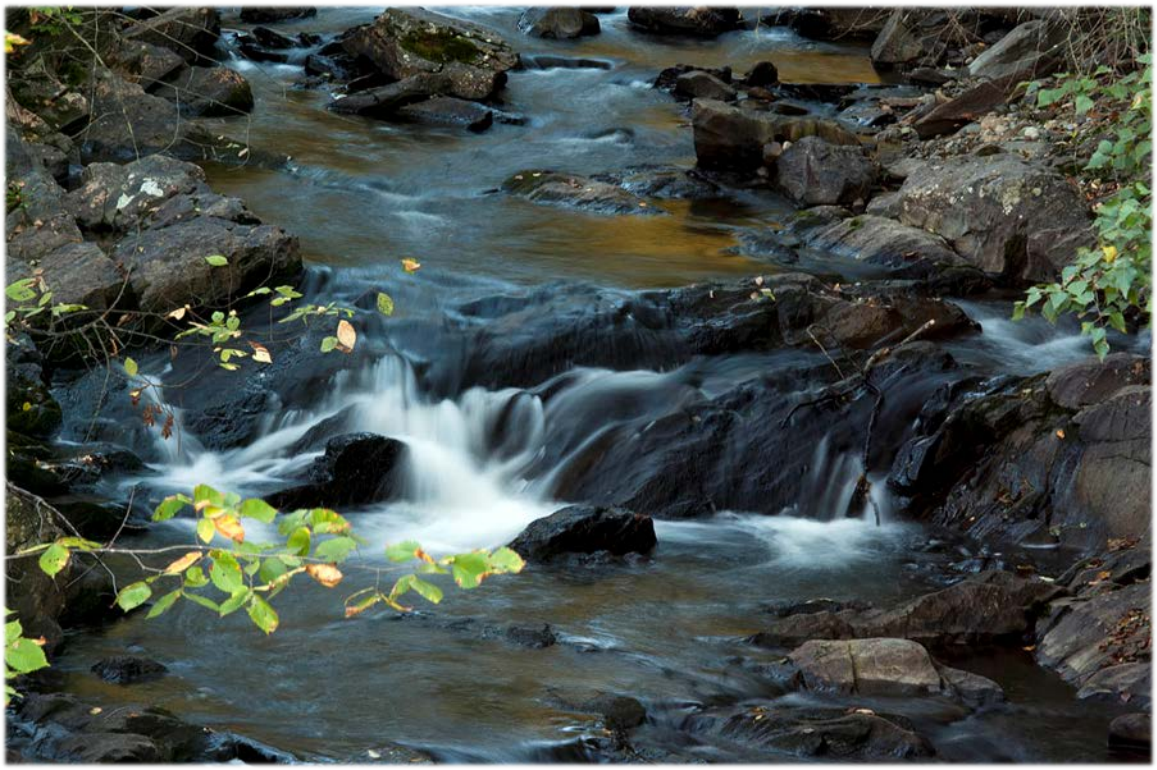
NORTH WALES BOROUGH - WISSAHICKON CREEK TOTAL MAXIMUM DAILY LOAD (TMDL) STRATEGY

North Wales Borough, Montgomery County, Pennsylvania
March 2016 (Rev. August 2018)



Prepared by:

Boucher & James, Inc.
An Employee Owned Company

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Introduction

Section 303(d) of the Clean Water Act and the U.S. Environmental Protection Agency's (EPA's) Water Quality Planning and Management Regulations (40 CFR Part 130) require states to develop Total Maximum Daily Loads (TMDLs) for waterbodies that are not meeting their designated uses even though pollutant sources have implemented technology-based controls. A TMDL establishes the allowable load of a pollutant or other quantifiable parameter based on the relationship between pollutant sources and in-stream water quality. A TMDL provides the scientific basis for a state to establish water quality-based controls to reduce pollution from both point and nonpoint sources and restore and maintain the quality of the state's water resources (USEPA, 1991).[1]

The EPA established a Total Maximum Daily Load (TMDL) for the Wissahickon Creek watershed in 2003 to address those segments impaired as a result of excess siltation. The TMDL identified overland flow from urban stormwater runoff and streambank erosion as primary contributors. North Wales Borough as a regulated MS4 is required to implement a TMDL plan through the National Pollutant Discharge Elimination System (NPDES) program. The overall goal of this TMDL plan is to decrease siltation in stormwater runoff. Gilmore & Associates, Inc. originally prepared the TMDL plan for North Wales in September 2012. A new plan was prepared by Boucher & James, Inc. in response to comments in a Pennsylvania Department of Environmental Protection's (PA DEP) letter dated February 26, 2015. This plan is a revision of the March 2016 plan based on comments by the PA DEP in their June 15, 2018 letter.

Wissahickon Watershed Information

The Wissahickon Creek drains approximately 64 square miles and extends 24.1 miles in a southeasterly direction through lower Montgomery and northwestern Philadelphia Counties. Major tributaries in the basin include Sandy Run and Pine Run, draining a heavily urbanized area east of the mid-section of the watershed. Other tributaries to Wissahickon Creek include Trewellyn Creek, Willow Run - East, Willow Run - West, Rose Valley Tributary, Paper Mill Run, Creshiem Creek, Monoshone Creek, Prophecy Creek, Lorraine Run, Wises Mill Tributary, and Valley Road Tributary. All tributaries mentioned are included with the mainstem of the Wissahickon Creek on Pennsylvania's 303(d) list of impaired waters.[1]

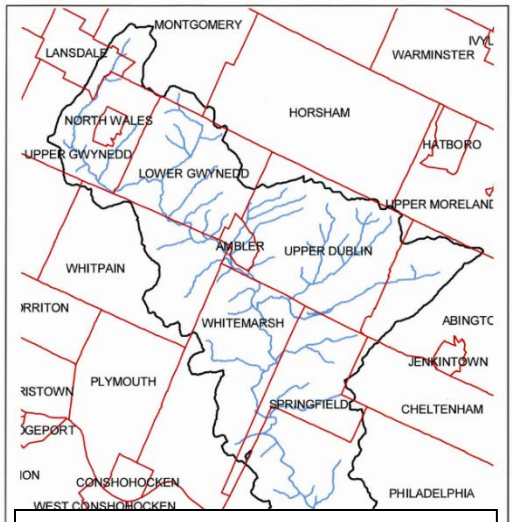

Figure 2-2 Municipal boundaries in the Wissahickon Creek, Pennsylvania from the Nutrient and Siltation TMDL Development for Wissahickon Creek, Final Plan, October 2003, US EPA

The entire borough of North Wales is located within the Wissahickon Creek watershed. The borough covers 0.6 square miles of land, the majority of which exists as low-intensity residential development

Waste Load Allocation (WLA)

The Wissahickon Creek TMDL plan establishes Waste Load Allocations (WLA) for each municipality within the Wissahickon watershed. The WLA is the summation of Streambank Erosion and Overland Load components for the target siltation amount in

Municipality	Existing Load from Streambank Erosion (lbs/yr)	Streambank Erosion WLA (lbs/yr)	Percent Reduction for Streambank Erosion	Existing Overland Load (lbs/yr)	Overland Load WLA (lbs/yr)	Percent Reduction for Overland Load (lbs/yr)	TOTAL WLA (lbs/yr)
Ambler	17,974.49	9,346.73	0.48	75,008.50	32,843.24	0.56	42,189.97
Cheltenham	1,758.29	1,512.13	0.14	20,549.46	4,449.00	0.78	5,961.13
Horsham	2,611.24	1,267.20	0.51	5,764.44	2,288.51	0.60	3,555.71
Lansdale	10,032.37	5,216.83	0.48	60,295.96	47,115.59	0.22	52,332.43
Lower	168,245.82	87,487.83	0.48	575,510.64	349,872.50	0.39	437,360.30
Montgomery	25,443.78	13,230.77	0.48	135,550.26	97,897.57	0.28	111,128.30
North Wales	8,414.77	4,375.68	0.48	50,070.60	37,955.87	0.24	42,331.55
Philadelphia	133,827.01	115,091.23	0.14	1,413,863.47	265,770.10	0.81	380,861.30

Portion of Figure 14-2 Summary of sediment wasteload allocations from streambank erosion and overland load by municipality (MS4) Nutrient and Siltation TMDL Development for Wissahickon Creek, Final Plan, October 2003, US EPA

pounds per year (lbs/yr). This WLA is the amount of siltation, in pounds per year, the municipality is expected to eventually eliminate with the use of stormwater Best Management Practices (BMP's). The following provides the WLA for North Wales Borough.

Existing Load from Streambank Erosion (lbs/yr) – 8,414.77
Streambank Erosion WLA (lbs/yr) – 4,375.68 (48 percent reduction)

Existing Overland Load (lbs/yr) – 50,070.60
Overland Load WLA (lbs/yr – 37,995.87 (24 percent reduction)

Total WLA (lbs/yr) – 42,331.55

WLA Reduction / Parsing

Parsing is an option to determine the portion of the TMDL load reduction which is not the responsibility of the MS4 permittee. Land areas within the municipality's portion of the impaired watershed which do not drain into the Municipal Separate Storm Sewer (MS4) can be parsed out of the WLA. Any parsing that is undertaken must be consistent with the terms and conditions of the applicable TMDL.[2] The parsing method results in a recalculation of the MS4 TMDL area of responsibility and the municipal's total WLA.

Six areas of the borough were determined to be suitable for parsing. The parse areas are shown on the overall TMDL Plan in Appendix I. Tables calculating the parsed areas acreage and land uses are included in Appendix II. The Stroud Water Research Center – Model My Watershed program was utilized to determine acreage and land use of the parse areas. Unit Area Loading Rates from Table 4.6 of the TMDL plan were then utilized to determine the reduction in pollutant load. The parse areas consist of non-municipally owned properties where stormwater flows out of the borough, into the neighboring township, without entering the North Wales stormwater system. The following provides the WLA reduction due to parsing.

Total WLA (lbs/yr) – 42,331.55
Parse Total (lbs/yr) – 2,789.7
Remaining WLA (lbs/yr) – 39,541.85

Reductions in Pollutant Loadings

The built out and residential nature of the borough limits the potential for stormwater projects which could reduce the overall WLA. One project has been undertaken which resulted in a reduction in pollutant loads. The project involved a parking lot expansion at the North Wales Regional Rail Station. The location of this project is shown on the Plan in Appendix I. Appendix II provides the calculated reduction in pollutant loadings for this project which totals 329.9 lbs/yr.

Recalculated Total WLA (lbs/yr) – 39,541.85
Existing Pollutant Load Reduction (lbs/yr) – 329.9
Remaining WLA (lbs/yr) – 39,211.95

Required Waste Load Reduction

The TMDL requires a minimum ten percent reduction in the WLA during the first permit term. Based on the recalculated WLA the minimum reduction is 3,921.19 lbs/yr. Pollutant load reductions, in excess of the minimum, will be crediting toward requirements for future permit terms.

Pollutant Loading Reduction Implementation

When evaluating the potential BMPs the 'National Pollutant Discharge Elimination System (NPDES) Stormwater Discharges from Small Municipal Separate Storm Sewer Systems BMP Effectiveness Values' and the 'Recommendations of the Expert Panel to Define Removal Rates for Urban Stormwater Retrofit Projects' were used to determine the effectiveness of potential BMPs.

The built-out nature of the borough, as well as the lack of stormwater basins for potential modifications and few open channels due to past culverting, severely limits the ability of the borough to address the WLA.

To determine the feasibility of addressing the WLA, five of the largest stormwater drainage sub-basins within the borough were mapped and the pollutant loads calculated. The sub-basins are designated D1 through D5. These sub-basins encompass the majority of the borough. Drainage from the sub-basins discharge separately to the surface along the northwest border of the borough. The outfalls are all located inside the borough near the municipal boundary or just within the adjoining township. Individual plans showing the stormwater drainage sub-basins are included in Appendix I.

Treatment of the stormwater from one or more of the sub-basins is considered the best option for meeting the required pollutant load reductions. The chosen BMP would be installed near the sub-basin outfall within the borough limits, if possible. To document the potential to treat the required pollutant load, a table providing the pollutant load calculation for each of the sub-basins is included in Appendix II. The Stroud Water Research Center – Model My Watershed program was utilized to determine acreage and land use of the sub-basins. Unit Area Loading Rates from Table 4.6 of the TMDL plan were then utilized to determine the pollutant load. The tables include pollutant removal rates in percentage (i.e. BMP Effectiveness Values) for a hypothetical BMP, in this case the removal rates for a Wet Ponds and Wetlands. The tables show that the required pollutant reduction can be addressed through a BMP associated with one or more of the outfalls. The pollutant removal rates or BMP Effectiveness Values were obtained from document 3800-PM-BCW0100m which is included in Appendix III.

Some stream channel restoration, associated with the outfalls for the above noted sub-basins, may also be undertaken although available channels are limited. In addition, the borough owns several properties in the neighboring Upper Gwynedd Township. These properties, mostly vacant land, were the location of the borough's former sewage treatment plant and are bisected by a stream. The use of these properties to treat stormwater is possible, however, additional study would be needed to confirm the effectiveness of BMP(s) on the properties.

Public Participation

A Public participation component is required by the PA DEP as part of this TMDL plan. Public participation includes making the plan available for review, advertising in a newspaper of general circulation, describing the plans strategy, where it may be reviewed and the length of time provided for the receipt of comments. The plan requires receipt by the municipality of written and verbal comments, documentation and consideration of each timely comment and identification of any changes made to the plan in response to those comments.

A complete copy of the PRP was available for public review at the municipal offices. A public notice was published in a local newspaper which included a description of the plan, where it could be reviewed, the 30-day comment period and the municipal meeting at which public comments would be received. Appendix IV contains the public notification information.

References

1. "Nutrient and Siltation TMDL Development for Wissahickon Creek, Pennsylvania. Final Report." October 2003. U.S. Environmental Protection Agency.
2. "Draft Model Total Maximum Daily Load and Chesapeake Bay Pollutant Reduction Plan and Guidance." February 2015. PA DEP.
3. "Pennsylvania Stormwater BMP Manual." December 30, 2006. PA DEP

Appendix I

LEGEND

— *SURFACE WATERS / CHANNELS*

A — *PARSED AREAS*

EXISTING BMPS

(1) *NORTH WALES REGIONAL RAIL STATION PARKING LOT EXPANSION*

BASE MAP — PENNSYLVANIA DEPARTMENT OF TRANSPORTATION TYPE 5 B MAP, REVISED 12-16-03. ALL LOCATIONS APPROXIMATE.

0 800' 1,600'

PROJECT :

NORTH WALES TMDL PLAN
300 SCHOOL STREET
NORTH WALES, PA 19454

APPLICANT :

NORTH WALES BOROUGH
300 SCHOOL STREET
NORTH WALES, PA 19454

JOB NO.: 1468010

DRAWN BY: TLH

CHECKED BY: PSG

SCALE: 1" = 800'

PLAN STATUS: FINAL

TITLE : TMDL PLAN

Boucher & James, Inc.
CONSULTING ENGINEERS
DOYLESTOWN ✦ STROUDSBURG ✦ LEHIGH VALLEY
CORP. HEADQUARTERS: 1456 FERRY RD, BUILDING 500, DOYLESTOWN, PA. 18901
VOICE: (215) 345-9400 FAX: (215) 345-9401
www.bjengineers.com

SHEET 1 OF 1

PROJECT NAME : **NORTH WALES TMDL PLAN**

DATE: AUGUST 1, 2018

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M:\MS4s\North Wales PRP TMDL DWG\PRP TMDL Plan.dwg || Tabname :TMDL Drainage D1 || Aug 07, 2018 - 1:01pm || tharris

PROJECT :

NORTH WALES TMDL PLAN
NORTH WALES BOROUGH
MONTGOMERY COUNTY

APPLICANT :

NORTH WALES BOROUGH
300 SCHOOL STREET
NORTH WALES, PA 19454

JOB NO.: 1468010

DRAWN BY: TLH

CHECKED BY:

SCALE: NA

PLAN STATUS: FINAL

TITLE : DRAINAGE AREA D1

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CONSULTING ENGINEERS
DOYLESTOWN ✦ STROUDSBURG ✦ LEHIGH VALLEY
CORP. HEADQUARTERS: 1456 FERRY RD, BUILDING 500, DOYLESTOWN, PA. 18901
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PROJECT :

NORTH WALES TMDL PLAN

NORTH WALES BOROUGH
MONTGOMERY COUNTY

APPLICANT :

NORTH WALES BOROUGH

300 SCHOOL STREET
NORTH WALES, PA 19454

JOB NO.: 1468010

DRAWN BY: TLH

CHECKED BY:

SCALE: NA

PLAN STATUS: FINAL

TITLE :

DRAINAGE AREA D2

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CONSULTING ENGINEERS
DOYLESTOWN ✦ STROUDSBURG ✦ LEHIGH VALLEY
CORP. HEADQUARTERS: 1456 FERRY RD, BUILDING 500, DOYLESTOWN, PA. 18901
VOICE: (215) 345-9400 FAX: (215) 345-9401
www.bjengineers.com

SHEET 1 OF 1

PROJECT NAME :

NORTH WALES TMDL PLAN

DATE: AUGUST 1, 2018

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PROJECT :

NORTH WALES TMDL PLAN
NORTH WALES BOROUGH
MONTGOMERY COUNTY

APPLICANT :

NORTH WALES BOROUGH
300 SCHOOL STREET
NORTH WALES, PA 19454

JOB NO.: 1468010

DRAWN BY: TLH

CHECKED BY:

SCALE: NA

PLAN STATUS: FINAL

TITLE : DRAINAGE AREA D3

Boucher & James, Inc.
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DOYLESTOWN ✦ STROUDSBURG ✦ LEHIGH VALLEY
CORP. HEADQUARTERS: 1456 FERRY RD, BUILDING 500, DOYLESTOWN, PA. 18901
VOICE: (215) 345-9400 FAX: (215) 345-9401
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SHEET 1 OF 1

PROJECT NAME : NORTH WALES TMDL PLAN

DATE: AUGUST 1, 2018

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PROJECT : NORTH WALES TMDL PLAN NORTH WALES BOROUGH MONTGOMERY COUNTY		JOB NO.: 1468010	TITLE : DRAINAGE AREA D4
APPLICANT : NORTH WALES BOROUGH 300 SCHOOL STREET NORTH WALES, PA 19454		DRAWN BY: TLH CHECKED BY: SCALE: NA PLAN STATUS: FINAL	Boucher & James, Inc. CONSULTING ENGINEERS DOYLESTOWN ◆ STROUDSBURG ◆ LEHIGH VALLEY CORP. HEADQUARTERS: 1456 FERRY RD, BUILDING 500, DOYLESTOWN, PA. 18901 VOICE: (215) 345-9400 FAX: (215) 345-9401 www.bjengineers.com PROJECT NAME : NORTH WALES TMDL PLAN
			SHEET 1 OF 1 DATE: AUGUST 1, 2018

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PROJECT : NORTH WALES TMDL PLAN NORTH WALES BOROUGH MONTGOMERY COUNTY		JOB NO.: 1468010	TITLE : DRAINAGE AREA D5
APPLICANT : NORTH WALES BOROUGH 300 SCHOOL STREET NORTH WALES, PA 19454		DRAWN BY: TLH CHECKED BY: SCALE: NA PLAN STATUS: FINAL	Boucher & James, Inc. CONSULTING ENGINEERS DOYLESTOWN ✦ STROUDSBURG ✦ LEHIGH VALLEY CORP. HEADQUARTERS: 1456 FERRY RD, BUILDING 500, DOYLESTOWN, PA. 18901 VOICE: (215) 345-9400 FAX: (215) 345-9401 www.bjengineers.com
			SHEET 1 OF 1
		PROJECT NAME : NORTH WALES TMDL PLAN	DATE: AUGUST 1, 2018

Appendix II

North Wales TMDL
Parse Areas - Page 1 of 2

Land Use	Parse Area A (square meters)	Parse Area B (square meters)	Parse Area C (square meters)	Parse Area D (square meters)	Parse Area E (square meters)	Parse Area F (square meters)	Parse Area G (square meters)	Totals (square meters)
Barren Land (Rock/Sand/Clay)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cultivated Crops	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Deciduous Forest	0.00	5,383.32	0.00	6,280.53	0.00	1,794.44	1,794.44	15,252.73
Developed, High Intensity	6,280.54	4,486.10	0.00	0.00	0.00	0.00	0.00	10,766.64
Developed, Low Intensity	0.00	8,074.97	2,691.66	7,177.75	4,486.10	8,074.98	897.22	31,402.68
Developed, Medium Intensity	897.22	6,280.53	0.00	0.00	897.22	897.22	0.00	8,972.19
Developed, Open Space	0.00	4,486.10	7,177.75	19,738.82	3,588.88	5,383.32	1,794.44	42,169.31
Emergent Herbaceous Wetlands	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Evergreen Forest	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grassland/Herbaceous	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mixed Forest	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Open Water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Land uses obtained from the Stroud Water Research Centers Model My Watershed program

North Wales TMDL
Parse Areas - Page 2 of 2

Land Use	Totals (square meters)	Totals (Acres)	Unit Area Loading Rate (lbs/acre/yr)	Totals (lbs/yr)
Barren Land (Rock/Sand/Clay)	0.0	0.0	---	---
Cultivated Crops	0.0	0.0	---	---
Deciduous Forest	15,252.7	3.8	5.4	20.5
Developed, High Intensity	10,766.6	2.7	105.1	279.7
Developed, Low Intensity	31,402.7	7.8	124.1	963.1
Developed, Medium Intensity	8,972.2	2.2	105.1	233.1
Developed, Open Space	42,169.3	10.4	124.1	1,293.4
Emergent Herbaceous Wetlands	0.0	0.0	---	---
Evergreen Forest	0.0	0.0	---	---
Grassland/Herbaceous	0.0	0.0	---	---
Mixed Forest	0.0	0.0	---	---
Open Water	0.0	0.0	---	---
			Total Parsed Waste Load (lbs/yr)	**2,789.7**

Land uses obtained from the Stroud Water Research Centers Model My Watershed program
Unit area loading rates obtained from Table 4-6 of the Nutrient and Siltation TMDL Development for Wissachickon Creek, Pennsylvania

Pollutant Load Reduction
Wissahickon Creek PRP
North Wales Borough

Project: North Wales Station
Date of Project: 2015
Pollutant: Sediment

Pre-Development Conditions

Land Use	Area (acres)	Loading Rate (lbs/ac/yr)	Sub Totals
Low-Intensity Residential	0.28	124.12	34.75
High-Intensity Residential	0.23	105.12	24.18
Transitional	0.71	400.58	284.41
		Total Pre-Development	**343.34**

Post-Development Conditions

Low-Intensity Residential	0.26	124.12	32.27
High-Intensity Residential	0.96	105.12	100.92
		Total Post-Development Before BMP Reduction	**133.19**
		Sediment Reduction for Raingarden BMP	90%
		Total Post-Development	**13.32**
		Net Sediment Reduction (Pre minus Post) lbs/yr	**330.02**

Notes:

Unit Area Loading Rate obtained from Table 4-6 of the Nutrient and Siltation TMDL Development for Wissahickon Creek, Pennsylvania. Values for Subwatershed 1 utilized in the calculations, no Transition value provided for Subwatershed 1 so average of other watersheds providing numbers was utilized.

Land Use Information and Pollutant Load Calculation / Reduction Calculation
Sub-basin D1
Wissahickon Creek - North Wales Borough

Land Use	Area (m^2)	Area (acres)	Unit Area Loading Rate (lbs/acre/yr)	Total Loading (lbs/yr)
Barren Land (Rock/Sand/Clay)	0.00	0.00	---	---
Cultivated Crops	0.00	0.00	---	---
Deciduous Forest	0.00	0.00	---	---
Developed, High Intensity	897.22	0.22	105.10	23.30
Developed, Low Intensity	23,327.71	5.76	124.10	715.36
Developed, Medium Intensity	8,972.20	2.22	105.10	233.01
Developed, Open Space	15,252.73	3.77	124.10	467.74
Emergent Herbaceous Wetlands	0.00	0.00	---	---
Evergreen Forest	0.00	0.00	---	---
Grassland/Herbaceous	0.00	0.00	---	---
Mixed Forest	0.00	0.00	---	---
Open Water	0.00	0.00	---	---
Pasture/Hay	0.00	0.00	---	---
Perennial Ice/Snow	0.00	0.00	---	---
Shrub/Scrub	0.00	0.00	---	---
Woody Wetlands	0.00	0.00	---	---
			Total Calculated Load (lbs/yr)	1,439.41
			Example BMP Sediment Reduction (%)	60%
			Total Sediment Reduction (lbs/yr)	863.65

Land uses obtained from the Stroud Water Research Centers Model My Watershed program.
Unit area loading rates obtained from Table 4-6 of the Nutrient and Siltation TMDL Development for Wissachickon Creek, Pennsylvania.

Land Use Information and Pollutant Load Calculation / Reduction Calculation
Sub-basin D2
Wissahickon Creek - North Wales Borough

Land Use	Area (m^2)	Area (acres)	Unit Area Loading Rate (lbs/acre/yr)	Total Loading (lbs/yr)
Barren Land (Rock/Sand/Clay)	0.00	0.00	---	---
Cultivated Crops	0.00	0.00	---	---
Deciduous Forest	0.00	0.00	---	---
Developed, High Intensity	7,177.76	1.77	105.10	186.41
Developed, Low Intensity	52,038.73	12.86	124.10	1,595.81
Developed, Medium Intensity	17,944.39	4.43	105.10	466.03
Developed, Open Space	24,224.93	5.99	124.10	742.88
Emergent Herbaceous Wetlands	0.00	0.00	---	---
Evergreen Forest	0.00	0.00	---	---
Grassland/Herbaceous	0.00	0.00	---	---
Mixed Forest	0.00	0.00	---	---
Open Water	0.00	0.00	---	---
Pasture/Hay	0.00	0.00	---	---
Perennial Ice/Snow	0.00	0.00	---	---
Shrub/Scrub	0.00	0.00	---	---
Woody Wetlands	0.00	0.00	---	---
			Total Calculated Load (lbs/yr)	2,991.12
			Example BMP Sediment Reduction (%)	60%
			Total Sediment Reduction (lbs/yr)	1,794.67

Land uses obtained from the Stroud Water Research Centers Model My Watershed program.
Unit area loading rates obtained from Table 4-6 of the Nutrient and Siltation TMDL Development for Wissachickon Creek, Pennsylvania.

Land Use Information and Pollutant Load Calculation / Reduction Calculation
Sub-basin D3
Wissahickon Creek - North Wales Borough

Land Use	Area (m^2)	Area (acres)	Unit Area Loading Rate (lbs/acre/yr)	Total Loading (lbs/yr)
Barren Land (Rock/Sand/Clay)	0.00	0.00	---	---
Cultivated Crops	0.00	0.00	---	---
Deciduous Forest	0.00	0.00	---	---
Developed, High Intensity	15,252.73	3.77	105.10	396.12
Developed, Low Intensity	66,394.23	16.41	124.10	2,036.03
Developed, Medium Intensity	43,066.53	10.64	105.10	1,118.47
Developed, Open Space	18,841.61	4.66	124.10	577.79
Emergent Herbaceous Wetlands	0.00	0.00	---	---
Evergreen Forest	0.00	0.00	---	---
Grassland/Herbaceous	0.00	0.00	---	---
Mixed Forest	0.00	0.00	---	---
Open Water	0.00	0.00	---	---
Pasture/Hay	0.00	0.00	---	---
Perennial Ice/Snow	0.00	0.00	---	---
Shrub/Scrub	0.00	0.00	---	---
Woody Wetlands	0.00	0.00	---	---
			Total Calculated Load (lbs/yr)	4,128.41
			Example BMP Sediment Reduction (%)	60%
			Total Sediment Reduction (lbs/yr)	2,477.05

Land uses obtained from the Stroud Water Research Centers Model My Watershed program.
Unit area loading rates obtained from Table 4-6 of the Nutrient and Siltation TMDL Development for Wissachickon Creek, Pennsylvania.

Land Use Information and Pollutant Load Calculation / Reduction Calculation
Sub-basin D4
Wissahickon Creek - North Wales Borough

Land Use	Area (m^2)	Area (acres)	Unit Area Loading Rate (lbs/acre/yr)	Total Loading (lbs/yr)
Barren Land (Rock/Sand/Clay)	0.00	0.00	---	---
Cultivated Crops	0.00	0.00	---	---
Deciduous Forest	7,177.75	1.77	5.40	9.58
Developed, High Intensity	39,477.63	9.76	105.10	1,025.26
Developed, Low Intensity	115,741.25	28.60	124.10	3,549.29
Developed, Medium Intensity	119,330.12	29.49	105.10	3,099.09
Developed, Open Space	48,449.82	11.97	124.10	1,485.75
Emergent Herbaceous Wetlands	0.00	0.00	---	---
Evergreen Forest	0.00	0.00	---	---
Grassland/Herbaceous	0.00	0.00	---	---
Mixed Forest	0.00	0.00	---	---
Open Water	0.00	0.00	---	---
Pasture/Hay	0.00	0.00	---	---
Perennial Ice/Snow	0.00	0.00	---	---
Shrub/Scrub	0.00	0.00	---	---
Woody Wetlands	0.00	0.00	---	---
			Total Calculated Load (lbs/yr)	9,168.97
			Example BMP Sediment Reduction (%)	60%
			Total Sediment Reduction (lbs/yr)	5,501.38

Land uses obtained from the Stroud Water Research Centers Model My Watershed program.
Unit area loading rates obtained from Table 4-6 of the Nutrient and Siltation TMDL Development for Wissachickon Creek, Pennsylvania.

Land Use Information and Pollutant Load Calculation / Reduction Calculation
Sub-basin D5
Wissahickon Creek - North Wales Borough

Land Use	Area (m^2)	Area (acres)	Unit Area Loading Rate (lbs/acre/yr)	Total Loading (lbs/yr)
Barren Land (Rock/Sand/Clay)	0.00	0.00	---	---
Cultivated Crops	0.00	0.00	---	---
Deciduous Forest	25,122.12	6.21	5.40	33.52
Developed, High Intensity	0.00	0.00	---	---
Developed, Low Intensity	179,443.71	44.34	124.10	5,502.77
Developed, Medium Intensity	22,430.46	5.54	105.10	582.54
Developed, Open Space	187,518.68	46.34	124.10	5,750.40
Emergent Herbaceous Wetlands	0.00	0.00	---	---
Evergreen Forest	0.00	0.00	---	---
Grassland/Herbaceous	0.00	0.00	---	---
Mixed Forest	0.00	0.00	---	---
Open Water	0.00	0.00	---	---
Pasture/Hay	0.00	0.00	---	---
Perennial Ice/Snow	0.00	0.00	---	---
Shrub/Scrub	0.00	0.00	---	---
Woody Wetlands	0.00	0.00	---	---
			Total Calculated Load (lbs/yr)	11,869.23
			Example BMP Sediment Reduction (%)	60%
			Total Sediment Reduction (lbs/yr)	7,121.54

Land uses obtained from the Stroud Water Research Centers Model My Watershed program.
Unit area loading rates obtained from Table 4-6 of the Nutrient and Siltation TMDL Development for Wissachickon Creek, Pennsylvania.

Appendix III

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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. To determine pollutant reductions for this BMP, these steps must be taken: 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. 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). 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. 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 IV

Wissahickon Creek, North Wales Borough Public Notification

Notice is hereby given that North Wales Borough has prepared a Pollution Reduction Plan for nutrients and a TMDL plan for sediment for the Wissahickon Creek as required under the PA DEP MS4 program. The plans calculate pollutant loads and identifies strategies to reduce these loads by the prescribed amounts. The plans can be reviewed, and written comments accepted, at the municipal building located at 300 School Street, North Wales, PA 19454 during normal business hours. Comments will also be accepted at the Borough Council meeting on August 28th, 2018. The 30-day public comment period extends from August 10, 2018 to September 9, 2018.

Public Notification

The notification was published on August 10th, 2018 in The Reporter, a local newspaper. This report will be updated with the proof of publication, any public comments and consideration of these comments when they are received. The updated information will also be forwarded to the PA DEP.