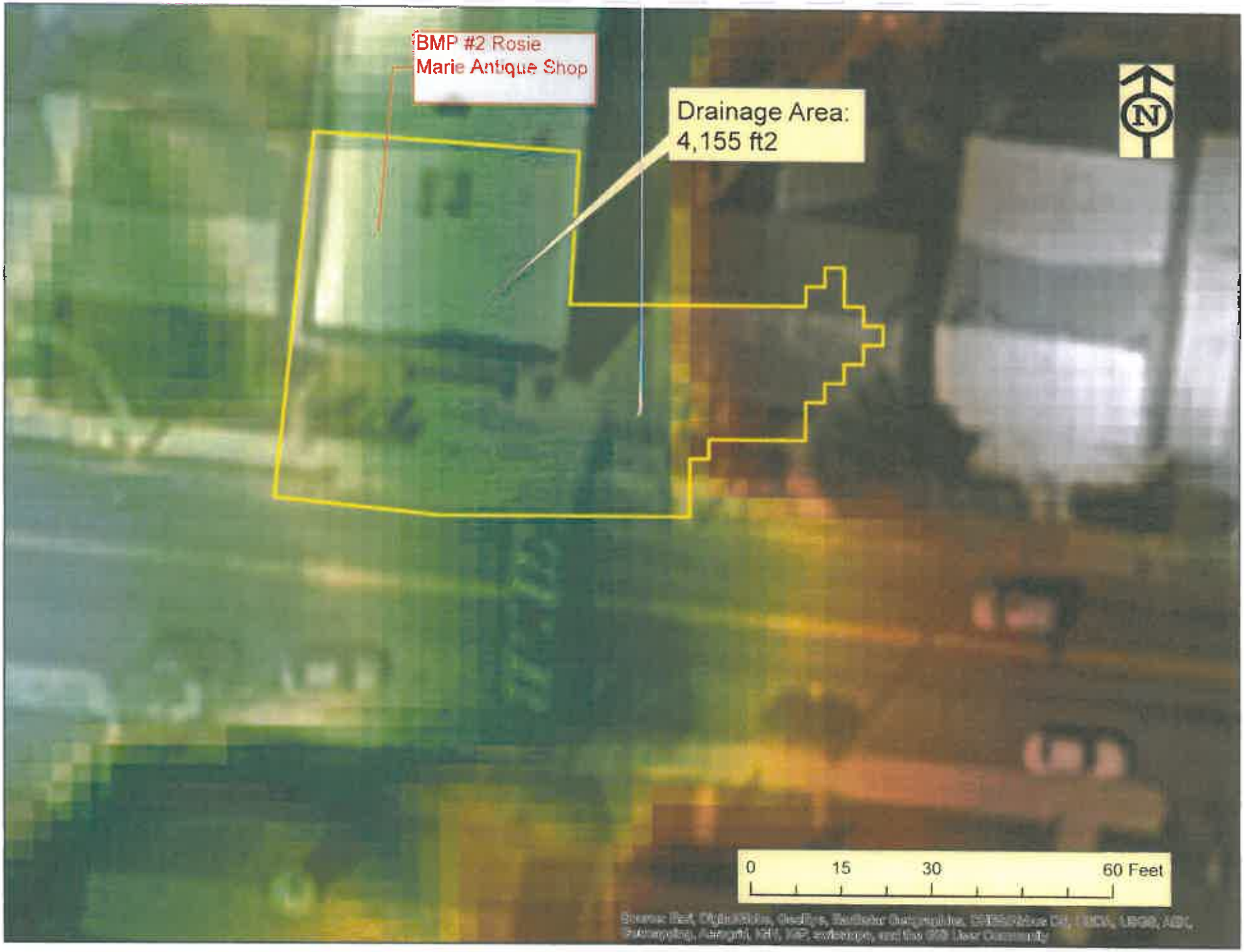
| Total Area | 0.195 | TN | TP | TSS |
|---|---|---|---|---|
| Impervious Area | 0.195 | 5.64135 | 0.21645 | 402.6945 |
| Pervious Area | 0 | 0 | 0 | 0 |
| | | 5.64135 | 0.21645 | 402.6945 |

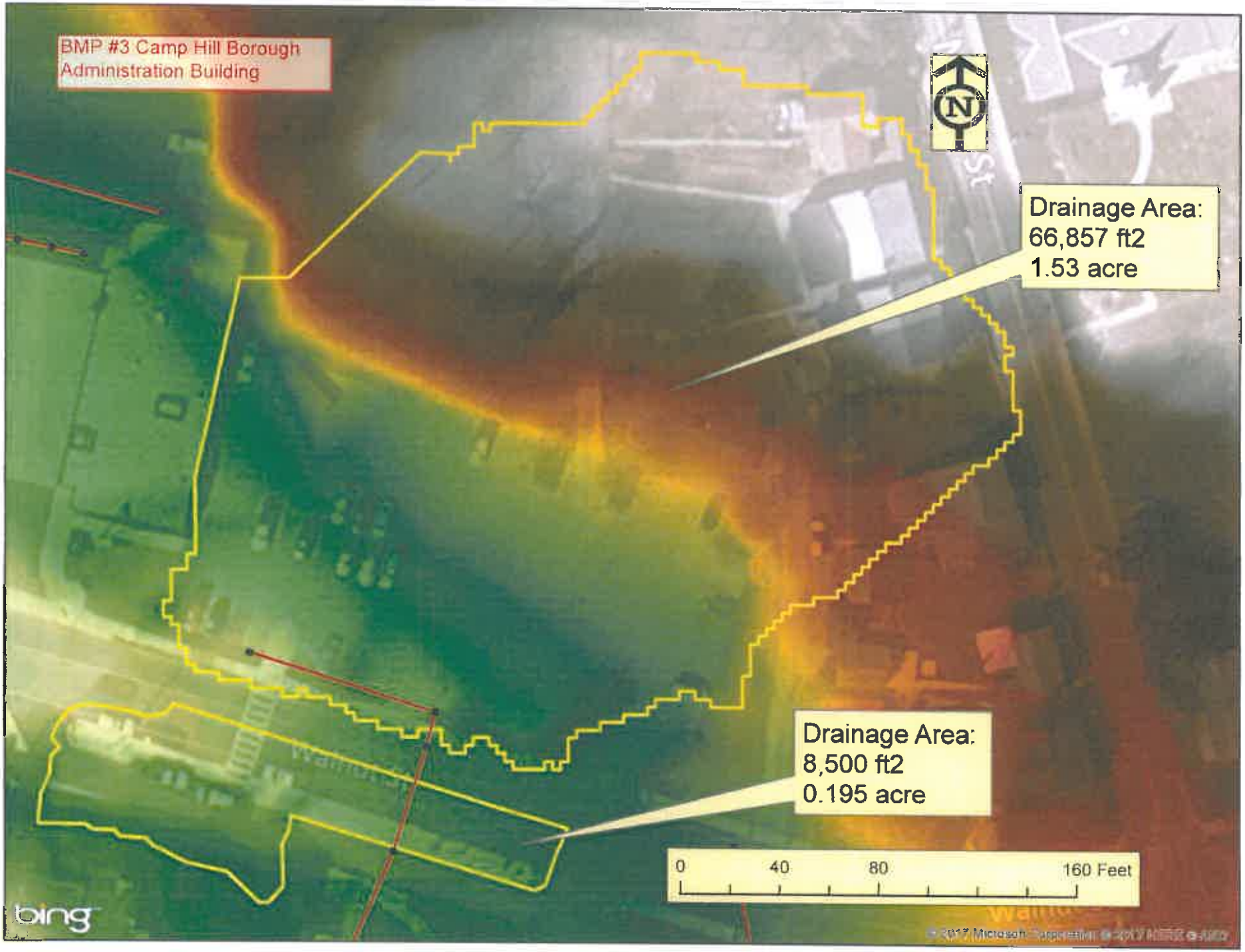
| Cumberland Co | | TN | TP | TSS |
|---|---|---|---|---|
| Impervious Area | | 28.93 | 1.11 | 2065.1 |
| Pervious Area | | 23.29 | 0.34 | 306.95 |

Permeable Pavement w/o sand/veg (A/B w/o underdrain)

| Reduction | (%) | 75% | 80% | 85% |
|---|---|---|---|---|
| Reduction | (lbs) | 4.23 | 0.17 | 342.29 |
| Total Pollutant | (lbs) | 1.41 | 0.04 | 60.40 |

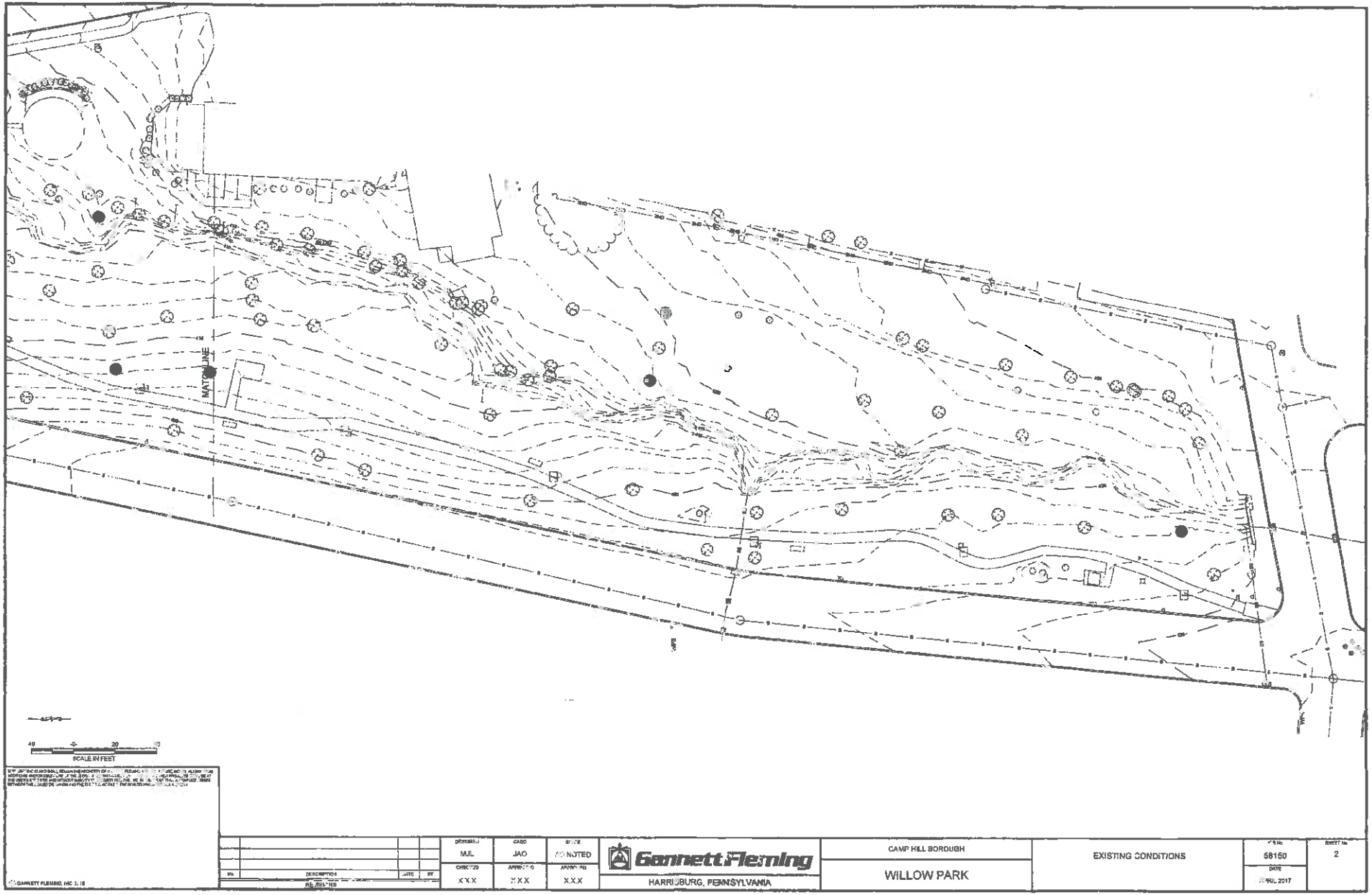

Walnut St
Drainage Area:
7,290 ft2
0.167 ac
N
BMP #1 Willow Park
0
40
80
160 Feet
bing


BMP #2 Rosie
Marie Antique Shop
Drainage Area:
4,155 ft2
N
0
15
30
60 Feet


BMP #3 Camp Hill Borough
Administration Building
Drainage Area:
66,857 ft2
1.53 acre
Drainage Area:
8,500 ft2
0.195 acre
0
40
80
160 Feet
bing

# APPENDIX I

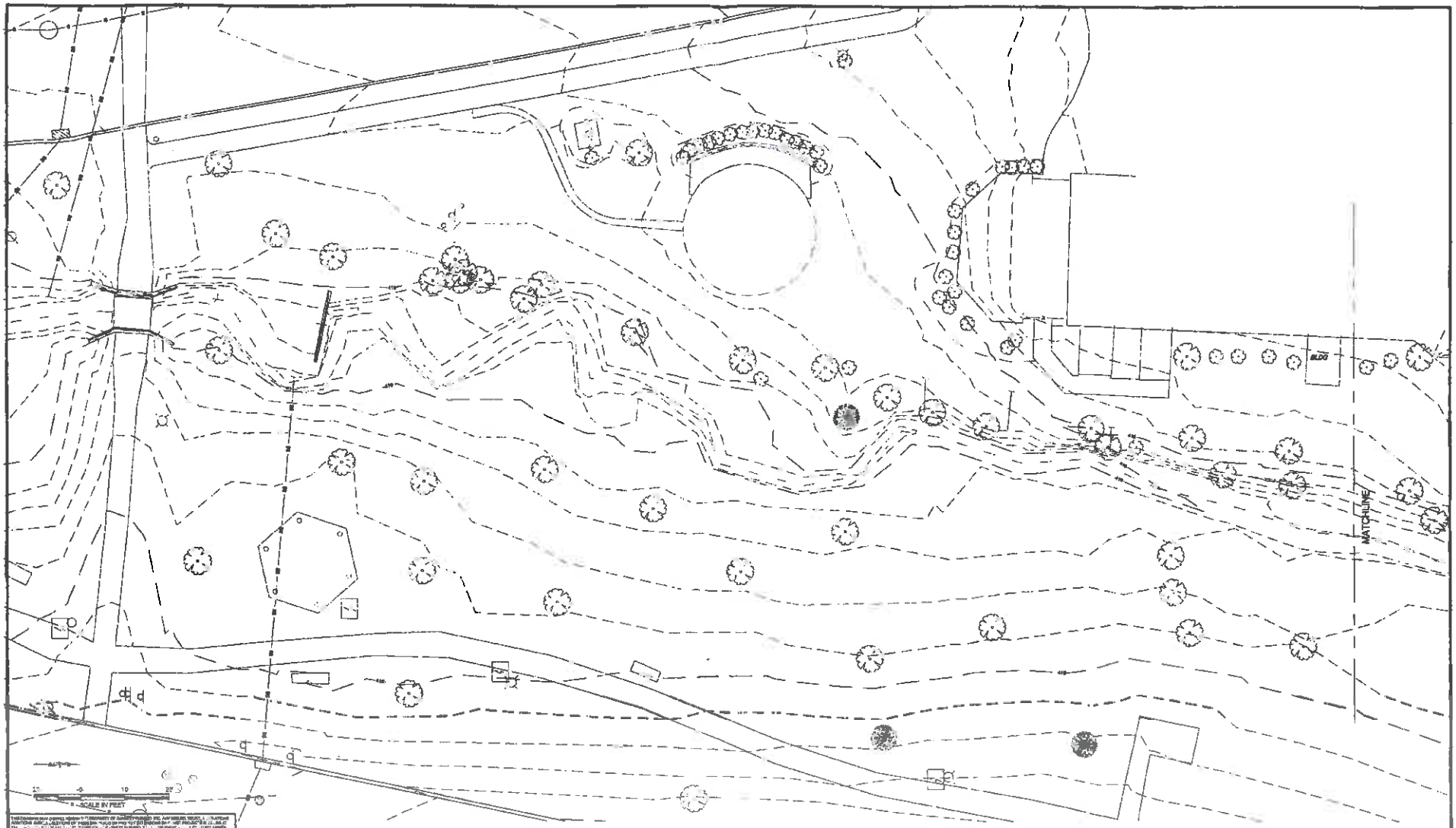
## WILLOW PARK STREAM RESTORATION PROJECT PRELIMINARY PLANS




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| DESIGNED: MJL | CADD: JAO | SCALE: AS NOTED | Gannett Fleming | CAMP HILL BOROUGH | EXISTING CONDITIONS | JOB No: 58150 | SHEET No: 2 |
| CHECKED: XXX | APPROVED: XXX | APPROVED: XXX | HARRISBURG, PENNSYLVANIA | WILLOW PARK | | DATE: APRIL 2017 | |

No. | DESCRIPTION | DATE | BY
REVISIONS

© GANNETT FLEMING, INC. 2018




| No | DESCRIPTION | DATE | BY |
|---|---|---|---|
| | REVISIONS | | |

| DESIGNED | CADD | SCALE |
|---|---|---|
| MJL | [illegible] | AS NOTED |
| CHECKED | APPROVED | APPROVED |
| X.X.X | X.X.X | X.X.X |

Gannett Fleming

HARRISBURG, PENNSYLVANIA

CAMP HILL BOROUGH

WILLOW PARK

EXISTING CONDITIONS

JOB No 58150

DATE APRIL 2017

SHEET No 1

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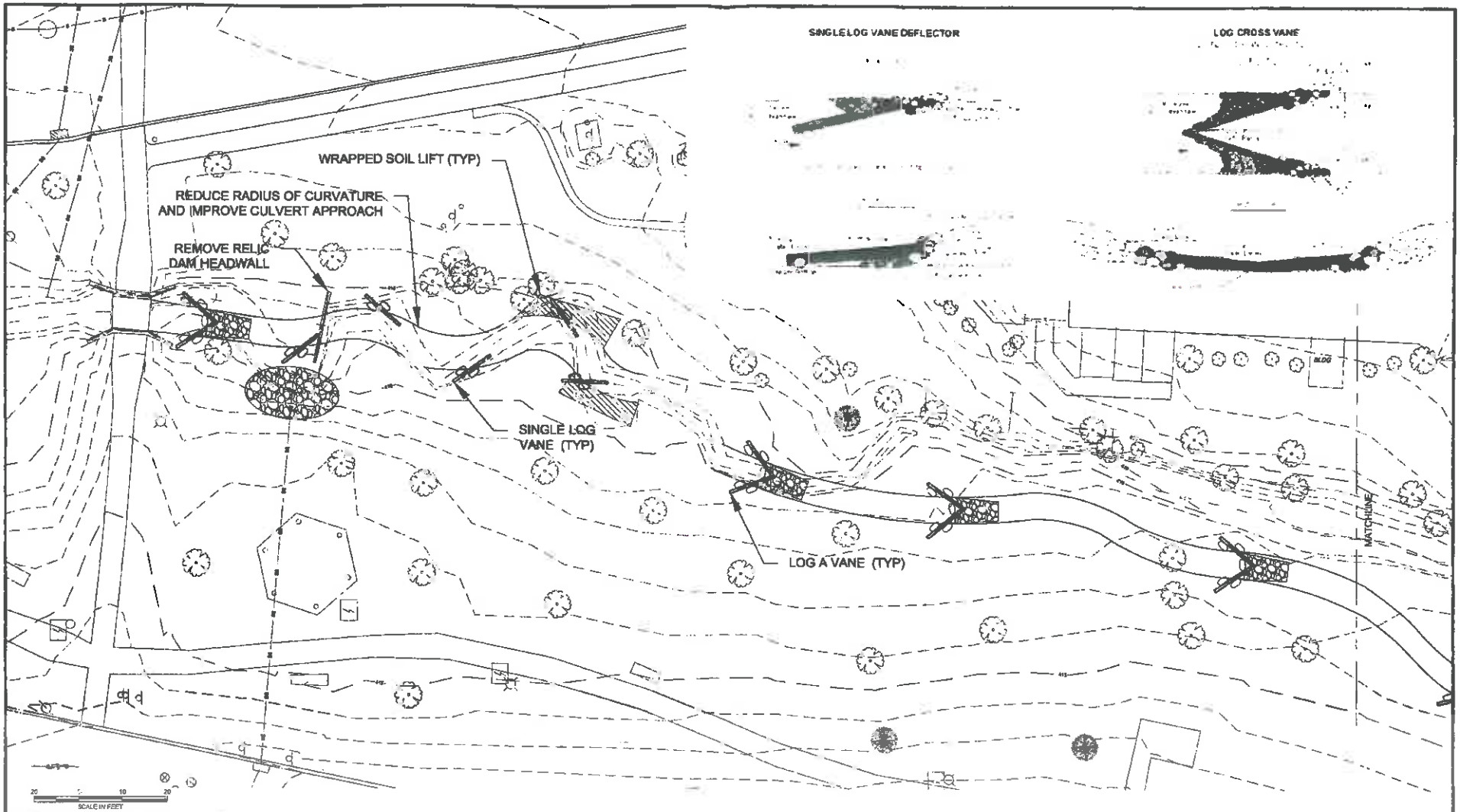



| No | DESCRIPTION | DATE | BY |
|---|---|---|---|
| | REVISIONS | | |

| DESIGNED | DRAWN | SCALE |
|---|---|---|
| MJL | JAO | AS NOTED |
| CHECKED | APPROVED | APPROVED |
| XXX | XXX | XXX |

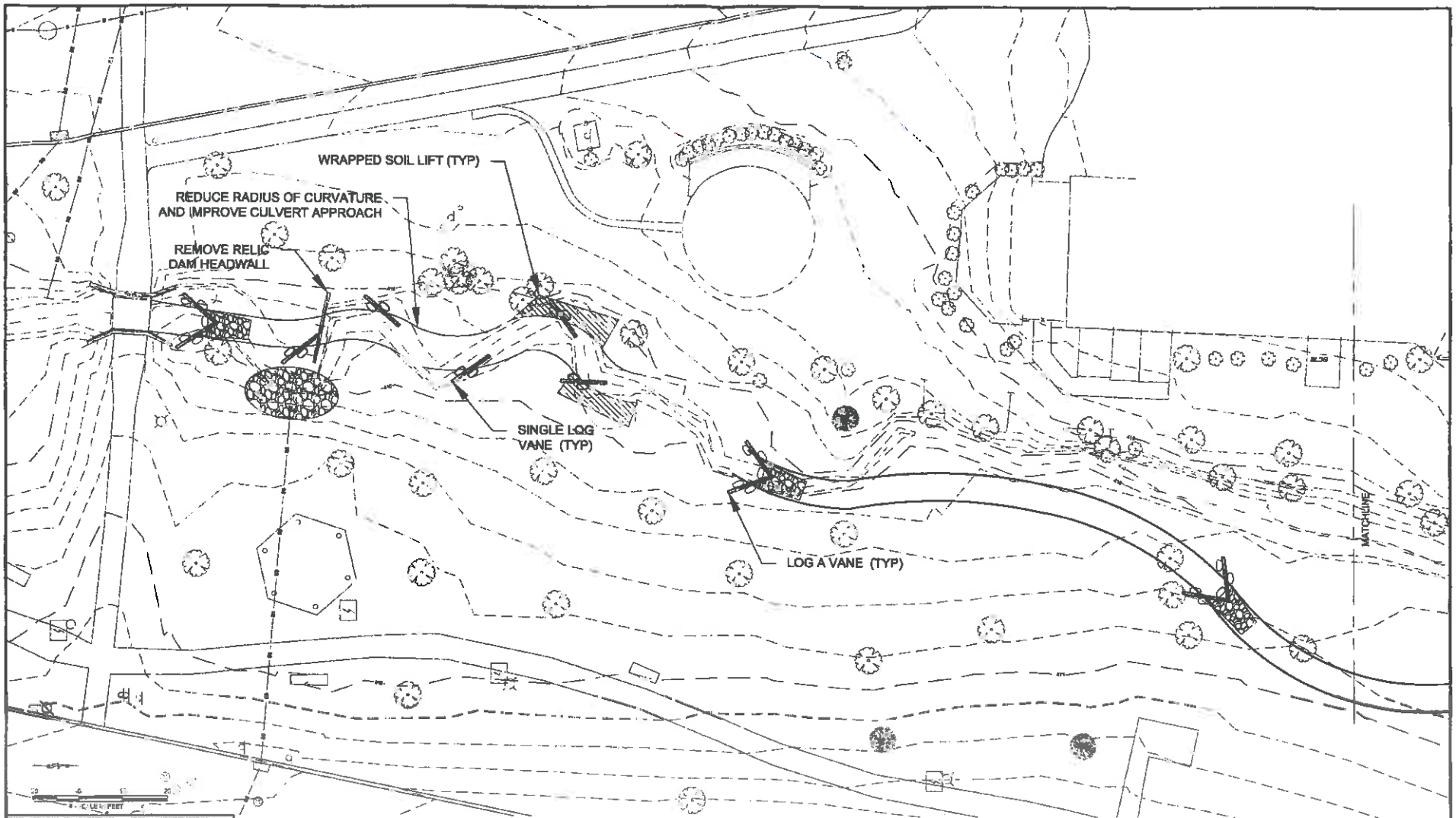
Gannett Fleming
HARRISBURG, PENNSYLVANIA

CAMP HILL BOROUGH
WILLOW PARK

PROPOSED ALTERNATIVE 1

JOB No. 58150
DATE APRIL 2017

SHEET No. 1




| No | DESCRIPTION | DATE | BY |
|---|---|---|---|
| | REVISIONS | | |

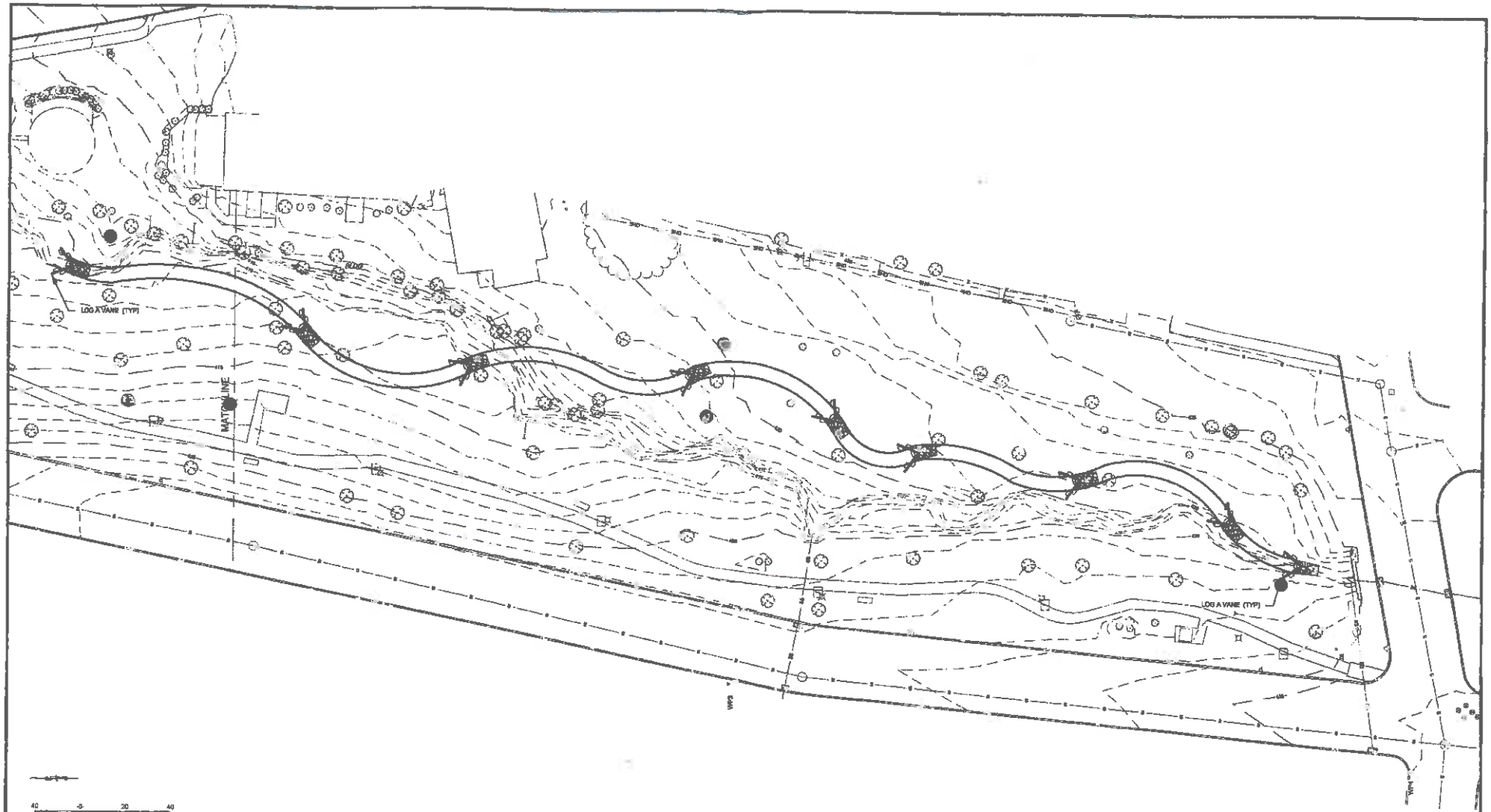
| DESIGNED | DRAWN | SCALE |
|---|---|---|
| MJL | JAO | AS NOTED |
| CHECKED | APPROVED | APPROVED |
| X.X.X | X.X.X | X.X.X |

Gannett Fleming
HARRISBURG, PENNSYLVANIA

CAMP HILL BOROUGH
WILLOW PARK

PROPOSED ALTERNATIVE 2

JOB No. 55150
DATE APRIL 2017
SHEET No. 1




| No | DESCRIPTION | DATE | BY |
|---|---|---|---|
| | REVISIONS | | |

| DESIGNED | CADD | SCALE |
|---|---|---|
| MJL | JAO | AS NOTED |
| CHECKED | APPROVED | APPROVED |
| XXX | XXX | XXX |

Gannett Fleming

HARRISBURG, PENNSYLVANIA

CAMP HILL BOROUGH

WILLOW PARK

PROPOSED ALTERNATIVE 2

JOB No. 58150

DATE APRIL 2017

SHEET No. 2

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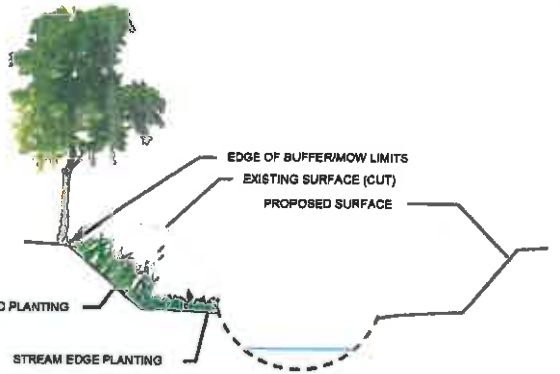
# APPENDIX J

# SCHAEFFER PARK DEVELOPMENT PRELIMINARY PLANS




WILLOW PARK CROSS SECTION CONCEPTUAL DESIGN (TYPICAL)

LOG A VANE (TYP)

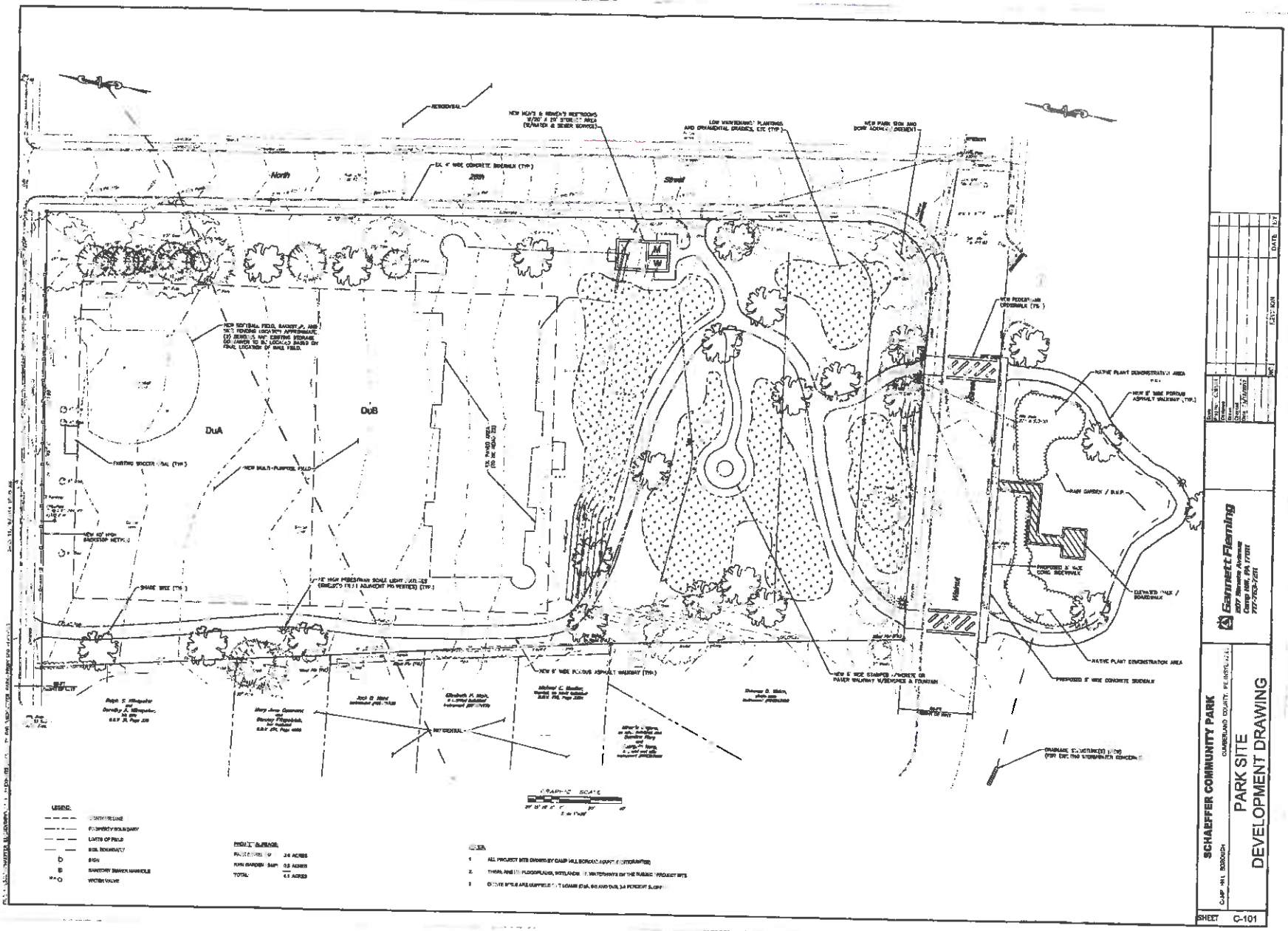
MATCHLINE

TEMP PLUNGE POOL (TYP)

LOG A VANE (TYP)

40 0 20 40
SCALE IN FEET

| | | | | | |
|---|---|---|---|---|---|
| | | DESIGNED MJL | CADD JAO | SCALE AS NOTED | Gannett Fleming<br>HARRISBURG, PENNSYLVANIA |
| | | CHECKED XXX | APPROVED XXX | APPROVED XXX | CAMP HILL BOROUGH<br>WILLOW PARK |
| | | | | | PROPOSED ALTERNATIVE 1 |
| | | | | | J. O. No. 58150<br>DATE APRIL 2017<br>SHEET No. 2 |


North
28th
Street
DuA
DuB
Walnut
Gannett Fleming
SCHAEFFER COMMUNITY PARK
CUMBERLAND COUNTY, PENNSYLVANIA
PARK SITE
DEVELOPMENT DRAWING
SHEET C-101