MS4 TMDL STRATEGY REPORT

[DRAFT – MAY 25, 2016]

BOROUGH OF LANSDALE

MONTGOMERY COUNTY, PENNSYLVANIA

NPDES MS4 PERMIT NO. PAG 130038

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Borough of Lansdale MS4 TMDL Strategy Report
May 25, 2016

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1.0 INTRODUCTION AND BACKGROUND

The Borough of Lansdale (the Borough), located in southeastern Montgomery County, is comprised of a 3.1 square mile area with a population of approximately 16,500, a median household income of $61,182, and per capita income of $29,239 (US Census Bureau 2014). The Borough owns and operates a storm sewer system that contributes hydrologically to the Wissahickon Creek, Skippack Creek, and Neshaminy Creek, Watersheds. All three of these watersheds have Total Maximum Daily Load (TMDL) studies approved by the United States Environmental Protection Agency (US EPA). The pollutant of concern for all three TMDL studies is sediment. These studies establish waste load allocations (WLAs) and required sediment reductions for the Borough of Lansdale.

The Borough's storm sewer system is regulated in Pennsylvania by the Municipal Separate Storm Sewer System (MS4) Permit program, under a National Pollutant Discharge Elimination System (NPDES) Stormwater Permit (PAG 130038) issued by Pennsylvania Department of Environmental Protection (PA DEP) in 2004. Because each of the three watersheds receiving stormwater discharges from the Borough's storm sewer system has a TMDL requirement, the Borough is required to develop a written TMDL Plan to identify how it will reduce sediment pollution and meet TMDL requirements, or obligations, in each watershed. This MS4 TMDL Strategy Report outlines the plan and pollutant control measures the Borough will implement to reduce sediment in discharges from their MS4 consistent with each watershed's TMDL. The plan is an integral component of the Borough's overall stormwater management program, which has been underway in the Borough since PA DEP issued the first MS4 permit in 2004.

This report provides the Borough with an aggressive strategy for meeting its TMDL obligations with a number of sediment reduction control measures to be implemented in the Borough. Consistent with the permit requirements, the Borough anticipates providing PADEP with further information on these control measures including design details in 2017 or as part of the Borough's next MS4 Permit application. Together this MS4 TMDL Strategy and a subsequent report containing MS4 TMDL Design Details will comprise the Borough's complete MS4 TMDL Plan to be implemented over a multi-year timeframe, with periodic reports made to PADEP showing milestones met and measurable progress toward substantial reductions in pollutant loads. Control measure implementation will be adaptive, iterative and dynamic as necessary to achieve efficiencies and cost effectiveness in keeping with the Borough's overall stormwater program.

2.0 WATERSHED AND TMDL INFORMATION

Of the Borough's 3.1 square mile area, approximately 0.78 square miles are located in the Wissahickon Watershed, 1.0 square miles are in the Skippack Creek Watershed and 1.3 square miles are in the Neshaminy Creek Watershed. Figure 1 shows these watershed boundaries within the Borough and Figures 2, 3, and 4 provide maps of each watershed. Required information for each of watershed is provided in the following sections.

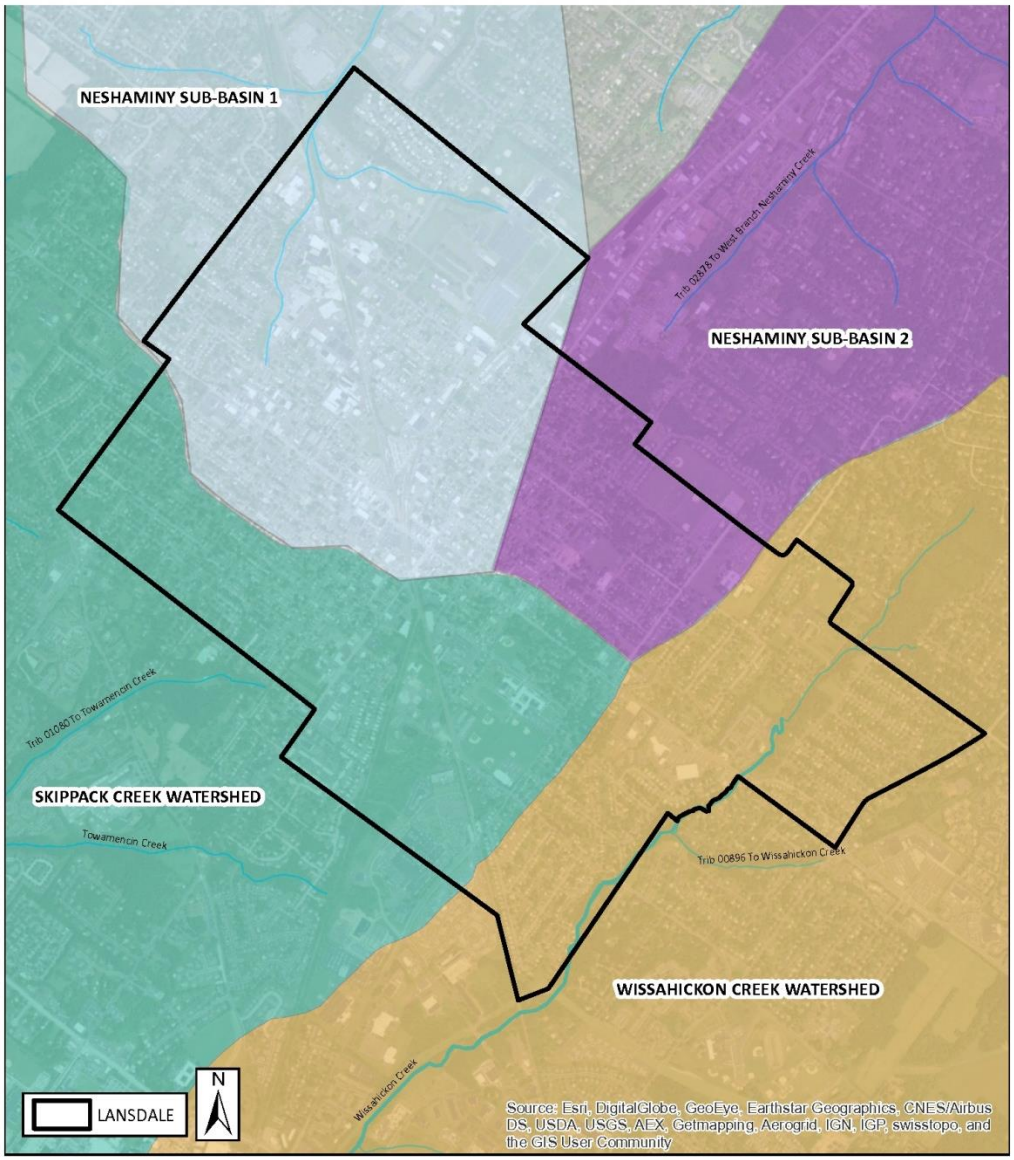

Figure 1. Map of Watershed Boundaries within the Borough of Lansdale

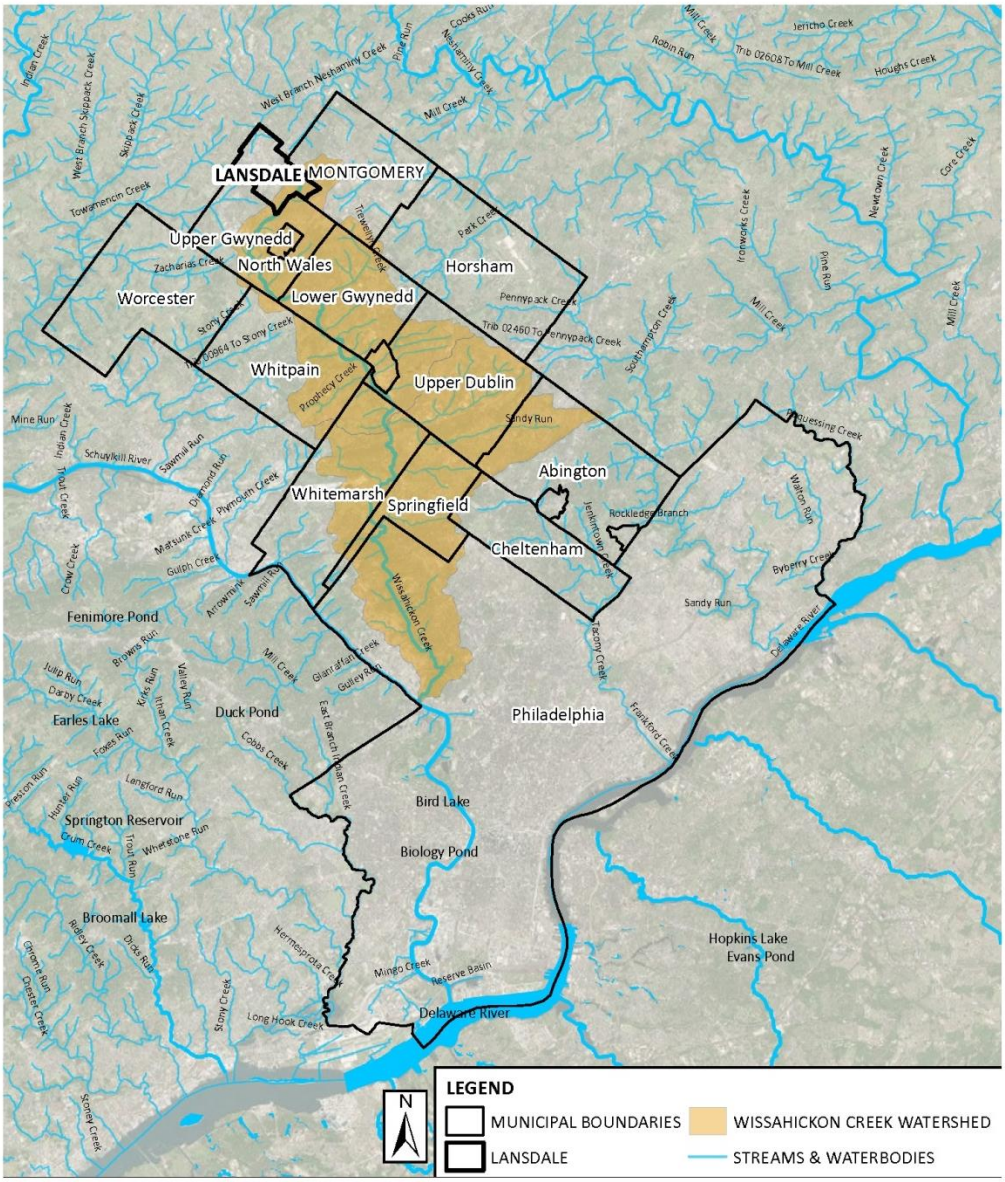

Figure 2. Wissahickon Creek Watershed Map with Municipal Boundaries

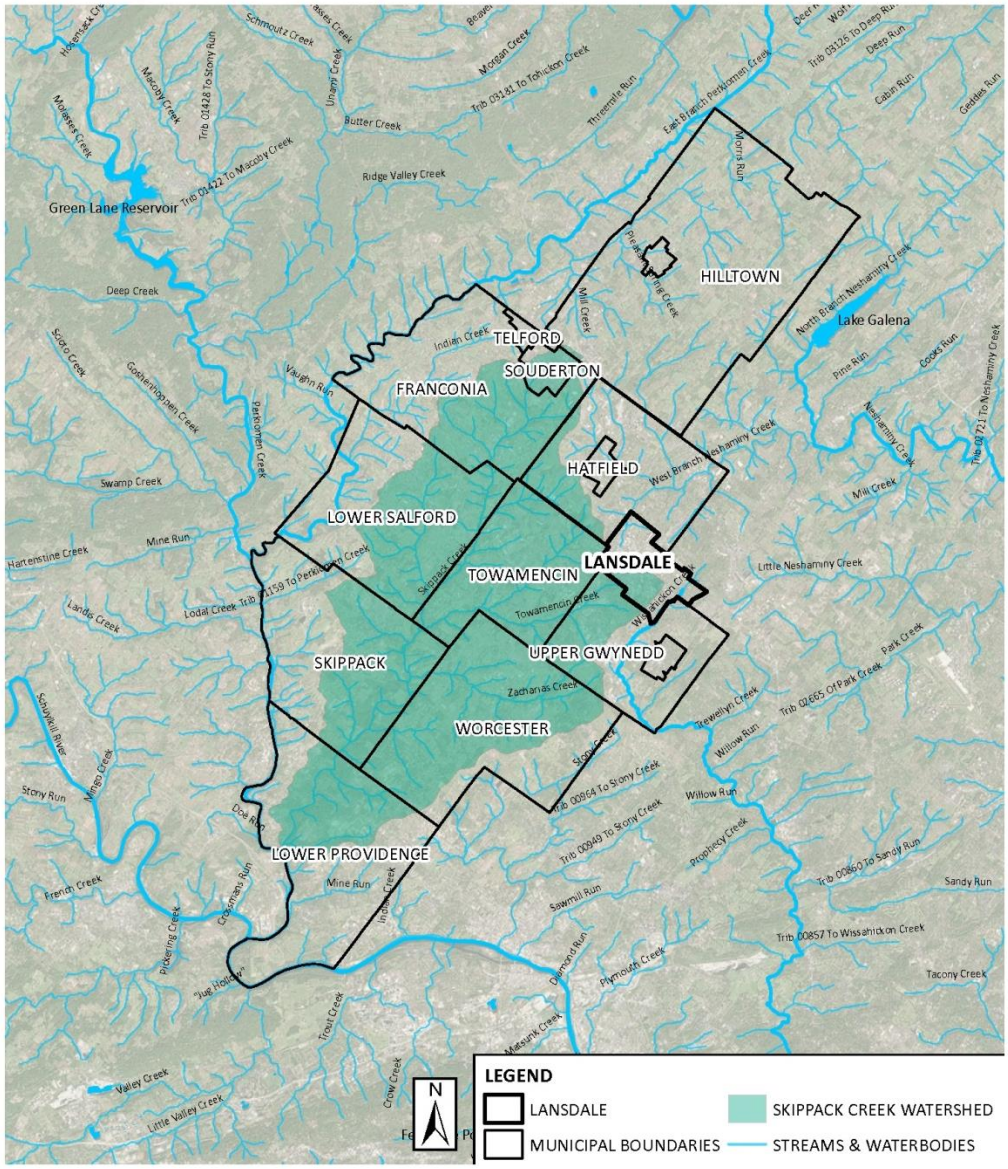

Figure 3. Skippack Creek Watershed Map with Municipal Boundaries

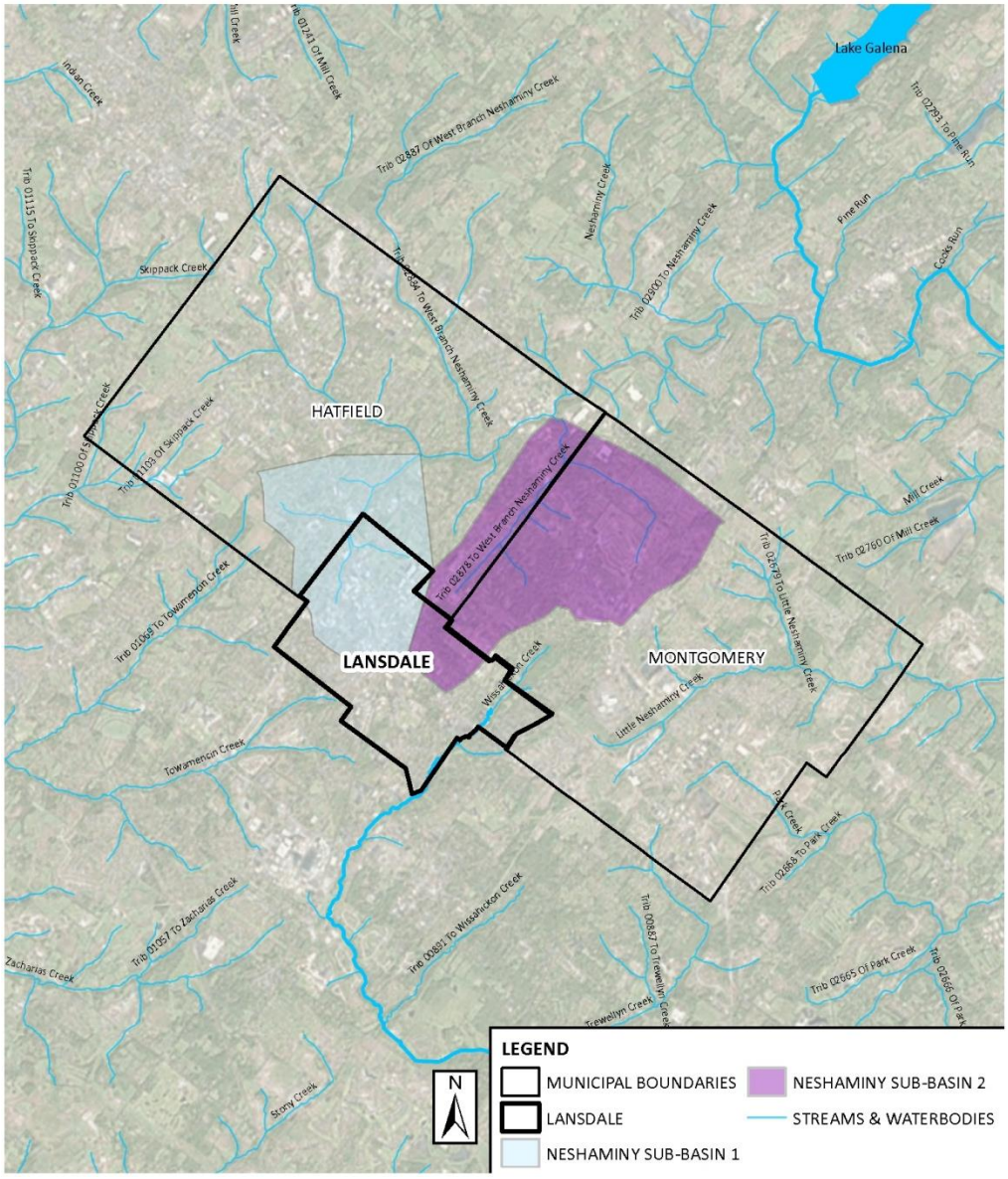

Figure 4. Neshaminy Creek Sub-basin 1 and 2 Map with Municipal Boundaries

2.1 WISSAHICKON CREEK

Wissahickon Creek Watershed is approximately 64 square miles in size and tributary of the Schuylkill River. The Borough of Lansdale drains to the main stem of the Wissahickon Creek, which flows through Montgomery County and discharges into the Schuylkill River in Philadelphia. The designated uses of the Wissahickon Creek are water supply, recreation and aquatic life and the creek is designated as a Trout Stock Fishery. The Wissahickon Creek main stem and its tributaries are listed as impaired for siltation/sediment and as such has a Siltation/Sediment TMDL, which was issued by US EPA in 2003.

Required MS4 TMDL Plan contents for this watershed are provided below. The numbering of each item below corresponds to the information requested in the PADEP's *Authorization to Discharge Under the NPDES General Permit for Discharges from Small MS4s PAG-13, Part C, Item b. MS4 TMDL Plan, Required Contents (Rev 4/2013)*.

i. Title of TMDL:

U.S. Environmental Protection Agency, Region 3, Nutrient and Siltation TMDL Development for Wissahickon Creek, Pennsylvania, Final Report, October 2003.

ii. Watershed Name:

Schuylkill Watershed
Hydrologic Unit Code (HUC): 02040203

iii. Borough of Lansdale Waste Load Allocations and Required Reduction:

Table 1. Sediment WLA and Required Reduction - Wissahickon Creek TMDL[1]

MS4 Permittee	Sediment Baseline Load (lbs/year)	Sediment WLA (lbs/year)	Reduction Required	Reduction Required (lbs/year)
Borough of Lansdale	70,328	52,332	26%	17,996

[1]Reflects sediment baseline load from original TMDL study (2003). See Section 3.0 for recalculated sediment baseline load and reduction required.

iv. Municipalities Subject to TMDL within HUC:

Table 2. Municipalities Subject to Wissahickon Creek TMDL within HUC 02040203

Municipality	County
Abington Township	Montgomery
Ambler Borough	Montgomery
Cheltenham Township	Montgomery
Horsham Township	Montgomery
Lansdale Borough	**Montgomery**
Lower Gywnedd Township	Montgomery
Montgomery Township	Montgomery
North Wales Borough	Montgomery
Philadelphia	Philadelphia
Springfield Township	Montgomery
Upper Dublin Township	Montgomery
Upper Gwynedd Township	Montgomery
Upper Moreland Township	Montgomery
Whitemarsh Township	Montgomery
Whitpain Township	Montgomery
Worchester Township	Montgomery

v. Counties Subject to TMDL within HUC:

Montgomery County
Philadelphia County

vi. Allocated Pollutant Loadings:

Refer to Table 1 and Section 3.0.

vii. Reductions in Pollutant Loadings Necessary to Meet WLA:

Refer to Table 1 and Section 3.0.

viii. List of Control Measures to Meet the TMDL:

Refer to Section 5.0.

ix. Analysis of Pollutant Load Reductions and Implementation Timeline:

Refer to Section 5.0 and 6.0.

2.2 SKIPPACK CREEK

Skippack Creek watershed is approximately 56 square miles in size and tributary of the Perkiomen Creek that flows to the Schuylkill River. The Borough of Lansdale drains to the Towamencin Creek which is a tributary to Skippack Creek. Skippack Creek is designated as Trout Stock Fishery. The Skippack Creek main stem and tributaries are listed as impaired for siltation/sediment, including West Branch, Towamencin Creek, and Zarcharis Creek, and has a Siltation/Sediment TMDL, which was issued by US EPA in 2005.

Required MS4 TMDL Plan contents for this watershed are provided below. The numbering of each item below corresponds to the information requested in the PADEP's *Authorization to Discharge Under the NPDES General Permit for Discharges from Small MS4s PAG-13, Part C, Item b. MS4 TMDL Plan, Required Contents (Rev 4/2013)*.

i. Title of TMDL:

U.S. Environmental Protection Agency, Region 3, Total Maximum Daily Load for Skippack Creek, Montgomery County, Pennsylvania, April 8, 2005.

ii. Watershed Name:

Schuylkill Watershed
HUC: 02040203

iii. Borough of Lansdale Waste Load Allocations and Required Reduction:

Table 3. Sediment WLA and Required Reduction - Skippack Creek TMDL[1]

MS4 Permittee	Sediment Baseline Load (lbs/year)	Sediment WLA (lbs/year)	Reduction Required	Reduction Required (lbs/year)
Borough of Lansdale	2,299,779	1,884,401	18%	415,378

[1]Reflects sediment baseline load from original TMDL study (2005). See Section 3.0 for recalculated sediment baseline load and reduction required.

iv. Municipalities Subject to TMDL within HUC:

Table 4. Municipalities Subject to Skippack Creek TMDL within HUC 02040203

Municipality	County
Franconia Township	Montgomery
Hatfield Township	Montgomery
Hilltown Township	Montgomery
Lansdale Borough	**Montgomery**
Lower Providence Township	Montgomery
Lower Salford Township	Montgomery
Skippack Township	Montgomery
Souderton Borough	Montgomery
Telford Borough	Montgomery
Towamencin Township	Montgomery
Upper Gwynedd Township	Montgomery
Worchester Township	Montgomery

v. Counties Subject to TMDL within HUC:

Montgomery County

vi. Allocated Pollutant Loadings:

Refer to Table 3 and Section 3.0.

vii. Reductions in Pollutant Loadings Necessary to Meet WLA:

Refer to Table 3 and Section 3.0.

viii. List of Control Measures to Meet the TMDL:

Refer to Section 5.0.

ix. Analysis of Pollutant Load Reductions and Implementation Timeline:

Refer to Section 5.0 and 6.0.

2.3 NESHAMINY CREEK

Neshaminy Creek watershed is approximately 232 square miles in size and discharges to the Delaware River in Bucks County. Portions of Lansdale Borough drain to unnamed tributaries within two sub-basins in the West Branch Neshaminy Creek drainage area (Sub-basin 1 and Sub-basin 2). Neshaminy West Branch Sub-basin 1 is approximately 1.07 square miles in size and Neshaminy West Branch Sub-basin 2 is approximately 0.25 square miles is size. The Neshaminy Creek Watershed designated uses are warm water fishery and migratory fishes. The West Branch Neshaminy Creek Sub-basin 1 and Sub-basin 2 are listed as impaired for siltation/sediment resulting from urban runoff and storm sewers discharges and have a Siltation/Sediment TMDLs, which were issued by US EPA in 2003.

Required MS4 TMDL Plan contents for these Neshaminy Creek Watershed sub-basins are provided below. The numbering of each item below corresponds to the information requested in the PADEP's *Authorization to Discharge Under the NPDES General Permit for Discharges from Small MS4s PAG-13, Part C, Item b. MS4 TMDL Plan, Required Contents (Rev 4/2013).*

i. Title of TMDL:

U.S. Environmental Protection Agency, Region 3, Total Maximum Daily Load (TMDL) Assessment for the Neshaminy Creek Watershed in Southeast, Pennsylvania, December 2003.

ii. Watershed Name:

Neshaminy Creek-Delaware River Watershed
HUC: 02040201

iii. Borough of Lansdale Waste Load Allocations and Required Reduction:

Table 5. Sediment WLA and Required Reduction - Neshaminy Creek West Branch Sub-Basin 1 TMDL[1]

MS4 Permittee	Sediment Baseline Load (lbs/year)	Sediment WLA (lbs/year)	Reduction Required	Reduction Required (lbs/year)
Borough of Lansdale	66,039	55,5186	16%	10,852

[1]Derived value from TMDL (2003) documented by Lansdale Borough (Letter to PADEP June 11, 2012). See Section 3.0 for recalculated sediment baseline load and reduction required.

Table 6. Sediment WLA and Required Reduction - Neshaminy Creek West Branch Sub-Basin 2 TMDL[1]

MS4 Permittee	Sediment Baseline Load (lbs/year)	Sediment WLA (lbs/year)	Reduction Required	Reduction Required (lbs/year)
Borough of Lansdale	42,632	18,477	56%	24,156

[1]Derived value from TMDL (2003) documented by Lansdale Borough (Letter to PADEP June 11, 2012). See Section 3.0 for recalculated sediment baseline load and reduction required.

iv. Municipalities Subject to TMDL within HUC:

Table 7. Municipalities Subject to Neshaminy Creek West Branch Sub-basins 1 and 2 TMDLs in HUC 02040203

Municipality	County
Hatfield Township	Montgomery
Lansdale Borough	**Montgomery**
Montgomery Township	Montgomery

v. Counties Subject to TMDL within HUC:

Montgomery County

vi. Allocated Pollutant Loadings:

Refer to Table 6, Table 7, and Section 3.0.

vii. Reductions in Pollutant Loadings Necessary to Meet WLA:

Refer to Table 6, Table 7, and Section 3.0.

viii. List of Control Measures to Meet the TMDL:

Refer to Section 5.0.

ix. Analysis of Pollutant Load Reductions and Implementation Timeline:

Refer to Section 5.0 and 6.0.

3.0 UPDATED BASELINE SEDIMENT LOADS AND REQUIRED REDUCTIONS

Baseline sediment loads were recalculated and determined using the MapShed modeling tool (MapShed) for each of the Borough's TMDL watersheds. MapShed was utilized in this strategy report because: 1) It is understood that MapShed is the preferred platform by PADEP to support TMDL planning and compliance in the Commonwealth; 2) MapShed allows for consistency in the Borough's work developing a TMDL Plan, modeling pollutant control measures, and tracking TMDL progress; and 3) This approach is consistent with the approach of other MS4s in the Commonwealth, including by nearby municipalities with shared TMDL responsibilities.

MapShed was developed by Dr. Barry Evans of Penn State University in collaboration with PADEP, which has also funded the development of the model. The MapShed modeling tool used to inform this strategy (Version 1.4.0) includes an enhanced version of the core Generalized Watershed Loading Function model (GWLF). The predecessor to the GWLF model, AVGWLF, was previously used in determining the waste load allocations that were published in the TMDLs discussed in Section 2.0. In August 2011, the AVGWLF model was replaced with the enhanced version, GWLF-E, which provides additional capabilities not included in the older model. Of note, the enhanced GWLF-E model more effectively simulates waste load generation from streambank erosion.

3.1 UPDATED BASELINE SEDIMENT LOADS

Baseline sediment loads were recalculated for both the entire watersheds/sub-basins and for the Borough. Dr. Evans directly supported the Borough's MapShed modeling effort by providing source data and consultation, as well as updated sediment baseline numbers for each of the three TMDL watersheds and for the Borough of Lansdale. The Borough's contribution to baseline sediment loading in each of the three watersheds was calculated using MapShed's Urban Area Viewer tool. The results of updated baseline sediment load modeling for the Borough are provided in Table 8. MapShed output documentation for updated baseline sediment load calculations for both the entire watersheds/sub-basins and for the Borough is included in Appendix B. This documentation includes the breakdown of sediment loads from overland sources and sediment loads from streambank erosion within each watershed.

Table 8. Updated Baseline Sediment Loads for the Borough of Lansdale

Watershed	**Wissahickon Creek**	**Skippack Creek**	**Neshaminy Creek Sub-basin 1**	**Neshaminy Creek Sub-basin 2**
Updated Baseline Sediment Load (lbs/year)[1]	343,139	712,971	239,835	64,074

[1]MapShed/GWLF-E Model (2016)

3.2 UPDATED REQUIRED SEDIMENT LOAD REDUCTIONS

The Borough's required sediment load reductions were calculated for each watershed/sub-basin by multiplying the percent of required sediment reduction prescribed in the original TMDL plans (see Section 2.0) by the Borough's recalculated baseline sediment load (see Table 8 above). This approach to updating the Borough's required sediment load reductions was supported and by Dr. Evans, reviewed with PADEP, and confirmed as an acceptable approach via email correspondence with PADEP Southeast Regional Office staff (dated April 11, 2016). Updated required sediment load reductions are shown below in Table 9. Additional documentation of these calculations is provided in Appendix B.

Table 9. Updated Required Sediment Load Reductions for the Borough of Lansdale

Watershed	**Wissahickon Creek**	**Skippack Creek**	**Neshaminy Creek Sub-basin 1**	**Neshaminy Creek Sub-basin 2**
Updated Baseline Sediment Load (lbs/year)[1]	343,139	712,971	239,835	64,074
Required Reduction[2]	26%	18%	16%	56%
Updated Required Sediment Load Reduction (lbs/year)	89,216	128,335	38,374	35,881

[1]MapShed/GWLF-E Model (2016)
[2]Wissahickon Creek (2003), Skippack Creek (2005), and Neshaminy Creek (2003) TMDLs

4.0 IMPLEMENTATION STRATEGY DEVELOPMENT

The Borough has dedicated significant staff and consultant resources to develop a TMDL implementation strategy that meets that following goals:

- Reduce sediment loads attributed to the Borough's MS4 to meet all TMDL required reductions and improve the health of the Wissahickon, Skippack, and Neshaminy Creeks;
- Select control measures that are both cost effective and provide the greatest suite of benefits to the community; and
- Provide a practicable, actionable, and achievable implementation timeline that can be achieved within the Borough's physical and fiscal constraints.

To develop this strategy the Borough undertook the following steps:

1. Inventoried and thoroughly evaluated all sediment reduction control measures that have been implemented after the US EPA approved TMDLs were adopted (post-TMDL to present).
2. Modeled/calculated sediment reductions by post-TMDL control measures within each TMDL watershed to determine current progress toward sediment load reduction requirements and sediment reduction required by future control measures in each watershed.
3. Identified locations for potential future control measures in each watershed through stakeholder outreach and through desktop analysis using GIS databases, MS4 mapping, and available imagery. Control measures considered at each location consisted of new stormwater best management practices (BMPs), retrofits to existing BMPs, and streambank restoration.
4. Conducted on-site assessments and data collection at all identified locations to further evaluate project feasibility.
5. Developed conceptual designs of control measures including selection of appropriate BMP types, layout of conveyance features, delineation of drainage areas, MapShed modeling of sediment load reductions, and development of implementation cost estimates and annual operation and maintenance (O&M) cost estimates.
6. Prioritized future control measures based on cost effective sediment reduction, community benefits, stakeholder feedback, ongoing maintenance demands, and ease of implementation (e.g., property ownership, project permitting, etc.).
7. Developed an actionable implementation timeline that considers community attributes, local conditions, annual expenditures and Borough resources.

The results of this TMDL strategy development process are summarized in the following sections: Section 5.0 – Implemented and Future Control Measures and Section 6.0 – Implementation Timeline and Milestones.

5.0 IMPLEMENTED AND FUTURE CONTROL MEASURES

The Borough's TMDL strategy is built upon the continued operation and maintenance of currently implemented sediment control measures and the implementation of new "future" control measures over time. Implemented control measures and future control measures are described in the following section of this report. A map of the implemented and potential future control measures is provided in Figure 5. Control measures are labeled with Project IDs which are defined in the following sections.

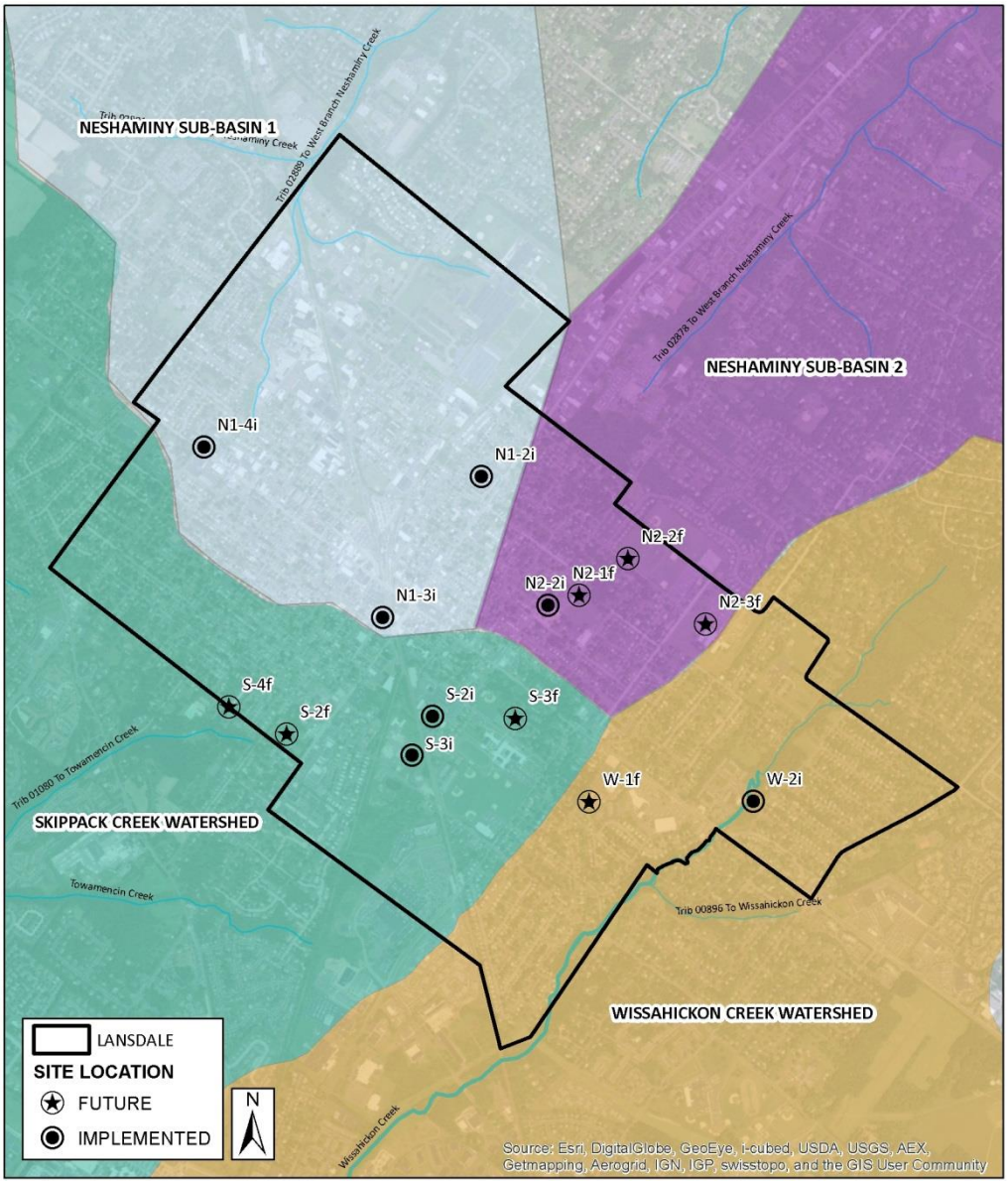

Figure 5. Map of Implemented and Future Control Measures

5.1 IMPLEMENTED CONTROL MEASURES

Since the US EPA's approval of the three TMDLs, the Borough has implemented multiple sediment reduction control measures within each watershed. These control measures consist of a Borough-wide street sweeping program reduces sediment in overland flow and numerous stormwater BMPs that infiltrate, filter, and that detain stormwater runoff, which reduces streambank erosion and the resulting sediment transport.

The Borough has thoroughly inventoried and evaluated all sediment reduction control measures that have been implemented during the post-TMDL period. For stormwater BMPs, this evaluation included:

- Review of as-built surveys, design/construction documents, and stormwater management calculations;
- Confirmation of drainage areas using design plans and Borough GIS data;
- Modeling of sediment reductions in MapShed using the Urban BMP Editor Tool; and
- On-site inspections.

For the Borough's street sweeping program, sediment reductions were based on the Borough's direct measurements of material removal by street sweeping from 2013 to 2015 and calculated by applying methods documented in Maryland Department of the Environment's (MDE's) *Accounting for Stormwater Wasteload and Impervious Acres Treated – Guidance for National Pollutant Discharge Elimination System Stormwater Permits* (August 2014).

Detailed information and supporting calculations for each implemented control measure is provided in Appendix C. A summary of implemented control measures and current progress toward required sediment reductions is provided by watershed/sub-basin in the following sections.

5.1.1 Wissahickon Creek

A summary of the implemented post-TMDL control measures and achieved sediment reduction for the Wissahickon Creek Watershed is provided below in Table 10. Table 11 summarizes the current progress toward meeting the Borough's required sediment load reduction as well as the sediment load reduction that is required by future control measures. The Borough has currently achieved 96% of the required sediment load reduction for the Wissahickon Creek Watershed. Detailed documentation of implemented control measures and sediment reduction calculations is provided in Appendix C.

Table 10. Sediment Reduction by Implemented Post-TDML Control Measures – Wissahickon Creek Watershed

Project ID	Project Name	Control Measure Type	Sediment Reduction (lbs/year)
W-1i	Street Sweeping Program	Overland Sediment Control	25,014
W-2i	Wissahickon Park Infiltration Basins and Riparian Corridor	Infiltration Basins & Riparian Restoration	61,400
Sediment Load Reduction by Implemented Control Measures:			**86,414**

Table 11. Summary of Sediment Load Reduction by Implemented Control Measures and Required Reduction by Future Control Measures – Wissahickon Creek Watershed

Updated Sediment Load Reduction Required by Lansdale Borough (lbs/year)[1]	89,216
Sediment Load Reduction by Implemented Control Measures (lbs/year)	86,414
Sediment Load Reduction Required by Future Control Measures (lbs/year)	2,802

[1]MapShed/GWLF-E Model (2016) – Refer to Table 9 of this report.

5.1.2 Skippack Creek

A summary of the implemented post-TMDL control measures and achieved sediment reduction for the Skippack Creek Watershed is provided below in Table 12. Table 13 summarizes the current progress toward meeting the Borough's required sediment load reduction as well as the sediment load reduction that is required by future control measures. The Borough has currently achieved 30% of the required sediment load reduction for the Skippack Creek Watershed. Detailed documentation of implemented control measures and sediment reduction calculations is provided in Appendix C.

Table 12. Sediment Reduction by Implemented Post-TDML Control Measures – Skippack Creek Watershed

Project ID	Project Name	Control Measure Type	Sediment Reduction (lbs/year)
S-1i	Street Sweeping Program	Overland Sediment Control	28,761
S-2i	Silk Factory Subsurface Infiltration BMP	Subsurface Infiltration BMP	8,600
S-3i	Andale Green Wet Pond BMP[1]	Wet Pond BMP	800
Sediment Load Reduction by Implemented Control Measures:			**38,161**

[1]Additional BMPs are proposed as part of this project. Sediment reduction numbers for this project will be updated upon implementation and as-built survey of these additional BMPs.

Table 13. Summary of Sediment Load Reduction by Implemented Control Measures and Required Reduction by Future Control Measures – Skippack Creek Watershed

Updated Sediment Load Reduction Required by Lansdale Borough (lbs/year)[1]	128,335
Sediment Load Reduction by Implemented Control Measures (lbs/year)	38,161
Sediment Load Reduction Required by Future Control Measures (lbs/year)	90,174

[1]MapShed/GWLF-E Model (2016) – Refer to Table 9 of this report.

5.1.3 Neshaminy Creek Sub-basin 1

A summary of the implemented post-TMDL control measures and achieved sediment reduction for the Neshaminy Creek Sub-basin 1 is provided below in Table 14. Table 15 summarizes the current progress toward meeting the Borough's required sediment load reduction as well as the sediment load reduction that is required by future control measures. The Borough has currently met and exceeded the required sediment load reduction for the Neshaminy Creek Sub-basin 1. Detailed documentation of implemented control measures and sediment reduction calculations is provided in Appendix C.

Table 14. Sediment Reduction by Implemented Post-TDML Control Measures – Neshaminy Creek Sub-basin 1

Project ID	Project Name	Control Measure Type	Sediment Reduction (lbs/year)
N1-1i	Street Sweeping Program	Overland Sediment Control	40,637
N1-2i	Elm Terrace Subsurface Infiltration BMP	Subsurface Infiltration	2,600
N1-3i	Borough Hall Complex Bioretention and Subsurface Infiltration BMPs	Bioretention and Subsurface Infiltration	1,200
N1-4i	Unique Aid Medical Office Infiltration BMP	Infiltration	400
Sediment Load Reduction by Implemented Control Measures:			**44,837**

Table 15. Summary of Sediment Load Reduction by Implemented Control Measures and Required Reduction by Future Control Measures – Neshaminy Creek Sub-basin 1

Updated Sediment Load Reduction Required by Lansdale Borough (lbs/year)[1]	38,374
Sediment Load Reduction by Implemented Control Measures (lbs/year)	44,837
Sediment Load Reduction Required by Future Control Measures (lbs/year)	0

[1]MapShed/GWLF-E Model (2016) – Refer to Table 9 of this report.

5.1.4 Neshaminy Creek Sub-basin 2

A summary of the implemented post-TMDL control measures and achieved sediment reduction for the Neshaminy Creek Sub-basin 2 is provided below in Table 16. Table 17 summarizes the current progress toward meeting the Borough's required sediment load reduction as well as the sediment load reduction that is required by future control measures. The Borough has currently achieved 41% of the required sediment load reduction for the Neshaminy Creek Sub-basin 2. Detailed documentation of implemented control measures and sediment reduction calculations is provided in Appendix C.

Table 16. Sediment Reduction by Implemented Post-TDML Control Measures – Neshaminy Creek Sub-basin 2

Project ID	Project Name	Control Measure Type	Sediment Reduction (lbs/year)
N2-1i	Street Sweeping Program	Overland Sediment Control	12,913
N2-2i	Williamson Square Subsurface Infiltration and Detention BMP	Subsurface Infiltration/Detention	1,800
Sediment Load Reduction by Implemented Control Measures:			**14,713**

Table 17. Summary of Sediment Load Reduction by Implemented Control Measures and Required Reduction by Future Control Measures – Neshaminy Creek Sub-basin 2

Updated Sediment Load Reduction Required by Lansdale Borough (lbs/year)[1]	35,881
Sediment Load Reduction by Implemented Control Measures (lbs/year)	14,713
Sediment Load Reduction Required by Future Control Measures (lbs/year)	21,168

[1]MapShed/GWLF-E Model (2016) – Refer to Table 9 of this report.

5.2 FUTURE CONTROL MEASURES

Based on the TMDL strategy development process described in Section 4.0 – Implementation Strategy Development, the Borough has developed a portfolio of "priority" future control measures to meet the Borough's remaining sediment load reduction requirements. This portfolio consists of control measures to reduce sediment from streambank erosion and includes both stormwater BMPs and streambank restoration projects.

Priority future control measures are defined in this report as sediment reduction control measure projects that the Borough intends to pursue first upon PADEP's acceptance of this TMDL strategy. Cumulatively, these priority future control measures will allow the Borough to meet and exceed its sediment load reduction requirements for all TMDL watersheds. Although conceptual designs have been developed for these projects, the Borough recognizes that issues may arise that could deem a priority project unpractical or infeasible. For this reason, the Borough has identified contingency control measures to mitigate this risk. If necessary, these contingency control measure projects could be considered for implementation to replace or supplement the priority projects identified in this report. During the implementation of this TMDL strategy, the Borough will periodically evaluate and, if necessary, update these portfolios of priority and contingency control measures.

Sediment reductions by all future control measures were modeled in MapShed using the Urban BMP Editor Tool. All stormwater BMPs have been conceptually designed per the PA Stormwater BMP Manual. While some drainage areas are larger, sediment load reduction calculations for infiltration BMPs were modeled conservatively in MapShed assuming a maximum equivalent treated drainage area at an 8-to-1 ratio of total drainage area to BMP footprint by the PA Stormwater BMP Manual.

Detailed information and supporting calculations for each priority future control measure is provided in Appendix D. A summary of potential future control measures, modeled sediment reductions, and estimated implementation costs for priority control measures is provided by watershed/sub-basin in the following sections.

5.2.1 Wissahickon Creek

A summary of the priority future control measures proposed to meet all remaining sediment load reduction requirements for the Wissahickon Creek Watershed is provided below in Table 18. Implementation of the priority future control measure will exceed the required sediment load reduction for the Wissahickon Creek Watershed. This project is already under construction, therefore contingency future control measures are not presented for this watershed. Detailed documentation of this priority future control measure and sediment reduction calculations are provided in Appendix D.

Table 18. Sediment Reduction by Priority Future Control Measure – Wissahickon Creek

Project ID	Project Name	Control Measure Type	Sediment Reduction (lbs/year)
W-1f	YMCA Detention BMPs and Basin Retrofit	Subsurface Detention Basins	5,700
Sediment Load Reduction by Priority Future Control Measures:			**5,700**
Sediment Load Reduction Required by Future Control Measures:			2,802

5.2.2 Skippack Creek

A summary of priority future control measures proposed to meet all remaining sediment load reduction requirements for the Skippack Creek Watershed is provided below in Table 19. All proposed priority future control measures are located on Borough-owned property. Implementation of these priority future control measures will exceed the required sediment load reduction for the Skippack Creek Watershed. Table 20 provides a list of contingency future control measures for this watershed. Detailed documentation of priority future control measures and sediment reduction calculations are provided in Appendix D.

Table 19. Sediment Reduction by Priority Future Control Measures – Skippack Creek

Project ID	Project Name	Control Measure Type	Sediment Reduction (lbs/year)
S-1f	White Roads Park Infiltration BMPs and Streambank Restoration	Infiltration/Streambank Restoration	55,800
S-2f	Borough Cemetery Streambank Restoration	Streambank Restoration	21,400
S-3f	Memorial Park Subsurface Infiltration BMP	Subsurface Infiltration	36,400
Sediment Load Reduction by Priority Future Control Measures:			**113,600**
Sediment Load Reduction Required by Future Control Measures:			90,174

Table 20. Sediment Reduction by Contingency Future Control Measures – Skippack Creek

Project ID	Project Location	Control Measure Type	Sediment Reduction (lbs/year)
S-1c	York Ave Elementary	Subsurface Infiltration	4,400
S-2c	Lansdale Historical Society	Infiltration/Bioretention	1,100
S-3c	629 S Mitchell Ave	Infiltration/Bioretention	2,200
S-4c	443 Church Road	Infiltration/Bioretention	8,600
S-5c	York and Susquehanna Park	Infiltration/Bioretention	2,200
S-6c	Trinity Church	Subsurface Infiltration	10,700
Sediment Load Reduction by Contingency Future Control Measures:			**29,200**

5.2.3 Neshaminy Creek Sub-basin 1

The Borough has currently met and exceeded the required sediment load reduction for the Neshaminy Creek Sub-basin 1, therefore no future control measures are proposed in this watershed.

5.2.4 Neshaminy Creek Sub-basin 2

A summary of priority future control measures proposed to meet all remaining sediment load reduction requirements for Neshaminy Creek Sub-basin 2 is provided below in Table 21. Implementation of these priority future control measures will exceed the required sediment load reduction for Neshaminy Creek Sub-basin 2. Not all priority projects may be needed to meet sediment load reduction requirements. An additional buffer is built into this portfolio (36,400 lbs/year proposed vs. 21,168 lbs/year required) due to the fact that two of three priority future control measures are located on private property. Table 22 provides a list of contingency future control measures for this watershed. Detailed documentation of priority future control measures and sediment reduction calculations are provided in Appendix D.

Table 21. Sediment Reduction by Priority Future Control Measures – Neshaminy Creek Sub-basin 2

Project ID	Project Name	Control Measure Type	Sediment Reduction (lbs/year)
N2-1f	Fourth Street Park Infiltration BMPs	Bioretention and Subsurface Infiltration	12,600
N2-2f	Lansdale Catholic Subsurface Infiltration BMP	Subsurface Infiltration	16,600
N2-3f	St. Mary's Manor Bioretention BMPs	Bioretention/Infiltration	7,200
Sediment Load Reduction by Priority Future Control Measures:			**36,400**
Sediment Load Reduction Required by Future Control Measures:			21,168

Table 22. Sediment Reduction by Contingency Future Control Measures – Neshaminy Creek Sub-basin 2

Project ID	Project Location	Control Measure Type	Sediment Reduction (lbs/year)
N2-1c	Lansdale Parks & Recreation HQ	Subsurface Infiltration	500
N2-2c	Oak St. Cul-de-Sac	Subsurface Infiltration	500
Sediment Load Reduction by Contingency Future Control Measures:			**1,000**

6.0 IMPLEMENTATION TIMELINE AND MILESTONES

The Borough intends to implement the TMDL strategy presented in this report over the next three MS4 permit cycles. Table 23 presents estimated implementation progress within each watershed at each permit cycle milestone. Table 24 outlines an approximate timeline for implementation for future control measures as well as estimated expenditures at each permit cycle milestone.

Table 23. Timeline of Progress Toward Required Sediment Load Reductions

Milestone	Progress Toward Required Sediment Load Reduction			
	Wissahickon Creek	Skippack Creek	Neshaminy Creek Sub-basin 1	Neshaminy Creek Sub-basin 2
Present	96%	30%	**117%**	41%
End of Current Permit Cycle	**100%**	30%	**117%**	41%
End of Permit Cycle 1	**100%**	73%	**117%**	76%
End of Permit Cycle 2	**100%**	90%	**117%**	**100%**
End of Permit Cycle 3	**100%**	**100%**	**117%**	**100%**

Table 24. Timeline of Control Measure Implementation and Summary of Program Cost

Milestone	Future Control Measures (Project ID)		Borough Expenditure (2016 USD)	
	Permitting / Design	Construction	Implementation	Annual O&M
Present	-	-	-	-
End of Current Permit Cycle	S-1f	W-1f	$150,000	$0
End of Permit Cycle 1	N2-1f	S-1f N2-1f	$2,000,000	$31,000
End of Permit Cycle 2	S-2f N2-2f or N2-3f	S-2f N2-2f or N2-3f	$1,900,000	$45,000
End of Permit Cycle 3	S-3f	S-3f	$1,500,000	$55,000
Estimated Total Capital Expenditure:			**$5,550,000**	

Throughout the implementation of this TMDL strategy, the Borough will routinely evaluate and update, if necessary, these proposed timelines and plans to implement specific control measures. The estimated expenditures required for the Borough to implement this TMDL strategy represent a significant hardship on the Borough and its residents. For this reason, it may be necessary for the Borough to pursue outside funding sources or new funding mechanisms to supplement the Borough's Capital Improvement Budget in order to meet the timeline outlined in this strategy. The Borough will also continue to look for other cost effective control measures and update their portfolio of potential future control measures as appropriate.

The Borough is also exploring grant and financing options as a source of long-term and stable revenue to fund future control measures identified in this TMDL strategy. During the first permit cycle, the Borough will be in communication with target audiences including institutions and private landowners to engage in discussions about Borough stormwater management needs and priority projects to solicit sites and partners for priority stormwater retrofits. For example, school sites and other institutions will be approached to discuss prospective stormwater retrofit projects that may be eligible for grants or support from the Schuylkill River Restoration Fund, Wissahickon Valley Watershed Association, or PA Environmental Council. In this way, the Borough will work to seek grants to help subsidize priority control measure projects. The Borough will also explore funding options through PA Infrastructure Investment Authority (Pennvest) (www.pennvest.pa.gov/Information/Funding) including Clean Water State Revolving Fund (CWSFR) for construction and maintenance of stormwater and watershed management projects; Non-Point Source Projects funding for brownfield and greyfield (old under used commercial real estate) redevelopment and open space repurposing; and Growing Greener Grants in which Pennvest and PADEP make grant funds available for stormwater infrastructure projects.

Additionally, as redevelopment occurs, the Borough is positioned to gain new needed stormwater management capacity since land disturbance activities at sites in excess of 1 acre must adhere to stormwater requirements, including at sites where stormwater management had not existed previously due to the age of development. The Borough will also initiate a dialogue with large commercial property owners and developers about potential opportunities for private sites to manage additional stormwater runoff above that which is required -- in this way, as sites are redeveloped they may go above their minimum stormwater management requirement and provide capacity that will help the Borough meet its TMDL goals more cost effectively.

In the first five-year permit cycle, these financing options will be evaluated and pursued and depending upon the success in funding control measures, the Borough may consider other financing methods to implement control measures identified in the TMDL strategy. The Borough is committed to working and communicating with PADEP throughout this process.

7.0 INSPECTION AND MAINTENANCE

Under the TMDL strategy, the Borough will continue to operate and expand upon its existing MS4 O&M program to ensure stormwater management practices in the Borough are properly inspected and maintained, and performing as designed in accordance with the PA BMP Manual (2006) and current standards. Borough inspection forms for municipal and private facilities are included in Appendix E.

The Borough's O&M program currently includes routine inspection and maintenance of Borough-owned stormwater BMPs. In 2015, the Borough conducted inspections of more than eleven stormwater BMPs, including basins and infiltration systems, and other stormwater management system components, and undertook needed maintenance activities. Upon PADEP acceptance of this TMDL Plan and implementation of additional control measures in the Borough, the O&M program will include routine inspection and maintenance of new practices as well.

The Borough has the authority to inspect BMPs on privately-owned sites in the Borough and performs annual inspections to identify any maintenance needs. With respect to BMPs on private property, individual property owners are responsible for proper maintenance and for BMPs installed since the adoption of Ordinance No, 1855 (2014), property owners must enter into an O&M Agreement with the Borough to provide assurances that the BMPs on their property will be properly inspected and maintained. The Borough has right-of-access authority to inspect and take needed actions to maintain BMPs on private property as circumstances warrant, and have the authority to recover its costs associated with any maintenance performed on private property.

In addition to inspecting Borough-owned stormwater facilities and private stormwater facilities as reported in the Borough's MS4 Annual Report, the Borough performs street sweeping as discussed in this TMDL Plan. The Borough's street sweeping program helps reduce the accumulation of fines, solids in stormwater inlets, conveyance structures, and facilities helping to ensure and optimize facility performance. Following inspections, which are conducted by Borough contract engineer and Borough staff, maintenance activities are undertaken to correct malfunctions and cleanout any clogged facilities. This information is currently reported to PADEP, and as new control measures and BMPs are constructed, inspection and maintenance records will be maintained and reported for all new TMDL control measures implemented.

The control measures detailed in this TMDL strategy will receive O&M based on individual BMP design and guidance in the PA BMP Manual. O&M procedures are required to be included in construction documents for all new control measures. For private sites, these required O&M procedures are articulated in O&M Agreements.

The Borough assumes responsibility for overseeing control measures implemented under its TMDL Plan and will on an ongoing basis evaluate BMP performance. This monitoring will be informed by the Borough's routine inspection program and may necessitate the addition of more rigorous inspection procedures to understand and evaluate BMP performance. Inspection teams, comprised of a PA licensed engineer and trained staff, will pay particular attention to BMPs installed on private property to support property owners with inspection and maintenance activities as it is in the best interest of private property owners and Borough for these sediment reduction control measures to perform at the highest possible level.

8.0 ORDINANCE REVIEW

The Borough over many years has adopted ordinances to establish needed authorities and comprehensively manage stormwater. These stormwater ordinances are listed in the table below. Ordinances that regulate and guide stormwater management in Lansdale Borough are contained in the Borough Sub-Division and Land Development Ordinance (SALDO) which embodies the Borough's regulations and authorities for comprehensive stormwater management.

Ordinance No	Adoption Date	Title
1226	1980	Stormwater Management
1584	1996	Stormwater Management
1726	2005	MS4 Ordinance update
1855	2014	Neshaminy 167 Model Ordinance Adoption
1881	2015	Wissahickon Ordinance update/review

Several ordinance provisions enacted to better manage stormwater, control runoff, protect stream quality and prevent degradation include:

- Requirements that stormwater management facilities be recorded as deed covenants.
- Requirements for bonds to cover stormwater facilities and provisions for Borough cost recovery.
- Requirements for stormwater management/runoff and infiltration match predevelopment conditions; this ordinance also references PA Comprehensive Stormwater Management Policy 2002, which includes managing the net change in pre and post development conditions to maximum extent possible.
- Requirement for O&M of stormwater BMPs including by private landowners and the Borough.
- Borough private property right-of-access to perform BMP inspections.
- Repealer clauses to eliminate inconsistent ordinances or parts of ordinances.
- Penalties for violations.
- Low Impact Development guidance.

On an ongoing basis, the Borough seeks to identify any inconsistencies and update stormwater regulations/code in its SALDO or zoning ordinances that might have the effect of restricting green stormwater management implementation and improve stormwater pollution controls.

During the first permit cycle of the implementation of this MS4 TMDL Strategy, the Borough will evaluate a potential ordinance amendment that would require additional stormwater volume management (beyond the current requirements) for land development and redevelopment projects within target TMDL watersheds. If this amendment is enacted, future land development and redevelopment projects will contribute to the Borough's required sediment load reduction within these watersheds and the Borough will update this MS4 TMDL Strategy to account for these future projects.

9.0 PUBLIC PARTICIPATION PLAN

Consistent with the MS4 Permit, including Minimum Control Measure (MCM) 2, and the Deficiency Letter the Borough received from PA DEP, the Borough is implementing the following public participation plan to inform the public about its stormwater management program, specifically the Borough's TMDL program, its goals, proposed control measures, and to solicit public input on the draft Lansdale Borough MS4 TMDL Strategy. The Borough also maintains a public education and outreach program as part of its overall stormwater program which aims to enlist public participation in several ways.

To solicit public comments on the draft MS4 TMDL Strategy, the Borough is taking the following steps.

- The Borough prepared a public notice to notify the public on how to review and comment on the draft MS4 TMDL Strategy. The notice informs the public that they can review a hardcopy of the Strategy at Borough Hall during the 30-day public comment period or can review it on-line at the Borough's website (www.lansdale.org). The public notice briefly describes the purpose of the strategy.
- The Borough will publish the public notice in the public notification section of *The Reporter*, an area newspaper of general circulation.
- The Borough is accepting written comments for a 30-day period public comment period from May 25, 2016 to June 24, 2016
- The Borough is accepting verbal and written comments from the public at public meeting held on June 15, 2016, at 7:00 pm at Borough Hall.
- At the conclusion of the public comment period, the Borough will review all comments received and consider modifications to the draft Strategy based on public input. The Borough will prepare a comments response document for inclusion in the final version of this draft MS4 TMDL Strategy. (Appendix G, Public Comment Response Document.)

The Borough has an ongoing public education and participation program initiated in early years of Pennsylvania's MS4 program. This program includes collaboration and membership with watershed organizations as well as Borough lead educational resources and programming, which to date has focused attention on residents, homeowners and the community at large as its' target audience. Local organizations that supplement and compliment the Borough's public education and engagement efforts include Perkiomen Watershed Conservancy (PWC), Pennsylvania Environmental Council (PEC), and Wissahickon Valley Watershed Association (WVWA). Periodic public outreach events and workshops are conducted to inform the public about stormwater issues and to encourage property owner participation in BMP projects to better control runoff. The Borough's education efforts encourage property owners to disconnect downspouts where appropriate to redirect roof and paved surface runoff onto grassy and garden areas and into rain gardens to reduce the volume of stormwater runoff entering storm drains and streams. The Wissahickon Park project completed in 2009 is an example of Borough commitment to not only better manage runoff from its older developed neighborhoods, but to demonstrate BMPs as a public education opportunity. The Borough will continue to expand its education and outreach efforts focusing on key target audiences particularly important to the success of its TMDL program including targeted outreach to commercial/industrial sites and institutional properties. This outreach will occur both independently and in collaboration with

watershed partners like WVWA, PWC, and PEC and will seek to engage property owners in stormwater retrofit projects, including those identified in this strategy. Other ways membership and collaboration with watershed groups may benefit the Borough's TMDL program, include programs like PWC's riparian tree planting/Treevitalize initiative, WVWA's residential rain barrel workshops, and PEC's southeast PA commercial property green stormwater infrastructure initiative. The Borough stormwater program and TMDL Strategy also benefit from ongoing watershed stakeholder community engagement programs including stream cleanups, school education programs, community bird walks, and other awareness-raising watershed education activities.

As the Borough moves ahead with the implementation of its MS4 TMDL Plan, these public engagement programs, including those directed to private property owners, institutions/schools, and commercial/industrial sites with potential proposed future BMPs, will become increasingly important and support the achievement of the Borough's Plan.

10.0 REFERENCES

Evans, B.M. and K.J. Corradini. *MapShed Version 1.3 Users Guide*. Penn State Institutes of Energy and the Environment, University Park, PA, Updated July 2015.

Maryland Department of the Environment (MDE), *Accounting for Stormwater Wasteload and Impervious Acres Treated – Guidance for National Pollutant Discharge Elimination System Stormwater Permits*, August 2014.

Pennsylvania Department of Environmental Protection. *Pennsylvania Stormwater Best Management Practices Manual*. Commonwealth of Pennsylvania, 2006.

U.S. Environmental Protection Agency, Region 3. *Nutrient and Siltation TMDL Development for Wissahickon Creek, Pennsylvania, Final Report*, October 2003.

U.S. Environmental Protection Agency, Region 3, *Total Maximum Daily Load (TMDL) Assessment for the Neshaminy Creek Watershed in Southeast, Pennsylvania*, December 2003.

U.S. Environmental Protection Agency, Region 3. *Total Maximum Daily Load for Skippack Creek, Montgomery County, Pennsylvania*, April 8, 2005.

APPENDIX A – DEP Deficiency Letter (FEB 26, 2015)

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

February 26, 2015

Mr. Jacob I. Ziegler
Borough of Lansdale
One Vine Street
Lansdale, PA 19446

Re: Review of MS4 TMDL Strategy
Borough of Lansdale MS4
NPDES Application No. PAG130038
Lansdale Borough, Montgomery County

Dear Mr. Ziegler:

The Department of Environmental Protection (DEP) received your Notice of Intent (NOI) for coverage under the PAG-13 MS4 NPDES General Permit on September 14, 2012. Your NOI contained a Strategy to address the Wissahickon Creek Total Maximum Daily Load (TMDL), the Skippack Creek TMDL and the Neshaminy Creek TMDL. DEP notes deficiencies with your Wissahickon Creek and Skippack Creek TMDL Strategy below.

Please note that your MS4 also drains to the Neshaminy Creek Watershed, which has an approved Sediment TMDL with assigned wasteload allocations by stream segment and not by MS4. Our review of your Neshaminy Sediment TMDL Strategy will be done at a later date and comments are not provided at this time.

Analysis of Alternative BMPs:

The Borough's required sediment reduction for the Wissahickon Creek is 17,996 lbs/year. For the Skippack Creek, the required reduction is 415,378 lbs/year.

The Borough proposes street sweeping and inlet cleaning as the primary means for achieving the required sediment load reductions in the Skippack and Wissahickon Creek watersheds. The Borough claims that its existing street sweeping program and enhanced inlet cleaning program will remove enough solids to meet the TMDL pollutant goals by this year (2015).

The Borough reports, through actual removal data, that its street sweeping program removes an average of 600 tons or 1,200,000 pounds of street sweeping debris per year. Since the Borough comprises 3.1 square miles of land, that value equates to 397,097 lbs/year. For the Wissahickon, (0.78 square mile) the Borough claims 301,935 lbs/year as a sediment reduction credit and, for the Skippack (1.0 square mile), the Borough claims 387,097 lbs/year. In addition to street sweeping, the Borough currently cleans 200 of its 1,700 inlets per year and removes approximately 150 pounds of material from each inlet. The Borough proposes to purchase a Vac

Truck which will allow 700 inlets to be cleaned each year, claiming a sediment reduction of 26,419 lbs/year in the Wissahickon and 33,871 lbs/year in the Skippack.

Claimed reductions for selected BMPs must be supported by the Pennsylvania Stormwater Best Management Practices Manual or other credible sources. Please note that pollutant reductions estimated by supporting documentation must correlate to the TMDL pollutant of concern (i.e. TSS or "street sweeping debris" does not correlate directly to sediment). For example, to correctly identify the amount of 'sediment' removed via street sweeping requires a consideration of the pre-TMDL street sweeping and inlet cleaning program (if any), as well as a determination of the fraction of sediment that is collected in the swept debris. Any program in place prior to the impairment was already considered in the stream assessment and cannot now be counted as 'reductions'. Also, consideration should be given to the frequency of the cleaning and the type of equipment used and its ability to collect 'sediment'.

In addition to street sweeping and inlet cleaning, the Borough describes additional BMP control measures:

Wissahickon Creek:

- Wissahickon Park Infiltration System and Riparian Corridor
  Existing, post-TMDL facility located on Borough park land, estimated to remove 8,204 lbs/yr of solids.
- YMCA Sediment Trap and Detention Basin
  Proposed for completion in 2014, this is a privately owned facility to serve an expanded YMCA complex, estimated to remove 2,354 lbs/yr of solids.

Skippack Creek:

- Silk Factory Subsurface Infiltration Bed System
  Existing, post-TMDL privately owned facility serving a residential condominium complex, estimated to remove 772 lbs/yr of solids.
- Andale Green Infiltration Basin System
  Proposed for completion in 2014, this is a privately owned facility serving a residential development, estimated to remove 2,707 lbs/yr of solids.

For all in-place BMPs, the Strategy should provide detailed calculations and locational information (latitude/longitude and mapping) to support the claimed reductions.

Additional BMPs will likely be needed to achieve the sediment reduction requirements of the TMDLs for the Wissahickon and Skippack Creeks. The Strategy should describe, in general, the source of the TMDL pollutant(s) and provide an explanation of the types of BMPs that are believed to be appropriate to control the pollutant(s). For sediment, the selection should consider the relative proportion of pollutant load which, according to the TMDL, results from overland flow and stream erosion. For example, if the TMDL reports that most of the in-stream sediment is a result of stream erosion, the Strategy should propose BMPs that will reduce high volume and

high peak flows. It should not propose BMPs that only control sediment in overland flow. While street sweeping and inlet cleaning are viable and approvable TMDL control measures, the impairments in both the Wissahickon Creek and Skippack Creek are mainly attributed to streambank erosion resulting from increased flow rate and volume.

The discussion of BMP types should consider locally relevant factors such as land use, percent impervious, rate of development/redevelopment, geology, soils, topography and land ownership. Included should be a logical process in which opportunities for load reductions will be pursued, with estimates of the type and general location of controls that will be implemented. Consideration should be given to the TMDL Control Measures identified in the instructions to the PAG-13 NOI and individual permit application.

Your TMDL Strategy needs to describe readily-accomplished opportunities to reduce pollutant loads. If there are existing BMPs which could be readily modified to improve their pollutant control capability (e.g., flood control BMPs) the Strategy should indicate that the Design Details will analyze their potential for improved stormwater management. Can property owners be encouraged to install voluntary retrofits? Are there other opportunities like planned construction projects (public and private)? Will sufficient controls be installed as a result of development, redevelopment and voluntary actions to satisfy the TMDL?

The above should be supported with examples of specific control measures, complete with locational information, which should be analyzed further in the Design Details.

Ordinance Review:

Permittees are encouraged but not required to evaluate the current stormwater ordinance, subdivision and land development ordinance and zoning ordinance. The purpose is to identify inconsistencies which would restrict the implementation of green stormwater management. At the permittee's discretion, ordinances may also include requirements which result in additional pollution controls.

Plan for Achieving Ultimate TMDL Obligations:

The Strategy must describe, in general, the BMPs that will be used to achieve the TMDL-required pollutant loading reductions. The total reductions must equal or exceed the required total reduction. Since, as noted above, credits claimed for street sweeping and inlets cleaning are subject to change, additional BMPs may be needed.

Claimed reductions must be supported by the Pennsylvania Stormwater Best Management Practices Manual or other credible sources.

Net Reductions for BMPs under Chapter 102:

Claimed reductions of pollutants of concern must be supported by the Pennsylvania Stormwater Best Management Practices Manual or other credible sources. For example, documented load

reductions from BMPs installed as a result of development/redevelopment may have a net reduction which may be able to be credited if pre-development pollutant loads are greater than post-development pollutant loads.

Permit-Term BMPs:

Please note that the TMDL Design Details must provide a list of BMPs to be implemented during the remainder of the current permit term, how such BMPs will reduce pollutant loads, an estimate of the pollutant load reductions, locational information, and a timeline for implementation. Proposed BMPs that will be installed following the current permit term should be identified but do not require this level of detail.

Operation & Maintenance

Please note that the Strategy should address operation and maintenance plans for existing BMPs for which you are claiming credit, and the Design Details should explain how appropriate operation and maintenance will be assured for each proposed BMP.

Miscellaneous:

The combined sediment load for the Wissahickon Creek from stream bank erosion and overland flow is 70,328 lbs/yr and the Wasteload Allocation is 52,332 lbs/year (with rounding), resulting in a required sediment load reduction of 17,996 lbs/year. Section 3.6 references a sediment load of 70,719 lbs/year. Section 3.7 and Table 3-1 reference a sediment load reduction of 18,387 lbs/year. The values need to be consistent with the TMDL. Please review and revise as necessary.

Public Participation and Involvement:

DEP is requiring that you take measures to solicit public involvement and participation for your revised TMDL Strategy to satisfy MCM-2. The required measures are as follows:

- Make a complete copy of the Strategy available for public review.
- Publish, in a newspaper of general circulation in the area, a public notice containing a statement describing the Strategy, where it may be reviewed by the public, and the length of time the permittee will provide for the receipt of comments.
- Accept written comments for a minimum of 30 days from the date of public notice.
- Accept any verbal or written comments from any interested member of the public at a public meeting or hearing.

- Consider and make a record of the consideration of each timely comment received from the public during the public comment period concerning the Strategy, identifying any changes made to the Strategy in response to the comment.

In your resubmission of the TMDL Strategy to DEP, please include a copy of the newspaper notice, a copy of all written comments received from the public and a copy of the permittee's record of consideration of all timely comments received in the public comment period.

DEP has recently updated its Standard Operating Procedures (SOPs) relating to the review of TMDL Strategies. All MS4s are invited to review the SOPs, which may assist in understanding what DEP is seeking in the submission of revised TMDL Strategies. To review the SOPs please visit DEP's website at www.depweb.state.pa.us, click on Program Integration, and then Standard Operating Procedures. Open the SOPs applicable to MS4s under the section for the Bureau of Point and Non-Point Source Management (see Section IV in the SOPs).

DEP wishes to clarify the issue of your current permit coverage. The PAG-13 General NPDES Permit that was originally issued in 2003, was administratively extended multiple times. Between 2008 and 2013, your MS4 operated under the administratively extended General Permit. On March 16, 2013, a new General Permit became effective. If you submitted a timely NOI, you are currently operating under the new PAG-13 General Permit. The General Permit is available on DEP's website (visit www.elibrary.dep.state.pa.us, select "Permit and Authorization Packages", "Point and Non-Point Source Management", "National Pollutant Discharge Elimination System – NPDES", "Municipal Separate Storm Sewer Systems – MS4s", and "PAG-13 General Permit"). While you must comply with the terms and conditions set forth in the new General Permit, you are not required to develop the "TMDL Design Details" portion of the overall TMDL Plan unless and until DEP approves your TMDL Strategy.

Please be advised that DEP is currently planning for the subsequent permit term. At this time DEP is proposing that MS4s subject to wasteload allocations (WLAs) in a TMDL for nutrient and/or sediment will need to develop and submit an integrated TMDL Plan with an individual permit application for the subsequent permit term. For many MS4s the individual permit application will be due in September 2017. DEP is sharing this information with you now to help you prepare for work that may be necessary over the next two years. TMDL Plans would not be necessary where WLAs are assigned for pollutants other than nutrients and/or sediment. Please check DEP's website at www.depweb.state.pa.us/MS4 for additional updates in 2015.

Please be advised that the Department is hosting free MS4 training sessions across the state to help municipalities and other permittees comply with NPDES requirements. You are encouraged to attend this training. Discussion regarding the BMP selection will be included in the TMDL Plan Training. The details regarding the training can be found on DEP's website at www.depweb.state.pa.us/MS4.

A resubmission of your TMDL Strategy addressing the issues identified in this letter is due no later than **December 31, 2015.** Please provide one original and two copies of the revised Strategy.

If you have any questions concerning this notice, or would like to schedule a meeting, please contact Laurel Ateyeh at 484.250.5198 or lateyeh@pa.gov.

Sincerely,

Jenifer L. Fields, P.E.
Clean Water Program Manager
Southeast Regional Office

cc: Mr. Morgan, P.E. – SC Engineers, Inc.
Mr. Patel, P.E. – Chief, Permits Section
Mr. O'Neil – Chief, Operations Section
Mr. Breitenstein
Mr. Gaul - Central Office, BPNPSM
File

APPENDIX B – Updated Baseline Sediment Loads, Required Reduction Calculations, and MapShed Documentation

Updated Baseline Loads and Required Load Reductions (MapShed 2016)

Wissahickon

Note: Wissahickon Creek Sediment TMDL was developed for sub-basin 9130 ('Headwaters')
New baseline sediment load for sub-basin 9130: 6933.3 tons (13,866,620 lbs)
Baseline for Lansdale based on Urban Area Tool: 171.6 tons (343,139 lbs)
Lansdale required sediment reduction percent: 26%
Lansdale load reduction required: 0.26 * 171.6 tons = **44.6 tons (89,216 lbs)**

Skippack

New baseline sediment load for Skippack watershed: 17,797.4 tons (35,594,838 lbs)
Baseline for Lansdale based on Urban Area Tool: 356.5 tons (712,971 lbs)
Lansdale required sediment reduction percent: 18%
Lansdale load reduction required: 0.18 * 356.5 tons = **64.1 tons** (**128,335 lbs**)

Neshaminy (Sub-Basin 1)

New baseline sediment load for Sub-Basin 1: 214.2 tons (428,259 lbs)
Baseline for Lansdale based on Urban Area Tool: 119.9 tons (239,835 lbs)
Lansdale required sediment reduction percent: 16%
Lansdale load reduction required: 0.16 * 119.9 tons = **19.2 tons (38,374 lbs)**

Neshaminy (Sub-Basin 2)

New baseline sediment load for Sub-Basin 2: 336.1 tons (672,203 lbs)
Baseline for Lansdale based on Urban Area Tool: 32.0 tons (64,074 lbs)
Lansdale required sediment reduction percent: 56%
Lansdale load reduction required: 0.56 * 32.0 tons = **18.0 tons (35,881 lbs)**

GWLF Total Loads for file: Wissahickon_recalculatedb Period of analysis: 23 years from 1975 to 1997

Source	Area (Acres)	Runoff (in)	Tons		Total Loads (Pounds)			
			Erosion	Sediment	Dissolved N	Total N	Dissolved P	Total P
Hay/Pasture	1194	2.8	358.1	45.1	574.8	754.6	97.9	121.1
Cropland	445	4.9	1711.2	215.4	1417.7	2277.1	62.4	173.3
Forest	2931	2.4	80.1	10.1	306.8	347.0	16.2	21.3
Wetland	259	7.3	7.1	0.9	81.6	85.1	4.3	4.8
Disturbed	835	8.7	150.4	18.9	33.0	108.6	16.5	26.3
Turfgrass	292	2.1	36.4	4.6	343.9	362.2	11.7	14.1
Open Land	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bare Rock	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sandy Areas	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unpaved Roads	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LD Mixed	69	3.5	0.0	0.6	7.4	26.2	1.1	2.8
MD Mixed	1295	10.2	0.0	44.7	568.7	1873.6	81.7	213.3
HD Mixed	2298	14.6	0.0	79.3	1009.3	3325.2	145.0	378.6
LD Residential	937	3.5	0.0	7.7	100.6	354.8	14.3	38.3
MD Residential	6309	6.0	0.0	217.8	2770.6	9128.2	398.0	1039.4
HD Residential	988	8.4	0.0	34.1	434.1	1430.2	62.4	162.9
Farm Animals						0.0		0.0
Tile Drainage				0.0		0.0		0.0
Stream Bank				6254.1		6236.9		804.7
Groundwater					79446.7	79446.7	1212.3	1212.3
Point Sources					0.0	0.0	0.0	0.0
Septic Systems					6125.9	6125.9	0.0	0.0
Totals	17850.9	6.70	2343.2	6933.3	93220.9	111882.2	2123.7	4213.2

Go Back | Pathogen Loads | Export to JPEG | Print | Close

Updated Baseline Sediment Load for Wissahickon sub-basin 9130 (entire basin)

GWLF Total Loads for file: Skippack_recalculatedbase Period of analysis: 23 years from 1975 to 1997

Source	Area (Acres)	Runoff (in)	Tons		Total Loads (Pounds)			
			Erosion	Sediment	Dissolved N	Total N	Dissolved P	Total P
Hay/Pasture	5916	1.1	1880.6	192.8	1093.8	1864.8	266.0	477.3
Cropland	2276	2.8	8205.9	841.1	4249.7	7614.1	267.3	1189.2
Forest	8369	0.8	297.6	30.5	300.5	422.5	15.8	49.3
Wetland	257	4.2	5.1	0.5	46.1	48.1	2.4	3.0
Disturbed	2345	6.2	518.8	53.2	65.8	278.5	32.9	91.2
Turfgrass	297	0.7	47.2	4.8	116.2	135.6	8.4	13.7
Open Land	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bare Rock	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sandy Areas	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unpaved Roads	5	4.9	38.6	4.0	1.0	16.8	0.0	4.4
LD Mixed	67	3.5	0.0	0.6	7.1	25.4	1.0	2.7
MD Mixed	1596	10.2	0.0	55.3	708.5	2333.7	101.6	265.4
HD Mixed	2817	14.6	0.0	97.6	1250.3	4118.3	179.3	468.3
LD Residential	2911	3.5	0.0	24.0	310.9	1105.9	44.2	119.1
MD Residential	7468	6.0	0.0	258.7	3314.4	10917.1	475.4	1241.4
HD Residential	1344	8.4	0.0	46.6	596.6	1965.2	85.6	223.5
Farm Animals						0.0		0.0
Tile Drainage				0.0		0.0		0.0
Stream Bank				16187.9		16188.5		4435.7
Groundwater					181149.3	181149.3	2631.4	2631.4
Point Sources					0.0	0.0	0.0	0.0
Septic Systems					18626.6	18626.6	0.0	0.0
Totals	35667.1	4.50	10993.8	17797.4	211836.9	246810.6	4111.5	11215.4

Go Back | Pathogen Loads | Export to JPEG | Print | Close

Updated Baseline Sediment Load for Skippack watershed (entire watershed)

GWLF Total Loads for file: NeshSB1_recalculatedbase Period of analysis: 23 years from 1975 to 1997

Source	Area (Acres)	Runoff (in)	Tons		Total Loads (Pounds)			
			Erosion	Sediment	Dissolved N	Total N	Dissolved P	Total P
Hay/Pasture	64	2.8	3.7	0.7	31.0	33.9	7.3	8.0
Cropland	30	4.9	38.8	7.4	94.8	124.2	5.8	13.4
Forest	86	2.4	0.3	0.1	9.1	9.3	0.5	0.5
Wetland	2	7.3	0.0	0.0	0.8	0.8	0.0	0.0
Disturbed	69	8.7	1.6	0.3	2.7	4.0	1.4	1.7
Turfgrass	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Open Land	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bare Rock	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sandy Areas	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unpaved Roads	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LD Mixed	10	3.5	0.0	0.1	1.2	3.7	0.2	0.4
MD Mixed	44	10.2	0.0	1.5	23.7	76.6	3.3	8.5
HD Mixed	519	14.6	0.0	17.6	276.9	893.6	38.5	99.6
LD Residential	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MD Residential	531	6.0	0.0	18.0	283.5	914.9	39.4	102.0
HD Residential	188	8.4	0.0	6.4	100.2	323.4	14.0	36.0
Farm Animals						0.0		0.0
Tile Drainage				0.0		0.0		0.0
Stream Bank				162.2		163.1		41.9
Groundwater					3861.9	3861.9	82.1	82.1
Point Sources					0.0	0.0	0.0	0.0
Septic Systems					32.0	32.0	0.0	0.0
Totals	1544.4	9.10	44.5	214.2	4717.8	6441.3	192.5	394.3

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Updated Baseline Sediment Load for Neshaminy Sub-basin 1 (entire sub-basin)

GWLF Total Loads for file: NeshSB2_recalculatedbase Period of analysis: 23 years from 1975 to 1997

Source	Area (Acres)	Runoff (in)	Tons		Total Loads (Pounds)			
			Erosion	Sediment	Dissolved N	Total N	Dissolved P	Total P
Hay/Pasture	77	2.8	0.0	0.0	37.0	37.0	7.0	7.0
Cropland	12	4.9	0.0	0.0	39.5	39.5	1.9	1.9
Forest	235	2.4	0.0	0.0	24.6	24.6	1.3	1.3
Wetland	17	7.3	0.0	0.0	5.4	5.4	0.3	0.3
Disturbed	111	8.7	0.0	0.0	4.4	4.4	2.2	2.2
Turfgrass	104	2.1	0.0	0.0	122.7	122.7	5.5	5.5
Open Land	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bare Rock	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sandy Areas	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unpaved Roads	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LD Mixed	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MD Mixed	114	10.2	0.0	3.8	52.5	172.3	7.5	19.6
HD Mixed	521	14.6	0.0	17.6	241.0	790.3	34.4	89.7
LD Residential	12	3.5	0.0	0.1	1.3	4.7	0.2	0.5
MD Residential	1085	6.0	0.0	36.7	501.4	1644.2	71.6	186.6
HD Residential	168	8.4	0.0	5.7	77.7	254.7	11.1	28.9
Farm Animals						0.0		0.0
Tile Drainage				0.0		0.0		0.0
Stream Bank				272.1		271.2		46.3
Groundwater					7050.7	7050.7	142.9	142.9
Point Sources					0.0	0.0	0.0	0.0
Septic Systems					78.2	78.2	0.0	0.0
Totals	2456.2	7.70	0.0	336.1	8236.4	10499.9	285.9	532.6

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Updated Baseline Sediment Load for Neshaminy Sub-basin 2 (entire sub-basin)

Select input data file: P:\PROJECTS\71315 - LANSDALE TMDL\Received\20160307_MapShed_input_files_Wissahickon_Skippa

Watershed Totals | **Municipality Loads** | Regulated Loads | Unregulated Loads

View loads for municipality: Lansdale Boro (41432)

Source	Source Area (ac)	Sediment Total Load (lb)	Sediment Loading Rate (lb/ac)	Nitrogen Total Load (lb)	Nitrogen Loading Rate (lb/ac)	Phosphorus Total Load (lb)	Phosphorus Loading Rate (lb/ac)
Hay/Pasture	15	1132.50	75.50	9.50	0.63	1.50	0.10
Cropland	2	1936.60	968.30	10.20	5.12	0.80	0.39
Forest	22	151.80	6.90	2.60	0.12	0.20	0.01
Wetland	0	0.00	0.00	0.00	0.00	0.00	0.00
Disturbed	20	908.00	45.40	2.60	0.13	0.60	0.03
Turfgrass	0	0.00	0.00	0.00	0.00	0.00	0.00
Open Land	0	0.00	0.00	0.00	0.00	0.00	0.00
Bare Rock	0	0.00	0.00	0.00	0.00	0.00	0.00
Sandy Areas	0	0.00	0.00	0.00	0.00	0.00	0.00
Unpaved Roads	0	0.00	0.00	0.00	0.00	0.00	0.00
LD Mixed	0	0.00	0.00	0.00	0.00	0.00	0.00
MD Mixed	20	1380.00	69.00	29.00	1.45	3.20	0.16
HD Mixed	64	4416.00	69.00	92.80	1.45	10.20	0.16
LD Residential	5	82.00	16.40	1.90	0.38	0.20	0.04
MD Residential	284	19596.00	69.00	411.80	1.45	45.40	0.16
HD Residential	12	829.20	69.10	17.40	1.45	1.90	0.16
Water	0						Source Weighting
Farm Animals				0.0		0.0	0.000
Tile Drainage		0.00		0.0		0.0	0.000
Stream Bank		312706.59		155.9		20.1	0.025
Groundwater				1986.2		30.3	0.025
Point Sources				0.0		0.0	0.000
Septic Systems				153.1		0.0	0.025
Totals	444	343138.7		2873.0		114.4	

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Updated Baseline for Lansdale Borough in Wissahickon sub-basin 9130 (Urban Area Tool output)

Select input data file: P:\PROJECTS\71315 - LANSDALE TMDL\Received\20160307_MapShed_input_files_Wissahickon_Skippa

Watershed Totals | **Municipality Loads** | Regulated Loads | Unregulated Loads

View loads for municipality: Lansdale Boro (41432)

Source	Source Area (ac)	Sediment Total Load (lb)	Sediment Loading Rate (lb/ac)	Nitrogen Total Load (lb)	Nitrogen Loading Rate (lb/ac)	Phosphorus Total Load (lb)	Phosphorus Loading Rate (lb/ac)
Hay/Pasture	27	1760.40	65.20	8.60	0.32	2.20	0.08
Cropland	0	0.00	0.00	0.00	0.00	0.00	0.00
Forest	20	146.00	7.30	1.00	0.05	0.20	0.01
Wetland	0	0.00	0.00	0.00	0.00	0.00	0.00
Disturbed	27	1225.80	45.40	3.20	0.12	1.10	0.04
Turfgrass	0	0.00	0.00	0.00	0.00	0.00	0.00
Open Land	0	0.00	0.00	0.00	0.00	0.00	0.00
Bare Rock	0	0.00	0.00	0.00	0.00	0.00	0.00
Sandy Areas	0	0.00	0.00	0.00	0.00	0.00	0.00
Unpaved Roads	0	0.00	0.00	0.00	0.00	0.00	0.00
LD Mixed	0	0.00	0.00	0.00	0.00	0.00	0.00
MD Mixed	0	0.00	0.00	0.00	0.00	0.00	0.00
HD Mixed	205	14206.50	69.30	299.30	1.46	34.90	0.17
LD Residential	30	495.00	16.50	11.40	0.38	1.20	0.04
MD Residential	116	8038.80	69.30	169.40	1.46	19.70	0.17
HD Residential	104	7207.20	69.30	151.80	1.46	17.70	0.17
Water	0						Source Weighting
Farm Animals				0.0		0.0	0.000
Tile Drainage		0.00		0.0		0.0	0.000
Stream Bank		679891.39		340.0		93.1	0.021
Groundwater				2717.2		39.5	0.015
Point Sources				0.0		0.0	0.000
Septic Systems				279.4		0.0	0.015
Totals	529	712971.1		3981.3		209.6	

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Updated Baseline for Lansdale Borough in Skippack watershed (Urban Area Tool output)

Select input data file: P:\PROJECTS\71315 - LANSDALE TMDL\Received\20160314_MapShed_input_files_Neshaminy\Neshami

Watershed Totals | **Municipality Loads** | Regulated Loads | Unregulated Loads

View loads for municipality: Lansdale Boro (41432)

Source	Source Area (ac)	Sediment Total Load (lb)	Sediment Loading Rate (lb/ac)	Nitrogen Total Load (lb)	Nitrogen Loading Rate (lb/ac)	Phosphorus Total Load (lb)	Phosphorus Loading Rate (lb/ac)
Hay/Pasture	25	550.00	22.00	13.30	0.53	3.30	0.13
Cropland	12	5890.80	490.90	49.70	4.14	5.40	0.45
Forest	12	15.60	1.30	1.30	0.11	0.10	0.01
Wetland	0	0.00	0.00	0.00	0.00	0.00	0.00
Disturbed	27	240.30	8.90	1.60	0.06	0.50	0.02
Turfgrass	0	0.00	0.00	0.00	0.00	0.00	0.00
Open Land	0	0.00	0.00	0.00	0.00	0.00	0.00
Bare Rock	0	0.00	0.00	0.00	0.00	0.00	0.00
Sandy Areas	0	0.00	0.00	0.00	0.00	0.00	0.00
Unpaved Roads	0	0.00	0.00	0.00	0.00	0.00	0.00
LD Mixed	0	0.00	0.00	0.00	0.00	0.00	0.00
MD Mixed	0	0.00	0.00	0.00	0.00	0.00	0.00
HD Mixed	405	27459.00	67.80	696.60	1.72	77.00	0.19
LD Residential	0	0.00	0.00	0.00	0.00	0.00	0.00
MD Residential	74	5017.20	67.80	127.30	1.72	14.10	0.19
HD Residential	166	11238.20	67.70	285.50	1.72	31.50	0.19
Water	0						Source Weighting
Farm Animals				0.0		0.0	0.000
Tile Drainage		0.00		0.0		0.0	0.000
Stream Bank		189423.38		95.3		24.5	0.584
Groundwater				1900.0		40.4	0.492
Point Sources				0.0		0.0	0.000
Septic Systems				0.0		0.0	0.000
Totals	721	239834.5		3170.6		196.8	

Print | Export to JPEG | Exit

Updated Baseline for Lansdale Borough in Nesh. Sub-Basin 1 (Urban Area Tool output)

Select input data file: P:\PROJECTS\71315 - LANSDALE TMDL\Received\20160314_MapShed_input_files_Neshaminy\Neshami

Watershed Totals | **Municipality Loads** | Regulated Loads | Unregulated Loads

View loads for municipality: Lansdale Boro (41432)

Source	Source Area (ac)	Sediment Total Load (lb)	Sediment Loading Rate (lb/ac)	Nitrogen Total Load (lb)	Nitrogen Loading Rate (lb/ac)	Phosphorus Total Load (lb)	Phosphorus Loading Rate (lb/ac)
Hay/Pasture	7	0.00	0.00	3.40	0.48	0.60	0.09
Cropland	0	0.00	0.00	0.00	0.00	0.00	0.00
Forest	0	0.00	0.00	0.00	0.00	0.00	0.00
Wetland	0	0.00	0.00	0.00	0.00	0.00	0.00
Disturbed	2	0.00	0.00	0.10	0.04	0.00	0.00
Turfgrass	0	0.00	0.00	0.00	0.00	0.00	0.00
Open Land	0	0.00	0.00	0.00	0.00	0.00	0.00
Bare Rock	0	0.00	0.00	0.00	0.00	0.00	0.00
Sandy Areas	0	0.00	0.00	0.00	0.00	0.00	0.00
Unpaved Roads	0	0.00	0.00	0.00	0.00	0.00	0.00
LD Mixed	0	0.00	0.00	0.00	0.00	0.00	0.00
MD Mixed	35	2362.50	67.50	52.90	1.51	6.00	0.17
HD Mixed	27	1827.90	67.70	41.00	1.52	4.60	0.17
LD Residential	0	0.00	0.00	0.00	0.00	0.00	0.00
MD Residential	109	7368.40	67.60	165.70	1.52	18.50	0.17
HD Residential	20	1354.00	67.70	30.40	1.52	3.40	0.17
Water	0						Source Weighting
Farm Animals				0.0		0.0	0.000
Tile Drainage		0.00		0.0		0.0	0.000
Stream Bank		51161.23		25.5		4.4	0.094
Groundwater				698.0		14.1	0.099
Point Sources				0.0		0.0	0.000
Septic Systems				0.0		0.0	0.000
Totals	200	64074.0		1017.0		51.6	

Print | Export to JPEG | Exit

Updated Baseline for Lansdale Borough in Nesh. Sub-Basin 2 (Urban Area Tool output)

APPENDIX C – Implemented Control Measures Supporting Documentation

STREET SWEEPING PROGRAM DOCUMENTATION

The Borough has a scheduled program for street cleaning. The program utilizes the single mechanical street sweeper (Johnston sweeper model J3000; year 2010) pictured below.

This sweeper is in operation ~9 months of each year and is deployed every day with the exception of winter months, holidays, severe weather days, or days when shop repairs are necessary. This vehicle is also used to clean up after special events in the Borough which may generate street litter. All debris collected by the street sweeper is disposed of or recycled properly.

The Borough's street sweeping program divides the entire Borough into four quadrants and the street sweeper works to clean all streets within a designated quadrant before moving on to the next. No street is swept twice before all streets in the Borough have been cleaned. After all four quadrants have been completed, the process is repeated. Adhering to this schedule, each quadrant is cleaned ~10 times per year.

The detailed recalculation of sediment removed via Borough street sweeping is provided in table below:

Material	Quantity	Unit	Assumptions/Source
Volume of grit removed (average year)	224	cy (grit)	volume of material removed by street sweeping in entire Borough (2013-2015 data) after screening to remove trash and leaves
Tons of grit removed (average year)	257.6	tons (grit)	assumes unit weight of 1.15 tons of grit/cy of grit; based on Borough weigh tickets
Sediment removed (average year)	108,192.0	lbs TSS	applies conversion of 420 lbs TSS/ton of material removed --- as per MD Dept. of Env., 2014[1]
[1] Maryland Department of the Environment (2014). "Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated." August, 2014.			

The annual volume of grit removed is based on yearly truck counts from 2013, 2014, and 2015. This value excludes trash and leaves which are screened prior to hauling. Grit hauling is performed by four Borough-owned Public Works vehicles, one of which is pictured below.

As the annual weight of sediment removed by street sweeping corresponds to the entire Borough (and is not otherwise broken out by watershed), the amount of sediment removed from street sweeping in each watershed basin area was weighted proportionally by the length of public streets within each watershed (see table below). This approach, while imperfect (overland sediment is not the same per unit length of road within the watershed), was deemed more appropriate than weighting by watershed basin area, as the density of streets varies.

Sub Basin Name	LF of public roads	% of total road length	Sediment removed via street sweeping (lbs/yr)
Wissahickon	61,764	23.1%	25,014
Skippack	71,016	26.6%	28,761
Upper Neshaminy Sub Basin 1	100,339	37.6%	40,637
Upper Neshaminy Sub Basin 2	34,023	12.7%	12,913*
TOTAL	267,142	100.0%	107,326

** Calculated sediment removal in Upper Neshaminy Sub Basin 2 was adjusted based on the overland sediment baseline load from MapShed. As a result, total sediment removed is slightly less than table above.*

An annual volume is based on yearly truck counts dating back to 2013, 2014, and 2015. This value excludes trash (which is pre-screened), but includes organic debris (mostly leaf litter) and grit.

Weight tickets from the Borough, used to calculate the average unit weight of grit (material removed by street sweeping after screening to remove trash and organic debris), are provided on the next page.

H & K MATERIALS

DIV. OF HAINES & KIBBLEHOUSE, INC.
P.O. BOX 1 • CHALFONT, PA. 18914
CRUSHED and BUILDING STONE
822-1961 822-2200

DATE

NAME LANSDALE — 5-4-16
ADDRESS BOROUGH — WEIGH BY [illegible]
JOB — WEIGH # 015797
DELIVERED BY OWN # 15 — ADDRESS

ITEM	WEIGHT		
Sweeper grit	GROSS 32380 LBS.	TRUCK LIC.	
	TARE 17860 LBS.	TRAILER LIC.	
	NET 14520 LBS.	PER TON	AMOUNT
	7.26 TN		
RECEIVED BY:		TAX	
		TOTAL	

9421

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H & K MATERIALS

DIV. OF HAINES & KIBBLEHOUSE, INC.
P.O. BOX 1 • CHALFONT, PA. 18914
CRUSHED and BUILDING STONE
822-1961 822-2200

DATE

NAME LANSDALE — 5-4-16
ADDRESS BOROUGH — WEIGH BY [illegible]
JOB — WEIGH # 015797
DELIVERED BY OWN # 12 — ADDRESS

ITEM	WEIGHT		
Sweeper grit	GROSS 29200 LBS.	TRUCK LIC.	
	TARE 17180 LBS.	TRAILER LIC.	
	NET 12020 LBS.	PER TON	AMOUNT
	6.01 TN		
RECEIVED BY:		TAX	
		TOTAL	

9422

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H & K MATERIALS

DIV. OF HAINES & KIBBLEHOUSE, INC.
P.O. BOX 1 • CHALFONT, PA. 18914
CRUSHED and BUILDING STONE
822-1961 822-2200

DATE

NAME Lansdale — 5-4-16
ADDRESS Borough — WEIGH BY [illegible]
JOB — WEIGH # 015797
DELIVERED BY OWN # LA14 — ADDRESS

ITEM	WEIGHT		
Sweeper grit	GROSS 31060 LBS.	TRUCK LIC.	
	TARE 16100 LBS.	TRAILER LIC.	
	NET 14960 LBS.	PER TON	AMOUNT
	7.48 TN		
RECEIVED BY:		TAX	
		TOTAL	

9420

CUSTOMERS COPY

IMPLEMENTED CONTROL MEASURES - SEDIMENT REDUCTION MODELING (MAPSHED)

All implemented control measures (excluding Street Sweeping, see preceding pages) were modeled individually in MapShed using the Urban BMP Editor.

The resulting sediment removal associated with each BMP was obtained by comparing the MapShed modeled output with the baseline watershed modeled output provided in Appendix B. For each BMP, the calculated sediment reduction is the difference in sediment load (reported in tons) between the BMP modeled output and the watershed baseline load (see highlighted cells).

Specific modeling considerations that went into modeling sediment reduction per BMP are as follows:

- All implemented BMPs were evaluated as described in Section 5.1 prior to modeling.

- For implemented BMPs that were installed as part of redevelopment projected, sediment reduction was modeled only for the pre-TMDL unmanaged impervious area. This approach was taken to ensure that sediment reduction was only calculated for redevelopment projects managing stormwater beyond permitted requirements.

- All implemented BMPs (except Street Sweeping) were modeled in MapShed following the guidance in the MapShed Manual. Implemented BMPs included in this strategy were modeled as stream protection projects or infiltration/bioretention control measures with the exception of control measure S-3i (Andale Green) which is an implemented wet pond BMP. This BMP was modeled as a constructed wetland according to MapShed Manual Table J1 – *Recommended usage of GWLF-E BMP options for various urban BMPS cited in PaDEP's 2006 stormwater manual*.

- All infiltration and detention BMPs were modeled in the Urban BMP Editor as infiltration/bioretention control measures. These BMPs were modeled by entering drainage area managed and 1 inch (2.54 centimeters) or runoff retention. This approach is taken to be conservative given the detailed design of future BMPs may actually allow for larger amount of runoff retention and sediment reduction.

- All stream protection control measures were modeled in the Urban BMP Editor either as a riparian corridor enhancement or as streambank stabilization. For riparian corridor control measures, the width of vegetative buffer strip was input. For streambank stabilization control measures, the length of stream segment with stabilized banks (in kilometers) was input.

DRAINAGE AREA MAP

WATERSHED: WISSAHICKON CREEK

ANNUAL SEDIMENT REDUCTION: 61,400 LBS/YEAR

CONTROL MEASURE TYPE: INFILTRATION BASINS & RIPARIAN RESTORATION

PROJECT STATUS: IMPLEMENTED

DESCRIPTION: Four infiltration basin BMPs featuring forebays, wetland plantings and swales were built in 2009 to intercept four stormwater pipes that were directly discharging into the Wissahickon Creek on Borough-owned property. These basins receive runoff from a 35.3-acre drainage area, filtering sediment before runoff reaches the Wissahickon Creek while reducing stormwater volume previously contributing to erosive flows. In addition to the basins, a 30-foot-wide riparian corridor was established along each side of a 900 LF stream segment, further enhancing streambank condition and reducing future in-stream erosion. Inspection and maintenance of this project is conducted by the Borough.

W-2i: WISSAHICKON PARK INFILTRATION BASINS AND RIPARIAN CORRIDOR

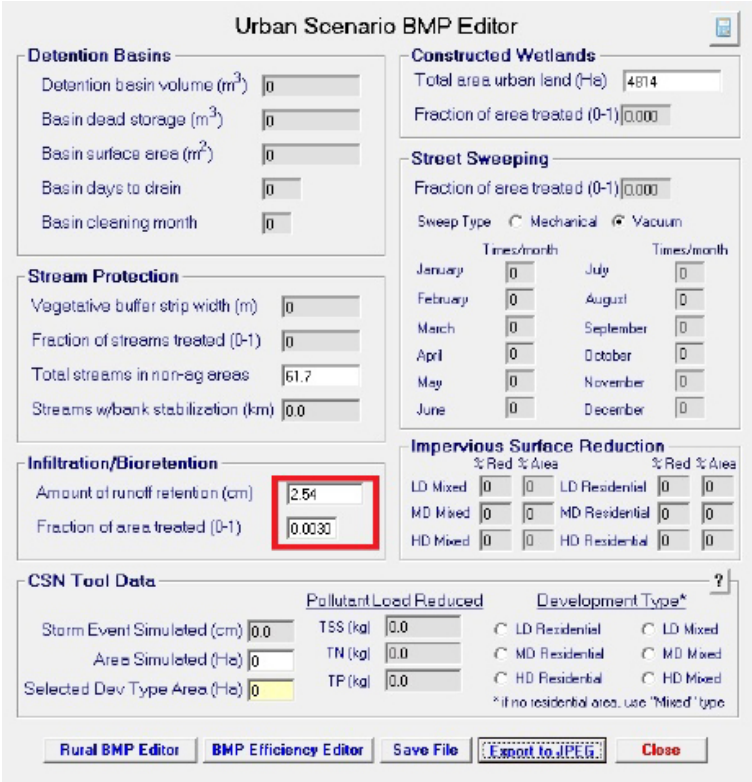
ADDRESS: *757 E MAIN STREET, LANSDALE, PA 19946*

LATITUDE, LONGITUDE: *40° 13’ 57.198” N, 75° 15’ 55.256” W*

W-2i: WISSAHICKON PARK INFILTRATION BASINS AND RIPARIAN CORRIDOR

SITE PHOTOS

W-2i: WISSAHICKON PARK INFILTRATION BASINS



Urban Scenario BMP Editor

Detention Basins

Detention basin volume (m^3)	0
Basin dead storage (m^3)	0
Basin surface area (m^2)	0
Basin days to drain	0
Basin cleaning month	0

Constructed Wetlands

Total area urban land (Ha)	4814
Fraction of area treated (0-1)	0.000

Street Sweeping

Fraction of area treated (0-1) 0.000

Sweep Type ○ Mechanical ◉ Vacuum

	Times/month		Times/month
January	0	July	0
February	0	August	0
March	0	September	0
April	0	October	0
May	0	November	0
June	0	December	0

Stream Protection

Vegetative buffer strip width (m)	0
Fraction of streams treated (0-1)	0
Total streams in non-ag areas	61.7
Streams w/bank stabilization (km)	0.0

Impervious Surface Reduction

	% Red	% Area		% Red	% Area
LD Mixed	0	0	LD Residential	0	0
MD Mixed	0	0	MD Residential	0	0
HD Mixed	0	0	HD Residential	0	0

Infiltration/Bioretention

Amount of runoff retention (cm)	2.54
Fraction of area treated (0-1)	0.0030

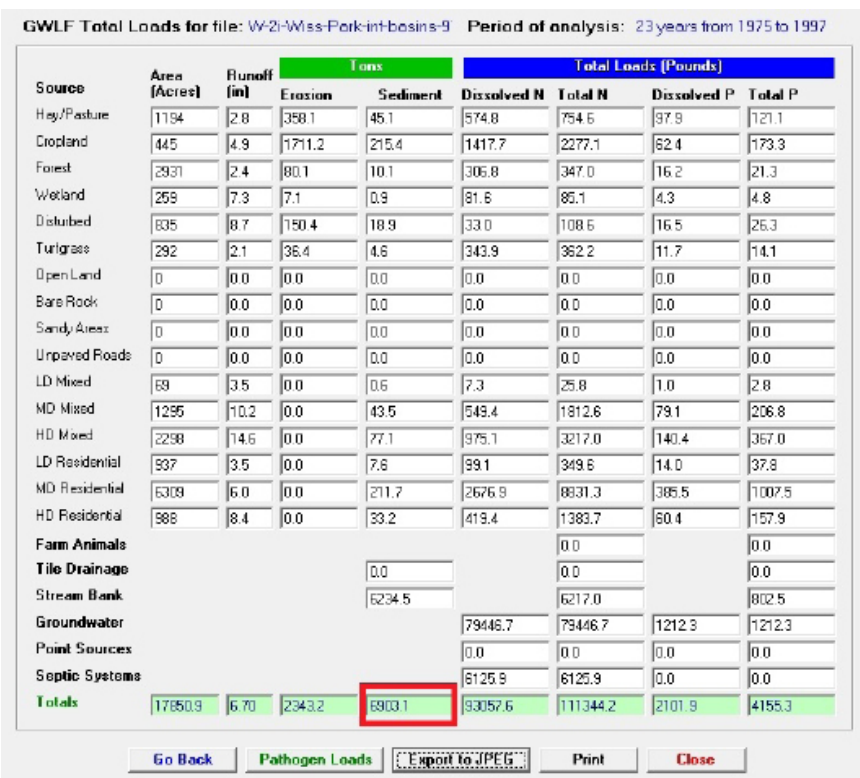
CSN Tool Data

		Pollutant Load Reduced		Development Type*	
Storm Event Simulated (cm)	0.0	TSS (kg)	0.0	○ LD Residential	○ LD Mixed
Area Simulated (Ha)	0	TN (kg)	0.0	○ MD Residential	○ MD Mixed
Selected Dev Type Area (Ha)	0	TP (kg)	0.0	○ HD Residential	○ HD Mixed

*if no residential area, use 'Mixed' type

Rural BMP Editor | BMP Efficiency Editor | Save File | Export to JPEG | Close

URBAN BMP EDITOR INPUT



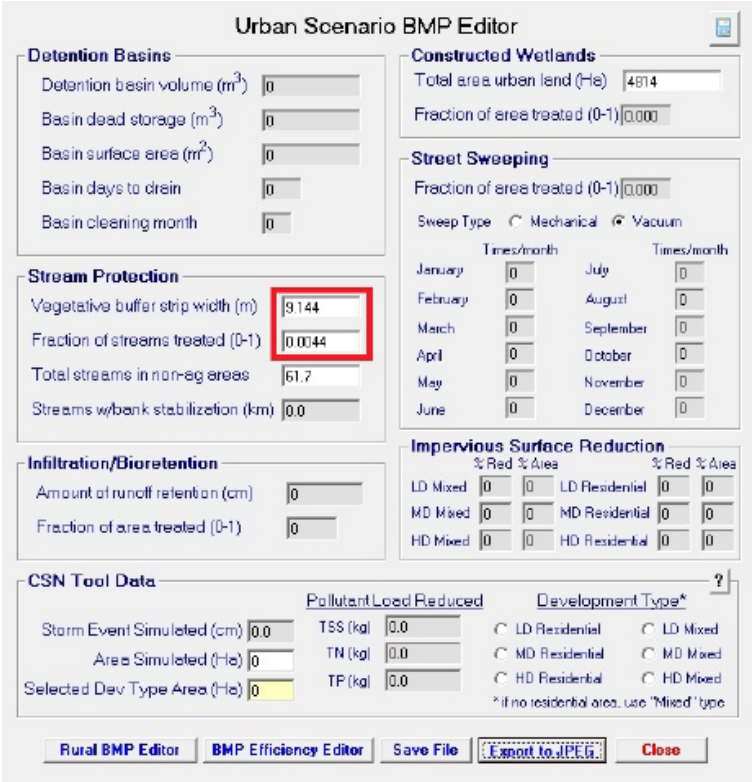
GWLF Total Loads for file: W-2i-Wiss-Park-inf-basins-9 Period of analysis: 23 years from 1975 to 1997

Source	Area (Acres)	Runoff (in)	Tons: Erosion	Tons: Sediment	Total Loads (Pounds): Dissolved N	Total N	Dissolved P	Total P
Hay/Pasture	1194	2.8	358.1	45.1	574.8	754.6	97.9	121.1
Cropland	445	4.9	1711.2	215.4	1417.7	2277.1	62.4	173.3
Forest	2931	2.4	80.1	10.1	305.8	347.0	16.2	21.3
Wetland	259	7.3	7.1	0.9	81.6	85.1	4.3	4.8
Disturbed	835	8.7	150.4	18.9	33.0	108.6	16.5	25.3
Turfgrass	292	2.1	36.4	4.6	343.9	362.2	11.7	14.1
Open Land	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bare Rock	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sandy Areas	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unpaved Roads	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LD Mixed	69	3.5	0.0	0.6	7.3	25.8	1.0	2.8
MD Mixed	1295	10.2	0.0	43.5	549.4	1812.6	79.1	206.8
HD Mixed	2298	14.6	0.0	77.1	975.1	3217.0	140.4	367.0
LD Residential	937	3.5	0.0	7.6	99.1	349.6	14.0	37.8
MD Residential	6309	6.0	0.0	211.7	2676.9	8831.3	385.5	1007.5
HD Residential	988	8.4	0.0	33.2	419.4	1383.7	60.4	157.9
Farm Animals						0.0		0.0
Tile Drainage				0.0		0.0		0.0
Stream Bank				6234.5		6217.0		802.5
Groundwater					79446.7	79446.7	1212.3	1212.3
Point Sources					0.0	0.0	0.0	0.0
Septic Systems					6125.9	6125.9	0.0	0.0
Totals	17850.9	6.70	2343.2	6903.1	93057.6	111344.2	2101.9	4155.3

Go Back | Pathogen Loads | Export to JPEG | Print | Close

MAPSHED OUTPUT

W-2i: WISSAHICKON PARK RIPARIAN CORRIDOR



Urban Scenario BMP Editor

Detention Basins

Detention basin volume (m^3)	0
Basin dead storage (m^3)	0
Basin surface area (m^2)	0
Basin days to drain	0
Basin cleaning month	0

Constructed Wetlands

Total area urban land (Ha)	4814
Fraction of area treated (0-1)	0.000

Street Sweeping

Fraction of area treated (0-1) 0.000

Sweep Type ○ Mechanical ◉ Vacuum

	Times/month		Times/month
January	0	July	0
February	0	August	0
March	0	September	0
April	0	October	0
May	0	November	0
June	0	December	0

Stream Protection

Vegetative buffer strip width (m)	9.144
Fraction of streams treated (0-1)	0.0044
Total streams in non-ag areas	61.7
Streams w/bank stabilization (km)	0.0

Infiltration/Bioretention

Amount of runoff retention (cm)	0
Fraction of area treated (0-1)	0

Impervious Surface Reduction

	% Red	% Area		% Red	% Area
LD Mixed	0	0	LD Residential	0	0
MD Mixed	0	0	MD Residential	0	0
HD Mixed	0	0	HD Residential	0	0

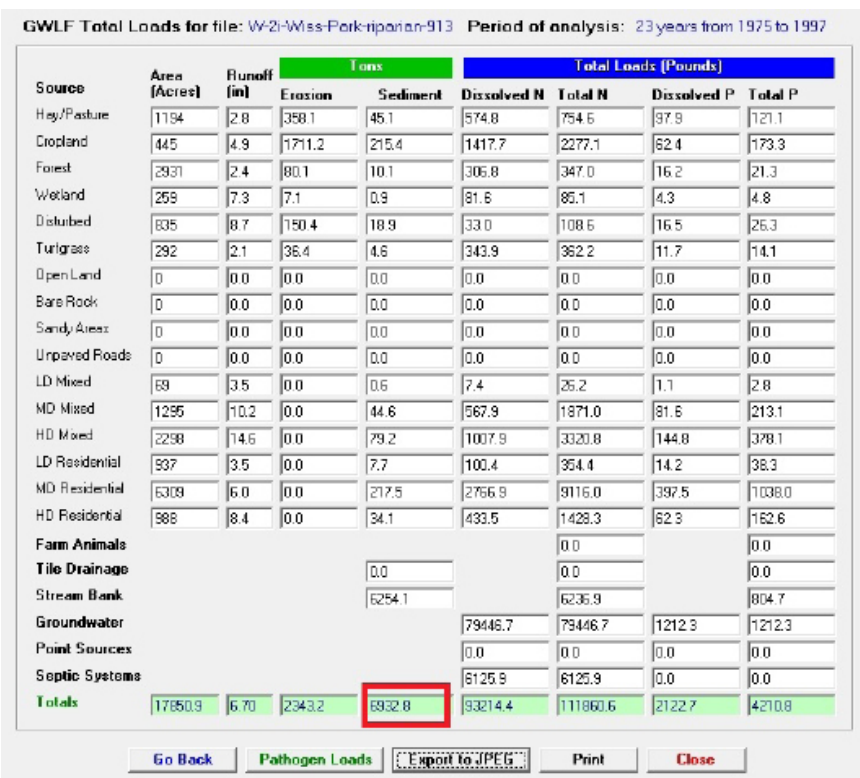
CSN Tool Data

		Pollutant Load Reduced		Development Type*	
Storm Event Simulated (cm)	0.0	TSS (kg)	0.0	○ LD Residential	○ LD Mixed
Area Simulated (Ha)	0	TN (kg)	0.0	○ MD Residential	○ MD Mixed
Selected Dev Type Area (Ha)	0	TP (kg)	0.0	○ HD Residential	○ HD Mixed

*if no residential area, use 'Mixed' type

Rural BMP Editor | BMP Efficiency Editor | Save File | Export to JPEG | Close

URBAN BMP EDITOR INPUT



GWLF Total Loads for file: W-2i-Wiss-Park-riparian-913 Period of analysis: 23 years from 1975 to 1997

Source	Area (Acres)	Runoff (in)	Tons: Erosion	Tons: Sediment	Total Loads (Pounds): Dissolved N	Total N	Dissolved P	Total P
Hay/Pasture	1194	2.8	358.1	45.1	574.8	754.6	97.9	121.1
Cropland	445	4.9	1711.2	215.4	1417.7	2277.1	62.4	173.3
Forest	2931	2.4	80.1	10.1	305.8	347.0	16.2	21.3
Wetland	259	7.3	7.1	0.9	81.6	85.1	4.3	4.8
Disturbed	835	8.7	150.4	18.9	33.0	108.6	16.5	25.3
Turfgrass	292	2.1	36.4	4.6	343.9	362.2	11.7	14.1
Open Land	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bare Rock	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sandy Areas	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unpaved Roads	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LD Mixed	69	3.5	0.0	0.6	7.4	26.2	1.1	2.8
MD Mixed	1295	10.2	0.0	44.6	567.9	1871.0	81.6	213.1
HD Mixed	2298	14.6	0.0	79.2	1007.9	3320.8	144.8	378.1
LD Residential	937	3.5	0.0	7.7	100.4	354.4	14.2	38.3
MD Residential	6309	6.0	0.0	217.5	2766.9	9116.0	397.5	1038.0
HD Residential	988	8.4	0.0	34.1	433.5	1428.3	62.3	162.6
Farm Animals						0.0		0.0
Tile Drainage				0.0		0.0		0.0
Stream Bank				6254.1		6236.9		804.7
Groundwater					79446.7	79446.7	1212.3	1212.3
Point Sources					0.0	0.0	0.0	0.0
Septic Systems					6125.9	6125.9	0.0	0.0
Totals	17850.9	6.70	2343.2	6932.8	93214.4	111860.6	2122.7	4210.8

Go Back | Pathogen Loads | Export to JPEG | Print | Close

MAPSHED OUTPUT

DRAINAGE AREA MAP

WATERSHED: SKIPPACK CREEK

CONTROL MEASURE TYPE: SUBSURFACE INFILTRATION

ANNUAL SEDIMENT REDUCTION: 8,600 LBS/YEAR

PROJECT STATUS: IMPLEMENTED

DESCRIPTION: In 2009, an underground infiltration BMP was added as a private property retrofit to an existing apartment complex and two existing parking lots that were constructed prior to the TMDL. Before the retrofit, runoff from the 3.6 acre site discharged to the sewer system without any peak flow or sediment controls. Now, all stormwater runoff generated from site is routed through the new BMP and all sediment removed by the BMP is an improvement from pre-TMDL/baseline conditions. Inspection for this project is conducted annually by the Borough and maintenance is conducted by the property owner.

S-2i: SILK FACTORY SUBSURFACE INFILTRATION BMP

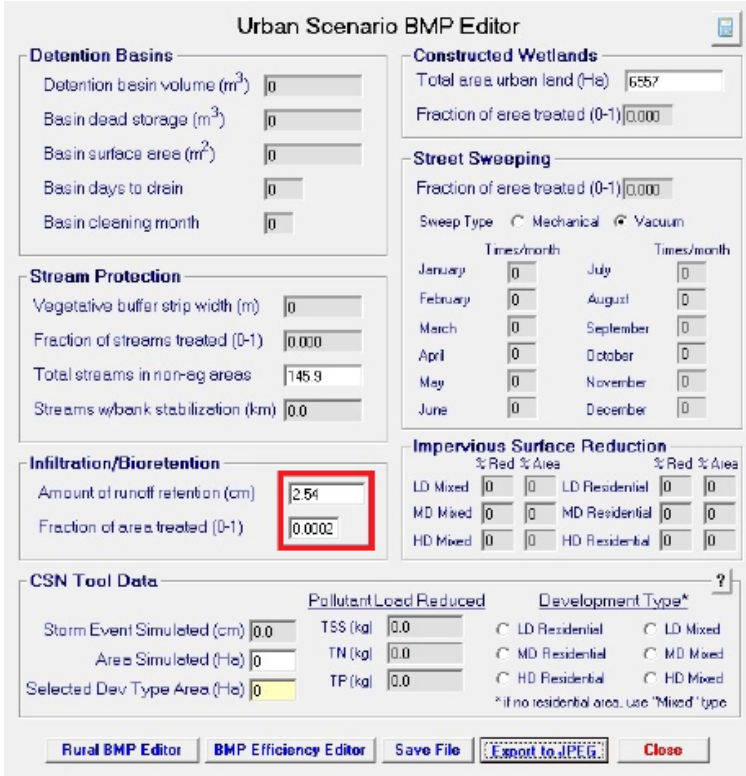
ADDRESS: *200 S LINE STREET, LANSDALE, PA 19946*

LATITUDE, LONGITUDE: *40° 14' 17.233" N, 75° 16' 56.658" W*

S-2i: SILK FACTORY SUBSURFACE INFILTRATION BMP

SITE PHOTOS

S-2i: SILK FACTORY SUBSURFACE INFILTRATION BMP



Urban Scenario BMP Editor

Detention Basins

Detention basin volume (m^3)	0
Basin dead storage (m^3)	0
Basin surface area (m^2)	0
Basin days to drain	0
Basin cleaning month	0

Constructed Wetlands

Total area urban land (Ha)	6557
Fraction of area treated (0-1)	0.000

Street Sweeping

Fraction of area treated (0-1) 0.000

Sweep Type ○ Mechanical ◉ Vacuum

	Times/month		Times/month
January	0	July	0
February	0	August	0
March	0	September	0
April	0	October	0
May	0	November	0
June	0	December	0

Stream Protection

Vegetative buffer strip width (m)	0
Fraction of streams treated (0-1)	0.000
Total streams in non-ag areas	145.9
Streams w/bank stabilization (km)	0.0

Infiltration/Bioretention

Amount of runoff retention (cm)	2.54
Fraction of area treated (0-1)	0.0002

Impervious Surface Reduction

	% Red	% Area		% Red	% Area
LD Mixed	0	0	LD Residential	0	0
MD Mixed	0	0	MD Residential	0	0
HD Mixed	0	0	HD Residential	0	0

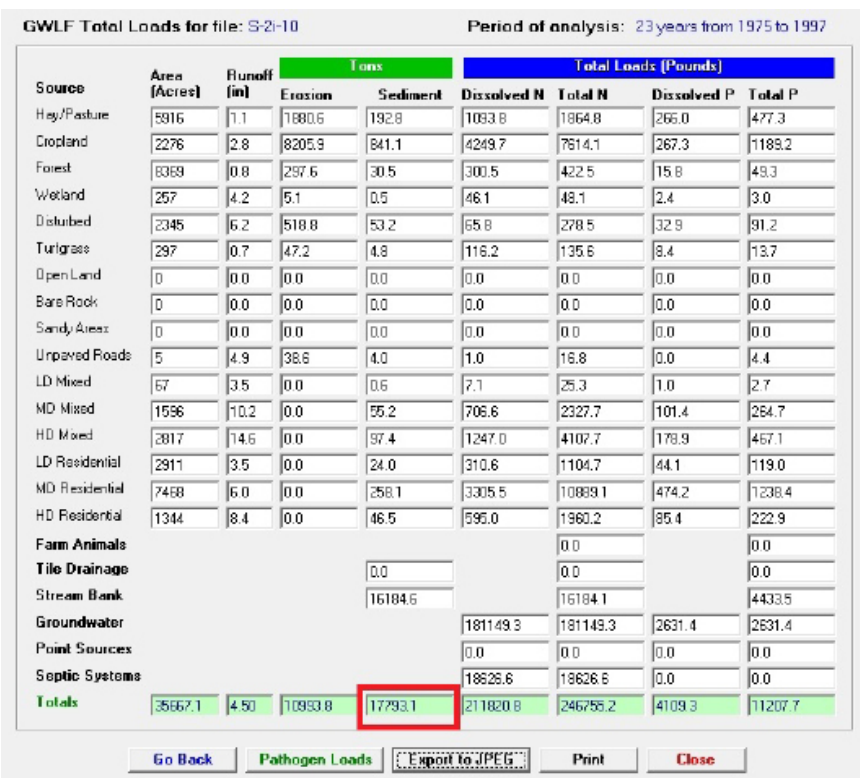
CSN Tool Data

		Pollutant Load Reduced		Development Type*	
Storm Event Simulated (cm)	0.0	TSS (kg)	0.0	○ LD Residential	○ LD Mixed
Area Simulated (Ha)	0	TN (kg)	0.0	○ MD Residential	○ MD Mixed
Selected Dev Type Area (Ha)	0	TP (kg)	0.0	○ HD Residential	○ HD Mixed

*if no residential area, use 'Mixed' type

Rural BMP Editor | BMP Efficiency Editor | Save File | Export to JPEG | Close

URBAN BMP EDITOR INPUT

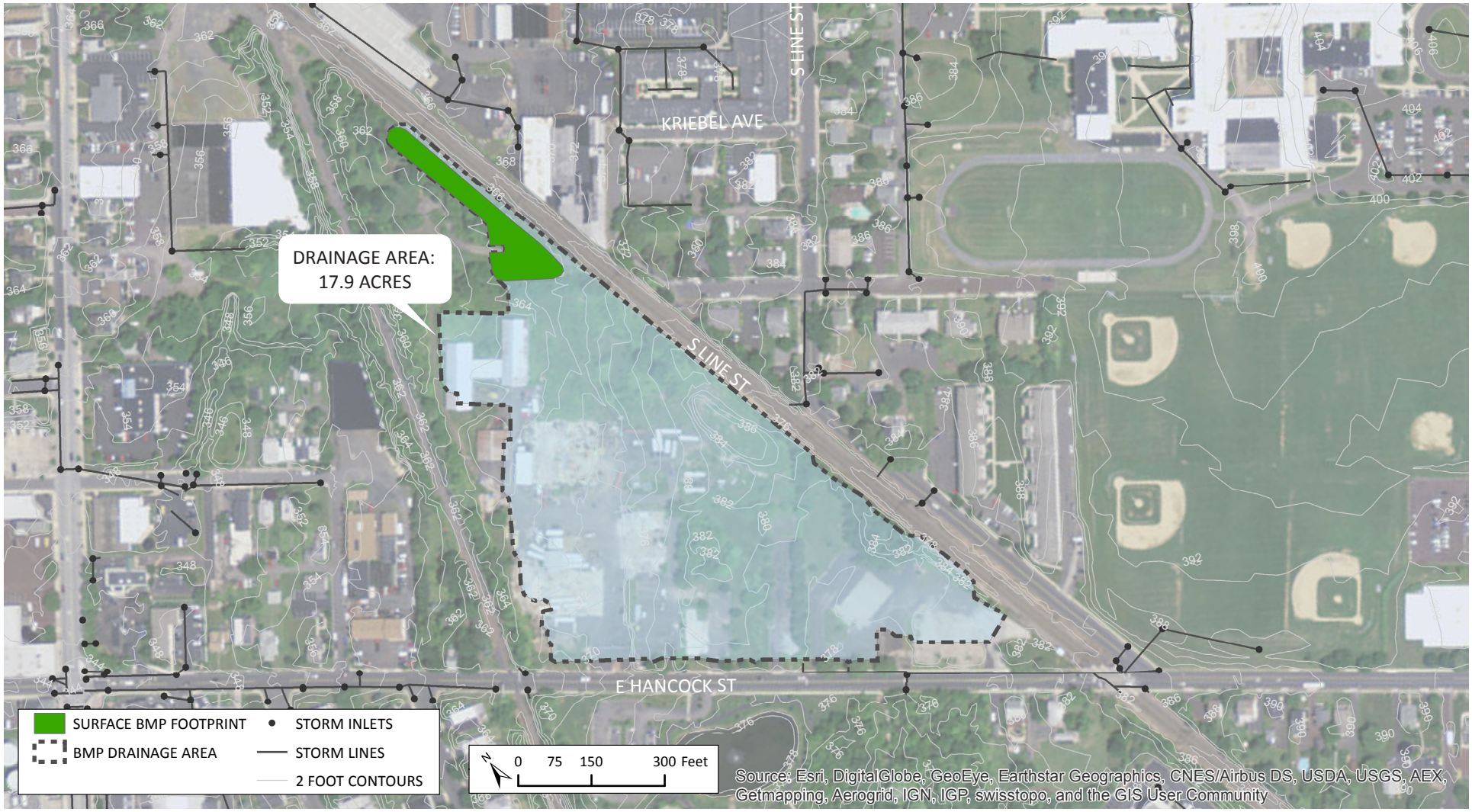


GWLF Total Loads for file: S-2i-10 Period of analysis: 23 years from 1975 to 1997

Source	Area (Acres)	Runoff (in)	Tons: Erosion	Tons: Sediment	Total Loads (Pounds): Dissolved N	Total N	Dissolved P	Total P
Hay/Pasture	5916	1.1	1880.6	192.8	1093.8	1864.8	266.0	477.3
Cropland	2276	2.8	8205.9	841.1	4249.7	7614.1	267.3	1189.2
Forest	8369	0.8	297.6	30.5	300.5	422.5	15.8	49.3
Wetland	257	4.2	5.1	0.5	46.1	48.1	2.4	3.0
Disturbed	2345	6.2	518.8	53.2	65.8	278.5	32.9	91.2
Turfgrass	297	0.7	47.2	4.8	116.2	135.6	8.4	13.7
Open Land	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bare Rock	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sandy Areas	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unpaved Roads	5	4.9	38.6	4.0	1.0	16.8	0.0	4.4
LD Mixed	67	3.5	0.0	0.6	7.1	25.3	1.0	2.7
MD Mixed	1596	10.2	0.0	55.2	706.6	2327.7	101.4	254.7
HD Mixed	2817	14.6	0.0	97.4	1247.0	4107.7	178.9	457.1
LD Residential	2911	3.5	0.0	24.0	310.6	1104.7	44.1	119.0
MD Residential	7468	6.0	0.0	258.1	3305.5	10889.1	474.2	1238.4
HD Residential	1344	8.4	0.0	46.5	595.0	1960.2	85.4	222.9
Farm Animals						0.0		0.0
Tile Drainage				0.0		0.0		0.0
Stream Bank				16184.6		16184.1		4433.5
Groundwater					181149.3	181149.3	2631.4	2631.4
Point Sources					0.0	0.0	0.0	0.0
Septic Systems					18626.6	18626.6	0.0	0.0
Totals	35667.1	4.50	10993.8	17793.1	211820.8	246755.2	4109.3	11207.7

Go Back | Pathogen Loads | Export to JPEG | Print | Close

MAPSHED OUTPUT



DRAINAGE AREA MAP

WATERSHED: SKIPPACK CREEK

CONTROL MEASURE TYPE: WET POND BMP

ANNUAL SEDIMENT REDUCTION: 800 LBS/YEAR

PROJECT STATUS: IMPLEMENTED

DESCRIPTION: A wet pond/retention basin BMP was constructed in 2014 as part of a private, phased community redevelopment project. Prior to 2014, all runoff generated over the predominately impervious site discharged from the site without any peak flow or sediment controls. The BMP manages runoff from 12.5 acres, which includes 8.7 impervious acres. Post-TMDL sediment reduction is only calculated for the 6.6 acres of pre-TMDL unmanaged impervious area now treated by the BMP. Inspection for this project is conducted annually by the Borough and maintenance is conducted by the property owner.

S-3i: ANDALE GREEN WET POND BMP

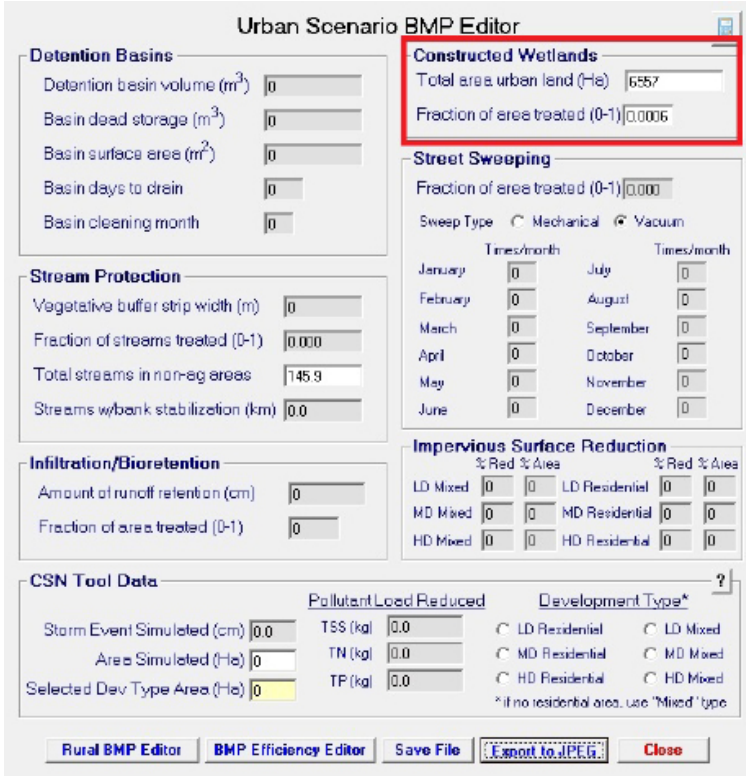
ADDRESS: *288 E HANCOCK STREET, LANSDALE, PA 19946*

LATITUDE, LONGITUDE: *40°14'03.0876", -075°17'03.3576"*

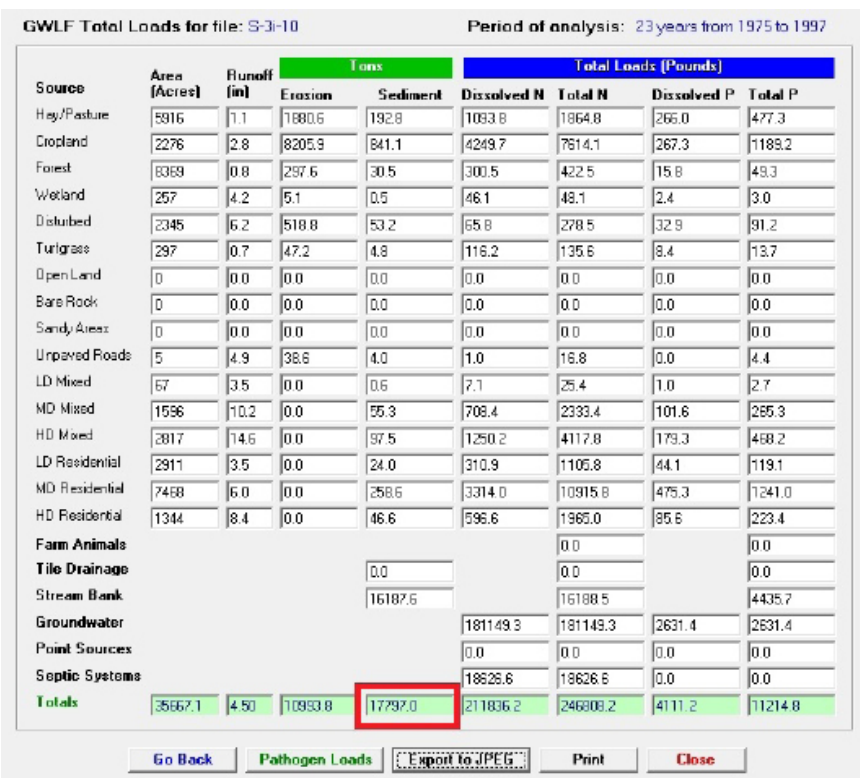
S-3i: ANDALE GREEN WET POND BMP

SITE PHOTOS

S-3i: ANDALE GREEN WET POND BMP



URBAN BMP EDITOR INPUT



GWLF Total Loads for file: S-3i-10 Period of analysis: 23 years from 1975 to 1997

Source	Area (Acres)	Runoff (in)	Tons: Erosion	Tons: Sediment	Total Loads (Pounds): Dissolved N	Total N	Dissolved P	Total P
Hay/Pasture	5916	1.1	1880.6	192.8	1093.8	1864.8	266.0	477.3
Cropland	2276	2.8	8205.9	841.1	4249.7	7614.1	267.3	1189.2
Forest	8369	0.8	297.6	30.5	300.5	422.5	15.8	49.3
Wetland	257	4.2	5.1	0.5	46.1	48.1	2.4	3.0
Disturbed	2345	6.2	518.8	53.2	65.8	278.5	32.9	91.2
Turfgrass	297	0.7	47.2	4.8	116.2	135.6	8.4	13.7
Open Land	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bare Rock	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sandy Areas	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unpaved Roads	5	4.9	38.6	4.0	1.0	16.8	0.0	4.4
LD Mixed	67	3.5	0.0	0.6	7.1	25.4	1.0	2.7
MD Mixed	1596	10.2	0.0	55.3	708.4	2333.4	101.6	255.3
HD Mixed	2817	14.6	0.0	97.5	1250.2	4117.8	179.3	458.2
LD Residential	2911	3.5	0.0	24.0	310.9	1105.8	44.1	119.1
MD Residential	7458	6.0	0.0	258.6	3314.0	10915.8	475.3	1241.0
HD Residential	1344	8.4	0.0	46.6	596.6	1965.0	85.6	223.4
Farm Animals						0.0		0.0
Tile Drainage				0.0		0.0		0.0
Stream Bank				16187.6		16188.5		4435.7
Groundwater					181149.3	181149.3	2631.4	2631.4
Point Sources					0.0	0.0	0.0	0.0
Septic Systems					18626.6	18626.6	0.0	0.0
Totals	35667.1	4.50	10993.8	17797.0	211836.2	246808.2	4111.2	11214.8

Go Back | Pathogen Loads | Export to JPEG | Print | Close

MAPSHED OUTPUT

DRAINAGE AREA MAP

WATERSHED: NESHAMINY SUB-BASIN 1

CONTROL MEASURE TYPE: SUBSURFACE INFILTRATION

ANNUAL SEDIMENT REDUCTION: 2,600 LBS/YEAR

PROJECT STATUS: IMPLEMENTED

DESCRIPTION: Two subsurface infiltration BMPs were constructed in 2006 as part of a redevelopment project that included a building expansion. Prior to 2006, all runoff generated over the 4.6-acre site was routed to the MS4 without any peak flow or sediment controls. The post-construction BMPs manage runoff from 4.3 acres of the site. Post-TMDL sediment reduction is only calculated for the 3.1 acres of pre-TMDL unmanaged impervious area now treated by the BMPs. Inspection for this project is conducted annually by the Borough and maintenance is conducted by the property owner.

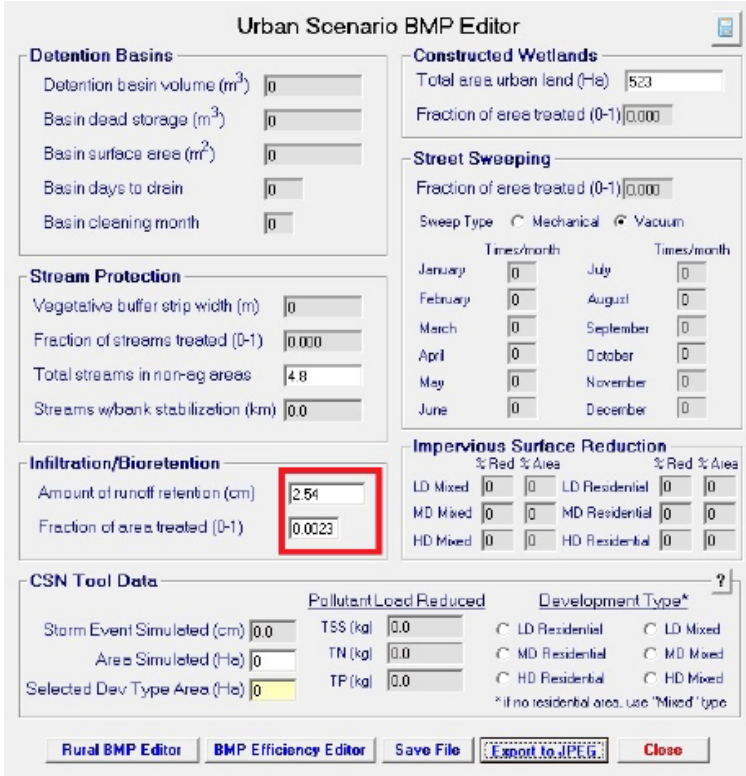
N1-2i: ELM TERRACE SUBSURFACE INFILTRATION BMPS

ADDRESS: *660 N BROAD STREET, LANSDALE, PA 19946*
LATITUDE, LONGITUDE: *40° 14’ 51.129” N, 75° 16’ 48.432” W*

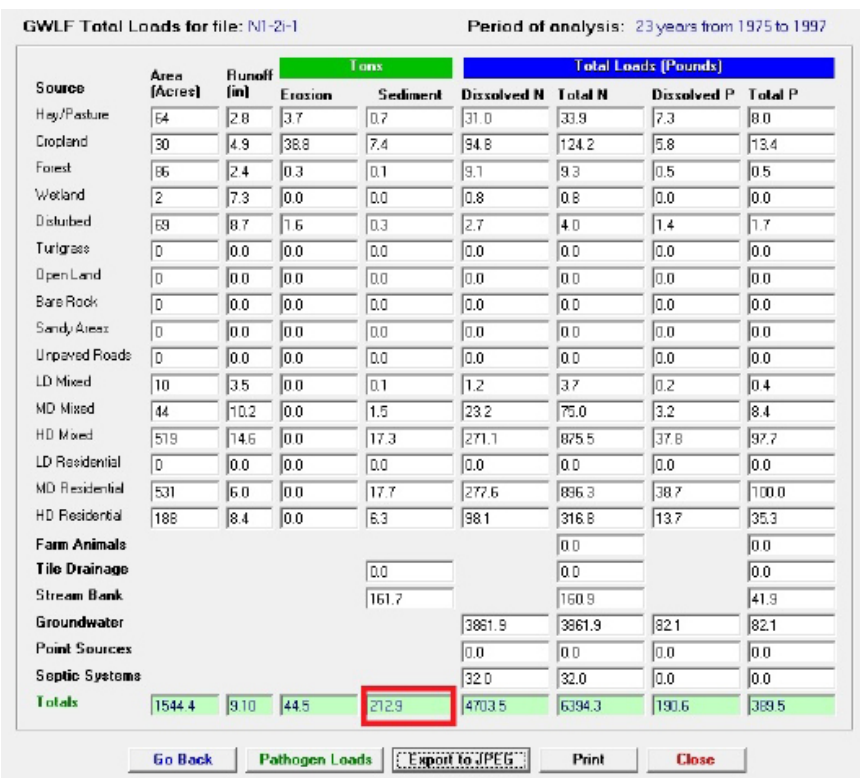
N1-2i: ELM TERRACE SUBSURFACE INFILTRATION BMPS

SITE PHOTOS

N1-2i: ELM TERRACE SUBSURFACE INFILTRATION BMPS



URBAN BMP EDITOR INPUT



GWLF Total Loads for file: N1-2i-1 Period of analysis: 23 years from 1975 to 1997

Source	Area (Acres)	Runoff (in)	Tons: Erosion	Tons: Sediment	Total Loads (Pounds): Dissolved N	Total N	Dissolved P	Total P
Hay/Pasture	64	2.8	3.7	0.7	31.0	33.9	7.3	8.0
Cropland	30	4.9	38.8	7.4	94.8	124.2	5.8	13.4
Forest	86	2.4	0.3	0.1	9.1	9.3	0.5	0.5
Wetland	2	7.3	0.0	0.0	0.8	0.8	0.0	0.0
Disturbed	69	8.7	1.6	0.3	2.7	4.0	1.4	1.7
Turfgrass	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Open Land	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bare Rock	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sandy Areas	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unpaved Roads	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LD Mixed	10	3.5	0.0	0.1	1.2	3.7	0.2	0.4
MD Mixed	44	10.2	0.0	1.5	23.2	75.0	3.2	8.4
HD Mixed	519	14.6	0.0	17.3	271.1	875.5	37.8	97.7
LD Residential	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MD Residential	531	6.0	0.0	17.7	277.6	896.3	38.7	100.0
HD Residential	188	8.4	0.0	6.3	98.1	316.8	13.7	35.3
Farm Animals						0.0		0.0
Tile Drainage				0.0		0.0		0.0
Stream Bank				161.7		160.9		41.9
Groundwater					3861.9	3861.9	82.1	82.1
Point Sources					0.0	0.0	0.0	0.0
Septic Systems					32.0	32.0	0.0	0.0
Totals	1544.4	9.10	44.5	212.9	4703.5	6394.3	190.6	389.5

Go Back | Pathogen Loads | Export to JPEG | Print | Close

MAPSHED OUTPUT

DRAINAGE AREA MAP

WATERSHED: NESHAMINY SUB-BASIN 1

ANNUAL SEDIMENT REDUCTION: 1,000 LBS/YEAR

CONTROL MEASURE TYPE: BIORETENTION AND SUBSURFACE INFILTRATION

PROJECT STATUS: IMPLEMENTED

DESCRIPTION: A bioretention BMP and subsurface infiltration BMP were constructed in 2015 as part of a redevelopment project at the public Borough Hall Complex. Prior to 2015, all runoff generated over the predominately impervious site discharged to the MS4 without any peak flow or sediment controls. Post-TMDL sediment reduction is calculated for the 1.2 acres of pre-TMDL unmanaged impervious area now treated by the BMP. Inspection and maintenance of this project is conducted by the Borough.

N1-3i: BOROUGH HALL COMPLEX BIORETENTION AND SUBSURFACE INFILTRATION BMPS

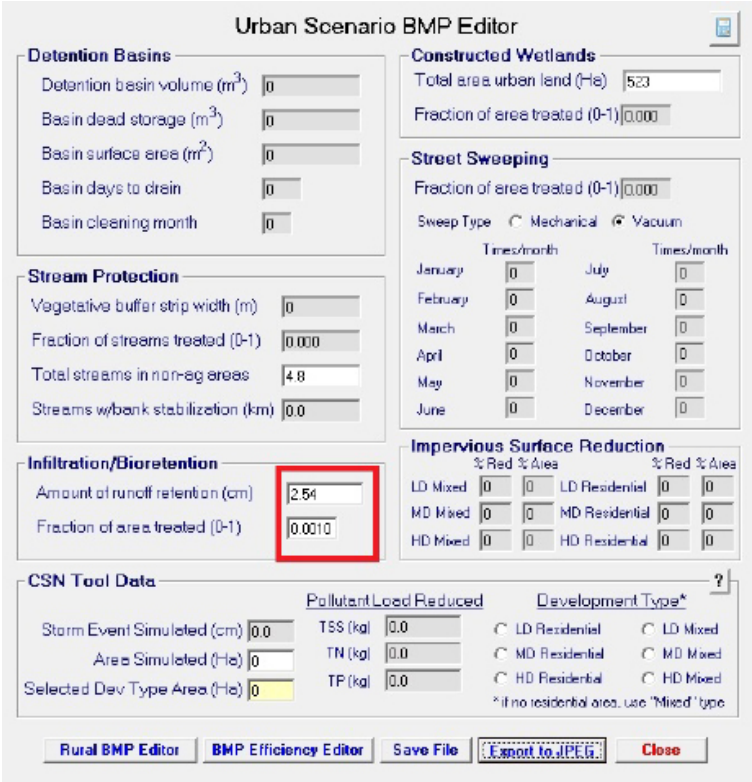
ADDRESS: *1 VINE STREET, LANSDALE, PA 19946*

LATITUDE, LONGITUDE: *40°14'26.5236", -75°17'06.7776"*

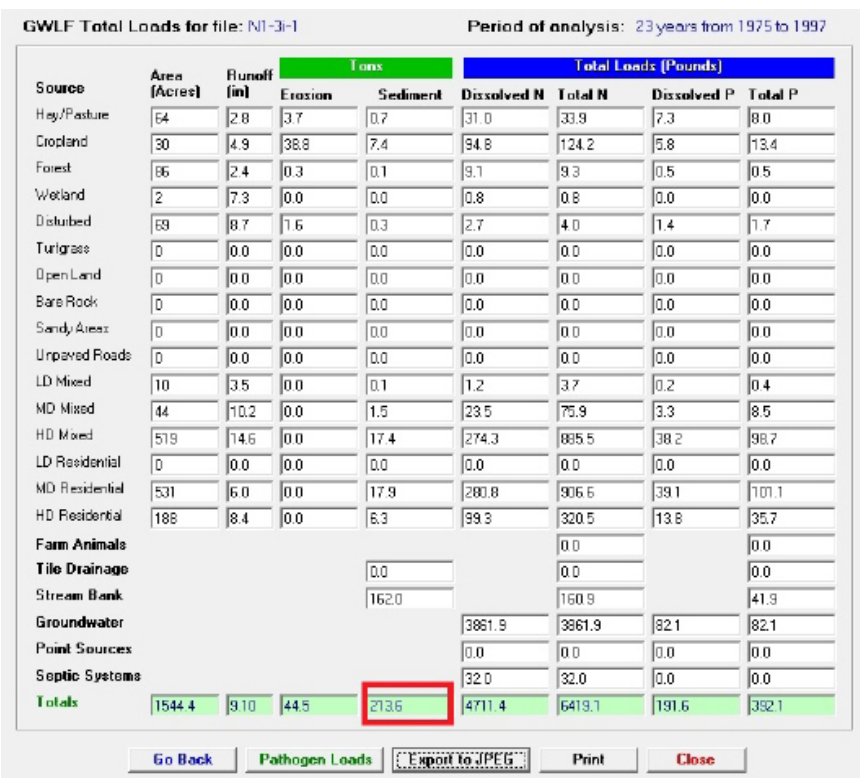
N1-3i: BOROUGH HALL COMPLEX BIORETENTION AND SUBSURFACE INFILTRATION BMPS

SITE PHOTOS

N1-3i: BOROUGH HALL COMPLEX BIORETENTION AND SUBSURFACE INFILTRATION BMPS



URBAN BMP EDITOR INPUT



GWLF Total Loads for file: N1-3i-1 Period of analysis: 23 years from 1975 to 1997

Source	Area (Acres)	Runoff (in)	Tons: Erosion	Tons: Sediment	Total Loads (Pounds): Dissolved N	Total N	Dissolved P	Total P
Hay/Pasture	64	2.8	3.7	0.7	31.0	33.9	7.3	8.0
Cropland	30	4.9	38.8	7.4	94.8	124.2	5.8	13.4
Forest	86	2.4	0.3	0.1	9.1	9.3	0.5	0.5
Wetland	2	7.3	0.0	0.0	0.8	0.8	0.0	0.0
Disturbed	69	8.7	1.6	0.3	2.7	4.0	1.4	1.7
Turfgrass	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Open Land	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bare Rock	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sandy Areas	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unpaved Roads	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LD Mixed	10	3.5	0.0	0.1	1.2	3.7	0.2	0.4
MD Mixed	44	10.2	0.0	1.5	23.5	75.9	3.3	8.5
HD Mixed	519	14.6	0.0	17.4	274.3	885.5	38.2	98.7
LD Residential	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MD Residential	531	6.0	0.0	17.9	280.8	906.6	39.1	101.1
HD Residential	188	8.4	0.0	6.3	99.3	320.5	13.8	35.7
Farm Animals						0.0		0.0
Tile Drainage				0.0		0.0		0.0
Stream Bank				162.0		160.9		41.9
Groundwater					3861.9	3861.9	82.1	82.1
Point Sources					0.0	0.0	0.0	0.0
Septic Systems					32.0	32.0	0.0	0.0
Totals	1544.4	9.10	44.5	213.6	4711.4	6419.1	191.6	392.1

Go Back | Pathogen Loads | Export to JPEG | Print | Close

MAPSHED OUTPUT

DRAINAGE AREA MAP

WATERSHED: NESHAMINY SUB-BASIN 1

CONTROL MEASURE TYPE: INFILTRATION

ANNUAL SEDIMENT REDUCTION: 400 LBS/YEAR

PROJECT STATUS: IMPLEMENTED

DESCRIPTION: An infiltration BMP was constructed in 2013 as part of a private redevelopment project. Prior to 2013, all runoff generated over the predominately impervious site discharged to the MS4 without any peak flow or sediment controls. Post-TMDL sediment reduction is only calculated for the 0.2 acres of pre-TMDL unmanaged impervious area now treated by the BMP. Inspection for this project is conducted annually by the Borough and maintenance is conducted by the property owner.

N1-4i: UNIQUE AID MEDICAL OFFICE INFILTRATION BMP

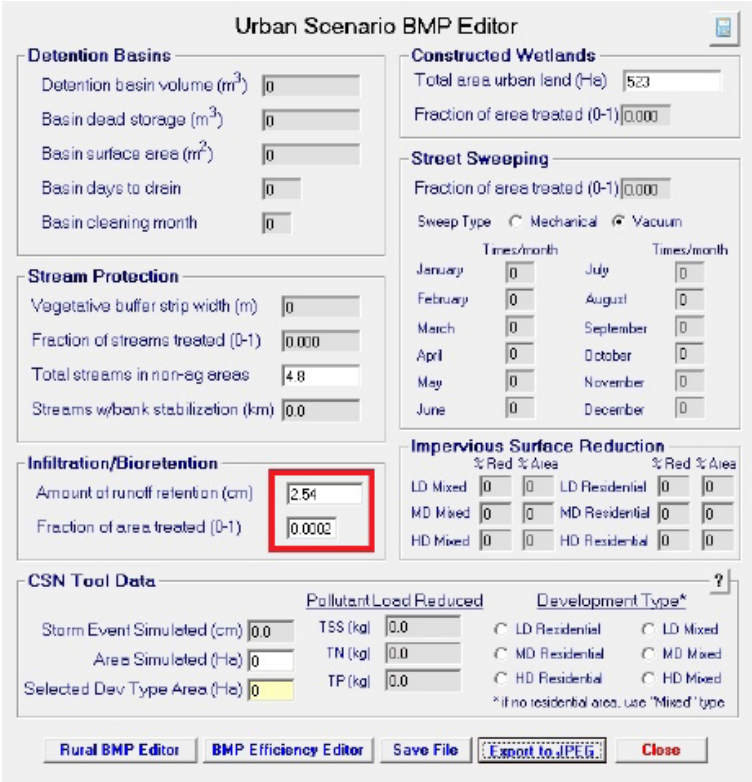
ADDRESS: *861 W MAIN STREET, LANSDALE, PA 19946*

LATITUDE, LONGITUDE: *40° 14’ 54.3474”N, -75° 17’ 41.37”W*

N1-4i: UNIQUE AID MEDICAL OFFICE INFILTRATION BMP

SITE PHOTOS

N1-4i: UNIQUE AID MEDICAL OFFICE INFILTRATION BMP



Urban Scenario BMP Editor

Detention Basins

Detention basin volume (m^3)	0
Basin dead storage (m^3)	0
Basin surface area (m^2)	0
Basin days to drain	0
Basin cleaning month	0

Constructed Wetlands

Total area urban land (Ha)	523
Fraction of area treated (0-1)	0.000

Street Sweeping

Fraction of area treated (0-1) 0.000

Sweep Type ○ Mechanical ◉ Vacuum

	Times/month		Times/month
January	0	July	0
February	0	August	0
March	0	September	0
April	0	October	0
May	0	November	0
June	0	December	0

Stream Protection

Vegetative buffer strip width (m)	0
Fraction of streams treated (0-1)	0.000
Total streams in non-ag areas	4.8
Streams w/bank stabilization (km)	0.0

Infiltration/Bioretention

Amount of runoff retention (cm)	2.54
Fraction of area treated (0-1)	0.0002

Impervious Surface Reduction

	% Red	% Area		% Red	% Area
LD Mixed	0	0	LD Residential	0	0
MD Mixed	0	0	MD Residential	0	0
HD Mixed	0	0	HD Residential	0	0

CSN Tool Data

		Pollutant Load Reduced		Development Type*	
Storm Event Simulated (cm)	0.0	TSS (kg)	0.0	○ LD Residential	○ LD Mixed
Area Simulated (Ha)	0	TN (kg)	0.0	○ MD Residential	○ MD Mixed
Selected Dev Type Area (Ha)	0	TP (kg)	0.0	○ HD Residential	○ HD Mixed

*if no residential area, use 'Mixed' type

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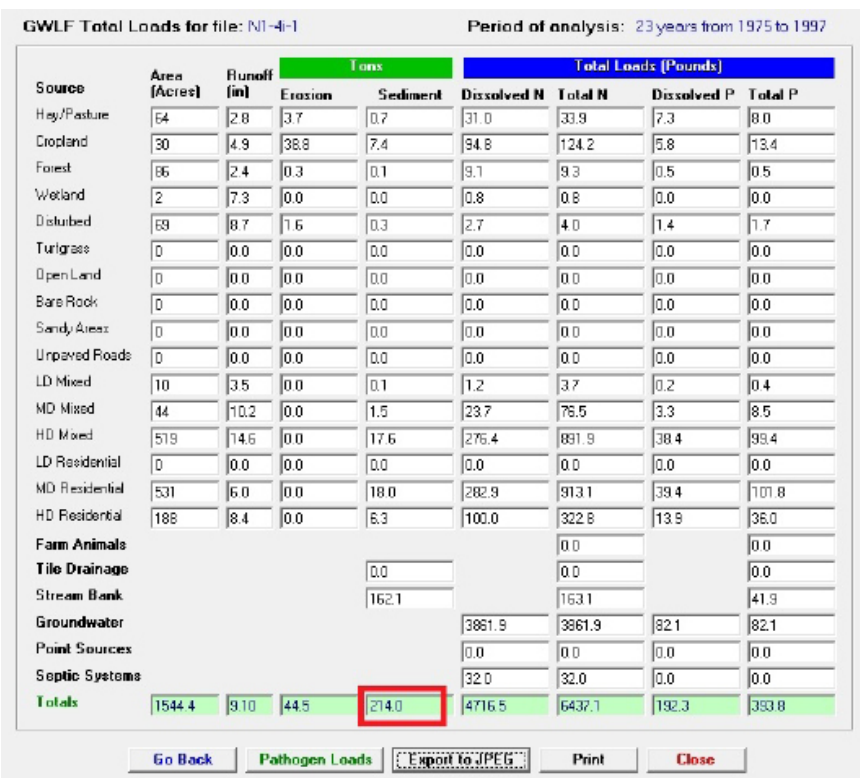
URBAN BMP EDITOR INPUT



GWLF Total Loads for file: N1-4i-1 Period of analysis: 23 years from 1975 to 1997

Source	Area (Acres)	Runoff (in)	Tons: Erosion	Tons: Sediment	Total Loads (Pounds): Dissolved N	Total N	Dissolved P	Total P
Hay/Pasture	64	2.8	3.7	0.7	31.0	33.9	7.3	8.0
Cropland	30	4.9	38.8	7.4	94.8	124.2	5.8	13.4
Forest	86	2.4	0.3	0.1	9.1	9.3	0.5	0.5
Wetland	2	7.3	0.0	0.0	0.8	0.8	0.0	0.0
Disturbed	69	8.7	1.6	0.3	2.7	4.0	1.4	1.7
Turfgrass	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Open Land	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bare Rock	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sandy Areas	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unpaved Roads	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LD Mixed	10	3.5	0.0	0.1	1.2	3.7	0.2	0.4
MD Mixed	44	10.2	0.0	1.5	23.7	78.5	3.3	8.5
HD Mixed	519	14.6	0.0	17.6	276.4	881.9	38.4	99.4
LD Residential	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MD Residential	531	6.0	0.0	18.0	282.9	913.1	39.4	101.8
HD Residential	188	8.4	0.0	6.3	100.0	322.8	13.9	36.0
Farm Animals						0.0		0.0
Tile Drainage				0.0		0.0		0.0
Stream Bank				162.1		163.1		41.9
Groundwater					3861.9	3861.9	82.1	82.1
Point Sources					0.0	0.0	0.0	0.0
Septic Systems					32.0	32.0	0.0	0.0
Totals	1544.4	9.10	44.5	214.0	4716.5	6437.1	192.3	393.8

Go Back | Pathogen Loads | Export to JPEG | Print | Close

MAPSHED OUTPUT

DRAINAGE AREA MAP

WATERSHED: NESHAMINY SUB-BASIN 2

CONTROL MEASURE TYPE: SUBSURFACE INFILTRATION/DETENTION

ANNUAL SEDIMENT REDUCTION: 1,800 LBS/YEAR

PROJECT STATUS: IMPLEMENTED

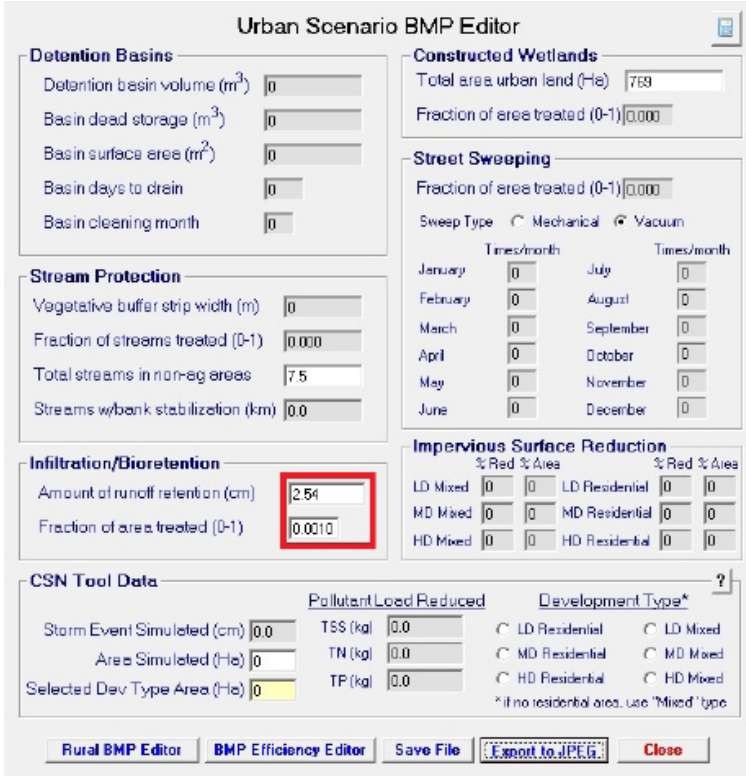
DESCRIPTION: A subsurface infiltration and detention BMP was constructed in 2012 as part of a private residential redevelopment project. Prior to 2012, all runoff generated over the predominately impervious site discharged to the MS4 without any peak flow or sediment controls. Post-TMDL sediment reduction is calculated for the 2.0 acres of pre-TMDL unmanaged impervious area now treated by the BMP. Inspection for this project is conducted annually by the Borough and maintenance is conducted by the property owner.

N2-2i: WILLIAMSON SQUARE SUBSURFACE INFILTRATION AND DETENTION BMP

ADDRESS: *NORTH LINE STREET AND EAST 4TH STREET, LANSDALE, PA 19946*

LATITUDE, LONGITUDE: *40°14'27.7548", -075°16'38.4600"*

N2-2i: WILLIAMSON SQUARE SUBSURFACE INFILTRATION AND DETENTION BMP



Urban Scenario BMP Editor

Detention Basins

Detention basin volume (m^3)	0
Basin dead storage (m^3)	0
Basin surface area (m^2)	0
Basin days to drain	0
Basin cleaning month	0

Constructed Wetlands

Total area urban land (Ha)	769
Fraction of area treated (0-1)	0.000

Street Sweeping

Fraction of area treated (0-1) 0.000

Sweep Type ○ Mechanical ◉ Vacuum

	Times/month		Times/month
January	0	July	0
February	0	August	0
March	0	September	0
April	0	October	0
May	0	November	0
June	0	December	0

Stream Protection

Vegetative buffer strip width (m)	0
Fraction of streams treated (0-1)	0.000
Total streams in non-ag areas	7.5
Streams w/bank stabilization (km)	0.0

Infiltration/Bioretention

Amount of runoff retention (cm)	2.54
Fraction of area treated (0-1)	0.0010

Impervious Surface Reduction

	% Red	% Area		% Red	% Area
LD Mixed	0	0	LD Residential	0	0
MD Mixed	0	0	MD Residential	0	0
HD Mixed	0	0	HD Residential	0	0

CSN Tool Data

		Pollutant Load Reduced		Development Type*
Storm Event Simulated (cm)	0.0	TSS (kg)	0.0	○ LD Residential ○ LD Mixed
Area Simulated (Ha)	0	TN (kg)	0.0	○ MD Residential ○ MD Mixed
Selected Dev Type Area (Ha)	0	TP (kg)	0.0	○ HD Residential ○ HD Mixed

* if no residential area, use 'Mixed' type

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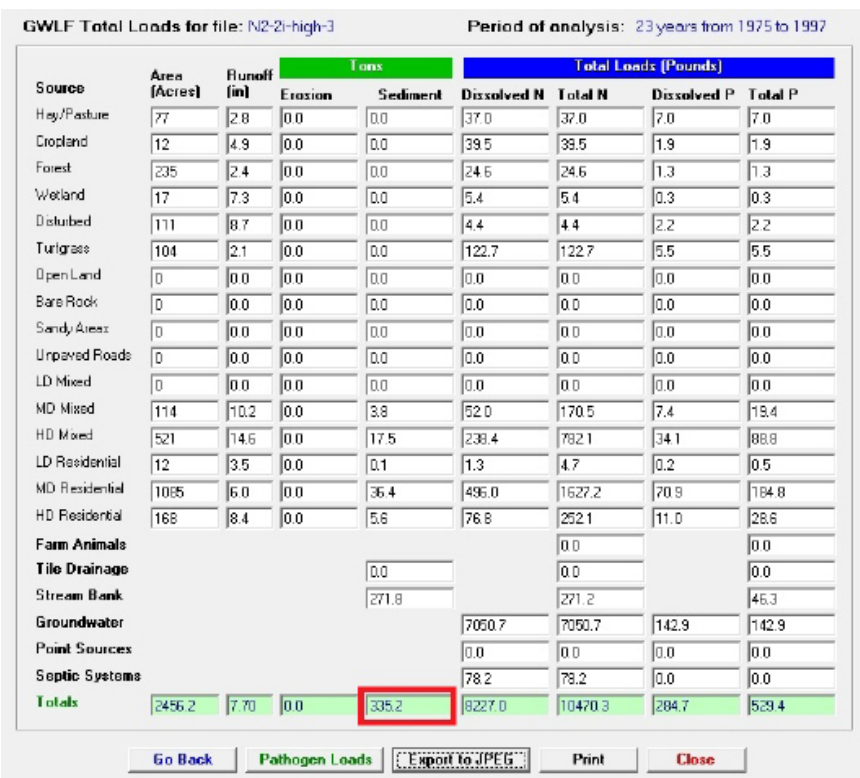
URBAN BMP EDITOR INPUT



GWLF Total Loads for file: N2-2i-high-3 Period of analysis: 23 years from 1975 to 1997

Source	Area (Acres)	Runoff (in)	Tons: Erosion	Tons: Sediment	Total Loads (Pounds): Dissolved N	Total N	Dissolved P	Total P
Hay/Pasture	77	2.8	0.0	0.0	37.0	37.0	7.0	7.0
Cropland	12	4.9	0.0	0.0	39.5	39.5	1.9	1.9
Forest	235	2.4	0.0	0.0	24.6	24.6	1.3	1.3
Wetland	17	7.3	0.0	0.0	5.4	5.4	0.3	0.3
Disturbed	111	8.7	0.0	0.0	4.4	4.4	2.2	2.2
Turfgrass	104	2.1	0.0	0.0	122.7	122.7	5.5	5.5
Open Land	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bare Rock	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sandy Areas	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unpaved Roads	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LD Mixed	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MD Mixed	114	10.2	0.0	3.8	52.0	170.5	7.4	19.4
HD Mixed	521	14.6	0.0	17.5	238.4	782.1	34.1	88.8
LD Residential	12	3.5	0.0	0.1	1.3	4.7	0.2	0.5
MD Residential	1085	6.0	0.0	36.4	496.0	1627.2	70.9	184.8
HD Residential	168	8.4	0.0	5.6	76.8	252.1	11.0	28.6
Farm Animals						0.0		0.0
Tile Drainage				0.0		0.0		0.0
Stream Bank				271.8		271.2		46.3
Groundwater					7050.7	7050.7	142.9	142.9
Point Sources					0.0	0.0	0.0	0.0
Septic Systems					78.2	78.2	0.0	0.0
Totals	2456.2	7.70	0.0	335.2	8227.0	10470.3	284.7	529.4

Go Back | Pathogen Loads | Export to JPEG | Print | Close

MAPSHED OUTPUT

APPENDIX D – Future Control Measures Supporting Documentation

FUTURE CONTROL MEASURES - SEDIMENT REDUCTION MODELING (MAPSHED)

All future control measures were modeled individually in MapShed using the Urban BMP Editor.

The resulting sediment removal associated with each BMP was obtained by comparing the MapShed modeled output with the baseline watershed modeled output provided in Appendix B. For each BMP, the calculated sediment reduction is the difference in sediment load (reported in tons) between the BMP modeled output and the watershed baseline load (see highlighted cells).

Specific modeling considerations that went into modeling sediment reduction per BMP are as follows:

- All future BMPs were evaluated as described in Section 5.1 prior to modeling.

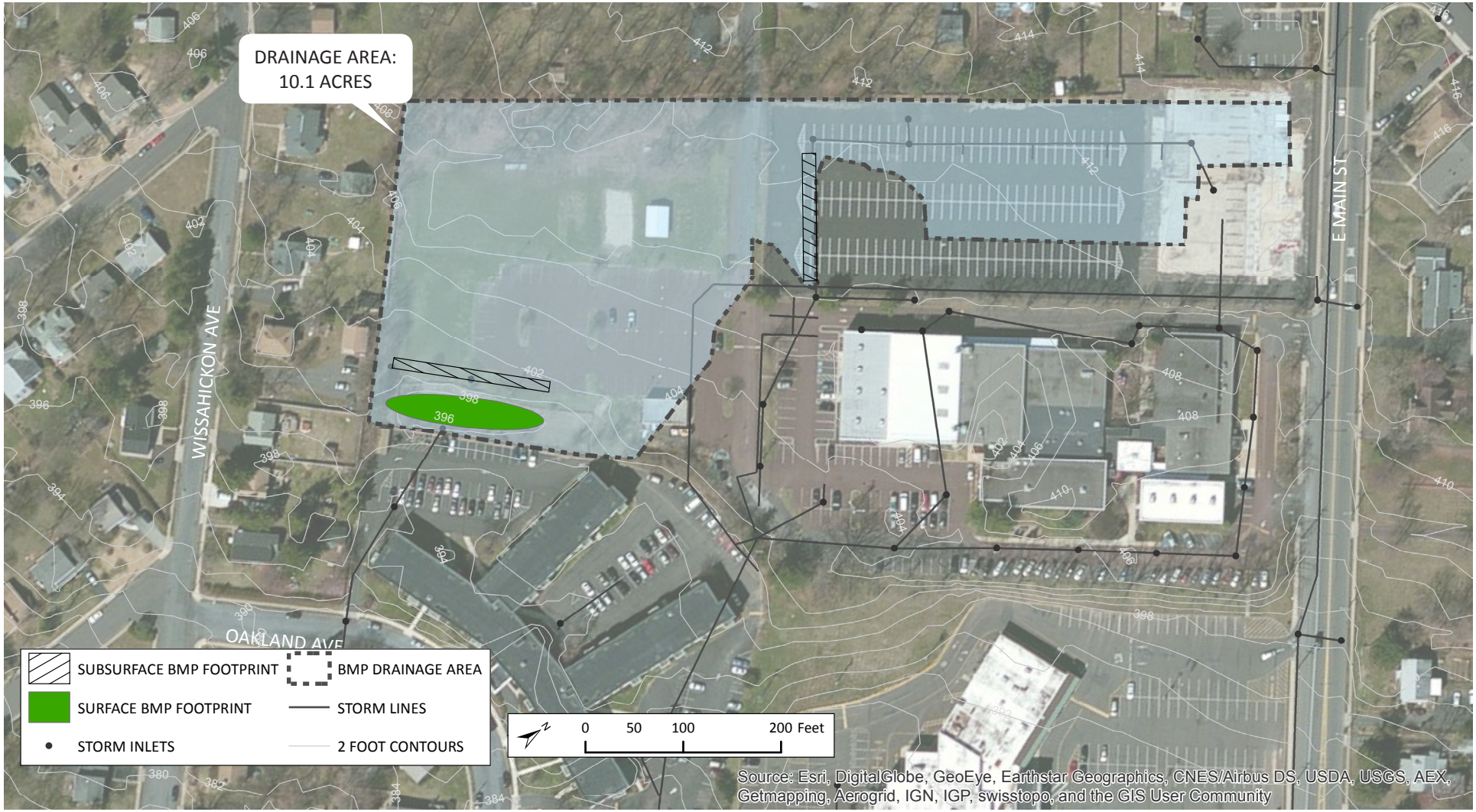
- All future BMPs were modeled in MapShed following the guidance in the MapShed Manual. Future BMPs included in this strategy were modeled as stream protection projects or infiltration/bioretention control measures. BMP types were modeled following guidance from MapShed Manual Table J1 – *Recommended usage of GWLF-E BMP options for various urban BMPS cited in PaDEP's 2006 stormwater manual*.

- All infiltration and detention BMPs were modeled in the Urban BMP Editor as infiltration/bioretention control measures. These BMPs were modeled by entering drainage area managed and 1 inch (2.54 centimeters) or runoff retention. This approach is taken to be conservative given the detailed design of future BMPs may actually allow for larger amount of runoff retention and sediment reduction.

- All stream protection control measures were modeled in the Urban BMP Editor either as a riparian corridor enhancement or as streambank stabilization. For riparian corridor control measures, the width of vegetative buffer strip was input. For streambank stabilization control measures, the length of stream segment with stabilized banks (in kilometers) was input.

- For all future BMPs, sediment reduction was conservatively modeled following sizing guidance from the Pennsylvania BMP Manual (PaDEP, 2006) that sets a maximum 8:1 loading ratio (drainage ratio: BMP footprint). This approach is taken to be conservative given the detailed design of future BMPs may actually allow for larger amount of runoff retention and sediment reduction from these control measures.

(*Note:* Portions of the drainage areas depicted on the project sheets for Priority BMPs N2-1f, N2-2f overlap with the drainage area depicted for Priority BMP N2-3f. This is shown to indicate drainage areas of each project should the other BMPs not be implemented. To avoid double-counting of potential sediment reduction credit, calculations for sediment reduction were only performed for Priority BMP N2-3f within these overlapping drainage areas. No sediment reduction was calculated for Priority BMPs N2-1f and N2-2f within these overlapping drainage areas.)



DRAINAGE AREA MAP

WATERSHED: NESHAMINY SUB-BASIN 2

ANNUAL SEDIMENT REDUCTION: 5,700 LBS/YEAR

CONTROL MEASURE TYPE: SUBSURFACE DETENTION BASINS

PROJECT STATUS: FUTURE

DESCRIPTION: Two subsurface detention BMPs and a detention basin retrofit are currently (May 2016) under construction as a part of a private redevelopment project at the Lansdale Area Family YMCA. Prior to redevelopment, all runoff generated over the 10.1-acre site was routed to the MS4 without any sediment controls. While the detention basin existed prior to the TMDL, it is proposed to be expanded and retrofitted to provide water quality treatment. Post-TMDL sediment reduction is calculated for the 3.3 acres of pre-TMDL unmanaged impervious area now treated by the BMPs. Inspection for this project will be conducted annually by the Borough and maintenance will be conducted by the property owner.

W-1f: YMCA DETENTION BMPS AND BASIN RETROFIT

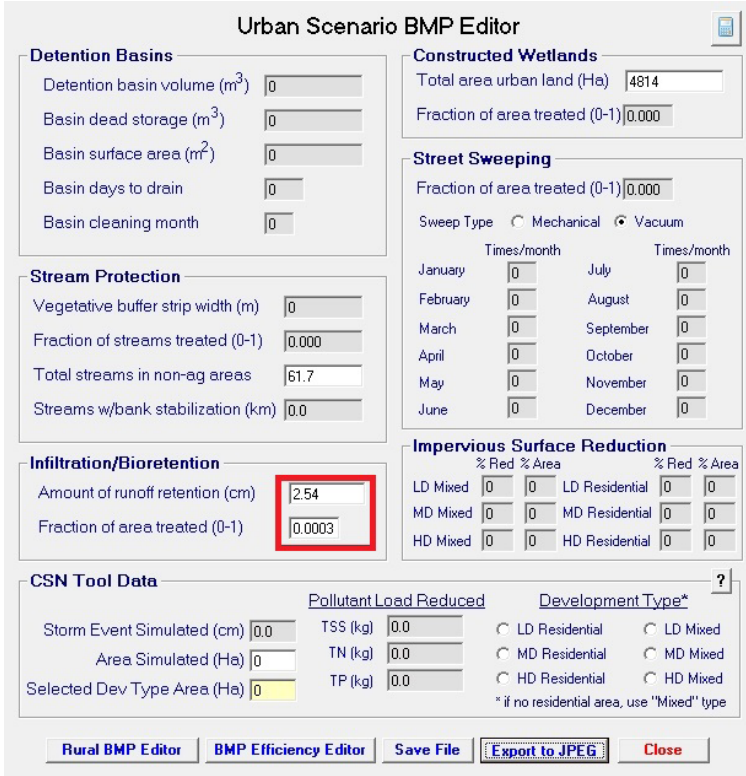
ADDRESS: *608 E MAIN STREET, LANSDALE, PA 19946*

LATITUDE, LONGITUDE: *40°14'01.3200", -075°16'17.5944"*

W-1f: YMCA DETENTION BMPS AND BASIN RETROFIT

SITE PHOTOS

W-1f: YMCA DETENTION BMPS AND BASIN RETROFIT LOW



Urban Scenario BMP Editor

Detention Basins

Detention basin volume (m^3)	0
Basin dead storage (m^3)	0
Basin surface area (m^2)	0
Basin days to drain	0
Basin cleaning month	0

Constructed Wetlands

Total area urban land (Ha)	4814
Fraction of area treated (0-1)	0.000

Street Sweeping

Fraction of area treated (0-1) 0.000

Sweep Type ○ Mechanical ● Vacuum

	Times/month		Times/month
January	0	July	0
February	0	August	0
March	0	September	0
April	0	October	0
May	0	November	0
June	0	December	0

Stream Protection

Vegetative buffer strip width (m)	0
Fraction of streams treated (0-1)	0.000
Total streams in non-ag areas	61.7
Streams w/bank stabilization (km)	0.0

Impervious Surface Reduction

	% Red	% Area		% Red	% Area
LD Mixed	0	0	LD Residential	0	0
MD Mixed	0	0	MD Residential	0	0
HD Mixed	0	0	HD Residential	0	0

Infiltration/Bioretention

Amount of runoff retention (cm)	2.54
Fraction of area treated (0-1)	0.0003

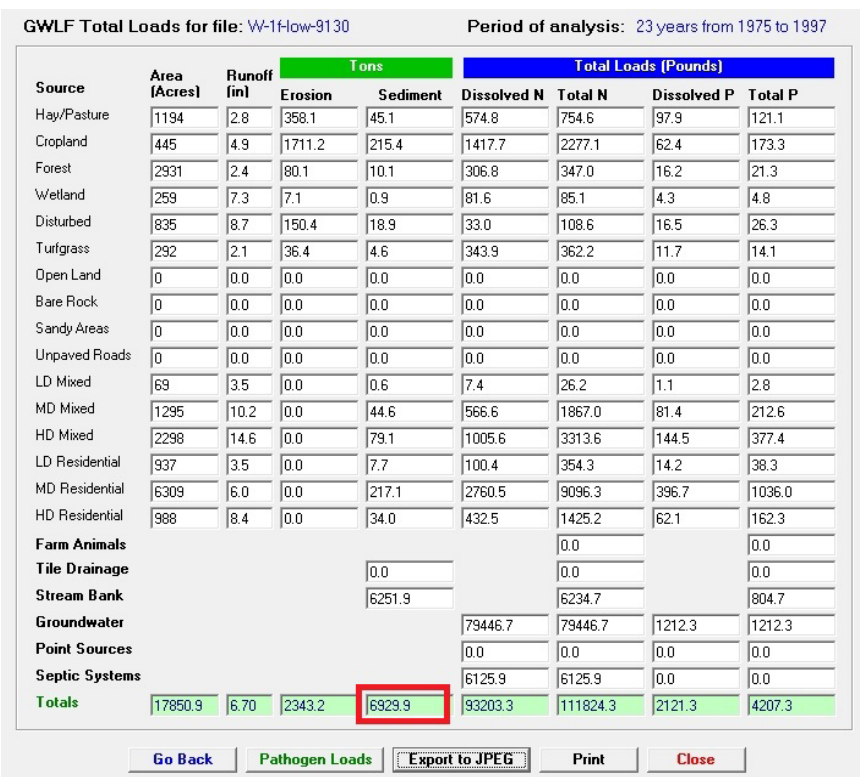
CSN Tool Data

		Pollutant Load Reduced		Development Type*	
Storm Event Simulated (cm)	0.0	TSS (kg)	0.0	○ LD Residential	○ LD Mixed
Area Simulated (Ha)	0	TN (kg)	0.0	○ MD Residential	○ MD Mixed
Selected Dev Type Area (Ha)	0	TP (kg)	0.0	○ HD Residential	○ HD Mixed

* if no residential area, use "Mixed" type

Rural BMP Editor | BMP Efficiency Editor | Save File | Export to JPEG | Close

URBAN BMP EDITOR INPUT



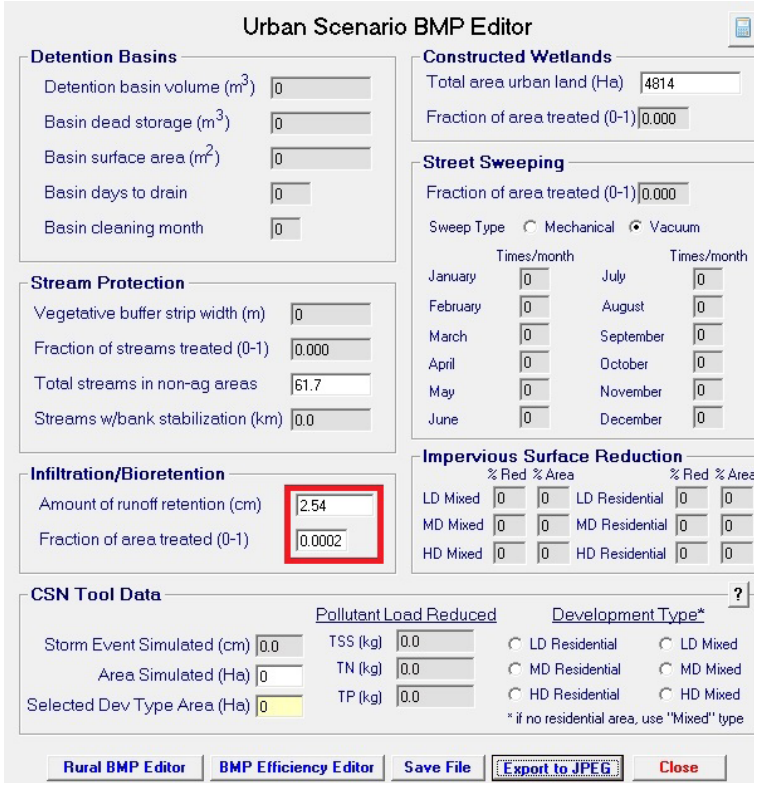
GWLF Total Loads for file: W-1f-low-9130 Period of analysis: 23 years from 1975 to 1997

Source	Area (Acres)	Runoff (in)	Tons: Erosion	Tons: Sediment	Total Loads (Pounds): Dissolved N	Total N	Dissolved P	Total P
Hay/Pasture	1194	2.8	358.1	45.1	574.8	754.6	97.9	121.1
Cropland	445	4.9	1711.2	215.4	1417.7	2277.1	62.4	173.3
Forest	2931	2.4	80.1	10.1	306.8	347.0	16.2	21.3
Wetland	259	7.3	7.1	0.9	81.6	85.1	4.3	4.8
Disturbed	835	8.7	150.4	18.9	33.0	108.6	16.5	26.3
Turfgrass	292	2.1	36.4	4.6	343.9	362.2	11.7	14.1
Open Land	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bare Rock	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sandy Areas	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unpaved Roads	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LD Mixed	69	3.5	0.0	0.6	7.4	26.2	1.1	2.8
MD Mixed	1295	10.2	0.0	44.6	566.6	1867.0	81.4	212.6
HD Mixed	2298	14.6	0.0	79.1	1005.6	3313.6	144.5	377.4
LD Residential	937	3.5	0.0	7.7	100.4	354.3	14.2	38.3
MD Residential	6309	6.0	0.0	217.1	2760.5	9096.3	396.7	1036.0
HD Residential	988	8.4	0.0	34.0	432.5	1425.2	62.1	162.3
Farm Animals						0.0		0.0
Tile Drainage				0.0		0.0		0.0
Stream Bank				6251.9		6234.7		804.7
Groundwater					79446.7	79446.7	1212.3	1212.3
Point Sources					0.0	0.0	0.0	0.0
Septic Systems					6125.9	6125.9	0.0	0.0
Totals	17850.9	6.70	2343.2	6929.9	93203.3	111824.3	2121.3	4207.3

Go Back | Pathogen Loads | Export to JPEG | Print | Close

MAPSHED OUTPUT

W-1f: YMCA DETENTION BMPS AND BASIN RETROFIT HIGH



Urban Scenario BMP Editor

Detention Basins

Detention basin volume (m^3)	0
Basin dead storage (m^3)	0
Basin surface area (m^2)	0
Basin days to drain	0
Basin cleaning month	0

Constructed Wetlands

Total area urban land (Ha)	4814
Fraction of area treated (0-1)	0.000

Street Sweeping

Fraction of area treated (0-1) 0.000

Sweep Type ○ Mechanical ◉ Vacuum

	Times/month		Times/month
January	0	July	0
February	0	August	0
March	0	September	0
April	0	October	0
May	0	November	0
June	0	December	0

Stream Protection

Vegetative buffer strip width (m)	0
Fraction of streams treated (0-1)	0.000
Total streams in non-ag areas	61.7
Streams w/bank stabilization (km)	0.0

Impervious Surface Reduction

	% Red	% Area		% Red	% Area
LD Mixed	0	0	LD Residential	0	0
MD Mixed	0	0	MD Residential	0	0
HD Mixed	0	0	HD Residential	0	0

Infiltration/Bioretention

Amount of runoff retention (cm)	2.54
Fraction of area treated (0-1)	0.0002

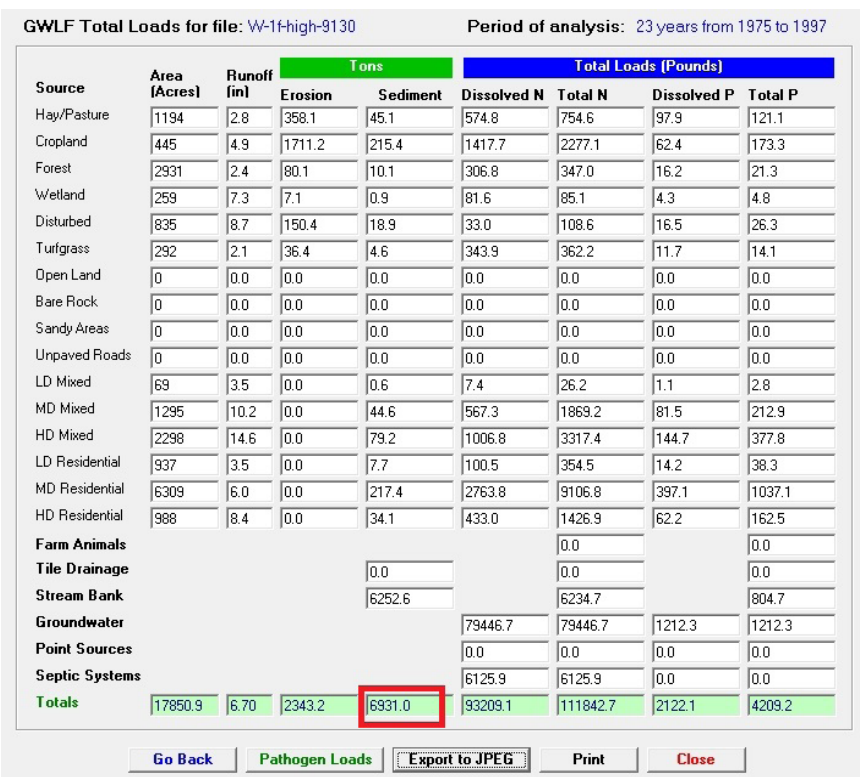
CSN Tool Data

		Pollutant Load Reduced		Development Type*	
Storm Event Simulated (cm)	0.0	TSS (kg)	0.0	○ LD Residential	○ LD Mixed
Area Simulated (Ha)	0	TN (kg)	0.0	○ MD Residential	○ MD Mixed
Selected Dev Type Area (Ha)	0	TP (kg)	0.0	○ HD Residential	○ HD Mixed

* if no residential area, use "Mixed" type

Rural BMP Editor | BMP Efficiency Editor | Save File | Export to JPEG | Close

URBAN BMP EDITOR INPUT

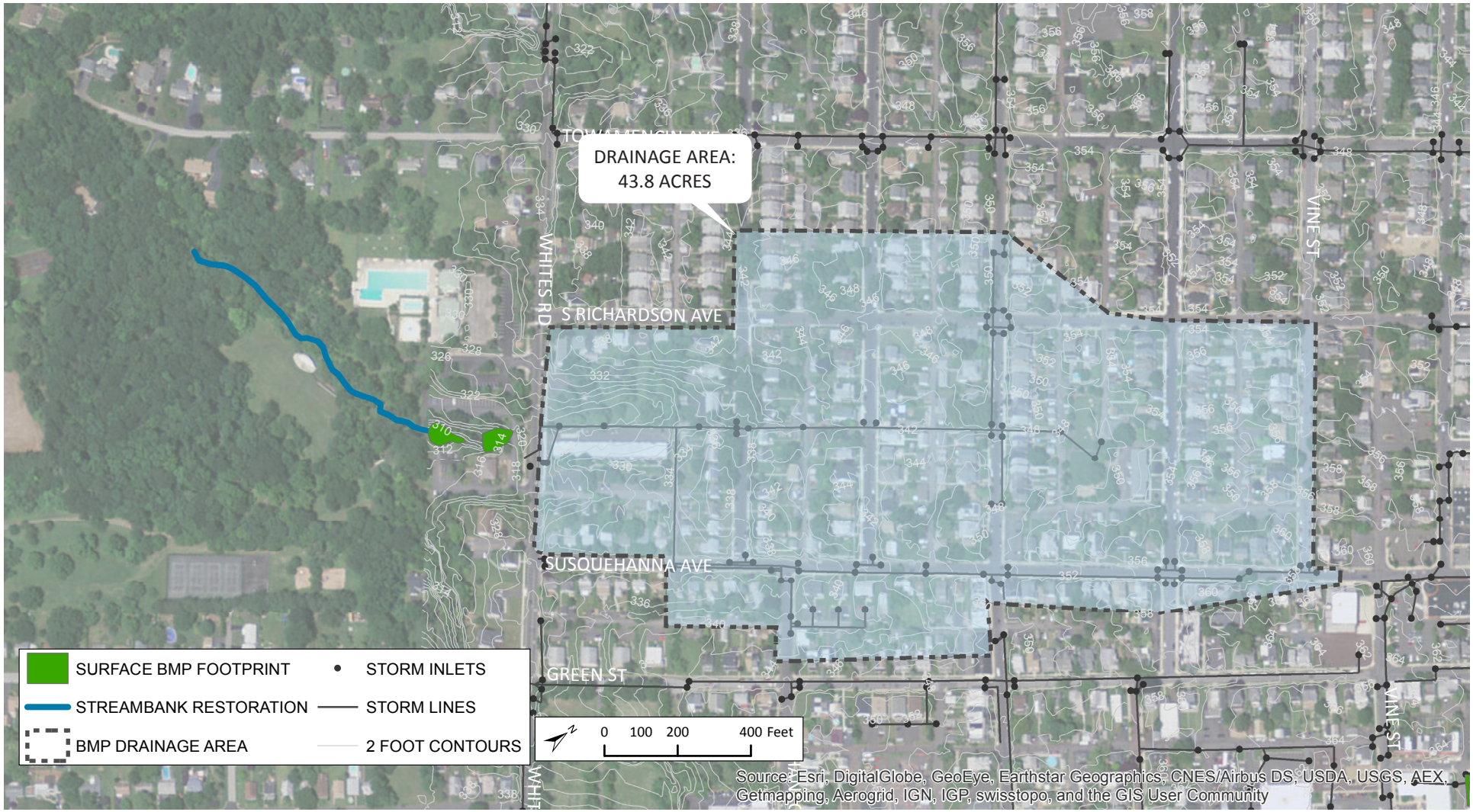


GWLF Total Loads for file: W-1f-high-9130 Period of analysis: 23 years from 1975 to 1997

Source	Area (Acres)	Runoff (in)	Tons: Erosion	Tons: Sediment	Total Loads (Pounds): Dissolved N	Total N	Dissolved P	Total P
Hay/Pasture	1194	2.8	358.1	45.1	574.8	754.6	97.9	121.1
Cropland	445	4.9	1711.2	215.4	1417.7	2277.1	62.4	173.3
Forest	2931	2.4	80.1	10.1	306.8	347.0	16.2	21.3
Wetland	259	7.3	7.1	0.9	81.6	85.1	4.3	4.8
Disturbed	835	8.7	150.4	18.9	33.0	108.6	16.5	26.3
Turfgrass	292	2.1	36.4	4.6	343.9	362.2	11.7	14.1
Open Land	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bare Rock	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sandy Areas	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unpaved Roads	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LD Mixed	69	3.5	0.0	0.6	7.4	26.2	1.1	2.8
MD Mixed	1295	10.2	0.0	44.6	567.3	1869.2	81.5	212.9
HD Mixed	2298	14.6	0.0	79.2	1006.8	3317.4	144.7	377.8
LD Residential	937	3.5	0.0	7.7	100.5	354.5	14.2	38.3
MD Residential	6309	6.0	0.0	217.4	2763.8	9106.8	397.1	1037.1
HD Residential	988	8.4	0.0	34.1	433.0	1426.9	62.2	162.5
Farm Animals						0.0		0.0
Tile Drainage				0.0		0.0		0.0
Stream Bank				6252.6		6234.7		804.7
Groundwater					79446.7	79446.7	1212.3	1212.3
Point Sources					0.0	0.0	0.0	0.0
Septic Systems					6125.9	6125.9	0.0	0.0
Totals	17850.9	6.70	2343.2	6931.0	93209.1	111842.7	2122.1	4209.2

Go Back | Pathogen Loads | Export to JPEG | Print | Close

MAPSHED OUTPUT



DRAINAGE AREA MAP

WATERSHED: SKIPPACK CREEK

CONTROL MEASURE TYPE: INFILTRATION/STREAMBANK RESTORATION

ANNUAL SEDIMENT REDUCTION: 55,800 LBS/YEAR

PROJECT STATUS: FUTURE

COST ESTIMATE: $785,400

O&M COSTS: $10,900/YEAR

DESCRIPTION: Two infiltration basins and streambank restoration are proposed at the MS4 outfall within Whites Roads Park, a Lansdale Borough-owned park just south of Whites Road. While this road demarcates the municipal boundary, the park is owned by the Borough and all runoff conveyed to the proposed infiltration BMPs is generated within the Borough. The infiltration basins will be designed to filter sediment and reduce stormwater volume. Immediately downstream of these infiltration BMPs, streambank restoration is planned for a 867-LF segment of stream that is experiencing ongoing erosion as a result of upstream development within Lansdale. This stream is a tributary of Towamencin Creek. The Borough has been actively pursuing funding for a streambank restoration project in this location.

S-1f: WHITES ROAD PARK INFILTRATION BMPS AND STREAMBANK RESTORATION

ADDRESS: *400 WHITES ROAD, LANSDALE, PA 19946*

LATITUDE, LONGITUDE: *40°14'13.2648", -075°17'34.5516"*

S-1f: WHITES ROAD PARK INFILTRATION BMPS AND STREAMBANK RESTORATION

SITE PHOTOS

S-1f: WHITES ROAD PARK INFILTRATION BMPS

Urban Scenario BMP Editor

Detention Basins

Detention basin volume (m^3)	0
Basin dead storage (m^3)	0
Basin surface area (m^2)	0
Basin days to drain	0
Basin cleaning month	0

Constructed Wetlands

Total area urban land (Ha)	6557
Fraction of area treated (0-1)	0.000

Street Sweeping

Fraction of area treated (0-1) 0.000

Sweep Type ○ Mechanical ● Vacuum

	Times/month		Times/month
January	0	July	0
February	0	August	0
March	0	September	0
April	0	October	0
May	0	November	0
June	0	December	0

Stream Protection

Vegetative buffer strip width (m)	0
Fraction of streams treated (0-1)	0.000
Total streams in non-ag areas	145.9
Streams w/bank stabilization (km)	0

Infiltration/Bioretention

Amount of runoff retention (cm)	2.54
Fraction of area treated (0-1)	0.0002

Impervious Surface Reduction

	% Red	% Area		% Red	% Area
LD Mixed	0	0	LD Residential	0	0
MD Mixed	0	0	MD Residential	0	0
HD Mixed	0	0	HD Residential	0	0

CSN Tool Data

		Pollutant Load Reduced		Development Type*	
Storm Event Simulated (cm)	0.0	TSS (kg)	0.0	○ LD Residential	○ LD Mixed
Area Simulated (Ha)	0	TN (kg)	0.0	○ MD Residential	○ MD Mixed
Selected Dev Type Area (Ha)	0	TP (kg)	0.0	○ HD Residential	○ HD Mixed

* if no residential area, use "Mixed" type

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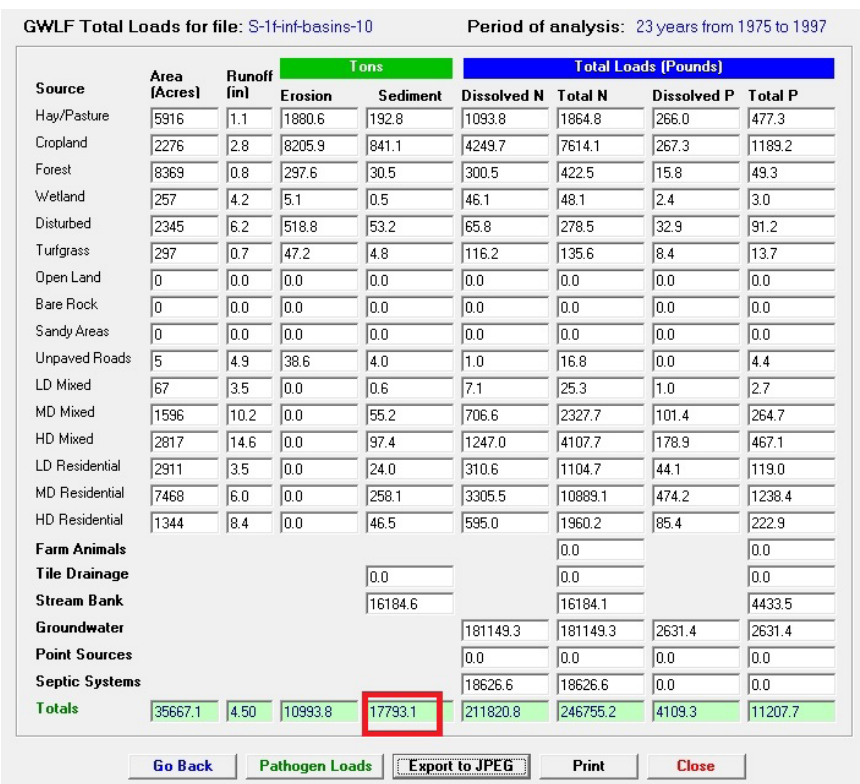
URBAN BMP EDITOR INPUT



GWLF Total Loads for file: S-1f-inf-basins-10 Period of analysis: 23 years from 1975 to 1997

Source	Area (Acres)	Runoff (in)	Tons: Erosion	Tons: Sediment	Total Loads (Pounds): Dissolved N	Total N	Dissolved P	Total P
Hay/Pasture	5916	1.1	1880.6	192.8	1093.8	1864.8	266.0	477.3
Cropland	2276	2.8	8205.9	841.1	4249.7	7614.1	267.3	1189.2
Forest	8369	0.8	297.6	30.5	300.5	422.5	15.8	49.3
Wetland	257	4.2	5.1	0.5	46.1	48.1	2.4	3.0
Disturbed	2345	6.2	518.8	53.2	65.8	278.5	32.9	91.2
Turfgrass	297	0.7	47.2	4.8	116.2	135.6	8.4	13.7
Open Land	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bare Rock	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sandy Areas	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unpaved Roads	5	4.9	38.6	4.0	1.0	16.8	0.0	4.4
LD Mixed	67	3.5	0.0	0.6	7.1	25.3	1.0	2.7
MD Mixed	1596	10.2	0.0	55.2	706.6	2327.7	101.4	264.7
HD Mixed	2817	14.6	0.0	97.4	1247.0	4107.7	178.9	467.1
LD Residential	2911	3.5	0.0	24.0	310.6	1104.7	44.1	119.0
MD Residential	7468	6.0	0.0	258.1	3305.5	10889.1	474.2	1238.4
HD Residential	1344	8.4	0.0	46.5	595.0	1960.2	85.4	222.9
Farm Animals						0.0		0.0
Tile Drainage				0.0		0.0		0.0
Stream Bank				16184.6		16184.1		4433.5
Groundwater					181149.3	181149.3	2631.4	2631.4
Point Sources					0.0	0.0	0.0	0.0
Septic Systems					18626.6	18626.6	0.0	0.0
Totals	35667.1	4.50	10993.8	17793.1	211820.8	246755.2	4109.3	11207.7

Go Back | Pathogen Loads | Export to JPEG | Print | Close

MAPSHED OUTPUT

S-1f: WHITES ROAD PARK STREAMBANK RESTORATION

Urban Scenario BMP Editor

Detention Basins

Detention basin volume (m^3)	0
Basin dead storage (m^3)	0
Basin surface area (m^2)	0
Basin days to drain	0
Basin cleaning month	0

Constructed Wetlands

Total area urban land (Ha)	6557
Fraction of area treated (0-1)	0.000

Street Sweeping

Fraction of area treated (0-1) 0.000

Sweep Type ○ Mechanical ◉ Vacuum

	Times/month		Times/month
January	0	July	0
February	0	August	0
March	0	September	0
April	0	October	0
May	0	November	0
June	0	December	0

Stream Protection

Vegetative buffer strip width (m)	0
Fraction of streams treated (0-1)	0.000
Total streams in non-ag areas	145.9
Streams w/bank stabilization (km	0.26426

Impervious Surface Reduction

	% Red	% Area		% Red	% Area
LD Mixed	0	0	LD Residential	0	0
MD Mixed	0	0	MD Residential	0	0
HD Mixed	0	0	HD Residential	0	0

Infiltration/Bioretention

Amount of runoff retention (cm)	0
Fraction of area treated (0-1)	0

CSN Tool Data

		Pollutant Load Reduced		Development Type*	
Storm Event Simulated (cm)	0.0	TSS (kg)	0.0	○ LD Residential	○ LD Mixed
Area Simulated (Ha)	0	TN (kg)	0.0	○ MD Residential	○ MD Mixed
Selected Dev Type Area (Ha)	0	TP (kg)	0.0	○ HD Residential	○ HD Mixed

* if no residential area, use "Mixed" type

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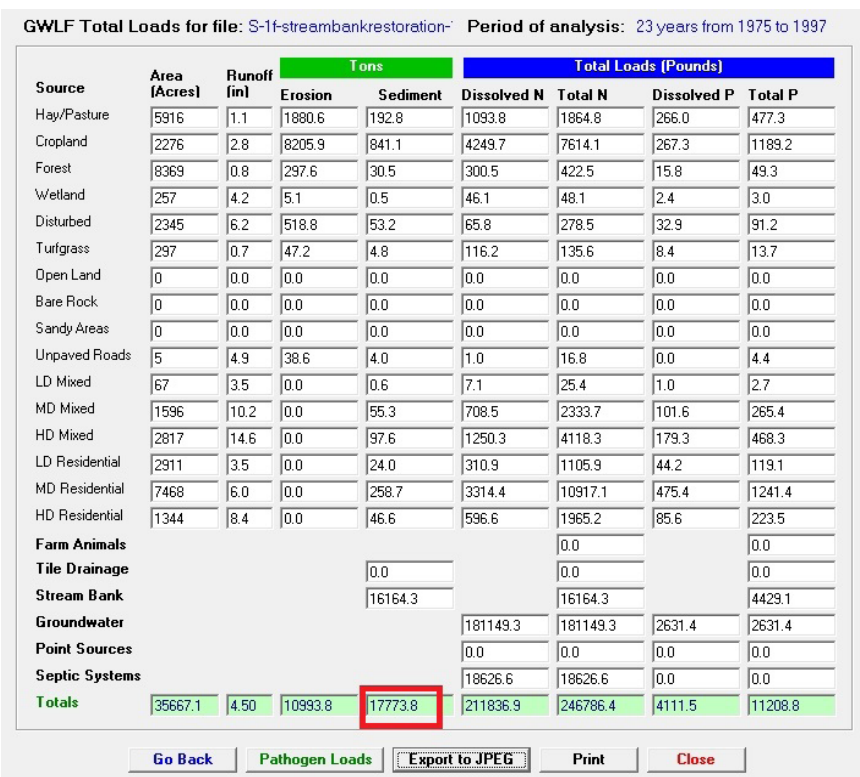
URBAN BMP EDITOR INPUT



GWLF Total Loads for file: S-1f-streambankrestoration- **Period of analysis:** 23 years from 1975 to 1997

Source	Area (Acres)	Runoff (in)	Tons: Erosion	Tons: Sediment	Total Loads (Pounds): Dissolved N	Total N	Dissolved P	Total P
Hay/Pasture	5916	1.1	1880.6	192.8	1093.8	1864.8	266.0	477.3
Cropland	2276	2.8	8205.9	841.1	4249.7	7614.1	267.3	1189.2
Forest	8369	0.8	297.6	30.5	300.5	422.5	15.8	49.3
Wetland	257	4.2	5.1	0.5	46.1	48.1	2.4	3.0
Disturbed	2345	6.2	518.8	53.2	65.8	278.5	32.9	91.2
Turfgrass	297	0.7	47.2	4.8	116.2	135.6	8.4	13.7
Open Land	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bare Rock	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sandy Areas	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unpaved Roads	5	4.9	38.6	4.0	1.0	16.8	0.0	4.4
LD Mixed	67	3.5	0.0	0.6	7.1	25.4	1.0	2.7
MD Mixed	1596	10.2	0.0	55.3	708.5	2333.7	101.6	265.4
HD Mixed	2817	14.6	0.0	97.6	1250.3	4118.3	179.3	468.3
LD Residential	2911	3.5	0.0	24.0	310.9	1105.9	44.2	119.1
MD Residential	7468	6.0	0.0	258.7	3314.4	10917.1	475.4	1241.4
HD Residential	1344	8.4	0.0	46.6	596.6	1965.2	85.6	223.5
Farm Animals						0.0		0.0
Tile Drainage				0.0		0.0		0.0
Stream Bank				16164.3		16164.3		4429.1
Groundwater					181149.3	181149.3	2631.4	2631.4
Point Sources					0.0	0.0	0.0	0.0
Septic Systems					18626.6	18626.6	0.0	0.0
Totals	35667.1	4.50	10993.8	17773.8	211836.9	246786.4	4111.5	11208.8

Go Back | Pathogen Loads | Export to JPEG | Print | Close

MAPSHED OUTPUT

DRAINAGE AREA MAP

WATERSHED: SKIPPACK CREEK
CONTROL MEASURE TYPE: STREAMBANK RESTORATION
ANNUAL SEDIMENT REDUCTION: 21,400 LBS/YEAR
PROJECT STATUS: FUTURE
COST ESTIMATE: $176,900
O&M COSTS: $2,400/YEAR

DESCRIPTION: A streambank restoration project is proposed for a 393-LF erosion-prone segment of stream within the Borough-owned Cemetery. This stream is a tributary of Towamencin Creek. While the stream segment on the northern edge of the property has an established riparian buffer, the streambanks on the rest of the property are in poor condition with steep slopes and exposed sediment. Restoration is proposed for the 393-LF segment currently in poor condition. Restoration concepts to be considered include an expanded vegetated buffer and naturalized stabilization methods. Inspection and maintenance of this project will be conducted by the Borough.

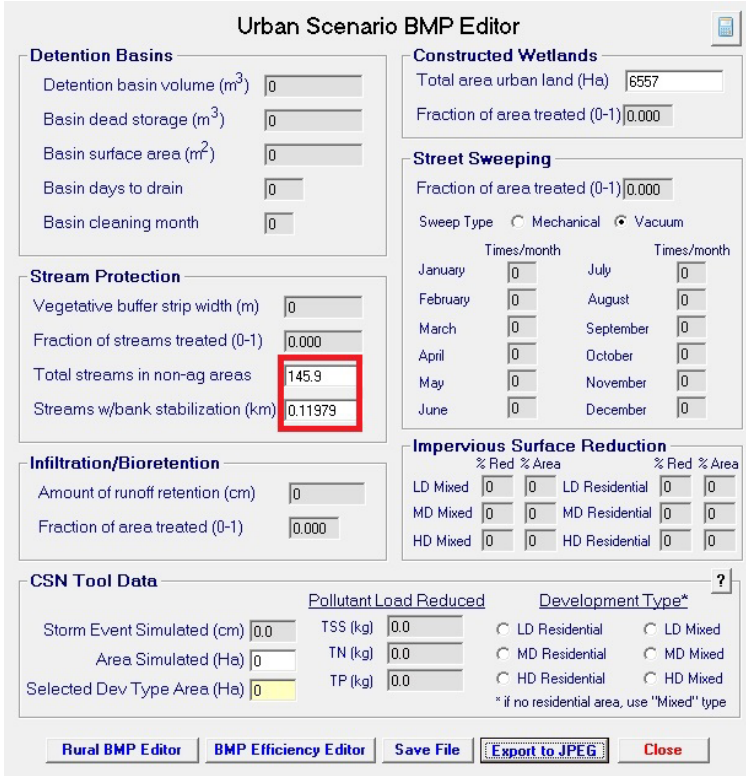
S-2f: BOROUGH CEMETERY STREAM RESTORATION

ADDRESS: *BROAD STREET AND WHITES ROAD, LANSDALE, PA 19946*
LATITUDE, LONGITUDE: *40°14'10.6260", -75°17'26.0736"*

S-2f: BOROUGH CEMETERY STREAM RESTORATION

SITE PHOTOS

S-2f: BOROUGH CEMETERY STREAM RESTORATION



Urban Scenario BMP Editor

Detention Basins

Detention basin volume (m^3)	0
Basin dead storage (m^3)	0
Basin surface area (m^2)	0
Basin days to drain	0
Basin cleaning month	0

Constructed Wetlands

Total area urban land (Ha)	6557
Fraction of area treated (0-1)	0.000

Street Sweeping

Fraction of area treated (0-1) 0.000

Sweep Type ○ Mechanical ● Vacuum

	Times/month		Times/month
January	0	July	0
February	0	August	0
March	0	September	0
April	0	October	0
May	0	November	0
June	0	December	0

Stream Protection

Vegetative buffer strip width (m)	0
Fraction of streams treated (0-1)	0.000
Total streams in non-ag areas	145.9
Streams w/bank stabilization (km)	0.11979

Infiltration/Bioretention

Amount of runoff retention (cm)	0
Fraction of area treated (0-1)	0.000

Impervious Surface Reduction

	% Red	% Area		% Red	% Area
LD Mixed	0	0	LD Residential	0	0
MD Mixed	0	0	MD Residential	0	0
HD Mixed	0	0	HD Residential	0	0

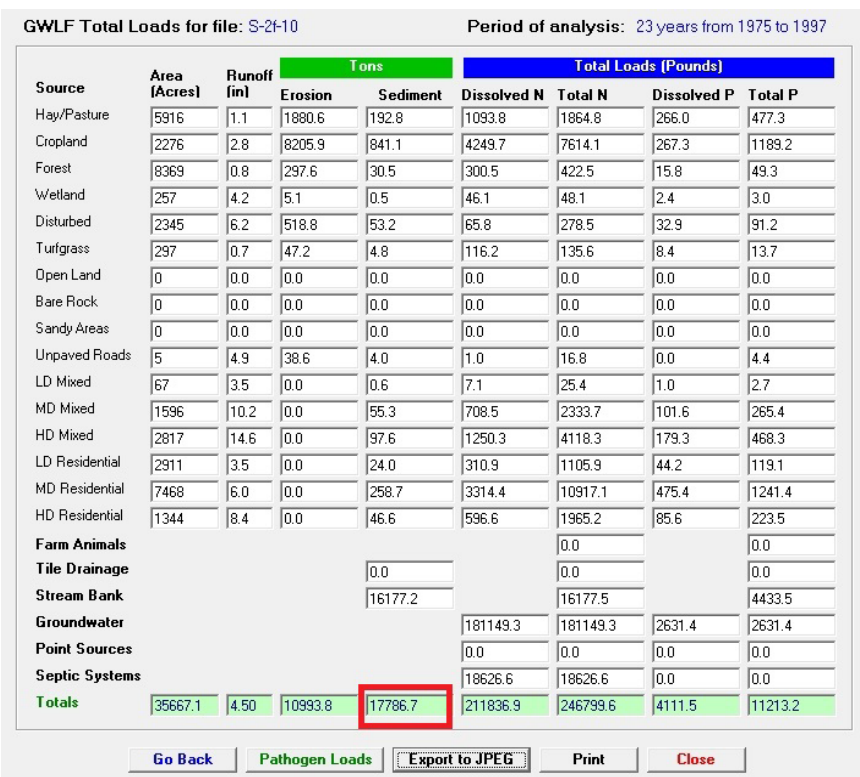
CSN Tool Data

		Pollutant Load Reduced		Development Type*	
Storm Event Simulated (cm)	0.0	TSS (kg)	0.0	○ LD Residential	○ LD Mixed
Area Simulated (Ha)	0	TN (kg)	0.0	○ MD Residential	○ MD Mixed
Selected Dev Type Area (Ha)	0	TP (kg)	0.0	○ HD Residential	○ HD Mixed

* if no residential area, use "Mixed" type

Rural BMP Editor | BMP Efficiency Editor | Save File | Export to JPEG | Close

URBAN BMP EDITOR INPUT

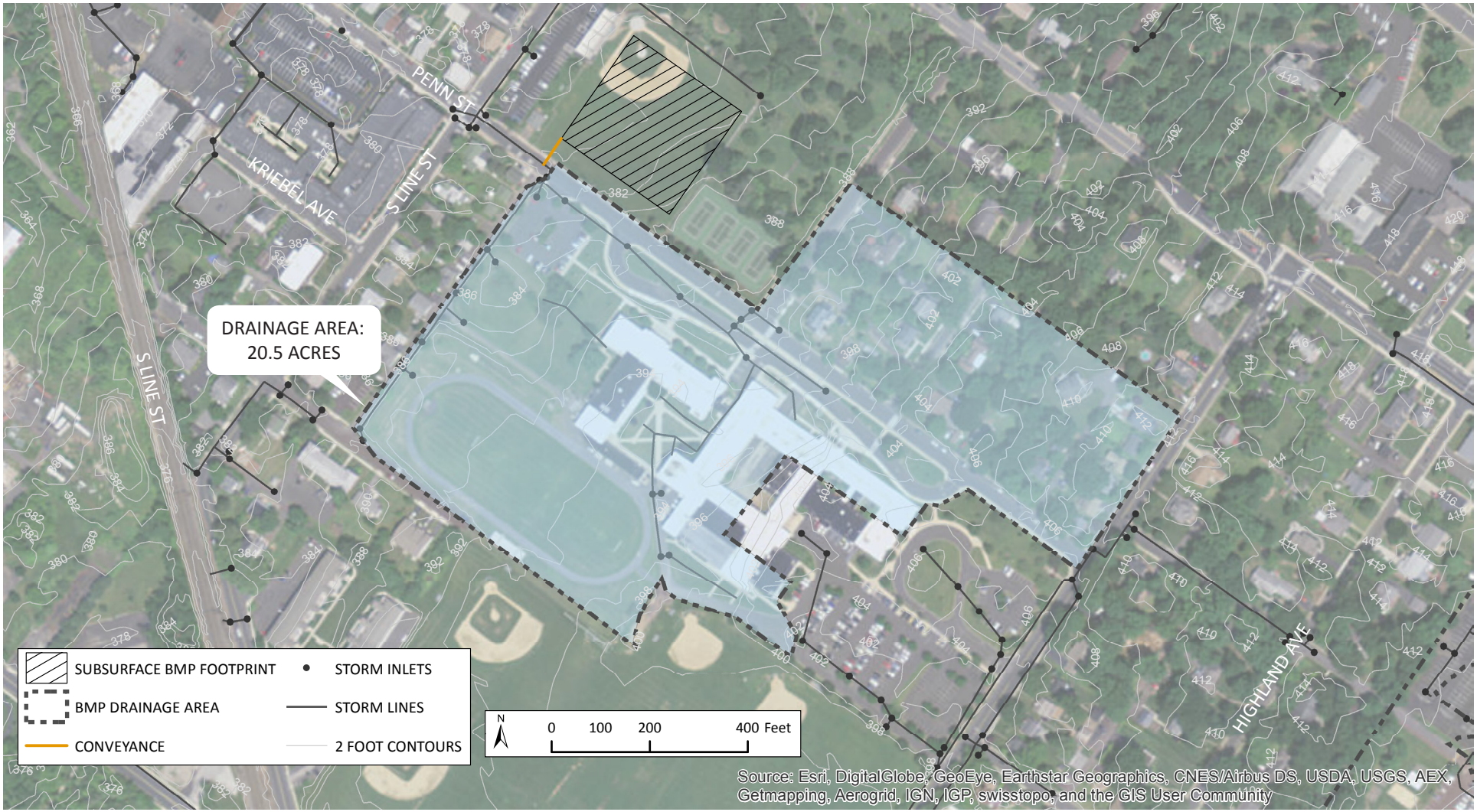


GWLF Total Loads for file: S-2f-10 Period of analysis: 23 years from 1975 to 1997

Source	Area (Acres)	Runoff (in)	Tons: Erosion	Tons: Sediment	Total Loads (Pounds): Dissolved N	Total N	Dissolved P	Total P
Hay/Pasture	5916	1.1	1880.6	192.8	1093.8	1864.8	266.0	477.3
Cropland	2276	2.8	8205.9	841.1	4249.7	7614.1	267.3	1189.2
Forest	8369	0.8	297.6	30.5	300.5	422.5	15.8	49.3
Wetland	257	4.2	5.1	0.5	46.1	48.1	2.4	3.0
Disturbed	2345	6.2	518.8	53.2	65.8	278.5	32.9	91.2
Turfgrass	297	0.7	47.2	4.8	116.2	135.6	8.4	13.7
Open Land	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bare Rock	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sandy Areas	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unpaved Roads	5	4.9	38.6	4.0	1.0	16.8	0.0	4.4
LD Mixed	67	3.5	0.0	0.6	7.1	25.4	1.0	2.7
MD Mixed	1596	10.2	0.0	55.3	708.5	2333.7	101.6	265.4
HD Mixed	2817	14.6	0.0	97.6	1250.3	4118.3	179.3	468.3
LD Residential	2911	3.5	0.0	24.0	310.9	1105.9	44.2	119.1
MD Residential	7468	6.0	0.0	258.7	3314.4	10917.1	475.4	1241.4
HD Residential	1344	8.4	0.0	46.6	596.6	1965.2	85.6	223.5
Farm Animals						0.0		0.0
Tile Drainage				0.0		0.0		0.0
Stream Bank				16177.2		16177.5		4433.5
Groundwater					181149.3	181149.3	2631.4	2631.4
Point Sources					0.0	0.0	0.0	0.0
Septic Systems					18626.6	18626.6	0.0	0.0
Totals	35667.1	4.50	10993.8	17786.7	211836.9	246799.6	4111.5	11213.2

Go Back | Pathogen Loads | Export to JPEG | Print | Close

MAPSHED OUTPUT



DRAINAGE AREA MAP

WATERSHED: SKIPPACK CREEK
CONTROL MEASURE TYPE: SUBSURFACE INFILTRATION
ANNUAL SEDIMENT REDUCTION: 36,400 LBS/YEAR
PROJECT STATUS: FUTURE
COST ESTIMATE: $1,541,700
O&M COSTS: $22,000/YEAR

DESCRIPTION: A subsurface infiltration BMP is proposed beneath an existing baseball field in Memorial Park, a Borough-owned park. A flow diversion structure is proposed to be constructed in-line with the storm sewer main located in Penn Street to convey stormwater to the BMP in the park. The BMP will manage runoff from 20.5 acres of mixed land cover, including Pennsdale Middle School and the surrounding neighborhoods, by storing and infiltrating stormwater beneath the field. A subsurface forebay adjacent to the Penn Street right-of-way will be provided for pre-treatment and for ease of maintenance access. Overflow from the BMP will be discharged back to the MS4 in Penn Street. Inspection and maintenance of this project will be conducted by the Borough.

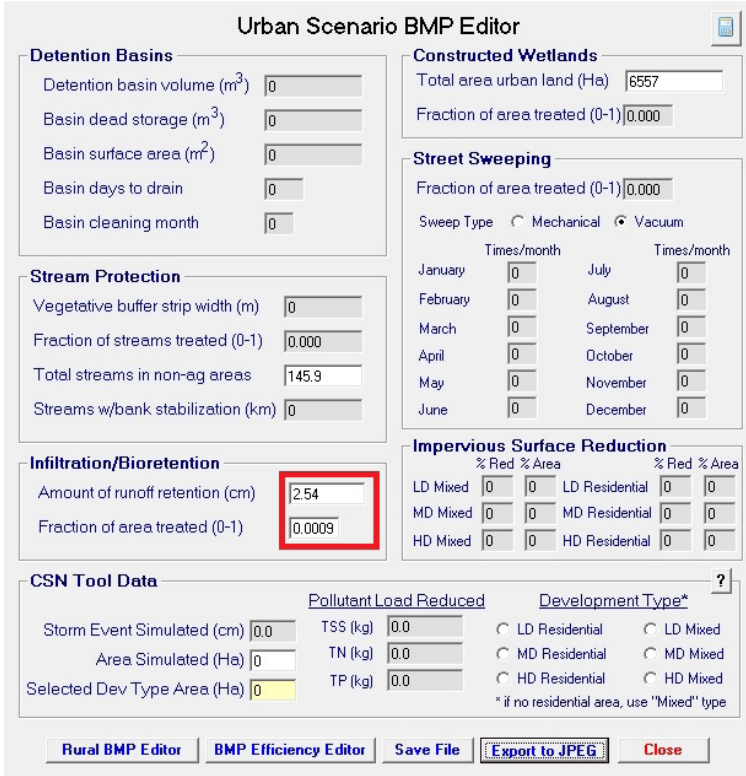
S-3f: MEMORIAL PARK SUBSURFACE INFILTRATION BMP

ADDRESS: *300 E MAIN STREET, LANSDALE, PA 19946*
LATITUDE, LONGITUDE: *40°14'16.1808", -075°16'44.2128"*

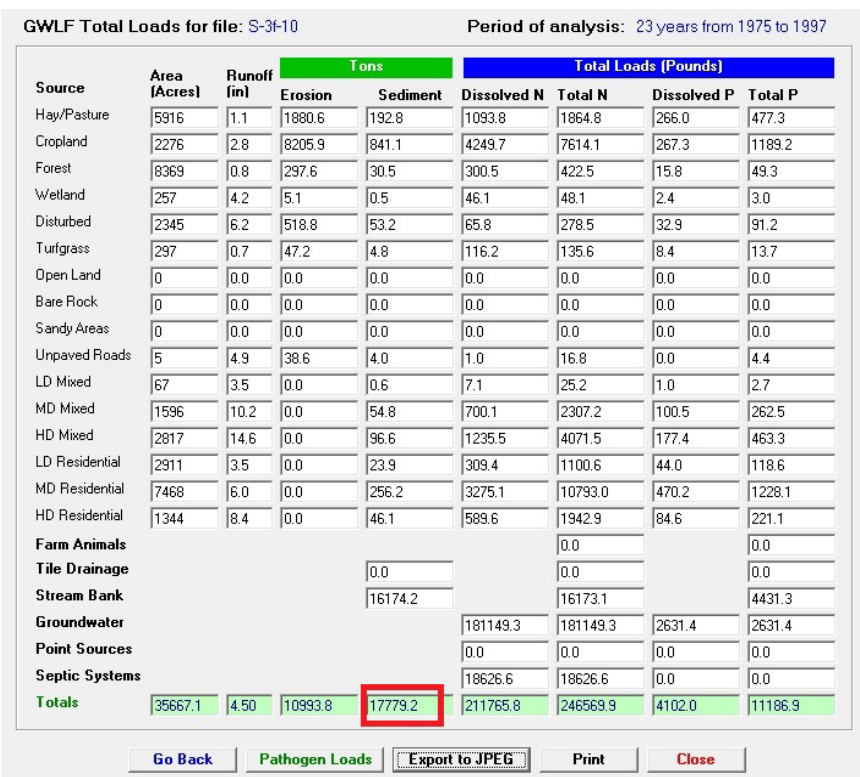
S-3f: MEMORIAL PARK SUBSURFACE INFILTRATION BMP

SITE PHOTOS

S-3f: MEMORIAL PARK SUBSURFACE INFILTRATION BMP



URBAN BMP EDITOR INPUT

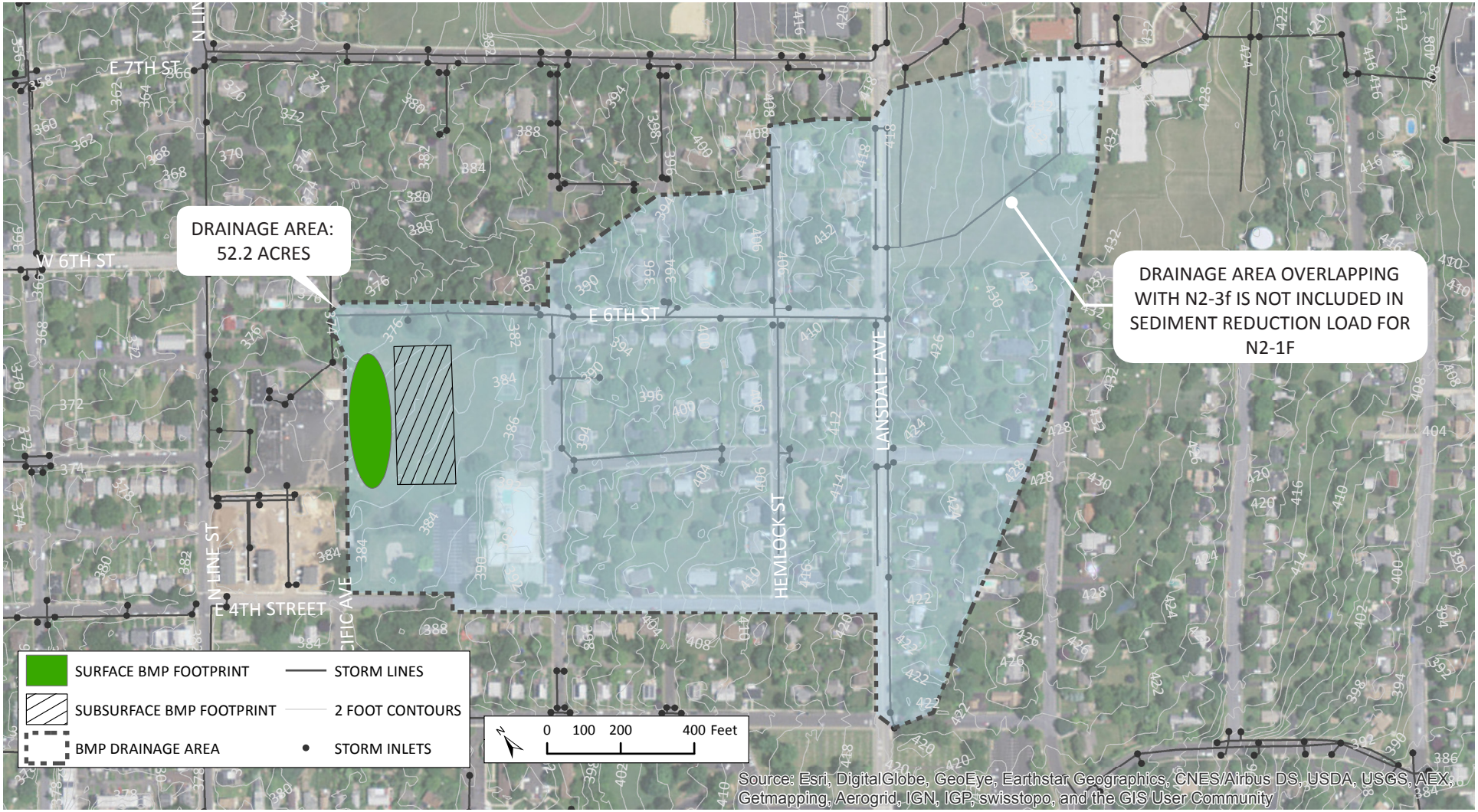


GWLF Total Loads for file: S-3f-10 Period of analysis: 23 years from 1975 to 1997

Source	Area (Acres)	Runoff (in)	Tons: Erosion	Tons: Sediment	Total Loads (Pounds): Dissolved N	Total N	Dissolved P	Total P
Hay/Pasture	5916	1.1	1880.6	192.8	1093.8	1864.8	266.0	477.3
Cropland	2276	2.8	8205.9	841.1	4249.7	7614.1	267.3	1189.2
Forest	8369	0.8	297.6	30.5	300.5	422.5	15.8	49.3
Wetland	257	4.2	5.1	0.5	46.1	48.1	2.4	3.0
Disturbed	2345	6.2	518.8	53.2	65.8	278.5	32.9	91.2
Turfgrass	297	0.7	47.2	4.8	116.2	135.6	8.4	13.7
Open Land	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bare Rock	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sandy Areas	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unpaved Roads	5	4.9	38.6	4.0	1.0	16.8	0.0	4.4
LD Mixed	67	3.5	0.0	0.6	7.1	25.2	1.0	2.7
MD Mixed	1596	10.2	0.0	54.8	700.1	2307.2	100.5	262.5
HD Mixed	2817	14.6	0.0	96.6	1235.5	4071.5	177.4	463.3
LD Residential	2911	3.5	0.0	23.9	309.4	1100.6	44.0	118.6
MD Residential	7468	6.0	0.0	256.2	3275.1	10793.0	470.2	1228.1
HD Residential	1344	8.4	0.0	46.1	589.6	1942.9	84.6	221.1
Farm Animals						0.0		0.0
Tile Drainage				0.0		0.0		0.0
Stream Bank				16174.2		16173.1		4431.3
Groundwater					181149.3	181149.3	2631.4	2631.4
Point Sources					0.0	0.0	0.0	0.0
Septic Systems					18626.6	18626.6	0.0	0.0
Totals	35667.1	4.50	10993.8	17779.2	211765.8	246569.9	4102.0	11186.9

Go Back | Pathogen Loads | Export to JPEG | Print | Close

MAPSHED OUTPUT



DRAINAGE AREA MAP

WATERSHED: NESHAMINY SUB-BASIN 2

CONTROL MEASURE TYPE: SURFACE AND SUBSURFACE INFILTRATION

ANNUAL SEDIMENT REDUCTION: 12,600 LBS/YEAR

PROJECT STATUS: FUTURE

COST ESTIMATE: $1,380,6000

O&M COSTS: $19,700/YEAR

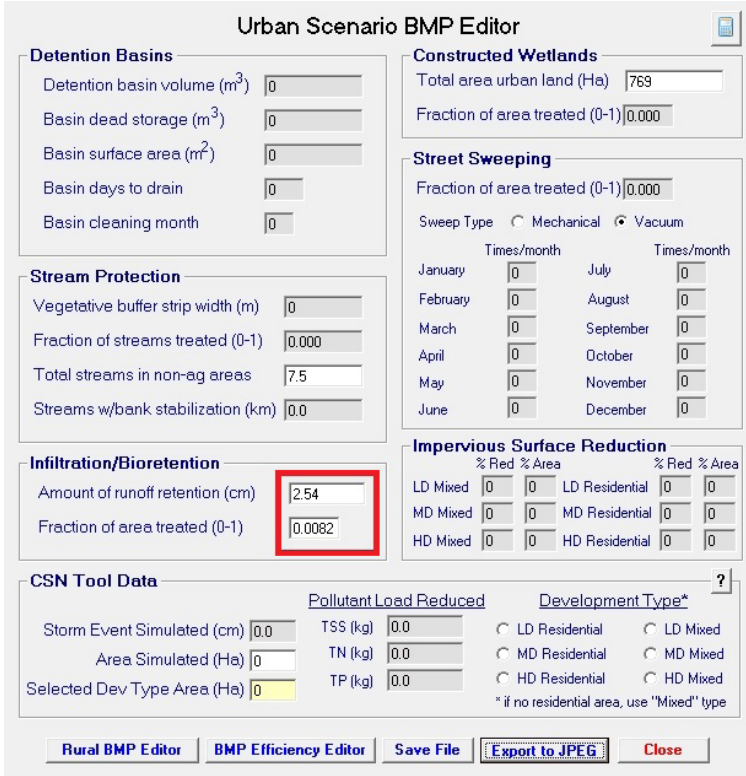
DESCRIPTION: A combination of bioretention and subsurface infiltration BMPs are proposed within Fourth Street Park, a Borough-owned park. A flow diversion structure is proposed to be constructed in-line with the storm sewer main located in East 6th Street and a new inlet is proposed along 4th Street to convey stormwater to BMPs in the park. The BMPs will manage runoff from 52.2 acres of mixed land cover. Ample space is available in the park for a surface BMP while keeping a large amount of space is available for recreational use. Additional storage capacity will be achieved with a subsurface infiltration BMP. Overflow from the BMP will be discharged back to the MS4 in East 6th Street. Inspection and maintenance of this project will be conducted by the Borough.

N2-1f: FOURTH STREET PARK INFILTRATION BMPs

ADDRESS: *400-498 E 6TH STREET, LANSDALE, PA 19946*

LATITUDE, LONGITUDE: *40°14'28.0068", -075°16'22.4148"*

N2-1f: FOURTH STREET PARK INFILTRATION BMPs



Urban Scenario BMP Editor

Detention Basins

Detention basin volume (m^3)	0
Basin dead storage (m^3)	0
Basin surface area (m^2)	0
Basin days to drain	0
Basin cleaning month	0

Constructed Wetlands

Total area urban land (Ha)	769
Fraction of area treated (0-1)	0.000

Street Sweeping

Fraction of area treated (0-1) 0.000

Sweep Type ○ Mechanical ● Vacuum

	Times/month		Times/month
January	0	July	0
February	0	August	0
March	0	September	0
April	0	October	0
May	0	November	0
June	0	December	0

Stream Protection

Vegetative buffer strip width (m)	0
Fraction of streams treated (0-1)	0.000
Total streams in non-ag areas	7.5
Streams w/bank stabilization (km)	0.0

Infiltration/Bioretention

Amount of runoff retention (cm)	2.54
Fraction of area treated (0-1)	0.0082

Impervious Surface Reduction

	% Red	% Area		% Red	% Area
LD Mixed	0	0	LD Residential	0	0
MD Mixed	0	0	MD Residential	0	0
HD Mixed	0	0	HD Residential	0	0

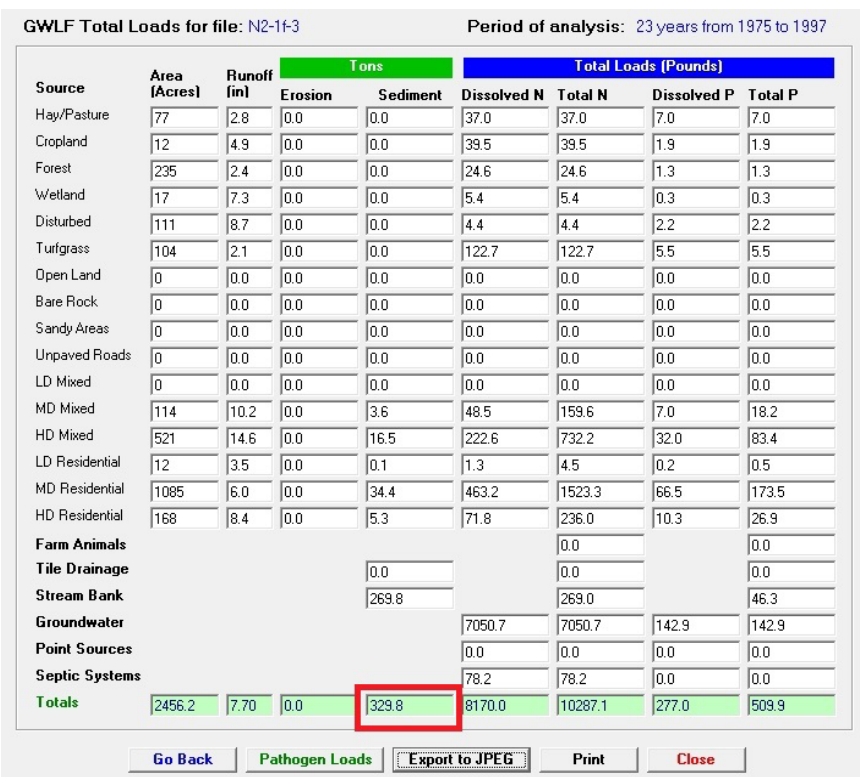
CSN Tool Data

		Pollutant Load Reduced		Development Type*	
Storm Event Simulated (cm)	0.0	TSS (kg)	0.0	○ LD Residential	○ LD Mixed
Area Simulated (Ha)	0	TN (kg)	0.0	○ MD Residential	○ MD Mixed
Selected Dev Type Area (Ha)	0	TP (kg)	0.0	○ HD Residential	○ HD Mixed

* if no residential area, use "Mixed" type

Rural BMP Editor | BMP Efficiency Editor | Save File | Export to JPEG | Close

URBAN BMP EDITOR INPUT



GWLF Total Loads for file: N2-1f-3 Period of analysis: 23 years from 1975 to 1997

Source	Area (Acres)	Runoff (in)	Tons: Erosion	Tons: Sediment	Total Loads (Pounds): Dissolved N	Total N	Dissolved P	Total P
Hay/Pasture	77	2.8	0.0	0.0	37.0	37.0	7.0	7.0
Cropland	12	4.9	0.0	0.0	39.5	39.5	1.9	1.9
Forest	235	2.4	0.0	0.0	24.6	24.6	1.3	1.3
Wetland	17	7.3	0.0	0.0	5.4	5.4	0.3	0.3
Disturbed	111	8.7	0.0	0.0	4.4	4.4	2.2	2.2
Turfgrass	104	2.1	0.0	0.0	122.7	122.7	5.5	5.5
Open Land	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bare Rock	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sandy Areas	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unpaved Roads	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LD Mixed	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MD Mixed	114	10.2	0.0	3.6	48.5	159.6	7.0	18.2
HD Mixed	521	14.6	0.0	16.5	222.6	732.2	32.0	83.4
LD Residential	12	3.5	0.0	0.1	1.3	4.5	0.2	0.5
MD Residential	1085	6.0	0.0	34.4	463.2	1523.3	66.5	173.5
HD Residential	168	8.4	0.0	5.3	71.8	236.0	10.3	26.9
Farm Animals						0.0		0.0
Tile Drainage				0.0		0.0		0.0
Stream Bank				269.8		269.0		46.3
Groundwater					7050.7	7050.7	142.9	142.9
Point Sources					0.0	0.0	0.0	0.0
Septic Systems					78.2	78.2	0.0	0.0
Totals	2456.2	7.70	0.0	329.8	8170.0	10287.1	277.0	509.9

Go Back | Pathogen Loads | Export to JPEG | Print | Close

MAPSHED OUTPUT

N2-1f: FOURTH STREET PARK INFILTRATION BMPs

SITE PHOTOS

DRAINAGE AREA MAP

WATERSHED: NESHAMINY SUB-BASIN 2
CONTROL MEASURE TYPE: SUBSURFACE INFILTRATION
ANNUAL SEDIMENT REDUCTION: 16,600 LBS/YEAR
PROJECT STATUS: FUTURE
COST ESTIMATE: $2,292,500
O&M COSTS: $32,800/YEAR

DESCRIPTION: A subsurface infiltration BMP is proposed underneath a ballfield on the western side of Lansdale Catholic High School's property. Flow diversion structures are proposed to be constructed in-line with the storm sewer main located in East 7th Street to convey stormwater to the BMP. This BMP will manage runoff from 34.5 acres of mixed land cover by storing and infiltrating stormwater beneath the privately-owned field. A subsurface forebay adjacent to the East 7th Street right-of-way will be provided for pre-treatment and for ease of maintenance access. Overflow from the BMP will be discharged back to the MS4 in East 7th Street. Inspection and maintenance of this project will be conducted by the Borough.

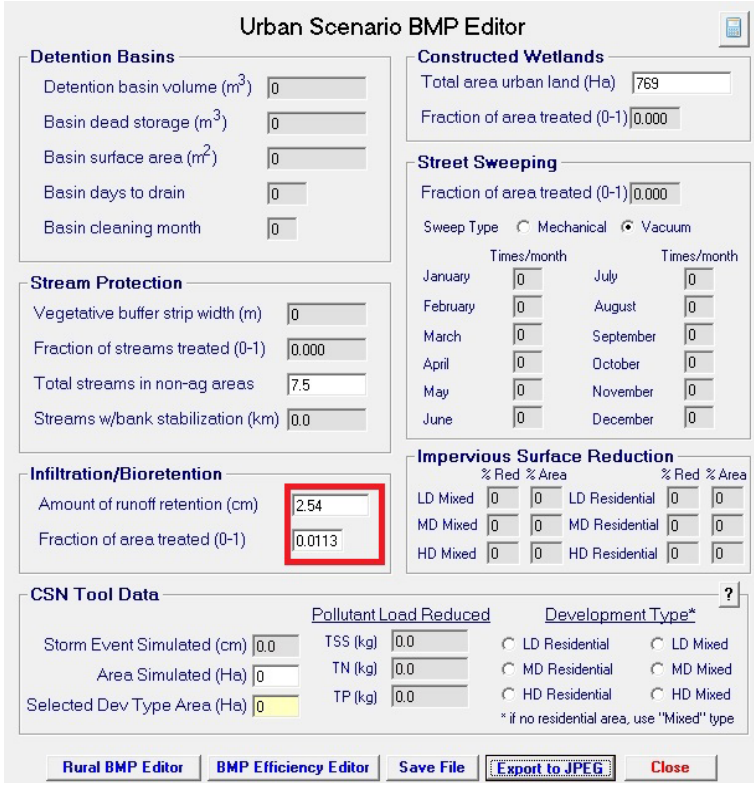
N2-2f: LANSDALE CATHOLIC SUBSURFACE INFILTRATION BMP

ADDRESS: *700 LANSDALE AVE, LANSDALE, PA 19946*
LATITUDE, LONGITUDE: *40°14'29.8536", -075°16'07.7592"*

N2-2f: LANSDALE CATHOLIC SUBSURFACE INFILTRATION BMP

SITE PHOTOS

N2-2f: LANSDALE CATHOLIC SUBSURFACE INFILTRATION BMP



Urban Scenario BMP Editor

Detention Basins

Detention basin volume (m^3)	0
Basin dead storage (m^3)	0
Basin surface area (m^2)	0
Basin days to drain	0
Basin cleaning month	0

Constructed Wetlands

Total area urban land (Ha)	769
Fraction of area treated (0-1)	0.000

Street Sweeping

Fraction of area treated (0-1) 0.000

Sweep Type ○ Mechanical ◉ Vacuum

	Times/month		Times/month
January	0	July	0
February	0	August	0
March	0	September	0
April	0	October	0
May	0	November	0
June	0	December	0

Stream Protection

Vegetative buffer strip width (m)	0
Fraction of streams treated (0-1)	0.000
Total streams in non-ag areas	7.5
Streams w/bank stabilization (km)	0.0

Impervious Surface Reduction

	% Red	% Area		% Red	% Area
LD Mixed	0	0	LD Residential	0	0
MD Mixed	0	0	MD Residential	0	0
HD Mixed	0	0	HD Residential	0	0

Infiltration/Bioretention

Amount of runoff retention (cm)	2.54
Fraction of area treated (0-1)	0.0113

CSN Tool Data

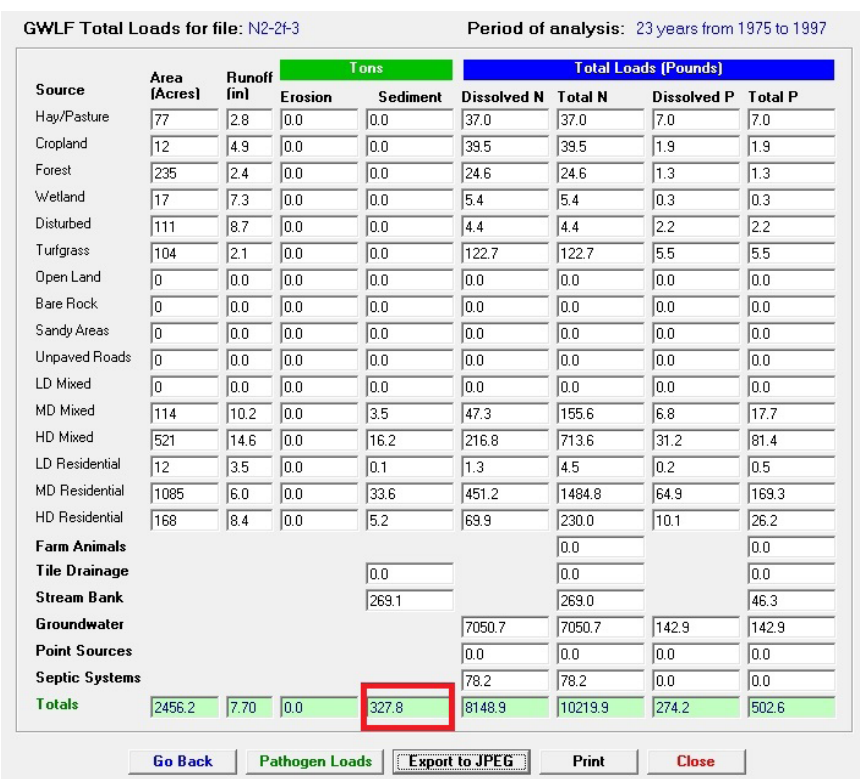
		Pollutant Load Reduced	
Storm Event Simulated (cm)	0.0	TSS (kg)	0.0
Area Simulated (Ha)	0	TN (kg)	0.0
Selected Dev Type Area (Ha)	0	TP (kg)	0.0

Development Type*: ○ LD Residential ○ LD Mixed ○ MD Residential ○ MD Mixed ○ HD Residential ○ HD Mixed

* if no residential area, use "Mixed" type

Rural BMP Editor | BMP Efficiency Editor | Save File | Export to JPEG | Close

URBAN BMP EDITOR INPUT



GWLF Total Loads for file: N2-2f-3 **Period of analysis:** 23 years from 1975 to 1997

Source	Area (Acres)	Runoff (in)	Tons: Erosion	Tons: Sediment	Total Loads (Pounds): Dissolved N	Total N	Dissolved P	Total P
Hay/Pasture	77	2.8	0.0	0.0	37.0	37.0	7.0	7.0
Cropland	12	4.9	0.0	0.0	39.5	39.5	1.9	1.9
Forest	235	2.4	0.0	0.0	24.6	24.6	1.3	1.3
Wetland	17	7.3	0.0	0.0	5.4	5.4	0.3	0.3
Disturbed	111	8.7	0.0	0.0	4.4	4.4	2.2	2.2
Turfgrass	104	2.1	0.0	0.0	122.7	122.7	5.5	5.5
Open Land	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bare Rock	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sandy Areas	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unpaved Roads	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LD Mixed	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MD Mixed	114	10.2	0.0	3.5	47.3	155.6	6.8	17.7
HD Mixed	521	14.6	0.0	16.2	216.8	713.6	31.2	81.4
LD Residential	12	3.5	0.0	0.1	1.3	4.5	0.2	0.5
MD Residential	1085	6.0	0.0	33.6	451.2	1484.8	64.9	169.3
HD Residential	168	8.4	0.0	5.2	69.9	230.0	10.1	26.2
Farm Animals						0.0		0.0
Tile Drainage				0.0		0.0		0.0
Stream Bank				269.1		269.0		46.3
Groundwater					7050.7	7050.7	142.9	142.9
Point Sources					0.0	0.0	0.0	0.0
Septic Systems					78.2	78.2	0.0	0.0
Totals	2456.2	7.70	0.0	327.8	8148.9	10219.9	274.2	502.6

Go Back | Pathogen Loads | Export to JPEG | Print | Close

MAPSHED OUTPUT

DRAINAGE AREA MAP

WATERSHED: NESHAMINY SUB-BASIN 2

CONTROL MEASURE TYPE: SURFACE BIORETENTION

ANNUAL SEDIMENT REDUCTION: 7,200 LBS/YEAR

PROJECT STATUS: FUTURE

COST ESTIMATE: $916,600

O&M COSTS: $13,100/YEAR

DESCRIPTION: Two bioretention BMPs are proposed in the large lawn space along the frontage of St. Mary's Manor, a private assisted living facility that straddles the border of the Neshaminy Sub-basin 2 and Wissahickon Creek watersheds. These BMPs will manage 8.5 acres of pre-TMDL unmanaged impervious area generated within Neshaminy Sub-basin 2. The bioretention BMPs could be paired with walking paths or other community amenities in an expansive and underused lawn area along Lansdale Avenue. Inspection and maintenance of this project will be conducted by the Borough.

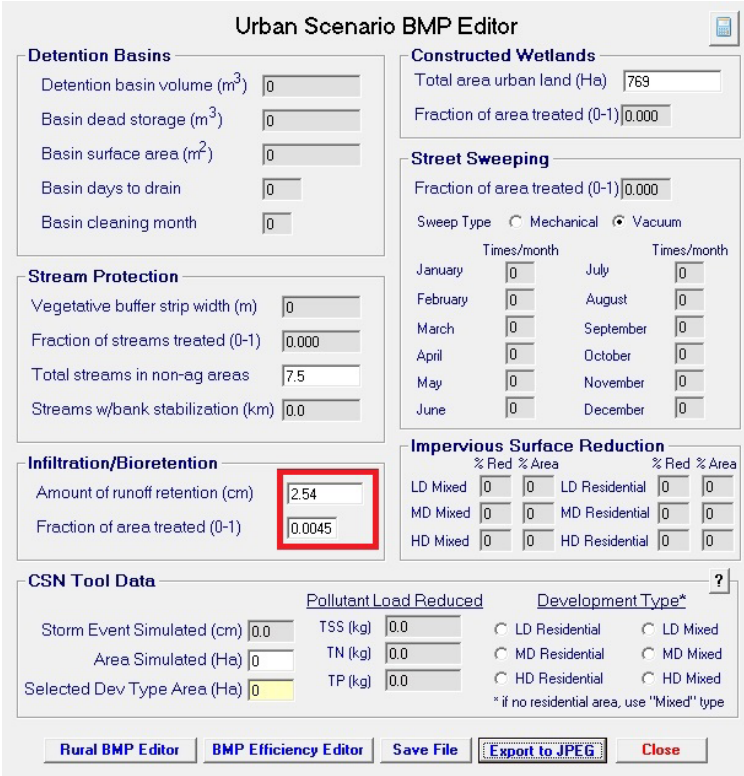
N2-3f: SAINT MARY'S MANOR BIORETENTION BMPs

ADDRESS: *701 LANSDALE AVE, LANSDALE, PA 19946*

LATITUDE, LONGITUDE: *40°14'24.6300", -075°16'02.0676"*

N2-3f: SAINT MARY'S MANOR BIORETENTION BMPs

SITE PHOTOS



Urban Scenario BMP Editor

Detention Basins

Detention basin volume (m^3)	0
Basin dead storage (m^3)	0
Basin surface area (m^2)	0
Basin days to drain	0
Basin cleaning month	0

Constructed Wetlands

Total area urban land (Ha)	769
Fraction of area treated (0-1)	0.000

Street Sweeping

Fraction of area treated (0-1) 0.000

Sweep Type ○ Mechanical ● Vacuum

	Times/month		Times/month
January	0	July	0
February	0	August	0
March	0	September	0
April	0	October	0
May	0	November	0
June	0	December	0

Stream Protection

Vegetative buffer strip width (m)	0
Fraction of streams treated (0-1)	0.000
Total streams in non-ag areas	7.5
Streams w/bank stabilization (km)	0.0

Infiltration/Bioretention

Amount of runoff retention (cm)	2.54
Fraction of area treated (0-1)	0.0045

Impervious Surface Reduction

	% Red	% Area		% Red	% Area
LD Mixed	0	0	LD Residential	0	0
MD Mixed	0	0	MD Residential	0	0
HD Mixed	0	0	HD Residential	0	0

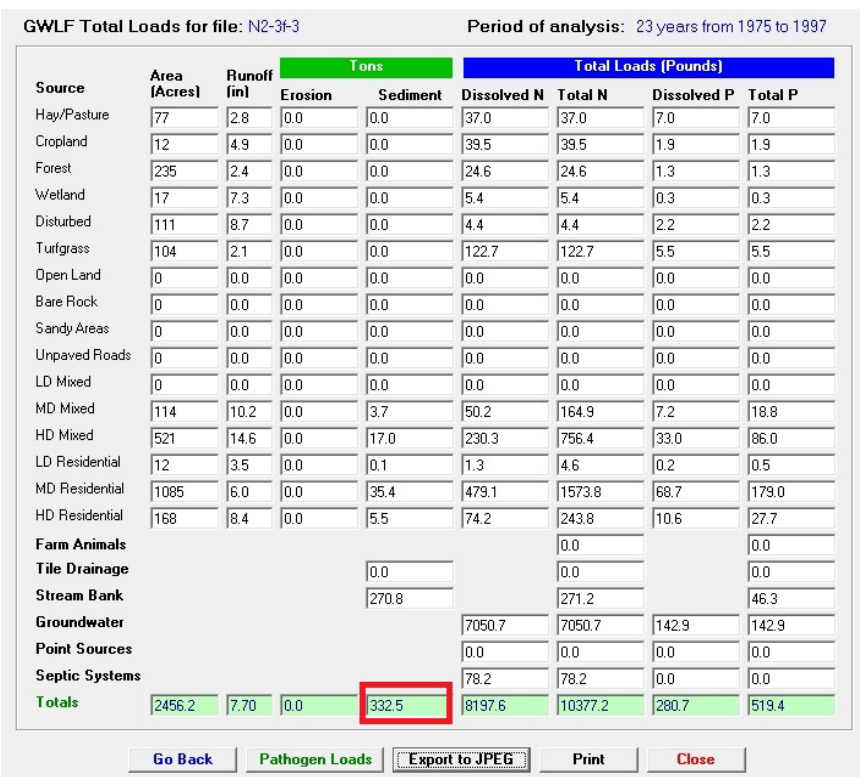
CSN Tool Data

		Pollutant Load Reduced		Development Type*	
Storm Event Simulated (cm)	0.0	TSS (kg)	0.0	○ LD Residential	○ LD Mixed
Area Simulated (Ha)	0	TN (kg)	0.0	○ MD Residential	○ MD Mixed
Selected Dev Type Area (Ha)	0	TP (kg)	0.0	○ HD Residential	○ HD Mixed

* if no residential area, use "Mixed" type

Rural BMP Editor | BMP Efficiency Editor | Save File | Export to JPEG | Close

URBAN BMP EDITOR INPUT



GWLF Total Loads for file: N2-3f-3 **Period of analysis:** 23 years from 1975 to 1997

Source	Area (Acres)	Runoff (in)	Tons: Erosion	Tons: Sediment	Total Loads (Pounds): Dissolved N	Total N	Dissolved P	Total P
Hay/Pasture	77	2.8	0.0	0.0	37.0	37.0	7.0	7.0
Cropland	12	4.9	0.0	0.0	39.5	39.5	1.9	1.9
Forest	235	2.4	0.0	0.0	24.6	24.6	1.3	1.3
Wetland	17	7.3	0.0	0.0	5.4	5.4	0.3	0.3
Disturbed	111	8.7	0.0	0.0	4.4	4.4	2.2	2.2
Turfgrass	104	2.1	0.0	0.0	122.7	122.7	5.5	5.5
Open Land	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bare Rock	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sandy Areas	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unpaved Roads	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LD Mixed	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MD Mixed	114	10.2	0.0	3.7	50.2	164.9	7.2	18.8
HD Mixed	521	14.6	0.0	17.0	230.3	756.4	33.0	86.0
LD Residential	12	3.5	0.0	0.1	1.3	4.6	0.2	0.5
MD Residential	1085	6.0	0.0	35.4	479.1	1573.8	68.7	179.0
HD Residential	168	8.4	0.0	5.5	74.2	243.8	10.6	27.7
Farm Animals						0.0		0.0
Tile Drainage				0.0		0.0		0.0
Stream Bank				270.8		271.2		46.3
Groundwater					7050.7	7050.7	142.9	142.9
Point Sources					0.0	0.0	0.0	0.0
Septic Systems					78.2	78.2	0.0	0.0
Totals	2456.2	7.70	0.0	332.5	8197.6	10377.2	280.7	519.4

Go Back | Pathogen Loads | Export to JPEG | Print | Close

MAPSHED OUTPUT

APPENDIX E – Facility Inspection Forms

MUNICIPAL STORMWATER FACILITY INSPECTION FORM

FACILITY TYPE: _____ **Date:** _____ **Time:** _____

TIME SINCE LAST RAIN: ≥72 hours <72 hours
QUANTITY OF LAST RAIN: ≥0.1 inches <0.1 inches
INSPECTION TEAM: _____
_____

SITE DESCRIPTION:

LOCATION (Narrative Description): _____
_____

STRUCTURE DETAILS: _____
_____

DOMINANT WATERSHED LAND USES: INDUSTRIAL COMMERCIAL RESIDENTIAL UNKNOWN
OTHER: _____

FLOW ESTIMATION:

WAS FLOW OBSERVED? NO YES
a. WIDTH OF WATER SURFACE (feet): _____
b. APPROXIMATE DEPTH OF WATER (feet): _____

VISUAL OBSERVATIONS:

ODOR: NONE MUSTY SEWAGE ROTTEN EGGS SOUR MILK OTHER: _____

COLOR: CLEAR RED YELLOW BROWN GREEN GREY OTHER: _____

CLARITY: CLEAR CLOUDY OPAQUE

FLOATABLES: NONE OILY SHEEN GARBAGE/SEWAGE OTHER: _____

DEPOSITS/STAINS: NONE SEDIMENTS OILY OTHER: _____

VEGETATION CONDITION: NONE NORMAL EXCESSIVE GROWTH INHIBITED GROWTH

STRUCTURAL CONDITION: NORMAL CONCRETE CRACKING METAL CORROSION OTHER: _____

BIOLOGICAL: MOSQUITO LARVAE BACTERIA/ALGAE OTHER: _____

COMMENTS: _____
_____
_____
_____
_____

DATA SHEET FILLED OUT BY: (Signature): _____ DATE: _____

(Print name): _____

PRIVATE STORMWATER FACILITY INSPECTION FORM

FACILITY TYPE: _____ **Date:** _____ **Time:** _____

TIME SINCE LAST RAIN: ≥72 hours <72 hours
QUANTITY OF LAST RAIN: ≥0.1 inches <0.1 inches
INSPECTION TEAM: _____
_____

SITE DESCRIPTION:

LOCATION (Narrative Description): _____
_____

STRUCTURE DETAILS: _____
_____

DOMINANT WATERSHED LAND USES: INDUSTRIAL COMMERCIAL RESIDENTIAL UNKNOWN
OTHER: _____

FLOW ESTIMATION:

WAS FLOW OBSERVED? NO YES
a. WIDTH OF WATER SURFACE (feet): _____
b. APPROXIMATE DEPTH OF WATER (feet): _____

VISUAL OBSERVATIONS:

ODOR: NONE MUSTY SEWAGE ROTTEN EGGS SOUR MILK OTHER: _____

COLOR: CLEAR RED YELLOW BROWN GREEN GREY OTHER: _____

CLARITY: CLEAR CLOUDY OPAQUE

FLOATABLES: NONE OILY SHEEN GARBAGE/SEWAGE OTHER: _____

DEPOSITS/STAINS: NONE SEDIMENTS OILY OTHER: _____

VEGETATION CONDITION: NONE NORMAL EXCESSIVE GROWTH INHIBITED GROWTH

STRUCTURAL CONDITION: NORMAL CONCRETE CRACKING METAL CORROSION OTHER: _____

BIOLOGICAL: MOSQUITO LARVAE BACTERIA/ALGAE OTHER: _____

COMMENTS: _____
_____
_____
_____
_____

DATA SHEET FILLED OUT BY: (Signature): _____ DATE: _____

(Print name): _____

APPENDIX F – Public Notice

BOROUGH OF LANSDALE

One Vine Street ■ Lansdale, Pennsylvania 19446-3601

■ FAX 215-361-8399 ■ 215-368-1691

PUBLIC NOTICE - Lansdale Borough Stormwater Program

The community has an opportunity to review and comment on the draft *Lansdale Borough MS4 TMDL Plan* to be submitted to PA Department of Environmental Protection (PA DEP) per the Federal Clean Water National Pollutant Discharge Elimination System (NPDES), PA Clean Streams Law and the PA DEP-issued Municipal Separate Stormwater Sewer System (MS4) Permit for municipalities in watersheds with MS4 Total Maximum Daily Load (TMDL) requirements. The **30-Day Public Comment Period from May 25, 2016 - June 24, 2016** is an opportunity for members of the public to read and comment on the draft TMDL report. A copy of the report is available on the Borough website, at www.lansdale.org , and a hardcopy can be reviewed in person at the Lansdale Municipal Building (1 Vine Street) during normal business hours. Written comments can be submitted to the Borough Manager, Lansdale Borough, 1 Vine Street, Lansdale, PA 19446 . The community is also invited to a public meeting to provide verbal comments on the plan. **The Public Meeting will be on June 15, 2016, at 7:00 pm, at Lansdale Municipal Building, 1 Vine Street, in Lansdale**. All comments on the plan must be received in the Borough Office by June 24, 2016.

The TMDL Plan Lansdale Borough has prepared describes measures and steps the Borough will implement in the coming years to reduce sediment pollution in streams in the Wissahickon Watershed, the Skippack Watershed, and the West Branch Neshaminy Watershed. The measures to be implemented include structural stormwater infiltration swales and trenches, extended detention / stormwater recharge basins, stream bank restoration and stabilization measures, and other best practices and control measures that reduce the volume and velocity of stormwater runoff flows entering creeks during storms.

Jacob I. Ziegler
Borough Secretary

APPENDIX G – Public Comment Response