Chesapeake Bay Pollutant Reduction Plan 8/15/22 Revision East Lampeter Township

East Lampeter Township
2250 Old Philadelphia Pike
Lancaster, PA 17602

Contents

Appendix D: Project 4B Team Ag methodology

Appendix E: Project 4C Team Ag methodology

Appendix F: I2 Capital Investments Pollution Reduction Credit Revolving Fund

CBPRP: Overall Summary

East Lampeter Township is located in Lancaster County, PA, and is bordered by the City of Lancaster, Lancaster Township, and Manheim Township to the North, West Lampeter Township to the West, Upper Leacock and Leacock Township to the East, and by Strasburg Township and Paradise Township to the South. East Lampeter Township has 17,776 residents according to the 2020 U.S. Census and covers an area of approximately 21 square miles. The Township's Municipal Separate Storm Sewer System, or MS4, contributes to three major watersheds.

The first is of the three watersheds is the Conestoga River watershed. 4,987 acres of the Conestoga River Watershed are located in East Lampeter Township, primarily within the North Eastern portion of the Township, where it divides East Lampeter Township from the City of Lancaster and Manheim Township. The main stem of the Conestoga, as well as Stauffer Run, comprise the Conestoga watershed. The Conestoga River is an NHD (National Hydrography Dataset) defined HUC (Hydrologic Unit Code) 12 watershed identified by Code 020503061107. Currently, the Conestoga River, Stauffer Run, and one of the unnamed tributaries have impairments listed for organic enrichment/low dissolved oxygen, siltation, chlorine, nutrients, and flow alterations.

The Mill Creek watershed flows through the center of the Township. 5,789 Acres comprise the Mill Creek Watershed, making it the largest in the Township. This is a HUC 12 watershed as well, with an identification code of 020503061106. The Mill Creek has impairments in nutrients and siltation.

The third watershed in East Lampeter Township is the Pequea Creek watershed, which forms the Southern border between East Lampeter, Paradise and Strasburg Townships. The East Lampeter portion of the Pequea Creek watershed is made up of 1,947 acres, and is listed as a HUC 12 watershed with an identification code of 020503061202. Impairments to the Pequea include nutrients, organic enrichment/low dissolved oxygen, and siltation.

Section A - Public Participation: Overall Summary

The process by which East Lampeter Township publicly advertised and received comments for the 2022 revision to the Chesapeake Bay Pollutant Reduction Plan, or CBPRP, is as follows:

July 26th :

- Review draft of revised PRP at the Township's internal MS4 meeting, Advertised a public notice in the Lancaster Newspaper - LNP, prior to August 15th Board of Supervisors Meeting
- See Copy of the Public Notice on Page 5 (advertise meeting by August 5th)
- At least 45 days prior to September 30, 2022 mailing date to DEP

August 15th:

- Introduced the Plan at Board of Supervisors Meeting, explained the contents and timeline, accept public comments
- Accept verbal comments from the public to be added to the PRP under Page 6

September 15th:

- 30 Day comment period ends

September 20th :

- Review all written and verbal comments at internal East Lampeter MS4 meeting
- See Copy of all written and verbal comments received on Page 6
- See Copy of Comment Considerations and CBPRP Edits on Page 7
- Review the final CBPRP Draft with all comments being addressed and included

September 30th:

- PRP mailed to DEP

Section A - Public Participation: Copy of Public Notice

Notice is hereby given that the Board of Supervisors of East Lampeter Township will receive public comment(s) on the proposed Revised Chesapeake Bay Nutrient Sediment Pollutant Reduction Plan (CBPRP) required under the 2018-2023 General MS4 Permit. The plan outlines pollution reduction strategies for the Township's Conestoga River, Mill Creek and Pequea Creek Watersheds.

The proposed Revised CBPRP is available for review at the Township office located at 2250 Old Philadelphia Pike, Lancaster, PA 17602, from 8:00 am – 4:00 pm Mon-Fri from August 15, 2022 to September 15, 2022. Digital copies are also available at www.eastlampetertownsip.org. The Township anticipates submission of the Revised CBPRP to the Department of Environmental Protection on or before September 30, 2022.

The Township shall introduce the plan at the August 15, 2022 Board of Supervisors Meeting at 7:30 pm, and the Township shall accept written comments for 30 days thereafter. Interested parties may submit written comments which must be postmarked by September 12, 2022 addressed to: Charles Hayes, Stormwater Coordinator, East Lampeter Township, 2250 Old Philadelphia Pike, Lancaster, PA 17602. In addition, oral comments will be accepted by the Board of Supervisors during their regular public meeting August 15, 2022. Electronic comments may be submitted to chayes@eltwp.org Please indicate in the subject line "Comments-East Lampeter Township CBPRP".

BOARD OF SUPERVISORS OF THE TOWNSHIP OF EAST LAMPETER

Section A - Public Participation: Copy of All Comments Received

Section A - Public Participation: Copy of Consideration of Comments

Section B - Mapping: Summary

Attached are the maps detailing each of the MS-3 sewersheds located in the Township. Mapping is completed on maps 2-13, as 8.5"x11", and the 11"x17" Index Map is attached as Appendix B . See Index of maps below:

Map 1: Index Map- Shows entire township & Proposed BMP (Best Management Practice) locations

Map 2: Conestoga River Sewersheds 1-6: Northeast corner of the Township

- Proposed PRPs located at 2003 Pennwyck Dr, 2141 Waterford Drive, behind Collen's Way and Meadow Ridge Drive, 2040 Pine Drive, and 624 Willow Road.
- Installed PRP at 623 Willow Road.

Map 3: Conestoga River Sewersheds 7-22: West-Central portion of Township

- Proposed PRPs located at 521 Willow Rd, 2101 William Penn Way, 1842 Colonial Village Lane, Willow Lane, 1809 William Penn Way, & 167 Greenfield Rd.
- Installed PRP at 355 Pitney Rd.

Map 4: Conestoga River Sewersheds 21-27: Central portion of the Township (Mt Sidney Rd/Horseshoe Rd Area)

- Proposed PRPs at 2353 Horseshoe Road, 2306 Horseshoe Road, & 527 Mount Sidney Road.
- Installed PRP at 2061 Jarvis Road.

Map 5: Conestoga River Sewersheds 23-30: Western portion of the Township (Rt 30 & 462, Eastland Dr)

- Proposed PRPs at the Rosewood Terrace community development, and 93 Strasburg Pike.

Map 6: Conestoga River Sewersheds 30-38: Western Portion of the Township (Rt 462 & Rt 340 Intersection)

- Proposed PRPs at 50-52 Pitney Rd, & HACC's Lancaster Campus.

Map 7: Mill Creek Sewersheds 1-14: West-Central Portion of the Township (Rt 462/Rt 30 Interchange)

- Proposed PRPs at 231 Strasburg Pike, 2098 Millstream Rd, & 351 Gridley Rd.

Map 8: Mill Creek Sewersheds 15-25: Central portion of the Township (Rt 30 Corridor)

- Proposed PRPs at Greenleaf Enterprises, ELT's Community Park, & 58 Witmer Road.
- Installed PRPs at ELT's Municipal Campus.

Map 9: Mill Creek Sewersheds 26-33: East-Central Portion of the Township (Rockvale corridor @ 30)

- Proposed PRPs at 63 Witmer Road and 231 Lynwood Road.

Map 10: Mill Creek Sewersheds 34-42: East-Central of the Township (Rt 340 Bird in Hand)

- Proposed PRP at 419 Mount Sidney Road.

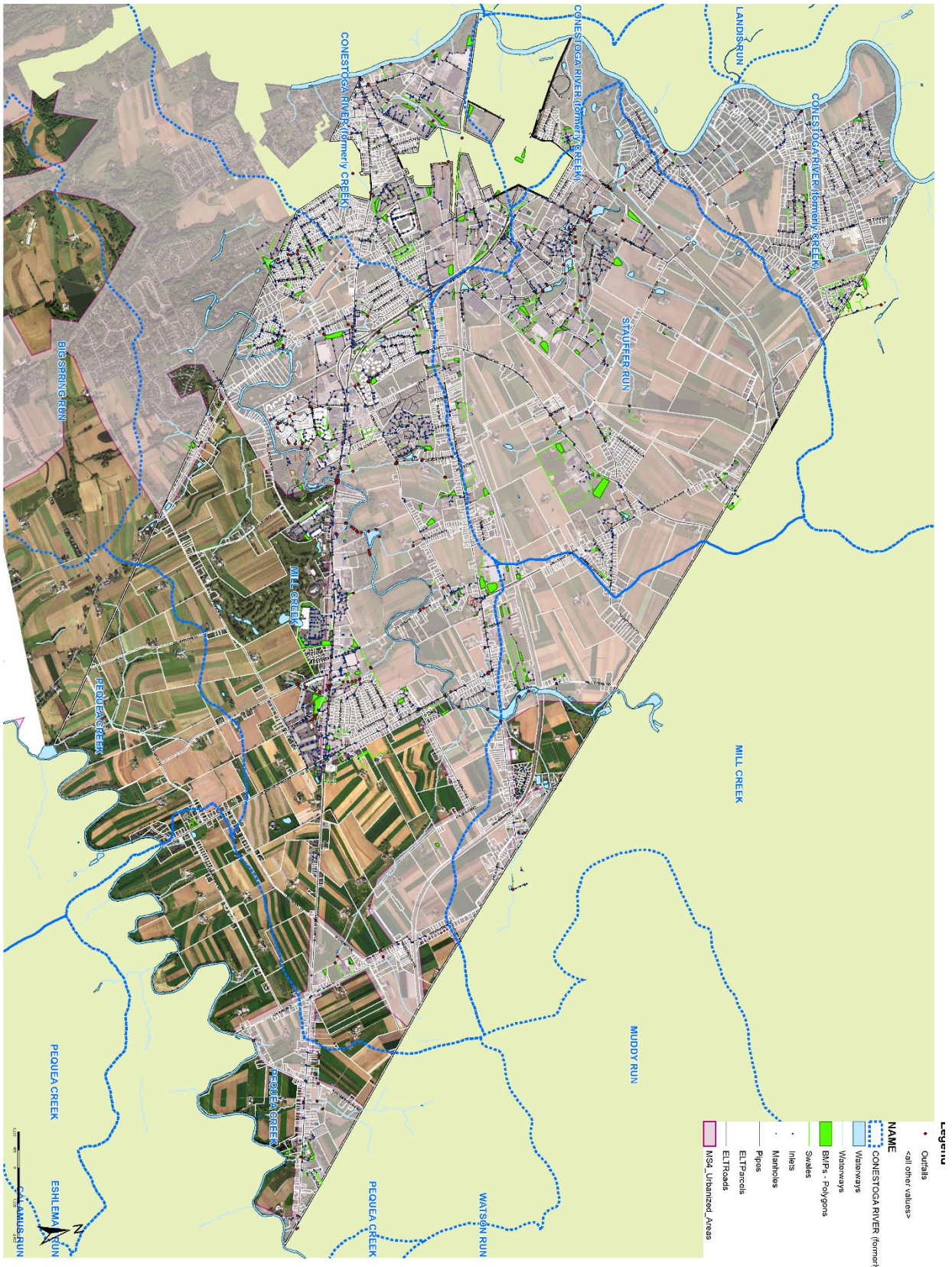
Map 11: Mill Creek Sewershed 36: Eastern Portion of the Township (Bird in Hand)

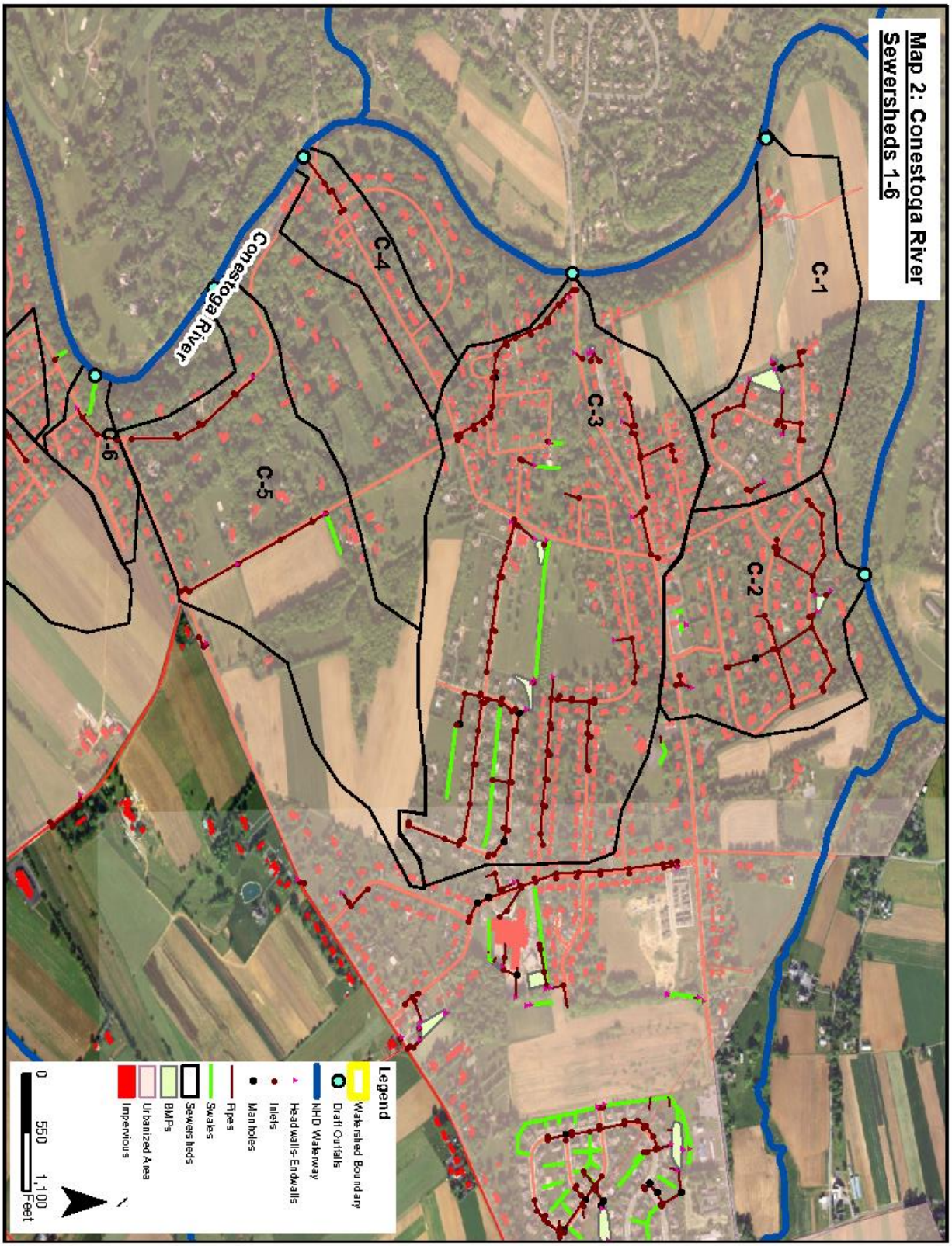
Map 12: Mill Creek Sewershed 44: South-Eastern Portion of the Township (Ronks)

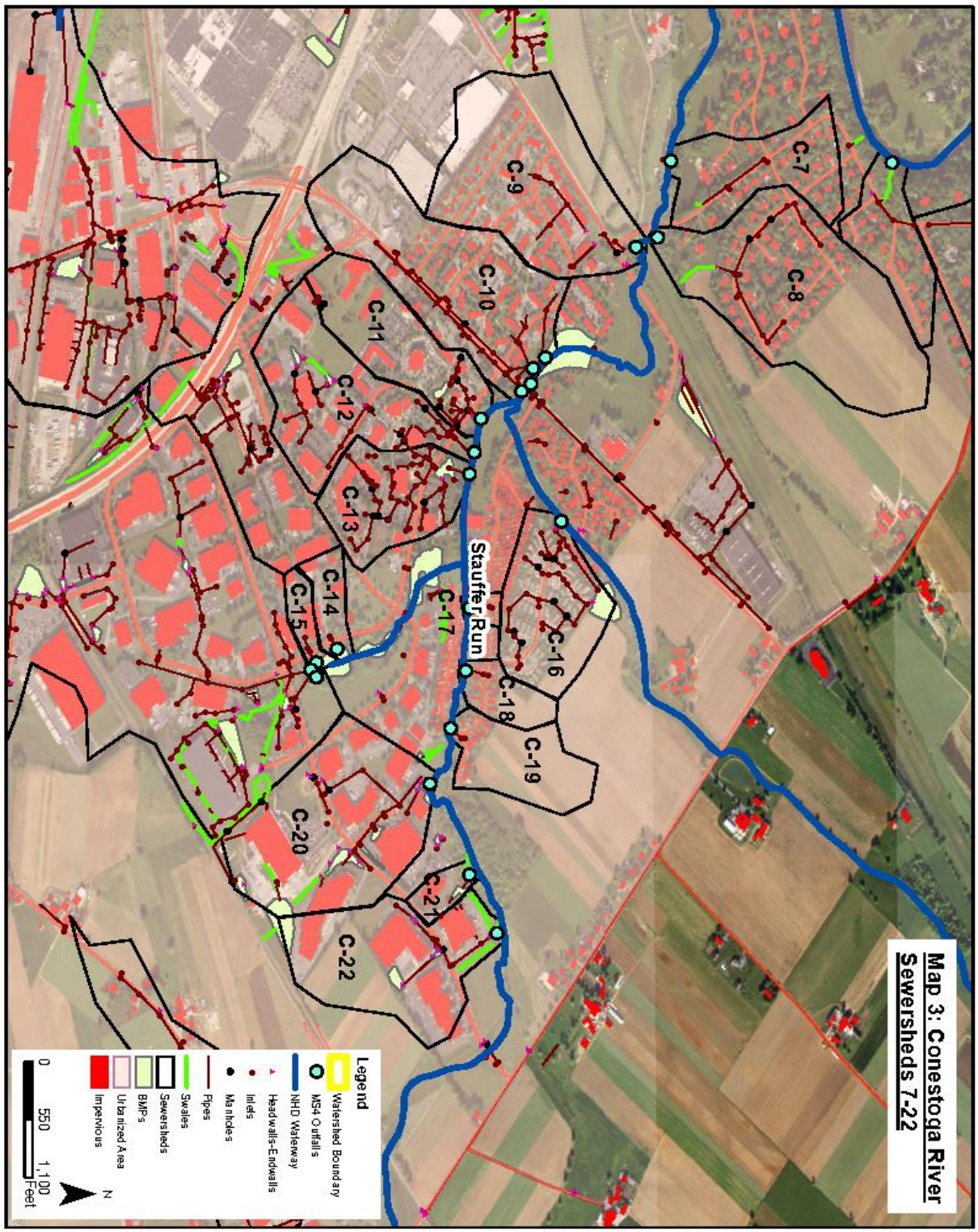
- Proposed PRPs at 2588 Bachmantown Road, & 39 South Soudersburg Road.

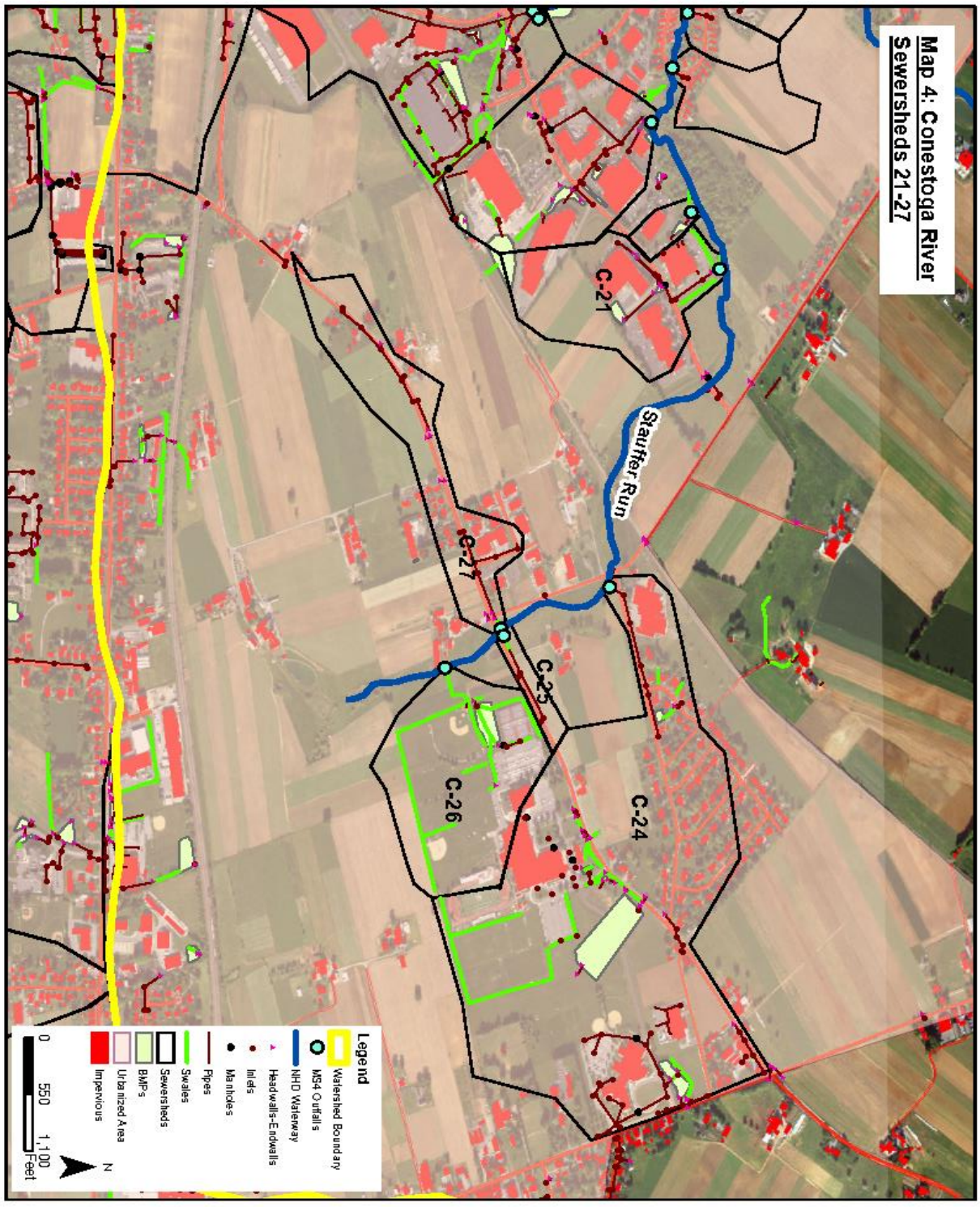
Map 13:

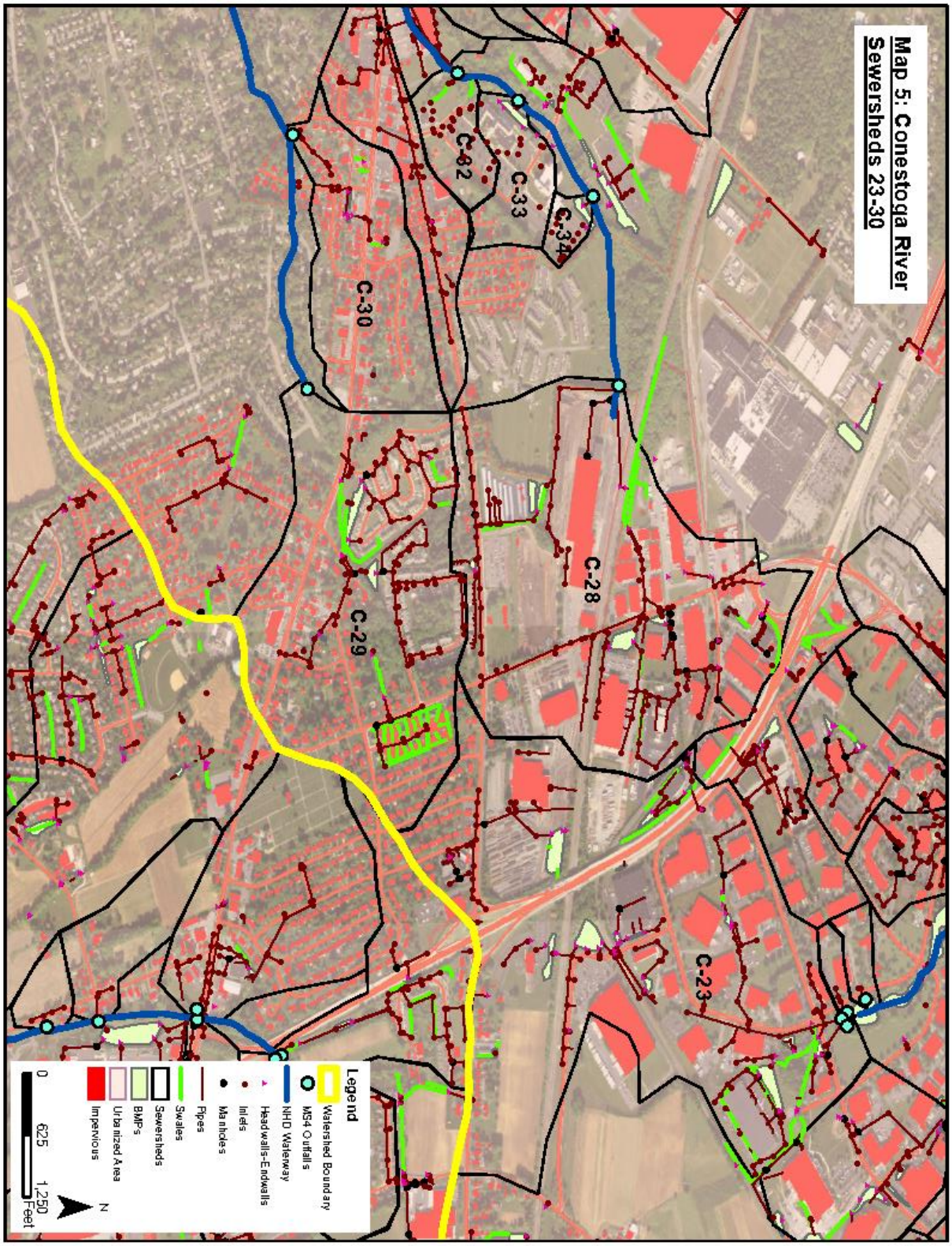
- Pequea Creek Sewershed 1-5: South-Western Portion of the Township (Ronks/Township Line)
- Installed PRP at the Mill Bridge Camp Resort

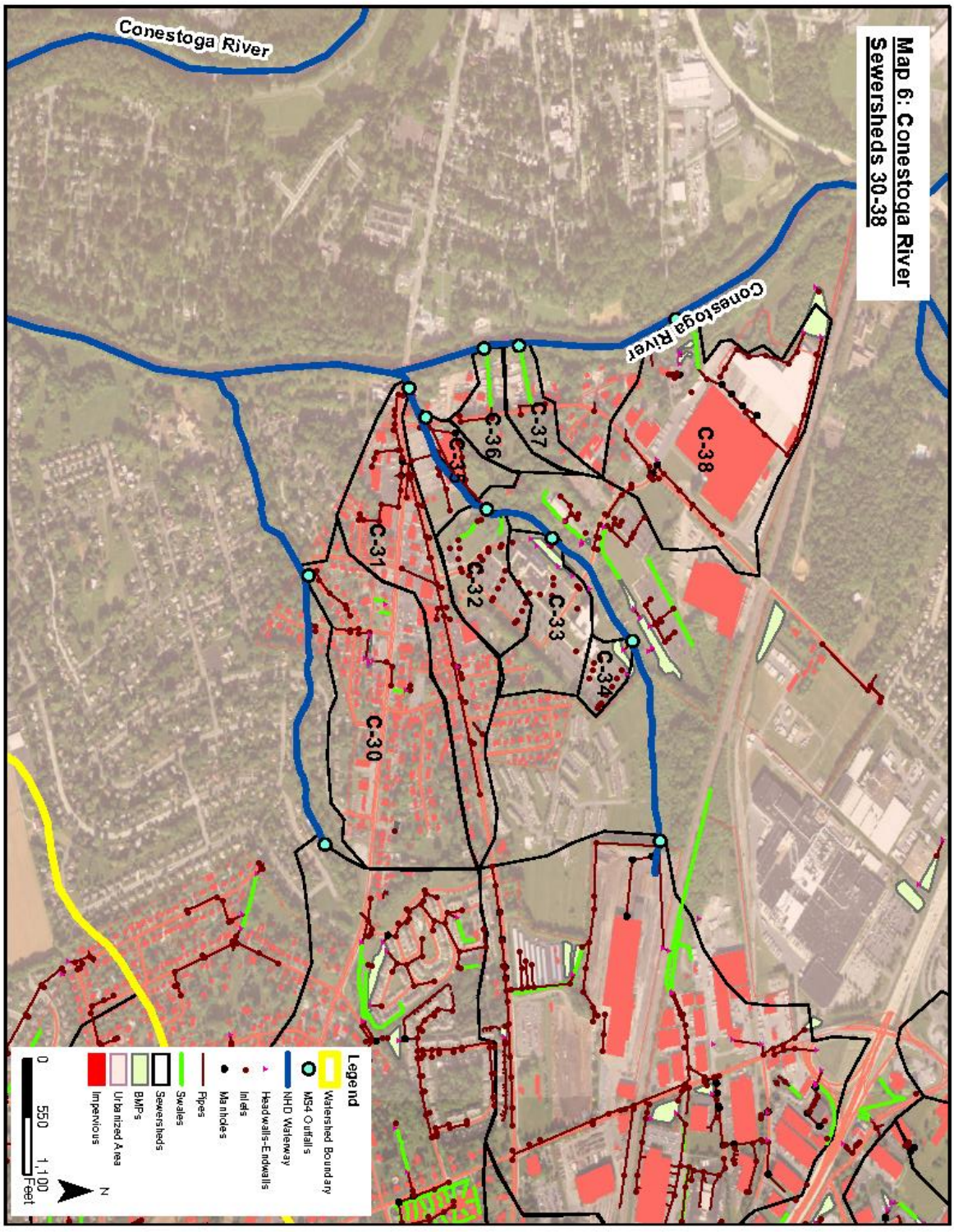

CONESTOGA RIVER (formerly CREEK)
LANDIS RUN
STAUFFER RUN
BIG SPRING RUN
MILL CREEK
PEQUEA CREEK
MUDDY RUN
WATSON RUN
ESHLEMAN RUN
CALAMUS RUN
Legend
Outfalls
<all other values>
NAME
CONESTOGA RIVER (formerly
Waterways
BMPs - Polygons
Swales
Inlets
Manholes
Pipes
ELTParcels
ELTRoads
MS4_Urbanized_Areas

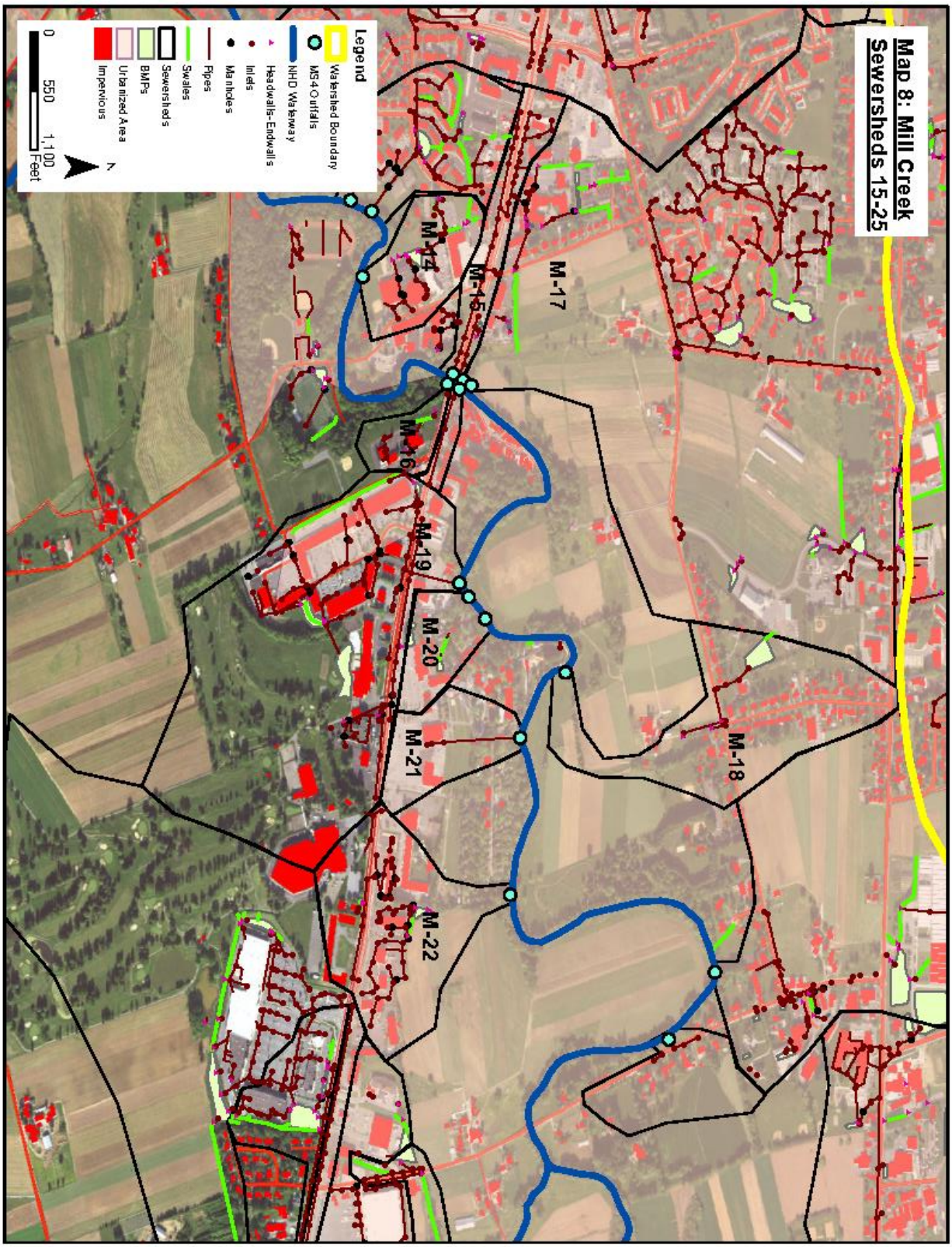

Map 2: Conestoga River
Sewersheds 1-6
Conestoga River
C-1
C-2
C-3
C-4
C-5
C-6
Legend
Watershed Boundary
Draft Outfalls
NHD Waterway
Headwalls-Endwalls
Inlets
Manholes
Pipes
Swales
Sewersheds
BMPs
Urbanized Area
Impervious
0
550
1,100
Feet
N

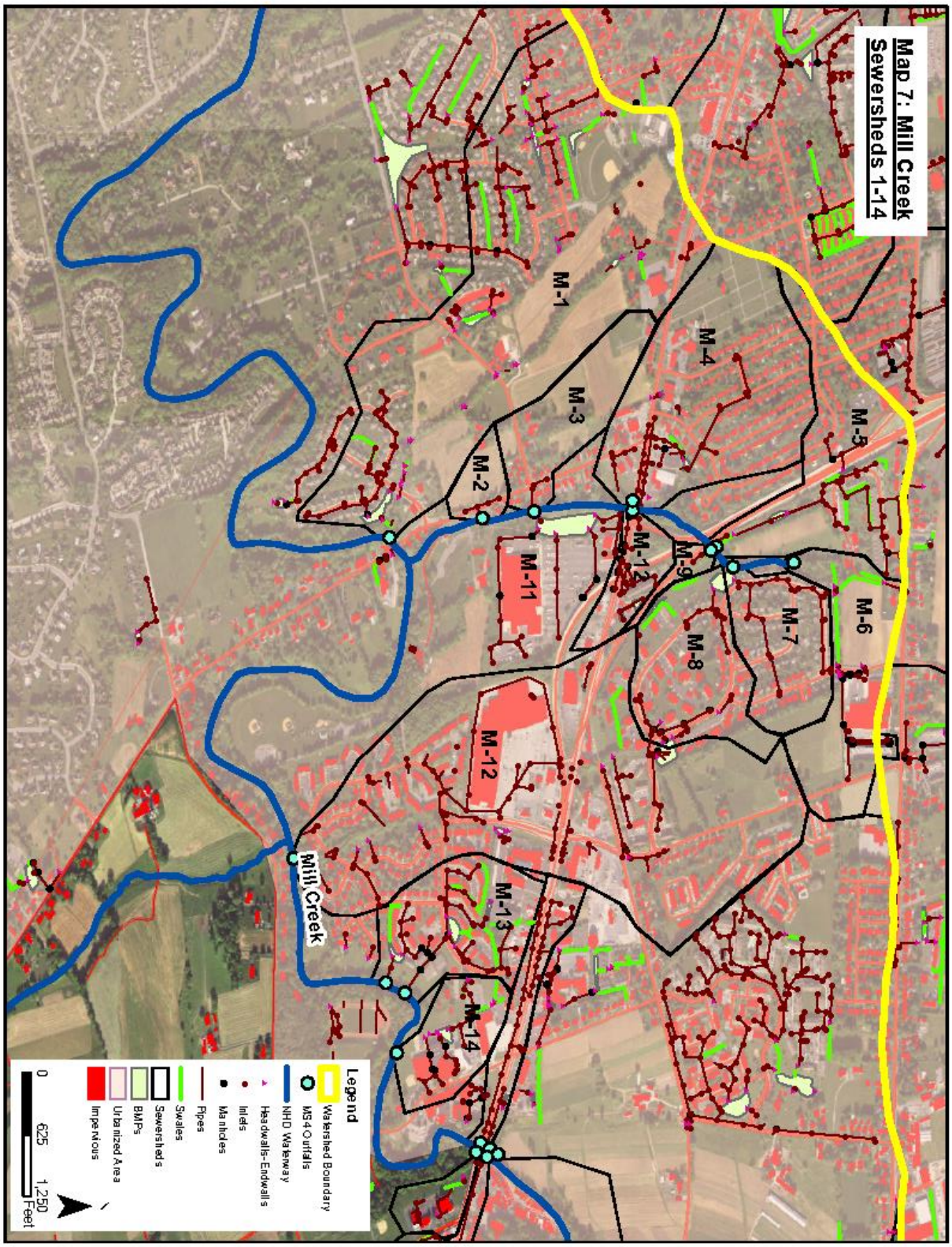

Map 3: Conestoga River
Sewersheds 7-22
C-7
C-8
C-9
C-10
C-11
C-12
C-13
C-14
C-15
C-16
C-17
C-18
C-19
C-20
C-21
C-22
Stauffer Run
Legend
Watershed Boundary
MS4 Outfalls
NHD Waterway
Headwalls-Endwalls
Inlets
Manholes
Pipes
Swales
Sewersheds
BMPs
Urbanized Area
Impervious
0
550
1,100
Feet
N

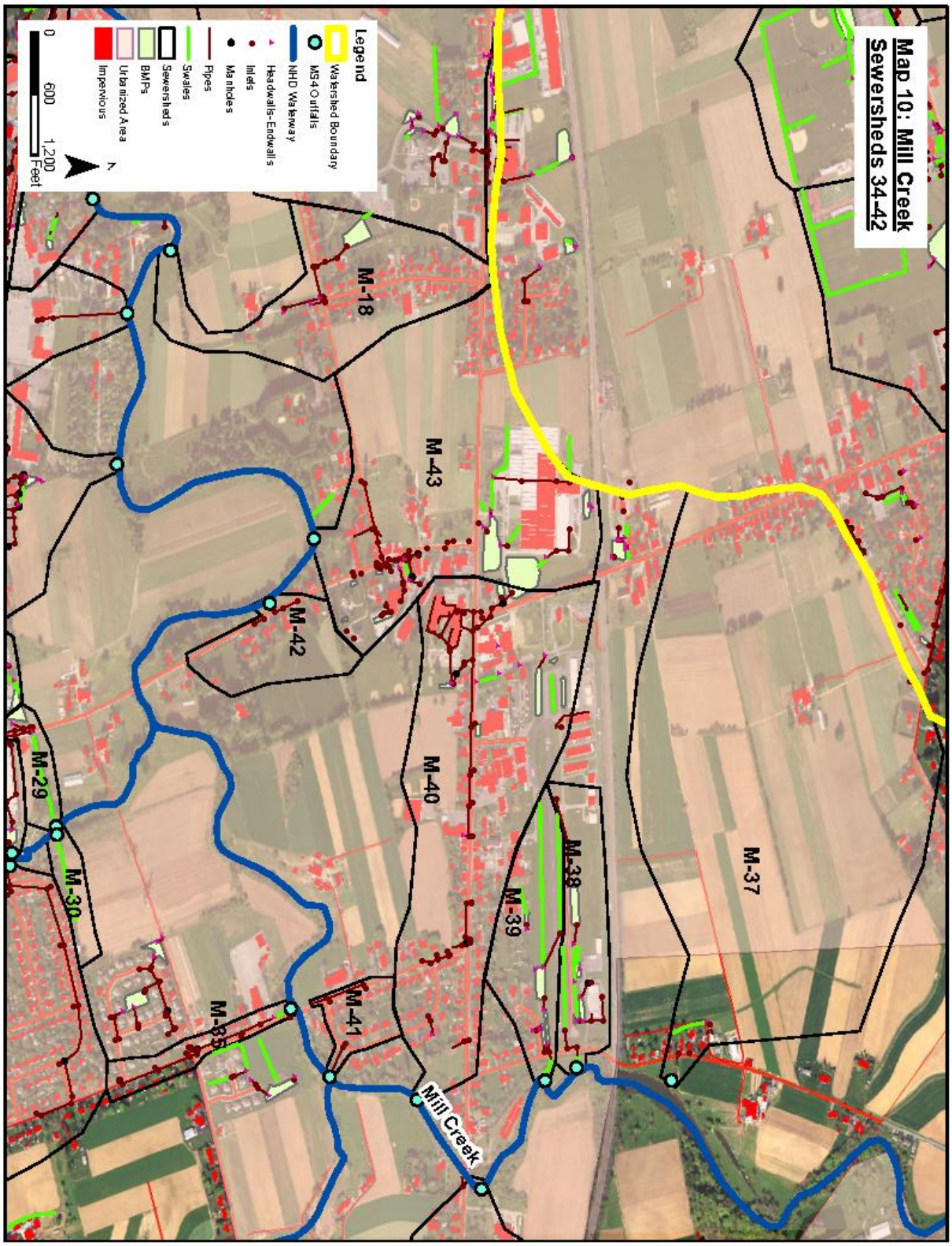

Map 4: Conestoga River
Sewersheds 21-27
C-21
Stauffer Run
C-27
C-25
C-26
C-24
Legend
Watershed Boundary
MS4 Outfalls
NHD Waterway
Headwalls-Endwalls
Inlets
Manholes
Pipes
Swales
Sewersheds
BMP's
Urbanized Area
Impervious
0
550
1,100
Feet
N

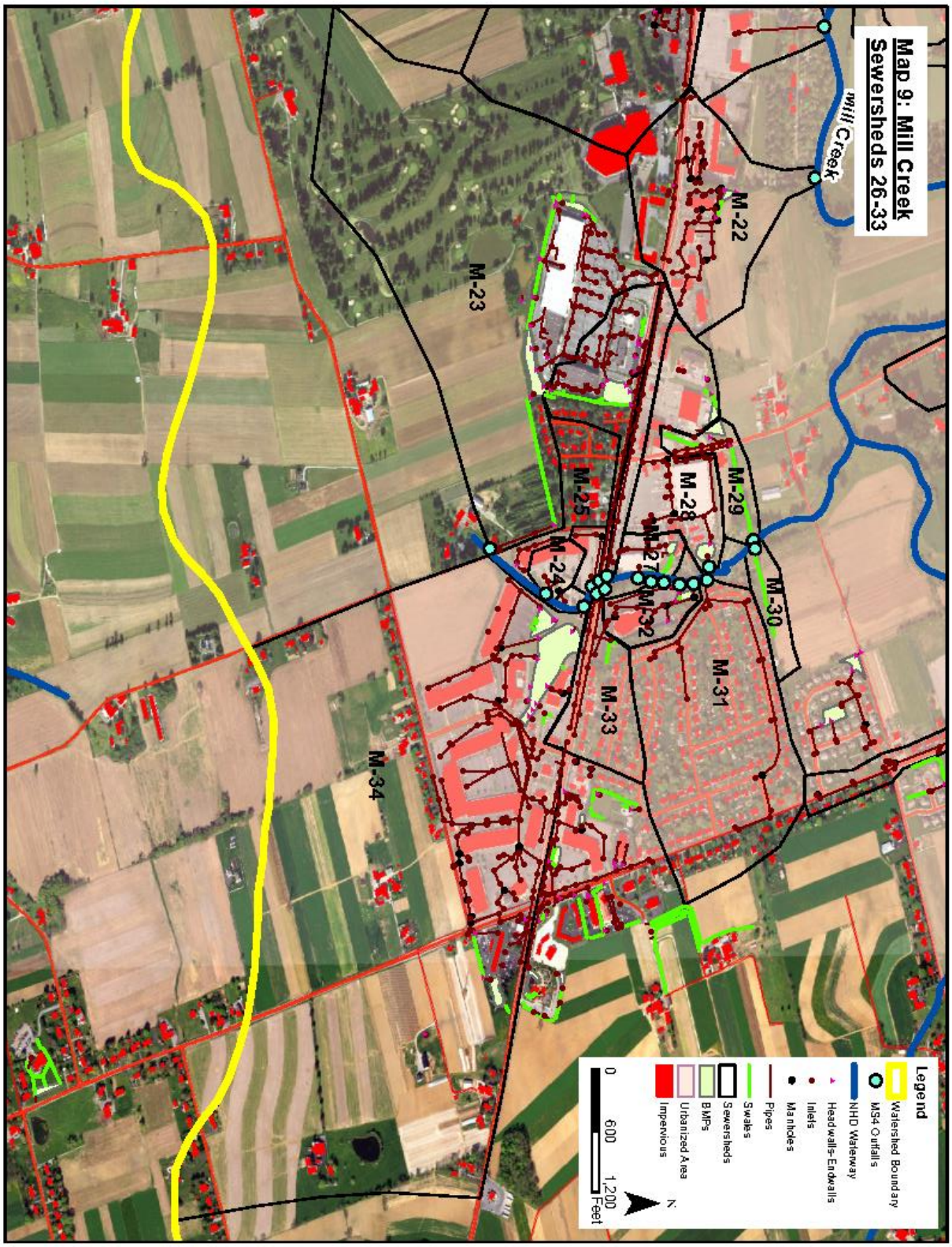

Map 5: Conestoga River
Sewersheds 23-30
C-30
C-62
C-33
C-34
C-28
C-29
C-23
Legend
Watershed Boundary
MS4 Outfalls
NHD Waterway
Headwalls-Endwalls
Inlets
Manholes
Pipes
Swales
Sewersheds
BMPs
Urbanized Area
Impervious
0
625
1,250
Feet
N


Map 6: Conestoga River
Sewersheds 30-38
Conestoga River
Conestoga River
C-30
C-31
C-32
C-33
C-34
C-35
C-36
C-37
C-38
Legend
Watershed Boundary
MS4 Outfalls
NHD Waterway
Headwalls-Endwalls
Inlets
Manholes
Pipes
Swales
Sewersheds
BMP's
Urbanized Area
Impervious
0
550
1,100
Feet
N


Map 8: Mill Creek
Sewersheds 15-25
Legend
Watershed Boundary
MS4 Outfalls
NHD Waterway
Headwalls-Endwalls
Inlets
Manholes
Pipes
Swales
Sewersheds
BMPs
Urbanized Area
Impervious
0
550
1,100
Feet
N
M-14
M-15
M-17
M-16
M-19
M-20
M-21
M-18
M-22


Map 7: Mill Creek Sewersheds 1-14
M-1
M-2
M-3
M-4
M-5
M-6
M-7
M-8
M-9
M-11
M-12
M-12
M-13
M-14
Mill Creek
Legend
Watershed Boundary
MS4 Outfalls
NHD Waterway
Headwalls-Endwalls
Inlets
Manholes
Pipes
Swales
Sewersheds
BMPs
Urbanized Area
Impervious
0
625
1,250
Feet


Map 10: Mill Creek
Sewersheds 34-42
Legend
Watershed Boundary
MS4 Outfalls
NHD Waterway
Headwalls-Endwalls
Inlets
Manholes
Pipes
Swales
Sewersheds
BMPs
Urbanized Area
Impervious
0
600
1,200
Feet
N
M-18
M-43
M-42
M-29
M-30
M-40
M-38
M-39
M-37
M-41
M-35
Mill Creek


Map 9: Mill Creek Sewersheds 26-33
Mill Creek
M-22
M-23
M-24
M-25
M-27
M-28
M-29
M-30
M-31
M-32
M-33
M-34
Legend
Watershed Boundary
MS4 Outfalls
NHD Waterway
Headwalls+Endwalls
Inlets
Manholes
Pipes
Swales
Sewersheds
BMPs
Urbanized Area
Impervious
0
600
1,200
Feet
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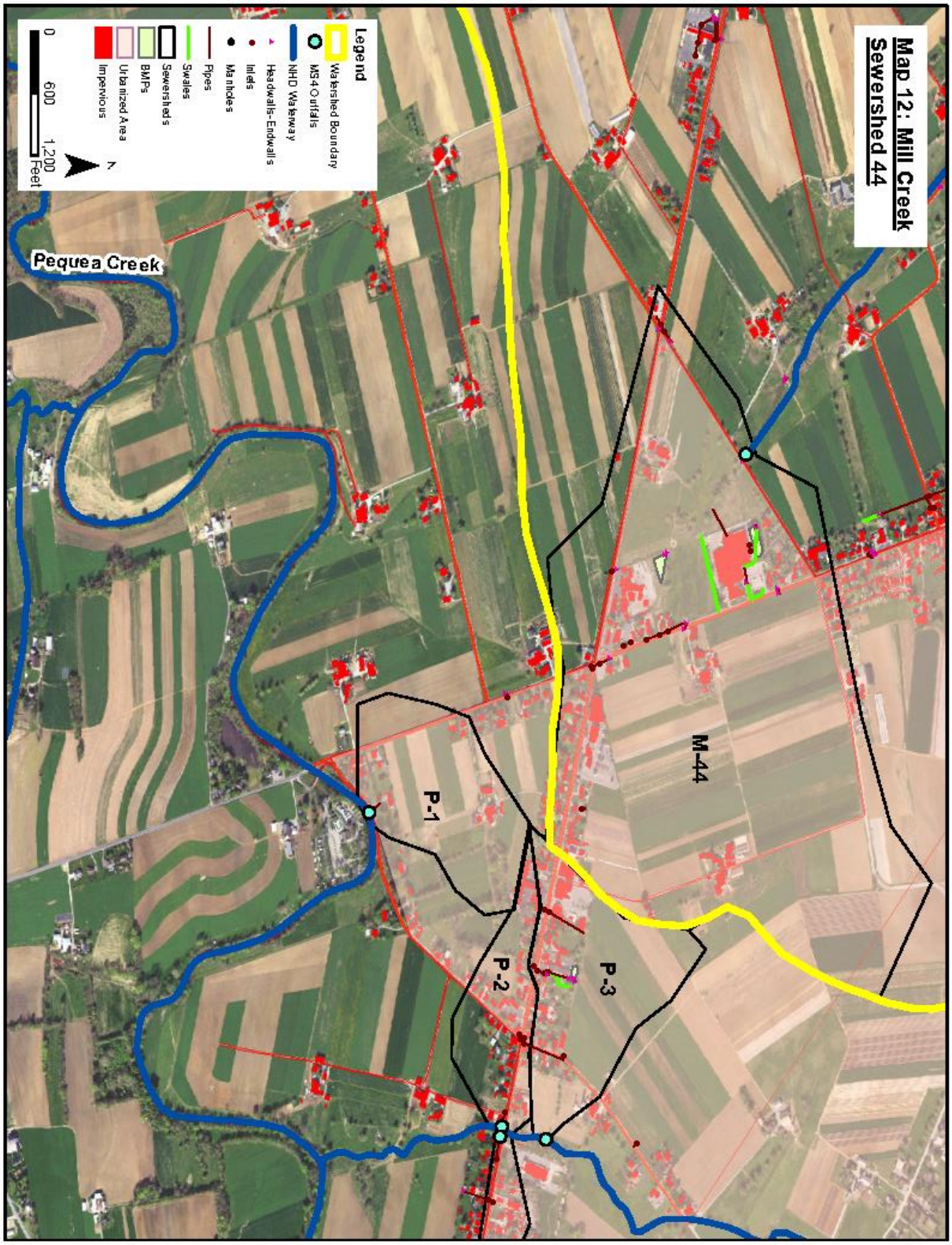
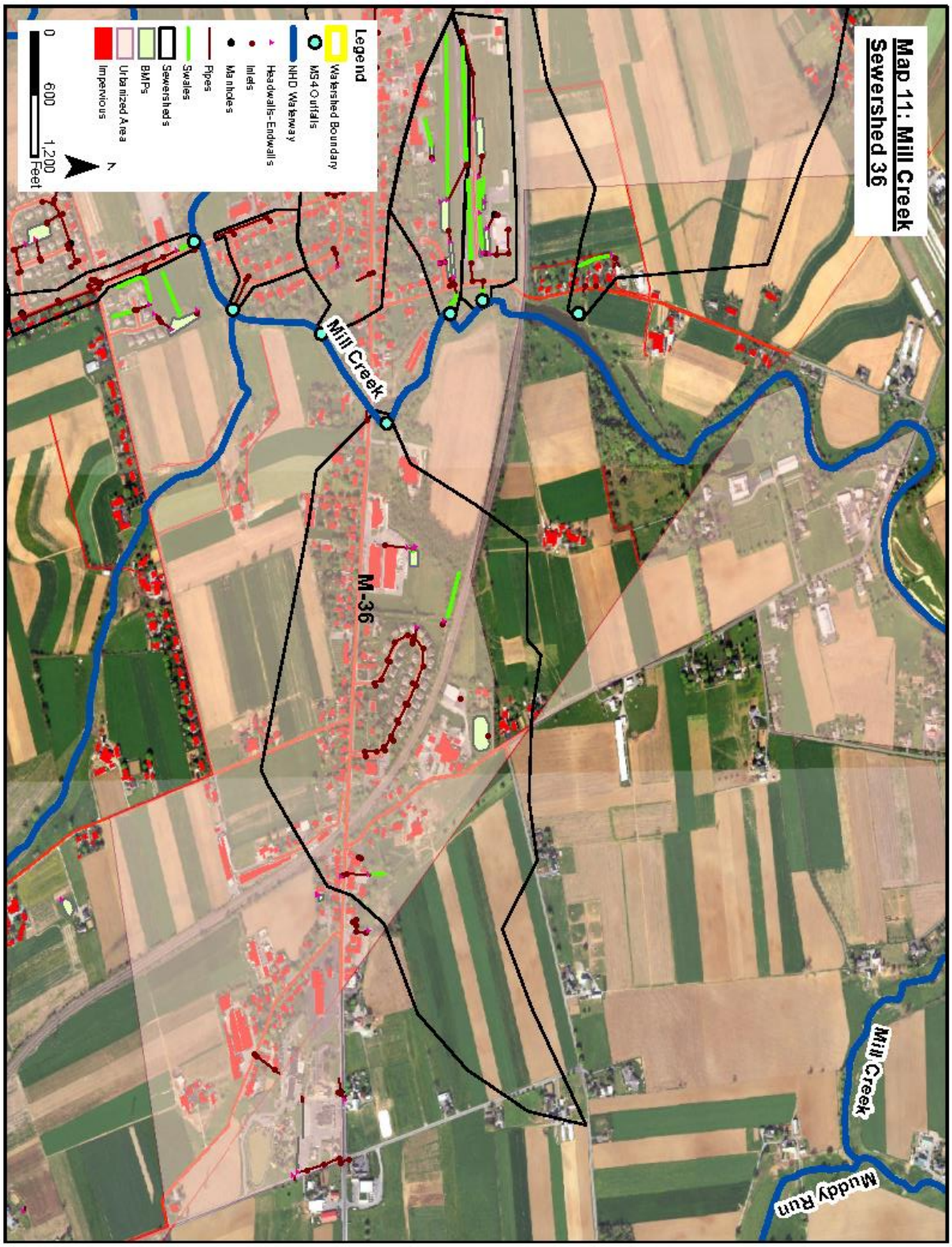
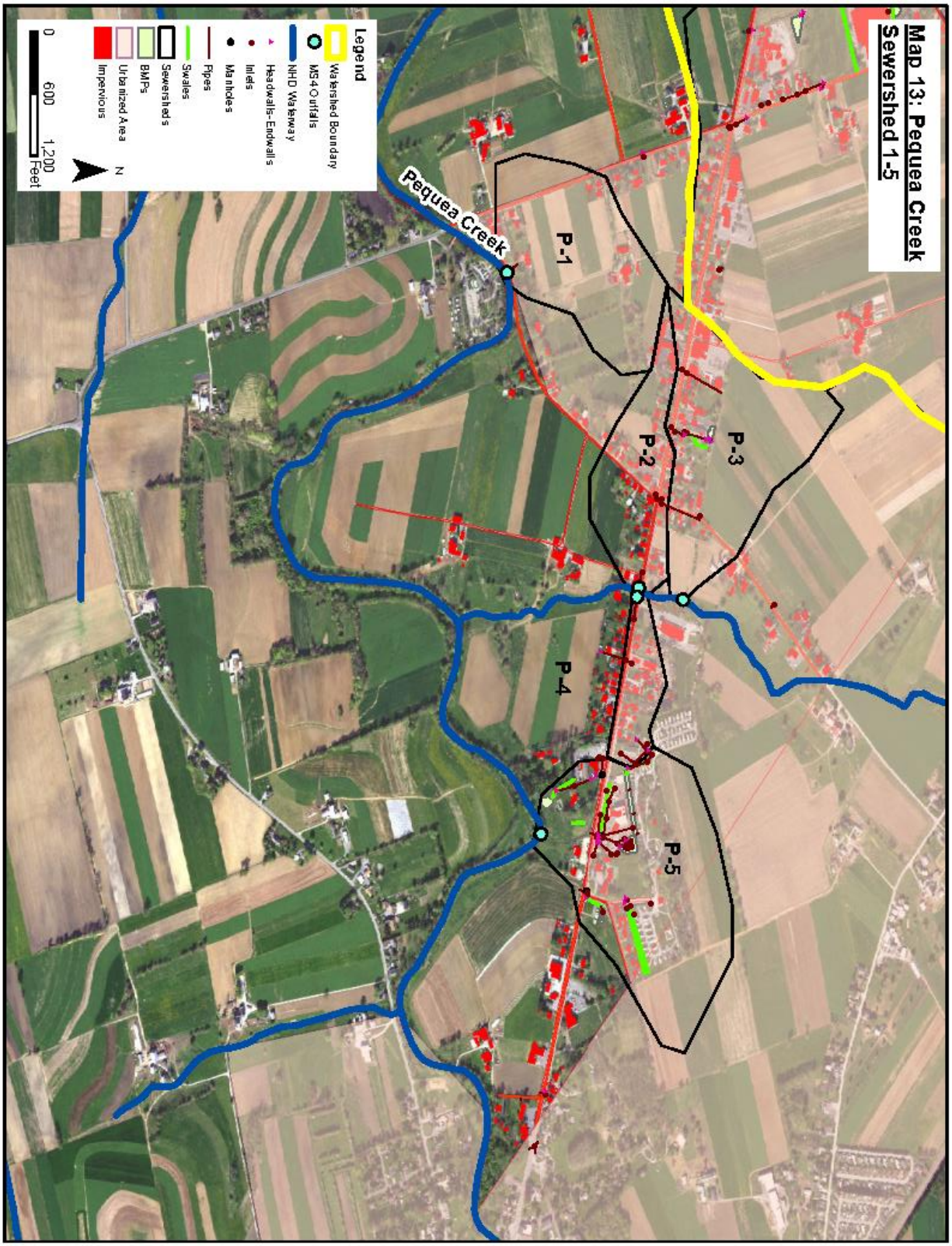

Map 12: Mill Creek
Sewershed 44
Legend
Watershed Boundary
MS4 Outfalls
NHD Waterway
Headwalls-Endwalls
Inlets
Manholes
Pipes
Swales
Sewersheds
BMPs
Urbanized Area
Impervious
0
600
1,200
Feet
N
Pequea Creek
M-44
P-1
P-2
P-3


Map 11: Mill Creek Sewershed 36
Legend
Watershed Boundary
MS4 Outfalls
NHD Waterway
Headwalls-Endwalls
Inlets
Manholes
Pipes
Swales
Sewersheds
BMPs
Urbanized Area
Impervious
0
600
1,200
Feet
N
Mill Creek
M-36
Mill Creek
Muddy Run


Map 13: Pequea Creek Sewershed 1-5
Legend
Watershed Boundary
MS4 Outfalls
NHD Waterway
Headwalls-Endwalls
Inlets
Manholes
Pipes
Swales
Sewersheds
BMPs
Urbanized Area
Impervious
0
600
1,200
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Pequea Creek
P-1
P-2
P-3
P-4
P-5

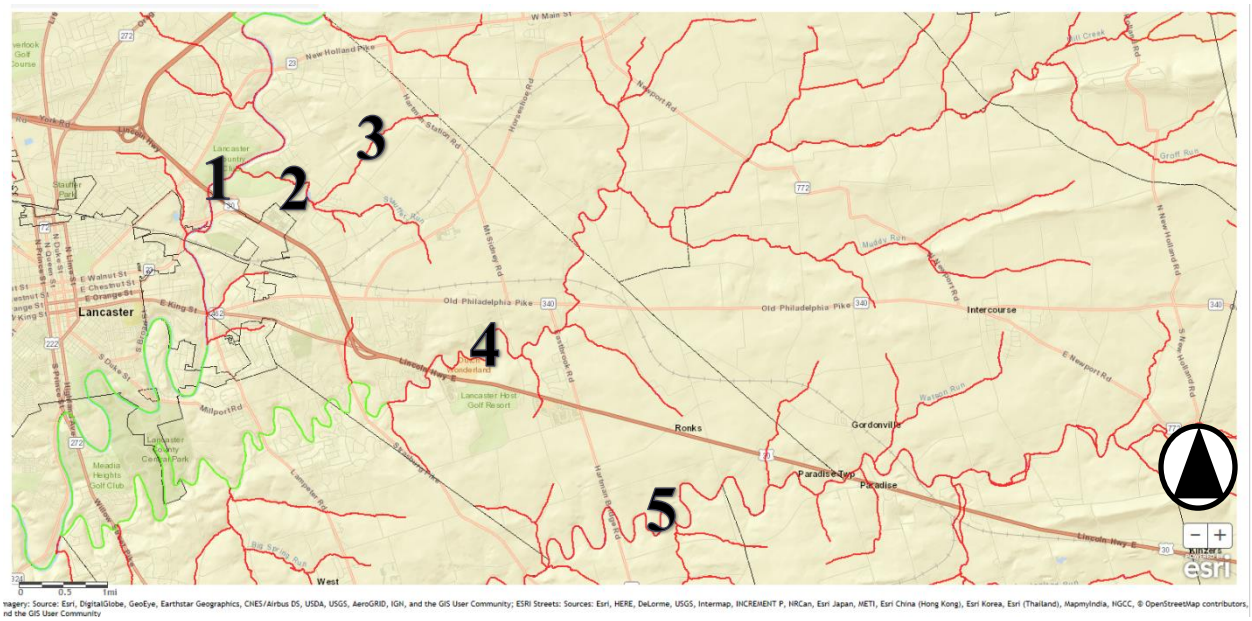

Figure A: eMapPA Impaired Watersheds Map

<u>East Lampeter Township Stream Impairments:</u>

1. Conestoga River: Pathogens, Organic Enrichment/Low Dissolved Oxygen, Siltation, Chlorine
2. Stauffer Run: Siltation
3. Unnamed Tributaries to Conestoga River: Nutrients, Flow Alterations
4. Mill Creek: Nutrients, Siltation
5. Pequea Creek: Nutrients, Organic Enrichment/Low Dissolved Oxygen, Siltation

Section D – Existing Loads:

Baseline Load Calculations:

East Lampeter had its pollutant loading rates in each of the watersheds calculated by LandStudies Inc. using Mapshed. This baseline loading calculation for Mill Creek and the Conestoga River was completed in May of 2016, while the Mapshed loading calculation for the Pequea Creek was completed in September 2016. (See Figures 1-4)

Figure 1: Loading Calculations for the Conestoga Watershed

Land Use	Acreage*	Sed (T/ac)	Total Sed. (T/yr)	N (lb/ac)	TN (lb/yr)	P (lb/ac)	TP (lb/yr)
Hay/ Pasture	786.0	0.04	29.9	0.46	364.1	0.1	112.2
Row Crops	642.0	0.25	158.2	3.21	2,057.6	0.4	246.7
Forest	208.0	0.01	1.2	0.13	26.3	0.0	3.1
Wetland	17.0	0.01	0.1	0.34	5.7	0.0	0.4
Open Water	74.0	0	0		0	0	0
Disturbed/ Transition	54.0	0.02	1.1	0.12	6.7	0.1	2.9
Turf	106.0	0.03	3.4	1.29	136.8	0.2	18.4
Unpaved Roads	0	0	0		0	0	0
LD Mixed	0	0	0		0	0	0
MD Mixed	551.0	0.01	3.8	0.29	159.2	0.0	18.6
HD Mixed	477.0	0.01	3.3	0.29	137.8	0.0	16.1
LD Res	109.0	0.00	0.3	0.11	11.9	0.0	1.3
MD Res	875.0	0.01	6.1	0.29	252.8	0.0	29.6
HD Res	0	0	0	0	0	0	0
Sub Total	3899.0		207.4		3159.0		448.4
Farm Animals					9,561.5		2,137.5
Streambank			1,858.0		4,411.0		1,931.3
Groundwater					76,435.6		169.3
Point Sources							
OLSS					664.2		
Total	**3,899.0**		**2,065.4**		**94,231.3**		**4,686.5**

*UA acreage for ELT was based on the Main Stem Conestoga Model Run. Loading rates used were calculated using the Conestoga ELT Model Run output.

Table 5. UA loadings in the Main Stem Conestoga East Lampeter Township Watershed

	Sediment (T/yr)	Nitrogen (lb/yr)	Phosphorus (lb/yr)
UA (land use loading)	207.4	3159.0	448.4
UA (other load contributors)	1,858.0	91,072.3	4,238.1
Total	2,065.4	94,231.3	4,686.5

The "other load contributors" within the Urbanized Area provide the greatest loading values within the Urbanized Area boundaries, particularly streambanks (sediment), groundwater (nitrogen), and livestock (phosphorus).

Figure 2: Loading Calculations for the Mill Creek Watershed

Land Use	Acreage	Sed (T/ac)	Total Sed. (T/yr)	N (lb/ac)	TN (lb/yr)	P (lb/ac)	TP (lb/yr)
Hay/ Pasture	764	0.034	26.2	0.25	190.2	0.10	79.3
Row Crops	726	0.162	117.4	2.07	1,503.5	0.36	258.8
Forest	252	0.005	1.2	0.05	13.6	0.01	3.2
Wetland	5	0	0	0.34	1.7	0.03	0.1
Open Water	2	0	0	0	0	0	0
Disturbed/ Transition	72	72.0	2.6	0.17	12.6	0.09	6.8
Turf	0	0	0	0	0	0	0
Unpaved Roads	0	0	0	0	0	0	0
LD Mixed	17	0.000	0	0	0	0	0
MD Mixed	329	0.001	0.2	0.04	14.1	0.01	1.8
HD Mixed	390	0.001	0.2	0.04	16.8	0.01	2.2
LD Res	77	0.000	0	0.02	1.4	0.002	0
MD Res	729	0.001	0.5	0.04	31.3	0.01	7.3
HD Res	0	0	0	0	0	0	0
Sub Total			148.4		1,785.1		356.6
Farm Animals					13,258.5		2,862.8
Streambank			672.5		1670.1		702.8
Groundwater					27,545.9		156.8
Point Sources							
OLSS					593.5		
Total	**3357**		**820.9**		**44,853.1**		**4,093.8**

	Sediment (T/yr)	Nitrogen (lb/yr)	Phosphorus (lb/yr)
UA (land use loading)	148.2	1,785.1	356.6
UA (other load contributors)	672.5	43,068.0	3,737.2
Total	820.9	44,853.1	4,093.8

The "other load contributors" within the Urbanized Area provide the greatest loading values within the Urbanized Area boundaries, particularly streambanks (sediment), groundwater (nitrogen), and livestock (phosphorus).

Figure 3: LandStudies Mapshed Modeling Results Report – Pequea Creek Watershed

Approximately 1,940 acres or two percent of the Pequea Creek watershed is in East Lampeter Township. The western portion of the township drains to a small unnamed tributary while the eastern area drains directly to the Pequea Creek. Approximately 15% of the Township is designated Urbanized Area (UA) by the 2010 Census. The largest amount of land within the township is devoted to agriculture (~76%). Residential and mixed uses accounts for approximately 11% of the Township, with medium density residential representing the greatest land cover of the urban land uses. The East Lampeter model runs resulted in the loadings summarized below.

The following represents notable considerations associated with the sources of pollutant loadings in the modeled Pequea watershed in East Lampeter Township:

- 92% of the total annual sediment loading is contributed by streambank erosion
- 6% of the total annual sediment loading is contributed by cropland
- 43% of the total annual nitrogen loading is contributed by livestock
- 32% of the total annual nitrogen loading is contributed by groundwater
- 50% of the total annual phosphorus loading is contributed by livestock
- 42% of the total annual phosphorus loading is contributed by streambanks

The following represents notable considerations associated with the sources of pollutant loadings in the modeled Pequea watershed in East Lampeter Township UA:

- 87% of the total annual sediment loading is contributed by streambank erosion
- 10% of the total annual sediment loading is contributed by cropland
- 44% of the total annual nitrogen loading is contributed by groundwater
- 40% of the total annual nitrogen loading is contributed by livestock
- 64% of the total annual phosphorus loading is contributed by livestock
- 24% of the total annual phosphorus loading is contributed by streambanks

The UA loadings were calculated using the per acre loading rate generated from the East Lampeter Township model run and applying it to the number of acres of each land use within the UA. Land use acreages within the UA were based on the MapShed land cover data layer with changes made to represent LFT cropland, pasture, and hay acreages as well as based on an evaluation of aerial imagery.

Summarized below are the total loadings from contributing land and UA other load contributors (the collective values of other pollutant contribution factors including livestock, streambanks, groundwater, and septic systems). The “other load contributors” load amounts were based on the percentage of UA within the Township. For example, 10% of the agricultural land in the Township is within the UA; therefore the total livestock loading within the UA was reduced to 10% of the loading

for the entire Township. Approximately 15 percent of the Township is in the UA; therefore the groundwater and septic system values were reduced to 15% of what MapShed generated for the entire township.

East Lampeter Township has aggregated these three watersheds together as the Conestoga, Mill Creek and Pequea Creek all flow into the Susquehanna River Watershed. Conestoga and Mill Creek aggregation was approved on June 13,2017, and the Pequea Creek aggregation was approved by DEP in 2022.

Table 1: UA Loadings for East Lampeter Township

	Sediment (T/yr.)	Nitrogen (lb./yr.)	Phosphorus (lb./yr.)
UA (land use loading)	13.8	177	30
UA (other load contributors)	87.4	2,806	342
Total Loadings for ELT	101.2	2,983	372

The "other load contributors" within the UA provide the greatest loading values within the UA boundaries, particularly streambanks (sediment), groundwater (nitrogen), and livestock (nitrogen and phosphorus).

As summarized above, the UA includes agricultural land uses, and these areas provide relatively significant loadings. However, an assumption can be made that the MS4 sewershed exists only in areas of urban/suburban land uses. The loadings identified in the urban/suburban land uses within the UA are significantly less than other pollutant contributors identified. The primary pollutant loading sources (nitrogen, phosphorus, and sediment) in the UA based only on urban/suburban land uses was determined to be:

- Medium Density Residential
- Medium Density Mixed Use
- High Density Mixed Use

According to the estimated land cover acreages within the UA, 55% of the urban land use categories (residential and mixed use) fall within the UA. In turn, the balance of "urban" land uses fall outside the UA boundaries.

Figure 4: Overall Loads in East Lampeter Township

	Sediment (lbs.)	Phosphorus (lbs.)	Nitrogen (lbs.)
Conestoga/Mill/Pequea	5,975,000	9,152.3	140,067.4
Totals	**5,975,000**	**9,152.3**	**140,067.4**

Areas Parsed Out:

Within the watershed planning area, East Lampeter Township has parsed out the Rights-of-Way which are covered under the MS4 permit for the Pennsylvania Department of Transportation (PennDOT). Refer to Figures 5-6 for the parsed-out areas within the Conestoga/Mill Creek/Pequea Creek watersheds.

Figure 5: Conestoga/Mill Creek/Pequea Creek PennDOT Roadway Linear Footages

Roadway	Linear Feet
• Route 23	5,915 LF
• Horseshoe Road	9,370 LF
• Pitney Road	5,547 LF
• Route 340	26,834 LF
• Route 462	5,853 LF
• Route 30	52,483 LF
• Mt. Sidney Rd	6,453 LF
• Strasburg Pike:	9,422 LF
• Route 462:	2,466 LF
• Oakview Rd:	3,552 LF
• Eastbrook Dr:	9,399 LF
• Ronks Rd:	6,458 LF
Total	137,568 LF

Figure 6: Loads Parsed out of Conestoga/Mill Creek/Pequea Creek PennDOT Roads

PennDOT Parsed out Roadways				
15' Shoulder	15'	x	143,753 LF	49.50 ac
35' Cartway	35'	x	143,753 LF	115.50 ac
Total				165.00 ac
dev. Open sp.	49.49 ac	x	0.19	9.40 ac
dec. high dens.	115.49 ac	x	0.99	114.34 ac
Impervious	123.73 ac			
Pervious	41.25 ac			
Sediment				
Impervious	1480.43	x	123.73 ac	183,173.6 lbs
Pervious	190.93	x	41.25 ac	7,875.86 lbs
Total				**191,049.46 lbs**
Phosphorus				
Impervious	1.55	x	123.73 ac	191.78 lbs
Pervious	0.36	x	41.25 ac	14.85 lbs
Total				**206.63 lbs**
Nitrogen				
Impervious	38.53	x	123.73 ac	4,767.32 lbs
Pervious	22.24	x	41.25 ac	917.40 lbs
Total				**5,684.72 lbs**

Remaining Load to Reduce:

With the baselines calculated, (See Figures 1-4) the PennDOT right of ways parsed out (See Figures 5-6), and PA DEP having given East Lampeter Township permission to aggregate the Conestoga River and Mill Creek and Pequea Creek Watersheds together, (See Appendix A) the following remaining load reductions are required within East Lampeter Township's Watershed planning area:

Conestoga/Mill Creek/Pequea:

Sediment:

Baseline Load:	5,975,000 lbs. (2,987.5 tons)
Load in PennDOT ROW:	191,049.45 lbs.
Load Remaining:	5,783,950.6 lbs.
10% Reduction:	**578,395.06 lbs. (289.2 tons)**

Phosphorus:

Baseline Load:	9,152.3 lbs.
Load in PennDOT ROW:	206.64 lbs.
Load Remaining:	8,945.66lbs
5% Reduction:	**447.28 lbs.**

Nitrogen:

Baseline Load:	97,214.3 lbs.
Load in PennDOT ROW:	5,684.7 lbs.
Load Remaining:	91,529.6 lbs.
3% Reduction:	**2,745.89 lbs.**

Section E – Proposed Load Reduction BMPS:

Conestoga/Mill Creek/Pequea Creek BMPs:

The Township needs to determine the minimum sediment (TS) and phosphorus (TP) loading in pounds per year (lbs./yr.) that must be reduced within 5 years following DEP's approval of coverage. The minimum percent reductions outlined by DEP (Department of Environmental Protection) are 10% sediment, 5% phosphorus and 3% nitrogen.

Minimum Sediment Reduction = 578,394.96 lbs. (289.2 tons)
Minimum Phosphorus Reduction = 447.27 lbs.
Minimum Nitrogen Reduction= 2,745.88 lbs.
The following describes the analysis of BMP's undertaken by East Lampeter Township to reduce sediment and phosphorus loads in the Conestoga, Mill Creek, and Pequea Creek Watersheds.

BMP Option 1: Inlet Cleaning/Advanced Sweeping – Conestoga & Mill Creek & Pequea Creek; Implemented

East Lampeter Township conducts routine inlet cleaning/street sweeping and record keeping that follows the Chesapeake Bay Foundation Expert Panel Report guidance as approved by DEP in 2021. The maximum amount of sediment that may be claimed is 289,197.48 lbs. at an average of 57,839.5 lbs. annually X 5 years.

BMP Option 2: 2250 Old Phila. Pike: ELT Municipal Campus – Basin Retrofits; Installed 6/1/2019

Located on ELT's municipal campus are 4 stormwater basins which are currently not providing any water quality benefits. Retrofitting each of the basins into bio-retention basins is project which East Lampeter has received a DEP Grant to complete. The drainage area to the 4 basins on the campus is 26.7 acres. The DEP BMP effectiveness reduction values for bioretention/rain gardens in A/B soils without underdrains is 90% for sediment, 85% for phosphorus and 80% for nitrogen.

Estimated Sediment Load:;
Impervious: 12.66 ac x 1480.43 =18,742.24 lbs.
Pervious: 14.04 ac x 190.93 = 2,680.65 lbs.
Total: 21,422.89 lbs.

Estimated Phosphorus Load:
Impervious: 12.66 ac x 1.55 =19.62 lbs.
Pervious: 14.04 ac x 0.36 = 5.05 lbs.
Total: 24.67 lbs.

Estimated Nitrogen Load:
Impervious: 12.66 ac x 38.53 = 487.79 lbs.
Pervious: 14.04 ac x 22.24 = 312.25 lbs.
Total: 800.04 lbs.

Estimated Reduction in Sediment: 21,422.89 lbs. x 90% = 19,280.60 lbs.

Estimated Reduction in Phosphorus: 24.67 lbs. x 85% = 20.96 lbs.

Estimated Reduction in Nitrogen: 800.04 lbs. x 80% = 640.03 lbs.

BMP Option 3: 355 Pitney Road – Riparian Buffer; Installed 6/25/2019

The developer of the property is installing a riparian buffer along a portion of Stauffer Run which bisects the property. The property is located at 355 Pitney Road, Lancaster, PA 17601 which is near the intersection of Pitney Rd. and Millcross Road. The riparian buffer proposed totals 3.98 acres, therefore the drainage area to the riparian buffer corridor cannot exceed 7.96 acres for TSS & P, and 15.92 acres for N. The DEP Effectiveness Values Table shows the reduction values for riparian buffers are 50% for sediment, 50% for phosphorus and 25 % for nitrogen.

Estimated Sediment Load:
Impervious: 1.1 ac x 1480.43 = 1,628.47 lbs.
Pervious: 6.86 ac x 190.93 = 1,309.77 lbs.
Total: 2,938.24 lbs.

Estimated Phosphorus Load:
Impervious: 1.1 ac x 1.55 = 1.7 lbs.
Pervious: 6.86 ac x 0.36 = 2.46 lbs.
Total: 4.16 lbs.

Estimated Nitrogen Load:
Impervious: 1.1 ac x 38.53 = 42.38 lbs.
Pervious: 14.82 ac x 22.24 = 329.60 lbs.
Total: 371.98 lbs.

Estimated Reduction in Sediment: 2,938.24 lbs. x 50% = 1,469.12 lbs.

Estimated Reduction in Phosphorus: 4.16 lbs. x 50% = 2.08 lbs.

Estimated Reduction in Nitrogen: 371.98 lbs. x 25% = 93 lbs.

BMP OPTION 4 : Agricultural BMPs

The Township working with Lancaster Farmland Trust and Team Ag Incorporated have identified agricultural sites within the urbanized area that can install BMP's that exceed the required baseline reduction practices on the entire farm. These BMP's are conservation planned, designed, and installed to meet the USDA NRCS practice standards. The Township follows the PA_DEP BMP effectiveness values document stating the BMP's not identified in the document or in Chesapeake Bay program expert panel reports, are to follow other technical resources for BMP effectiveness. MapShed does not provide reduction values for these BMP's, thus the Township follows the reduction values developed by the technical consultant Team Ag Inc. per DEP's guidance in 2021.

Site 4A: 623 Willow Rd. Lancaster, PA Installed 9-1-2020 to 11-1-2020

The Stabilization BMPs installed in 2021 resulted in the following sediment reductions:
Barnyard Stabilization – 9,525 sq. ft./43,560 sq. ft./ac x 5 tons/ac (assumed soil loss) x 2,000 lbs./ton = 2,186.64 lbs. of sediment reduced annually
Animal Trail & Walkway Stabilization – 4,020 sq. ft./43,560 sq. ft./ac x 5 tons/ac (assumed soil loss) x 2,000 lbs./ton = 922.87 lbs. of sediment reduced annually
Lane Stabilization – 13,800 sq. ft./43,560 sq. ft./ac x 5 tons/ac (assumed soil loss) x 2,000 lbs./ton = 3,168 lbs. of sediment reduced annually
Barnyard Stabilization – 10,910 sq. ft./43,560 sq. ft./ac x 5 tons/ac (assumed soil loss) x 2,000 lbs./ton = 2,504.59 lbs. of sediment reduced annually
The Animal Waste Management System BMPs installed in 2021 resulted in the following nutrient reductions:
Barnyard Improvements – Nitrogen = 604 lbs. annual reduction
Phosphorus = 242 lbs. annual reduction
Waste Storage Structure (liquid) – Nitrogen = 1,925 lbs. annual reduction
Phosphorus = 894 lbs. annual reduction
Waste Storage Structure (solid) – Nitrogen = 794 lbs. annual reduction
Phosphorus = 318 lbs. annual reduction
Buffer in Pasture system (liquid)- Nitrogen =152 lbs. annual reduction
Phosphorus =71 lbs. annual reduction
Buffer in Pasture system (solid)- Nitrogen = 128 lbs. annual reduction
Phosphorus = 51 lbs. annual reduction
See Appendix C.

Site 4B: 2061 Jarvis Rd. Lancaster, PA Installed 12-1-2020

The Stabilization BMPs installed in 2021 resulted in the following sediment reductions:
Roofed Heavy Use Area with Manure Storage Structure, Roof Runoff System & Stormwater Infiltration System under Barnyard Stabilization – 4,416 sq. ft./43,560 sq. ft./ac x 5 tons/ac (assumed soil loss) x 2,000 lbs./ton = 1,013.77 lbs. of sediment reduced annually
The Animal Waste Management System BMPs installed in 2021 resulted in the following nutrient reductions:
Nitrogen = 989 lbs. annual reduction
Phosphorus = 344 lbs. annual reduction
See Appendix D.

Site 4C 419 Mt. Sidney Rd.

The Stabilization BMPs planned with the following sediment reductions:
Roofed Heavy Use Area with a Roofed Manure Storage Structure, Animal Trails & Walkway, Roof Runoff System & Stormwater Infiltration System under Barnyard Stabilization Barnyard Stabilization – 12,588 sq. ft./43,560 sq. ft./ac x 5 tons/ac (assumed soil loss) x 2,000 lbs./ton = 2,890 lbs. of annual sediment reduction.
The Animal Waste Management System BMPs planned with the following nutrient reductions:
Nitrogen = 4,624 lbs. annual reduction
Phosphorus = 1,652 lbs. annual reduction
See Appendix E.

Site 4D: 624 Willow Rd. Lancaster, PA

The Stabilization BMPs planned with the following sediment reductions:
Barnyard Stabilization/Heavy Use Area/roof Runoff System with stormwater infiltration – 6,956 sq. ft./43,560 sq. ft./ac x 5 tons/ac (assumed soil loss) x 2,000 lbs./ton = 1,596.88 lbs. of sediment reduced annually
Barnyard Stabilization/Waste Storage Structure – 4,418 sq. ft./43,560 sq. ft./ac x 5 tons/ac (assumed soil loss) x 2,000 lbs./ton = 1,014.23 lbs. of sediment reduced annually
Animal Trail & Walkway Stabilization – 6,956 sq. ft./43,560 sq. ft./ac x 5 tons/ac (assumed soil loss) x 2,000 lbs./ton = 1,596.88 lbs. of sediment reduced annually
The Animal Waste Management System BMPs nutrient reductions to be determined upon completion of a new Waste System Management Plan and updated animal waste utilization worksheet:
Barnyard Improvements – Nitrogen = lbs. annual reduction
Phosphorus = lbs. annual reduction
Waste Storage Structure (liquid) – Nitrogen = lbs. annual reduction
Phosphorus = lbs. annual reduction
Waste Storage Structure (solid) – Nitrogen = lbs. annual reduction
Phosphorus = lbs. annual reduction

Site 4E: 2306 Horseshoe Rd. Lancaster, PA

The Stabilization BMPs planned with the following sediment reductions:
Heavy Use Area with a, Roof Runoff System & Stormwater Infiltration System under Barnyard Stabilization – 4,200sq. ft./43,560 sq. ft./ac x 5 tons/ac (assumed soil loss) x 2,000 lbs./ton = 964.19 lbs. of sediment reduced annually
Barnyard Stabilization/Waste Storage Structure – 4,069 sq. ft./43,560 sq. ft./ac x 5 tons/ac (assumed soil loss) x 2,000 lbs./ton = 934.11 lbs. of sediment reduced annually
Access Lane Stabilization – 9,300 sq. ft./43,560 sq. ft./ac x 5 tons/ac (assumed soil loss) x 2,000 lbs./ton = 2,134.98 lbs. of sediment reduced annually
Animal Trail & Walkway Stabilization – 3,600 sq. ft./43,560 sq. ft./ac x 5 tons/ac (assumed soil loss) x 2,000 lbs./ton = 826.44 lbs. of sediment reduced annually
The Animal Waste Management System BMPs nutrient reductions to be determined upon completion of a new Waste System Management Plan and updated animal waste utilization worksheet:
Barnyard Improvements – Nitrogen = lbs. annual reduction
Phosphorus = lbs. annual reduction
Waste Storage Structure (liquid) – Nitrogen = lbs. annual reduction
Phosphorus = lbs. annual reduction
Waste Storage Structure (solid) – Nitrogen = lbs. annual reduction
Phosphorus = lbs. annual reduction

BMP Option 5: Mill Bridge Camp Resort Streambank Restoration; Installed 9/18/2019

Working in conjunction with West Lampeter Township and Strasburg Borough, East Lampeter has identified a segment of the Pequea Creek located in East Lampeter Township to perform a section of streambank restoration that will mutually benefit each of the municipalities. East Lampeter Township has claimed a portion of the pollution reduction amounts from the project, in the amounts of 41,289 lbs./yr. TSS, 62.56 lbs./yr. TP, and 69 lbs./yr. TN, as per the project partner's inter-municipal agreement. The DEP streambank sediment reduction value of 44.88 lb./ft, a phosphorus reduction value of 0.068 lb./ft and a nitrogen reduction value of 0.075 lb./ft were used.

Estimated Reduction in Sediment: 920 LF x 44.88 lb./ft = 41,289 lbs.

Estimated Reduction in Phosphorus: 920 LF x 0.068 lb./ft = 62.56 lbs.

Estimated Reduction in Nitrogen: 920 LF x 0.075 lb./ft = 69 lbs.

BMP Option 6: Greenleaf Enterprises -Bioretention Basin Retrofits

The Property owner and the Township are developing plans for retrofitting a legacy PCSM dry detention basin into a bio-basin, with the consideration that an amount of facility volume credit be reserved for future potential with Chapter 102 requirements. The Township is negotiating an agreement with the property owner. The property is a series of greenhouses located on Old Philadelphia Pike in the Mill Creek watershed. The drainage areas to the 2 basins on the site are 17.07 and 7.51 acres. The DEP BMP effectiveness reduction values for bioretention in A/B soils with underdrains is 80% for sediment, 75% for phosphorus, and 70% for nitrogen.

Basin A

Estimated Sediment Load:
Impervious: 9.08 ac x 1480.43 = 13,442.30 lbs.
Pervious: 7.99 ac x 190.93 = 1,525.53 lbs.
Total: 14,967.83 lbs.

Estimated Phosphorus Load:
Impervious: 9.08 ac x 1.55 = 14.07 lbs.
Pervious: 7.99 ac x 0.36 = 2.88 lbs.
Total: 16.95 lbs.

Estimated Nitrogen Load:
Impervious: 9.08 ac x 38.53 = 349.85 lbs.
Pervious: 7.99 ac x 22.24 = 177.70 lbs.
Total: 527.55 lbs.

Estimated Reduction in Sediment: 14,967.83 lbs. x 80% = 11,974.26 lbs.

Estimated Reduction in Phosphorus: 19.95 lbs. x 75% = 14.96 lbs.

Estimated Reduction in Nitrogen: 527.55 lbs. x 70% = 369.28 lbs.

Basin B

Estimated Sediment Load:
Impervious: 4.7 ac x 1480.43 = 6,958.02 lbs.
Pervious: 2.81 ac x 190.93 = 536.51 lbs.
Total: 7,494.53 lbs.

Estimated Phosphorus Load:
Impervious: 4.7 ac x 1.55 = 7.28 lbs.
Pervious: 2.81 ac x 0.36 = 1.01 lbs.
Total: 8.29 lbs.

Estimated Nitrogen Load:
Impervious: 4.7 ac x 38.53 = 181.09 lbs.
Pervious: 2.81 ac x 22.24 = 62.49 lbs.
Total: 243.58 lbs.

Estimated Reduction in Sediment: 7,494.53 lbs. x 80% = 5,995.62 lbs.
Estimated Reduction in Phosphorus: 8.29 lbs. x 75% = 6.22 lbs.
Estimated Reduction in Nitrogen: 243.58 lbs. x 70% = 170.51 lbs.

BMP Option 7: HACC Lancaster Campus – Streambank Restoration/Stabilization

The Township and the Harrisburg Area Community College have agreed upon a project and are currently collaborating on the design to implement Streambank Stabilization on a portion of an unnamed tributary to the Conestoga River. The stream flows through the middle of the HACC Lancaster Campus with great educational potential featuring streambank stabilization with a riparian buffer that is integrated into the campus stormwater management. We are proposing a 2,141 LF section of the site. The DEP effectiveness values table shows reductions for streambank work are 115 lb./lf in sediment reduction, a 0.068 lb./lf in phosphorus reduction, and a 0.075 lb./lf in nitrogen reduction.

Estimated Reduction in Sediment: 2,141 LF x 115 lb./ft = 246,215 lbs.

Estimated Reduction in Phosphorus: 2,141 LF x 0.068 lb./ft = 145.59 lbs.

Estimated Reduction in Nitrogen: 2,141 LF x 0.075 lb./ft = 160.58 lbs.

BMP Option 8: ELT Community Park – Streambank Restoration/Stabilization

The Township has identified a portion of our municipal park property at Community Park, located along Hobson Road between Rt 30 & 340, as a good candidate for streambank stabilization. We are proposing 1,825 LF of streambank stabilization on the West side of the stream and an equivalent riparian buffer. The DEP effectiveness values table shows reductions for streambank work are 115 lb./lf in sediment reduction, a 0.068 lb./lf in phosphorus reduction, and a 0.075 lb./lf in nitrogen reduction. This PRP was previously approved for 938 LF.

Estimated Reduction in Sediment: 1,825 LF x 115 lb./ft =209,875 lbs.

Estimated Reduction in Phosphorus: 1,825 LF x 0.068 lb./ft = 124.1 lbs.

Estimated Reduction in Nitrogen: 1,825 LF x 0.075 lb./ft =136.88 lbs.

BMP Option 9: 58 Witmer Road – Streambank Restoration/Stabilization

The Township has identified a private property that lies adjacent to our municipal "Community Park" property with Mill Creek flowing between the properties. This farm is located adjacent to the commercial businesses on the north side of Lincoln Highway and along Witmer road. This section of Mill Creek is an excellent candidate for a stream stabilization project that would include a riparian/herbaceous buffer with stream fencing for cattle exclusion. We are proposing a 1,530 LF

section of stabilization on this East side of the stream and an equivalent buffer. The DEP effectiveness values table shows reductions for streambank work are 115 lb./lf in sediment reduction, a 0.068 lb./lf in phosphorus reduction and a 0.075 lb./lf in nitrogen reduction.

Estimated Reduction in Sediment: 1,530 LF x 115 lb./ft = 175,950 lbs.

Estimated Reduction in Phosphorus: 1,530 LF x 0.068 lb./ft = 104.04 lbs.

Estimated Reduction in Nitrogen: 1,530 LF x 0.075 lb./ft = 114.75 lbs.

BMP Option 10: I2 Capital Investments Pollution Reduction Credit Revolving Fund

East Lampeter Township has entered into an agreement to purchase sediment reduction credits from I-2 Capital Investors, Inc. Revolving Fund. I-2 Capital has received approval from PA DEP to operate a pollutant reduction revolving fund, whereby I-2 Capital and local partners, including but not limited to local landowners, the Lancaster Farmland Trust, Land Studies Inc, Red Barn Consulting, and or others install, implement, operate, and maintain pollutant reducing best management practices and facilities; and recoup the cost of installation via selling the pollutant reduction efficiency credits via the open market. This initial round of PRP installations for the revolving fund are targeted within the Stauffer Run watershed, and are in conjunction with the Lancaster County rapid stream-delisting initiative. Per the agreement, East Lampeter Township is purchasing credits for sediment pollutant reduction. See Appendix F.

Pollutant Reduction Accounting:

Sediment Reduction: 100,000-150,000 lbs./yr.

Phosphorous Reduction: 0 lbs./yr.

Nitrogen Reduction: 0 lbs./yr.

BMP Option 11 : Colleens Way – Dry Extended Detention Basin

The Colleen's Way basin is a legacy retrofit from a dry detention basin to a dry-extended detention basin. Downstream residents from the basin have routinely complained of excessive and erosive storm drainage flows, and drainage channel erosion. This project aims to increase residency and dewatering times, while settling out pollutants of concern, thereby reducing overall velocity and channel erosion downstream of the project site. Property owners of the basin have voiced ascent for the project. The drainage area to the basin on the is 30.86 acres. The DEP BMP effectiveness reduction values for a Dry Extended Detention basin in A/B soils without underdrains is 60 % for sediment and 20 % for phosphorus, and 20 % for nitrogen.

Estimated Sediment Load:
Impervious: 14.48 ac x 1480.43 = 21,436.63 lbs.
Pervious: 16.38 ac x 190.93 = 3,127.43 lbs.
Total: 24,564.06 lbs.

Estimated Phosphorus Load:
Impervious: 14.48 ac x 1.55 = 22.44 lbs.
Pervious: 16.38 ac x 0.36 = 5.90 lbs.
Total: 28.34 lbs.

Estimated Nitrogen Load:
Impervious: 14.48 ac x 38.53 = 557.91 lbs.
Pervious: 16.38 ac x 22.24 = 364.29 lbs.
Total: 922.20 lbs.

Estimated Reduction in Sediment: 24,564 lbs. x 60 % = 14,738.4 lbs.

Estimated Reduction in Phosphorus: 28.34 lbs. x 20 % = 5.67 lbs.

Estimated Reduction in Nitrogen: 922.20 lbs. x 20% = 184.44 lbs.

BMP Option 12 : 2040 Pine Drive – Wet Retention Basin Retrofit

The Meadow Ridge Pond discharges to the same UNT as the Colleen's Way Basin and Meadow Ridge Swale, while accepting urban stormwater runoff form a drainage area independent of the either two. This project proposes converting a legacy PCSMF wet pond into a wet retention pond with increased residence time for pollutant removal and peak rate reduction, as well as native plantings and livestock exclusion fencing. The current pond owner has voiced willingness to collaborate in this retrofit. The drainage area to the basin is 18.99 acres. The DEP BMP effectiveness reduction values for a wet retention basin in A/B soils is 60% for sediment 45 % for phosphorus, and 20% for nitrogen.

Estimated Sediment Load:
Impervious: 4.12 ac x 1480.43 = 6,099.37lbs.
Pervious: 14.87 ac x 190.93 = 2,839.13lbs.
Total: 8,938.49 lbs.

Estimated Phosphorus Load:
Impervious: 4.12 ac x 1.55 = 6.39 lbs.
Pervious: 14.87 ac x 0.36 = 6.35 lbs.
Total: 11.74 lbs.

Estimated Nitrogen Load:
Impervious: 4.12 ac x 38.53 = 158.74 lbs.
Pervious: 14.87 ac x 22.24 = 330.71 lbs.
Total: 489.45 lbs.

Estimated Reduction in Sediment: 8,938.49 lbs. x 60 % = 5,363.09 lbs.

Estimated Reduction in Phosphorus: 11.74 lbs. x 45 % = 5.28 lbs.
.
Estimated Reduction in Nitrogen: 489.45 lbs. x 20 % = 97.89 lbs.

BMP Option 13: 2040 Pine Drive - Vegetated Swale

The Meadow Ridge Swale provides conveyance for discharge from the Colleen's Way Basin dewatering device, and discharges to a drainage channel, road culvert, areas of naturally occurring springs, and ultimately to an NHD recognized UNT of the Conestoga River. The project proposal includes converting an erosive legacy grassed ditch into a grassed waterway/swale with amended soils, thereby further treating and managing urban storm flows from the Colleen's Way Basin watershed prior to WOTUS discharge. The drainage area to the swale is 1.97 acres. The DEP BMP effectiveness reduction values for a vegetated swale in C/D soils is 50% for sediment, 10% for phosphorus and 10% for nitrogen.

Estimated Sediment Load:
Impervious: 0.16 ac x 1480.43 = 236.87 lbs.
Pervious: 1.81 ac x 190.93 = 345.58 lbs.
Total: 582.45 lbs.
Estimated Phosphorus Load:
Impervious: 0.16 ac x 1.55 = .248 lbs.
Pervious: 1.81 ac x 0.36 = .65 lbs.
Total: 0.9 lbs.

Estimated Nitrogen Load:
Impervious: 0.16 ac x 38.53 = 6.16 lbs.
Pervious: 1.81 ac x 22.24 = 40.25 lbs.
Total: 46.41 lbs.

Estimated Reduction in Sediment: 582.45 lbs. x 50 % = 291.23 lbs.

Estimated Reduction in Phosphorus: 0.9 lbs. x 10 % = 0.09 lbs.

Estimated Reduction in Nitrogen: 46.41 lbs. x 10 % = 4.64 lbs.

BMP Option 14A : High Associates Inc. -Bioretention Basin Retrofits

The Property owner and the Township are developing plans for retrofitting a legacy PCSM dry detention basin into a bioretention basin. The Township is negotiating an agreement with the property owner. The property is a developed corporate center located on 1842 colonial Village Dr. in the Stauffer Run watershed. The drainage area to the A basin on the site is 29.04 acres. The DEP BMP effectiveness reduction values for bioretention in A/B soils with underdrains is 80% for sediment, 75 % for phosphorus, and 70 % for nitrogen.

Basin A
Estimated Sediment Load:
Impervious: 15.13 ac x 1480.43 = 22,393.90 lbs.
Pervious: 13.91 ac x 190.93 = 2,655.83 lbs.
Total: 25,049.73 lbs.

Estimated Phosphorus Load:
Impervious: 15.13 ac x 1.55 =23.45 lbs.

Pervious 13.91ac x 0.36 = 5.01 lbs.
Total: 28.46 lbs.

Estimated Nitrogen Load:
Impervious: 15.13 ac x 38.53 = 582.96 lbs.
Pervious: 13.91 ac x 22.24 = 309.36 lbs.
Total: 892.32 lbs.

Estimated Reduction in Sediment: 25,049.73 lbs. x 80% = 25049.73 lbs.

Estimated Reduction in Phosphorus: 28.46 lbs. x 75% = 21.34 lbs.

Estimated Reduction in Nitrogen: 892.32 lbs. x 70% = 624.62 lbs.

BMP Option 14B : High Associates Inc. -Bioretention Basin Retrofits

The Property owner and the Township are developing plans for retrofitting a legacy PCSM dry detention basin into a bioretention basin. The Township is negotiating an agreement with the property owner. The property is a developed corporate center located on 2101 William Penn Way in the Stauffer Run watershed. The drainage area to the B basin on the site is 15.54 acres. The DEP BMP effectiveness reduction values for bioretention in A/B soils with underdrains is 80% for sediment, 75 % for phosphorus, and 70 % for nitrogen.

Basin B:
Estimated Sediment Load:
Impervious: 8.53 ac x 1480.43 = 12,628.06 lbs.
Pervious: 7.01 ac x 190.93 = 1,338.42 lbs.
Total: 13,966.48 lbs.

Estimated Phosphorus Load:
Impervious: 8.53 ac x 1.55 = 13.22 lbs.
Pervious: 7.01 ac x 0.36 = 2.52_lbs.
Total: 15.74 lbs.

Estimated Nitrogen Load:
Impervious: 8.53 ac x 38.53 = 328.66 lbs.
Pervious: 7.01 ac x 22.24 = 155.90 lbs.
Total: 484.56 lbs.

Estimated Reduction in Sediment: 13,966.48 lbs. x 80% = 11,173.18 lbs.

Estimated Reduction in Phosphorus: 15.74 lbs. x 75% = 11.80 lbs.

Estimated Reduction in Nitrogen: 484.56 lbs. x 70% = 339.19 lbs.

BMP Option 14C : High Associates Inc. -Bioretention Basin Retrofits

The Property owner and the Township are developing plans for retrofitting a legacy PCSM dry detention basin into a bioretention basin. The Township is negotiating an agreement with the property owner. The property is a developed corporate center located on 1809 William Penn Way in the Stauffer Run watershed. The drainage area to the C basin on the site is 12.83 acres. The DEP BMP effectiveness reduction values for bioretention in A/B soils with underdrains is 80% for sediment, 75% for phosphorus, and 70% for nitrogen.

Basin C
Estimated Sediment Load:
Impervious: 9.21 ac x 1480.43 = 13,634.76 lbs.
Pervious: 3.62 ac x 190.93 = 691.16 lbs.
Total: 14,325.92 lbs.

Estimated Phosphorus Load:
Impervious: 9.21 ac x 1.55 = 14.28 lbs.
Pervious: 3.62 ac x 0.36 = 1.30 lbs.
Total: 15.58 lbs.

Estimated Nitrogen Load:
Impervious: 9.21 ac x 38.53 = 354.86 lbs.
Pervious: 3.62 ac x 22.24 = 80.51 lbs.
Total: 435.37 lbs.

Estimated Reduction in Sediment: 14,325.92 lbs. x 80% = 11,460.73 lbs.

Estimated Reduction in Phosphorus: 15.58 lbs. x 75% = 11.68 lbs.

Estimated Reduction in Nitrogen: 435.37 lbs. x 70% = 304.76 lbs.

BMP Option 14D : High Associates Inc. -Bioretention Basin Retrofits

The Property owner and the Township are developing plans for retrofitting a previously reported and installed (2004) dry extended detention basin enhanced to a bioretention facility with amended soils and underdrain. The Township is negotiating an agreement with the property owner. The property is a developed corporate center located on 167 Greenfield in the Stauffer Run watershed. The drainage area to the D basin on the site is 27.71 acres. The DEP BMP effectiveness reduction values for bioretention in A/B soils with underdrains is 80% for sediment, 75% for phosphorus, and 70 % for nitrogen.

Basin D
Estimated Sediment Load:
Impervious: 24.31 ac x 1480.43 = 35,989.25 lbs.
Pervious: 3.4 ac x 190.93 = 649.16 lbs.
Total: 36,638 lbs.

Estimated Phosphorus Load:
Impervious: 24.31 ac x 1.55 = 37.68 lbs.

Pervious: 3.4 ac x 0.36 = 1.22 lbs.
Total: 38.90 lbs.

Estimated Nitrogen Load:
Impervious: 24.31 ac x 38.53 = 936.66 lbs.
Pervious: 3.4 ac x 22.24 = 75.62 lbs.
Total: 1,012.28 lbs.

Estimated Reduction in Sediment: 36,638 lbs. x 80% = 29,310.4 lbs.
Existing Reduction for Load Adjustment: 36,638 lbs. x 60% = 21,982.8 lbs.
Claimable PRP Enhancement Credit for Sediment Reduction: 7,327.6 lbs.
Estimated Reduction in Phosphorus: 38.90 lbs. x 75% = 29.17 lbs.
Existing Reduction for Load Adjustment: 38.90 lbs. x 20% = 7.78 lbs.
Claimable PRP Enhancement Credit for Phosphorus Reduction: 21.39 lbs.
Estimated Reduction in Nitrogen: 1,012.28 lbs. x 70% = 708.60 lbs.
Existing Reduction for Load Adjustment: 1,012.28 lbs. x 20%= 202.46 lbs.
Claimable PRP Enhancement Credit for Nitrogen Reduction: 506.14 lbs.

BMP Option 15 : 231 Lynnwood - Riparian Buffer

The Township would be working with the landowner and Stroud Water Research to install a riparian buffer along an unnamed tributary to Mill Creek which runs through the property. The property is a farm located on Lynnwood road which receives significant stormwater runoff from the highway. The project is located in a priority catchment for the County de-listing initiative. The 550 LF of riparian buffer proposed totals 0.8204 acres, therefore the drainage area to the riparian buffer corridor cannot exceed 1.6408 acres for TSS & P, and 3.2816 acres for N. The DEP Effectiveness Values Table shows the reduction values for riparian buffers are 50% for sediment, 50% for phosphorus, and 25% for nitrogen.

Estimated Sediment Load:
Impervious: .1290 ac x 1480.43 = 190.98 lbs.
Pervious: 1.5118 ac x 190.93 = 288.65 lbs.
Total: 479.63 lbs.

Estimated Phosphorus Load:
Impervious: .1290 ac x 1.55 = .20 lbs.
Pervious: 1.5118 ac x 0.36 = .54 lbs.
Total: 0.74 lbs.

Estimated Nitrogen Load:
Impervious: 0.0801 ac x 38.53 = 3.09 lbs.
Pervious: 3.0786 ac x 22.24 = 68.47 lbs.
Total: 71.56 lbs.

Estimated Reduction in Sediment: 479.63 lbs. x 50% = 239.82 lbs.

Estimated Reduction in Phosphorus: 0.74 lbs. x 50% = .37 lbs.

Estimated Reduction in Nitrogen: 71.56 lbs. x 25% = 17.89 lbs.

BMP Option 16A : 521 Willow Rd.- Streambank Restoration/Stabilization

The Township would be working with the Landowner to do streambank stabilization with a riparian buffer on an unnamed tributary of Stauffer Run. This property has over 1,500 LF of streambank as we propose a prioritization of a 949 LF section for streambank work on both sides of the UNT. The DEP effectiveness values table shows reductions for streambank work are 115 lb./lf in sediment reduction, a 0.068 lb./lf in phosphorus reduction, and a 0.075 lb./lf in nitrogen reduction.

Estimated Reduction in Sediment: 949 LF x 115 lb./ft = 109,135 lbs.

Estimated Reduction in Phosphorus: 949 LF x 0.068 lb./ft = 64.53 lbs.

Estimated Reduction in Nitrogen: 949 LF. x 0.075 lb./ft= 71.18 lbs.

BMP Option 16B : 521 Willow Rd.- Riparian Buffer

The Township would be working with the landowner and a private planning consultant to install a riparian buffer along an unnamed tributary to Stauffer Run feeding the Conestoga, which runs through the property. The property is a farm located on Willow road which receives significant stormwater runoff from the highway. The project is located in a priority catchment for the County de-listing initiative. The 949 LF of riparian buffer proposed totals 1.525 acres, therefore the drainage area to the riparian buffer corridor cannot exceed 3.05 acres for TSS & P, and 6.1acres for N. The DEP Effectiveness Values Table shows the reduction values for riparian buffers are 50% for sediment, 50% for phosphorus, and 25% for nitrogen.

Estimated Sediment Load:
Impervious: 0 ac x 1480.43 = 0 lbs.
Pervious: 3.05 ac x 190.93 = 582.34 lbs.
Total: 582.34 lbs.

Estimated Phosphorus Load:
Impervious: 0 ac x 1.55 = 0 lbs.
Pervious: 3.05 ac x 0.36 = 1.1 lbs.
Total: 1.1 lbs.

Estimated Nitrogen Load:
Impervious: 0 ac x 38.53 = 0 lbs.
Pervious: 6.1 ac x 22.24 =135.66 lbs.
Total: 135.66 lbs.

Estimated Reduction in Sediment: 582.34 lbs. x 50% = 291.17 lbs.

Estimated Reduction in Phosphorus: 1.1 lbs. x 50% = 0.55 lbs.

Estimated Reduction in Nitrogen: 135.66 lbs. x 25% = 33.92 lbs.

BMP Option 17A : 624 Willow Rd.- Streambank Restoration/Stabilization

The Township would be working with the Landowner to do streambank restoration with a riparian buffer on an unnamed tributary of Stauffer Run. This property has an erosive stream including a section compromising the embankment of a shallow water wetland pond. We propose a 1,420 LF section for streambank work on the north side with a riparian buffer. The DEP effectiveness values table shows reductions for streambank work are 115 lb./lf in sediment reduction, a 0.068 lb./lf in phosphorus reduction, and a 0.075 lb./lf in nitrogen reduction.

Estimated Reduction in Sediment: 1420 LF x 115 lb./ft = 163,300 lbs.

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Estimated Reduction in Phosphorus: 1420 LF x 0.068 lb./ft = 96.56 lbs.

Estimated Reduction in Nitrogen: 1420 LF x 0.075 lb./ft = 106.5 lbs.

BMP Option 17B : 624 Willow Rd.- Riparian Buffer

The Township would be working with the landowner and a private planning consultant to install a riparian buffer mostly on the North side of an unnamed tributary to Stauffer Run feeding the Conestoga, which runs through the property. The property is a farm located on Willow road which receives significant stormwater runoff from the highway. The project is located in a priority catchment for the County de-listing initiative. The 1420 LF riparian buffer proposed totals 1.14 acres, therefore the drainage area to the riparian buffer corridor cannot exceed 2.28 acres for TSS & P, and 4.56 acres for N. The DEP Effectiveness Values Table shows the reduction values for riparian buffers are 50% for sediment, 50% for phosphorus, and 25% for nitrogen.

Estimated Sediment Load:
Impervious: 0 ac x 1480.43 = 0 lbs.
Pervious: 2.28 ac x 190.93 = 435.32 lbs.
Total: 435.32 lbs.

Estimated Phosphorus Load:
Impervious: 0 ac x 1.55 = 0 lbs.
Pervious: 2.28 ac x 0.36 = 0.82 lbs.
Total: 0.82 lbs.

Estimated Nitrogen Load:
Impervious: 0 ac x 38.53 = 0 lbs.
Pervious: 4.56 ac x 22.24 = 101.41 lbs.
Total: 101.41 lbs.

Estimated Reduction in Sediment: 435.32 lbs. x 50% = 217.66 lbs.

Estimated Reduction in Phosphorus: 0.82 lbs. x 50% = 0.41 lbs.

Estimated Reduction in Nitrogen: 101.42 lbs. x 25% = 25.35 lbs.

BMP Option 18A: 527 Mt Sidney - Vegetated Swale

This location is an erosive channel in a pasture that is 100% stormwater that is discharged from the neighboring developed properties and Stumptown Road on the South side. This concentrated flow is highly erosive with sediment discharging at the road culvert under the highway. The proposed project would install a vegetated swale with the proper sized parabolic shape to manage the capacity and prevent erosion. The drainage area to the swale is 57.65 acres. The DEP BMP effectiveness reduction values for a vegetated swale in C/D soils is 50 % for sediment, 10 % for phosphorus, and 10 % for nitrogen.

Estimated Sediment Load:
Impervious: 11.63 ac x 1480.43 =17,217.40 lbs.
Pervious: 46.02 ac x 190.93 = 8,786.60 lbs.
Total: 26,004 lbs.

Estimated Phosphorus Load:
Impervious: 11.63 ac x 1.55 = 18.03 lbs.
Pervious: 46.02 ac x 0.36 = 1.66 lbs.
Total: 19.69 lbs.

Estimated Nitrogen Load:
Impervious: 11.63 ac x 38.53 = 448.10 lbs.
Pervious: 46.02 ac x 22.24 = 1,023.49 lbs.
Total: 1,471.59 lbs.

Estimated Reduction in Sediment: 26,004 lbs. x 50 % = 13,002 lbs.

Estimated Reduction in Phosphorus: 19.69 lbs. x 10 % = 1.97 lbs.

Estimated Reduction in Nitrogen: 1,471.59 lbs. x 10% = 147.16 lbs.

BMP Option 18B : 527 Mt Sidney - Bioswale

This location is an erosive channel in a pasture that is 100% stormwater that is discharged from the neighboring developed properties and Stumptown Road on the South side. This concentrated flow is highly erosive with sediment discharging at the road culvert under the highway. The proposed project would install a bioswale with the amended soils to reduce load and provide bioretention properties. The drainage area to the swale is 57.65 acres. The DEP BMP effectiveness reduction values for a bioswale is 80 % for sediment, 75 % for phosphorus, and 70 % for nitrogen.

Estimated Sediment Load:
Impervious 11.63 ac x 1480.43 = 17,217.4 lbs.
Pervious: 46.02 ac x 190.93 = 8,786.60 lbs.
Total: 26,004 lbs.

Estimated Phosphorus Load:
Impervious: 11.63 ac x 1.55 = 18.03 lbs.
Pervious: 46.02 ac x 0.36 = 1.66 lbs.
Total: 19.69 lbs.

Estimated Nitrogen Load:
Impervious: 11.63 ac x 38.53 = 448.10 lbs.
Pervious: 46.02 ac x 22.24 = 1,023.49 lbs.
Total: 1,471.59 lbs.

Estimated Reduction in Sediment: 26,004 lbs. x 80 % = 20,803.2 lbs.

Estimated Reduction in Phosphorus: 19.69 lbs. x 75 % = 14.77 lbs.

Estimated Reduction in Nitrogen: 1,471.59 lbs. x 70 % = 1,030.11 lbs.

BMP Option 19A : 2353 Horseshoe Road– Dry Extended Detention Basin

The Township had identified a location along Horseshoe Road that collects stormwater from the roadway that flows across farmland with concentrated flow and deposits associated sediment onto Hartman Station Road. This flows to an unnamed tributary of Stauffer Run Watershed. A detention basin would provide storage and diminish the volume, velocity and energy of the stormwater as it is released to sheet flow. The drainage area to the basin on the is 5.22 acres. The DEP BMP effectiveness reduction values for a Dry Extended Detention basin in A/B soils without underdrains is 60 % for sediment, 20% for phosphorus, and 20% for nitrogen.

Estimated Sediment Load:
Impervious: 1.9746 ac x 1480.43 = 2,923.26 lbs.
Pervious: 3.2430 ac x 190.93 = 619.19 lbs.
Total: 3,542.45 lbs.

Estimated Phosphorus Load:
Impervious: 1.9746 ac x 1.55 = 3.06 lbs.
Pervious: 3.2430 ac x 0.36 = 1.17 lbs.
Total: 4.23 lbs.

Estimated Nitrogen Load:
Impervious: 1.9746 ac x 38.53 = 76.08 lbs.
Pervious: 3.2430 ac x 22.24 = 72.12 lbs.
Total: 148.20 lbs.

Estimated Reduction in Sediment: 3,542.45 lbs. x 60 % = 2,125.47 lbs.

Estimated Reduction in Phosphorus: 4.23 lbs. x 20 % = 0.846 lbs.

Estimated Reduction in Nitrogen: 148.20 lbs. x 20 % = 29.64 lbs.

BMP Option 19B : 2353 Horseshoe Road– Infiltration Practices with sand filter

The Township had identified a location along Horseshoe Road that collects stormwater from the roadway that flows across farmland with concentrated flow and deposits associated sediment onto Hartman Station Road. This flows to an unnamed tributary of Stauffer Run Watershed. An infiltration basin with a sand filter would maximize the sediment trapping efficiency and infiltration.

The drainage area to the basin on the is 5.2177 acres. The DEP BMP effectiveness reduction values for an Infiltration Practice with sand filter is 95% for sediment, 85% for phosphorus, and 85% for nitrogen.

Estimated Sediment Load:
Impervious: 1.9746 ac x 1480.43 = 2,923.26 lbs.
Pervious: 3.2430 ac x 190.93 = 619.19 lbs.
Total: 3,542.45 lbs.

Estimated Phosphorus Load:
Impervious: 1.9746 ac x 1.55 = 3.06 lbs.
Pervious: 3.2430 ac x 0.36 = 1.17 lbs.
Total: 4.23 lbs.
Estimated Nitrogen Load:
Impervious: 1.9746 ac x 38.53 = 76.08 lbs.
Pervious: 3.2430 ac x 22.24 = 72.12 lbs.
Total: 148.20 lbs.

Estimated Reduction in Sediment: 3,542.45 lbs. x 95 % = 3,365.33 lbs.

Estimated Reduction in Phosphorus: 4.23 lbs. x 85 % = 3.60 lbs.

Estimated Reduction in Nitrogen: 148.20 lbs. x 85 % = 125.97 lbs.

BMP Option 20A : 63 Witmer - Bioswale

This location is an erosive channel that is 100% stormwater that is discharged from the neighboring developed properties and Witmer Road. The proposed project would install a bioswale with the amended soils and check dams to reduce load and provide bioretention properties. The drainage area to the swale is 24.0591 acres. The DEP BMP effectiveness reduction values for a bioswale is 80 % for sediment, 75 % for phosphorus, and 70 % for nitrogen.

Estimated Sediment Load:
Impervious: 11.1824 ac x 1480.43 = 16,554.76 lbs.
Pervious: 12.8767 ac x 190.93 = 2,458.55 lbs.
Total: 19,013.31 lbs.

Estimated Phosphorus Load:
Impervious: 11.1824 ac x 1.55 = 17.33 lbs.
Pervious: 12.8767 ac x 0.36 = 4.64 lbs.
Total: 21.97 lbs.

Estimated Nitrogen Load:
Impervious: 11.1824 ac x 38.53 = 430.86 lbs.
Pervious: 12.8767 ac x 22.24 = 286.38 lbs.
Total: 717.24 lbs.

Estimated Reduction in Sediment: 19,013.31 lbs. x 80 % = 15,210.65 lbs.

Estimated Reduction in Phosphorus: 21.97 lbs. x 75 % = 16.48 lbs.

Estimated Reduction in Nitrogen: 717.24 lbs. x 70 % = 502.07 lbs.

BMP Option 20B : 63 Witmer - Vegetated Swale

This location is an erosive channel that is 100% stormwater that is discharged from the neighboring developed properties and Witmer Road. The proposed project would install a 718 LF vegetated swale. The drainage area to the swale is 24.0591 acres with B soils. The DEP BMP effectiveness reduction values for a bioswale is 70% for sediment, 45% for phosphorus, and 45 % for nitrogen.

Estimated Sediment Load:
Impervious: 11.1824 ac x 1480.43 = 16,554.76 lbs.
Pervious: 12.8767 ac x 190.93 = 2,458.55 lbs.
Total: 19,013.31 lbs.

Estimated Phosphorus Load:
Impervious: 11.1824 ac x 1.55 = 17.33 lbs.
Pervious: 12.8767 ac x 0.36 = 4.64 lbs.
Total: 21.97 lbs.

Estimated Nitrogen Load:
Impervious: 11.1824 ac x 38.53 = 430.86 lbs.
Pervious: 12.8767 ac x 22.24 = 286.38 lbs.
Total: 717.24 lbs.

Estimated Reduction in Sediment: 19,013.31 lbs. x 70 % = 13,309.32 lbs.

Estimated Reduction in Phosphorus: 21.97 lbs. x 45 % = 9.89 lbs.

Estimated Reduction in Nitrogen: 717.24 lbs. x 45 % = 322.76 lbs.

BMP Option 21A : 63 Witmer – Streambank Restoration/Stabilization

The Township has identified a section of Mill Creek, located between Witmer Road and East Brook Road, as a good candidate for stream restoration. We are proposing a 1,100 LF section of stabilization on the South side of Mill Creek and an equivalent 35 ft. riparian buffer. The DEP effectiveness values table shows reductions for streambank work are 115 lb./lf in sediment reduction, a 0.068 lb./lf in phosphorus reduction, and 0.075 lb./lf in nitrogen reduction.

Estimated Reduction in Sediment: 1,100 LF x 115 lb./ft = 126,500 lbs.

Estimated Reduction in Phosphorus: 1,100 LF x 0.068 lb./ft = 74.8 lbs.

Estimated Reduction in Nitrogen: 1,100 LF x 0.075 lb./ft = 82.5 lbs.

BMP Option 21B: 63 Witmer- Riparian Buffer

The Township would be working with the landowner and a conservation planning consultant to install a riparian buffer along the South side of Mill Creek which runs adjacent to the property. The property is a farm located between Witmer Road and East Brook Road. The 1,100 LF of riparian buffer proposed totals .88 acres, therefore the drainage area to the riparian buffer corridor cannot exceed 1.77 acres for TSS & P, and 3.53 acres for N. The DEP Effectiveness Values Table shows the reduction values for riparian buffers are 50% for sediment, 50% for phosphorus, and 25% for nitrogen.

Estimated Sediment Load:
Impervious: 0 ac x 1480.43 = 0 lbs.
Pervious: 1.77 ac x 190.93 =337.95 lbs.
Total: 337.95 lbs.

Estimated Phosphorus Load:
Impervious: 0 ac x 1.55 = 0 lbs.
Pervious: 1.77 ac x 0.36 = 0.64 lbs.
Total: 0.64 lbs.

Estimated Nitrogen Load:
Impervious: 0 ac x 38.53 = 0 lbs.
Pervious: 3.53 ac x 22.24 = 78.50 lbs.
Total: 78.50 lbs.

Estimated Reduction in Sediment: 337.95 lbs. x 50% = 168.98 lbs.

Estimated Reduction in Phosphorus: 0.64 lbs. x 50% = 0.32 lbs.

Estimated Reduction in Nitrogen: 78.50 lbs. x 25% = 19.63 lbs.

BMP Option 22A : 39 S. Soudersburg Road – Streambank Restoration/Stabilization

The Township has identified a segment of the Pequea Creek, located South of Soudersburg Road, as a good candidate for stream restoration. We are proposing a 4,790 LF section of stabilization, and equivalent 35 ft. riparian buffer on the North side in East Lampeter Township. An inner municipal agreement might be applicable for restoration on the south banks of the river. The DEP effectiveness values table shows reductions for streambank work are 115 lb./lf in sediment reduction, 0.068 lb./lf in phosphorus reduction, and 0.075 lb./lf in nitrogen reduction.

Estimated Reduction in Sediment: 4,790 LF x 115 lb./ft = 550,850 lbs.

Estimated Reduction in Phosphorus: 4,790 LF x 0.068 lb./ft = 325.72 lbs.

Estimated Reduction in Nitrogen: 4,790 LF x 0.075 lb./ft = 359.25 lbs.

BMP Option 22B : 39 S. Soudersburg Road - Riparian Buffer

The Township would be working with the landowner and a private planning consultant to install a riparian buffer along the North side of the Pequea Creek on the property located on S. Soudersburg Road. The 4,790 LF of riparian buffer proposed totals 3.85 acres, therefore the drainage area to the riparian buffer corridor cannot exceed 7.7 acres for TSS & P, and 15.4 acres for N. The DEP Effectiveness Values Table shows the reduction values for riparian buffers are 50% for sediment, 50% for phosphorus, and 25% for nitrogen.

Estimated Sediment Load:
Impervious: 0 ac x 1480.43 = 0 lbs.
Pervious: 7.7 ac x 190.93 = 1,470.16 lbs.
Total: 1,470.1 lbs.

Estimated Phosphorus Load:
Impervious: 0 ac x 1.55 = 0 lbs.
Pervious: 7.7 ac x 0.36 =2.77 lbs.
Total: 2.77 lbs.

Estimated Nitrogen Load:
Impervious: 0 ac x 38.53 = 0 lbs.
Pervious: 15.4 ac x 22.24 = 342.50 lbs.
Total: 342.50 lbs.

Estimated Reduction in Sediment: 1,470.16 lbs. x 50% = 735.08 lbs.

Estimated Reduction in Phosphorus: 2.77 lbs. x 50% = 1.39 lbs.

Estimated Reduction in Nitrogen: 342.50 lbs. x 25% = 85.63 lbs.

BMP Option 23A : 2588 Bachmantown Road – Streambank Restoration/Stabilization

The Township has identified a segment of the Pequea Creek, located South of Bachmantown Road, as a good candidate for stream restoration. We are proposing a 2,500 LF section of stabilization, and equivalent 35 ft. riparian buffer on the North side in East Lampeter Township. An inner municipal agreement might be applicable for restoration on the south banks of the river. The DEP effectiveness values table shows reductions for streambank work are 115 lb./lf in sediment reduction, and 0.068 lb./lf in phosphorus reduction, and 0.075 lb./lf in nitrogen reduction.

Estimated Reduction in Sediment: 2,500 LF x 115 lb./ft = 287,500 lbs.

Estimated Reduction in Phosphorus: 2,500 LF x 0.068 lb./ft = 170 lbs.

Estimated Reduction in Nitrogen: 2,500 LF x 0.075 lb./ft = 187.5 lbs.

BMP Option 23B :2588 Bachmantown Road - Riparian Buffer

The Township would be working with the landowner and a private planning consultant to install a riparian buffer along the Pequea Creek on the South side of the property located on Bachmantown

Road. The 2,500 LF of riparian buffer proposed totals 2.0 acres, therefore the drainage area to the riparian buffer corridor cannot exceed 4.0 acres for TSS & P, and 8.0 acres for N. The DEP Effectiveness Values Table shows the reduction values for riparian buffers are 50% for sediment, 50% for phosphorus, and 25% for nitrogen.

Estimated Sediment Load:
Impervious: 0 ac x 1480.43 = lbs.
Pervious: 4 ac x 190.93 = 763.72 lbs.
Total: 763.72 lbs.

Estimated Phosphorus Load:
Impervious: 0 ac x 1.55 = lbs.
Pervious: 4 ac x 0.36 = 1.44 lbs.
Total: 1.44 lbs.

Estimated Nitrogen Load:
Impervious: 0 ac x 38.53 = lbs.
Pervious: 8 ac x 22.24 = 177.92 lbs.
Total: 177.92 lbs.

Estimated Reduction in Sediment: 763.72 lbs. x 50% = 381.86 lbs.

Estimated Reduction in Phosphorus: 1.44 lbs. x 50% = 0.72 lbs.

Estimated Reduction in Nitrogen: 177.92 lbs. x 25% = 44.48 lbs.

BMP Option 24A : 231 Strasburg Pike – Streambank Restoration/Stabilization

The Township has identified an unnamed tributary of Mill Creek, located between Strasburg Pike and Millstream Road, as a good candidate for stream restoration. This large drainage area features eroding streambanks that would significantly benefit from restoration work in combination with riparian buffers, streambank fencing for cattle exclusion and the associated buffers filtering nutrients and sediment. We are proposing a 2,908 LF section of stabilization on both sides, and equivalent 35ft. riparian buffer. The DEP effectiveness values table shows reductions for streambank work are 115 lb./lf in sediment reduction, a 0.068 lb./lf in phosphorus reduction, and 0.075 lb./lf in nitrogen reduction.

Estimated Reduction in Sediment: 2,908 LF x 115 lb./ft = 334,420 lbs.

Estimated Reduction in Phosphorus: 2,908 LF x 0.068 lb./ft = 197.74 lbs.

Estimated Reduction in Nitrogen: 2,908 LF x 0.075 lb./ft = 218.1 lbs.

BMP Option 24B: 231 Strasburg Pike- Riparian Buffer

The Township would be working with the landowner and a conservation planning consultant to install a riparian buffer on both sides of an unnamed tributary to Mill Creek which runs through the property. The property is a farm located on Strasburg Pike and Millstream Road receives stormwater

runoff from the large drainage area with mixed land uses. The 2,908 LF riparian buffer proposed totals 4.67 acres, therefore the drainage area to the riparian buffer corridor cannot exceed 9.34 acres for TSS & P, and 18.68 acres for N. The DEP Effectiveness Values Table shows the reduction values for riparian buffers are 50% for sediment, 50% for phosphorus, and 25% for nitrogen.

Estimated Sediment Load:
Impervious: 0 ac x 1480.43 = 0 lbs.
Pervious: 9.34 ac x 190.93 =1,783.28 lbs.
Total: 1,783.28 lbs.

Estimated Phosphorus Load:
Impervious: 0 ac x 1.55 = 0 lbs.
Pervious: 9.34 ac x 0.36 = 3.36 lbs.
Total: 3.36 lbs.

Estimated Nitrogen Load:
Impervious: 0 ac x 38.53 = 0 lbs.
Pervious: 18.68 ac x 22.24 = 415.44 lbs.
Total: 415.44 lbs.

Estimated Reduction in Sediment: 1,783.28 lbs. x 50% = 891.64 lbs.

Estimated Reduction in Phosphorus: 3.36 lbs. x 50% = 1.68 lbs.

Estimated Reduction in Nitrogen: 415.44 lbs. x 25% = 103.86 lbs.

BMP Option 25A : 2098 Millstream Road – Streambank Restoration/Stabilization

The Township has identified an unnamed tributary of Mill Creek, located south of Millstream Road, as a good candidate for stream restoration. This large drainage area features eroding streambanks that would significantly benefit from restoration work in combination with riparian buffers, streambank fencing for cattle exclusion and the associated buffers filtering nutrients and sediment. We are proposing a 906 LF section of stabilization on both sides of the stream, and an equivalent 35ft. riparian buffer. The DEP effectiveness values table shows reductions for streambank work are 115 lb./lf in sediment reduction, a 0.068 lb./lf in phosphorus reduction, and s 0.075 lb./lf in nitrogen reduction.

Estimated Reduction in Sediment: 906 LF x 115 lb./ft = 104,190 lbs.

Estimated Reduction in Phosphorus: 906 LF x 0.068 lb./ft = 61.61 lbs.

Estimated Reduction in Nitrogen: 906 LF x 0.075 lb./ft = 67.95 lbs.

BMP Option 25B : 2098 Millstream Road - Riparian Buffer

The Township would be working with the landowner and a conservation planning consultant to install a riparian buffer on both sides of an unnamed tributary to Mill Creek which runs through the property located on Millstream Road. The 906' riparian buffer proposed totals 1.46 acres, therefore

the drainage area to the riparian buffer corridor cannot exceed 2.92 acres for TSS & P, and 5.84 acres for N. The DEP Effectiveness Values Table shows the reduction values for riparian buffers are 50% for sediment, 50% for phosphorus, and 25% for nitrogen.

Estimated Sediment Load:
Impervious: 0 ac x 1480.43 = 0 lbs.
Pervious: 2.92 ac x 190.93 =557.52 lbs.
Total: 557.52 lbs.

Estimated Phosphorus Load:
Impervious: 0 ac x 1.55 = 0 lbs.
Pervious: 2.92 ac x 0.36 =1.05 lbs.
Total: 1.05 lbs.

Estimated Nitrogen Load:
Impervious: 0 ac x 38.53 = 0 lbs.
Pervious: 5.84 ac x 22.24 = 129.88 lbs.
Total: 129.88 lbs.

Estimated Reduction in Sediment: 557.52 lbs. x 50% = 278.76 lbs.

Estimated Reduction in Phosphorus: 1.05 lbs. x 50% = .53 lbs.

Estimated Reduction in Nitrogen: 129.88 lbs. x 25% = 32.47 lbs.

BMP Option 26A : 351 Gridley Road – Streambank Restoration/Stabilization

The Township has identified an unnamed tributary of Mill Creek, located west of Gridley Road and south of Millstream Road, as a good candidate for stream restoration. This large drainage area features eroding streambanks that would significantly benefit from restoration work in combination with riparian buffers, streambank fencing for cattle exclusion and the associated buffers filtering nutrients and sediment. We are proposing a 2,556 LF section of stabilization on both sides of the stream, and an equivalent 35 ft. riparian buffer. The DEP effectiveness values table shows reductions for streambank work are 115 lb./lf in sediment reduction, a 0.068 lb./lf in phosphorus reduction, and a 0.075 lb./lf in nitrogen reduction.

Estimated Reduction in Sediment: 2,556 LF x 115 lb./ft = 293,940 lbs.

Estimated Reduction in Phosphorus: 2,556 LF x 0.068 lb./ft = 173.81 lbs.

Estimated Reduction in Nitrogen: 2,556 LF x 0.075 lb./ft = 191.7 lbs.

BMP Option 26B : 351 Gridley Road - Riparian Buffer

The Township would be working with the landowner and a conservation planning consultant to install a riparian buffer on both sides of an unnamed tributary to Mill Creek which runs through the property located on Gridley Road. The 2,556' riparian buffer proposed totals 4.11 acres, therefore the drainage area to the riparian buffer corridor cannot exceed 8.22 acres for TSS & P, and 16.44

acres for N. The DEP Effectiveness Values Table shows the reduction values for riparian buffers are 50% for sediment, 50% for phosphorus, and 25% for nitrogen.

Estimated Sediment Load:
Impervious: 0 ac x 1480.43 = 0 lbs.
Pervious: 8.22 ac x 190.93 =1,569.44 lbs.
Total: 1,569.44 lbs.

Estimated Phosphorus Load:
Impervious: 0 ac x 1.55 = 0 lbs.
Pervious: 8.22 ac x 0.36 =2.96 lbs.
Total: 2.96 lbs.

Estimated Nitrogen Load:
Impervious: 0 ac x 38.53 = 0 lbs.
Pervious: 16.44 ac x 22.24 = 365.62 lbs.
Total: 365.62 lbs.

Estimated Reduction in Sediment: 1,569.44 lbs. x 50% = 784.72 lbs.

Estimated Reduction in Phosphorus: 2.96 lbs. x 50% = 1.48 lbs.

Estimated Reduction in Nitrogen: 365.62 lbs. x 25% = 91.40 lbs.

BMP Option 27 : 93 Strasburg Pike- Streambank Restoration/Stabilization

The Township would be working with the Landowner to do a streambank stabilization project in a critically sensitive section of an unnamed tributary to Mill Creek, where it outlets into the main channel of Mill Creek at the old Fertility Grist Mill Dam on Strasburg Pike. The Township operates Flory Park on the East side and private party own the west side of this section. This UNT is significantly impacted by stormwater runoff from Lincoln Highway East and the Walmart. The location of the property in proximity to the Mill Dam and the storm surge/flooding on Mill Creek makes this site extra susceptible to bank erosion and soil loss. We propose a 350 LF section for streambank stabilization. The DEP effectiveness values table shows reductions for streambank work are 115 lb./lf in sediment reduction, a 0.068 lb./lf in phosphorus reduction, and a 0.075 lb./lf in nitrogen reduction.

Estimated Reduction in Sediment: 350 LF x 115 lb./ft = 40,250 lbs.

Estimated Reduction in Phosphorus: 350 LF x 0.068 lb./ft = 23.8 lbs.

Estimated Reduction in Nitrogen: 350 LF x 0.075 lb./ft = 26.25 lbs.

BMP Option 28: Conservation Tillage/Residue Management Program

The Township would offer a Conservation Tillage Program following the DEP guidelines under FAQ #71, and the default removal efficiencies listed for Low Residue, Conservation Tillage/Medium, and High Residue. Participants would be implementing this annual agronomic practice operating inside the MS4 planning area, and would follow the applicable soil and water conservation plan and or agricultural erosion and sediment control plan. This targeted area is comprised of 921 acres of tillable cropland with a projection of 20% participation, or 184 acres for planning purposes.

Tillage Type	% Residue	TN(%)	TP (%)	TSS (%)
Till-Low Residue	15-29%	5	9	18
Conservation Till	30-59%	10	58	41
Till – High Residue	>60%	14	71	79

Estimated Sediment Load:
Cropland: 184 ac x 383 lbs./ac =70,472 lbs.
Total: 70,472 lbs.

Estimated Phosphorus Load:
Cropland: 184 ac x 0.35 = 64.4 lbs.
Total: 64.4 lbs.

Estimated Nitrogen Load:
Cropland: 184 ac x 2.5 = 460 lbs.
Total: 460 lbs.

Estimated Reduction in Sediment: Low 70,472 lbs. x 18% = 12,684.96 lbs.
Estimated Reduction in Sediment: Med 70,472 lbs. x 41% = 28,893.52 lbs.
Estimated Reduction in Sediment: High 70,472 lbs. x 79% = 55,672.88 lbs.
Estimated Reduction in Phosphorus: Low 64.4 lbs. x 9 % = 5.8 lbs.
Estimated Reduction in Phosphorus: Med 64.4 lbs. x 58 % = 37.35 lbs.
Estimated Reduction in Phosphorus: High 64.4 lbs. x 71 % = 45.72 lbs.
Estimated Reduction in Nitrogen: Low 460 lbs. x 5 % = 23.0 lbs.
Estimated Reduction in Nitrogen: Med 460 lbs. x 10 % = 46.0 lbs.
Estimated Reduction in Nitrogen: High 460 lbs. x 14 % = 64.4 lbs.

BMP Option 29 : 2003 Pennwyck Rd – Streambank Work

The Township has identified a portion of the property at 2003 Pennwyck Rd., along the Conestoga River as a good candidate for streambank restoration. As this property has over 3,000 LF of streambank, we propose an 1,100 LF section of streambank restoration on the East side. The DEP effectiveness values table shows reductions for streambank work are 115 lb./lf in sediment reduction, a 0.068 lb./lf in phosphorus reductions, and a 0.075 lb./ft in nitrogen reductions.

Estimated Reduction in Sediment: 1,100 LF x 115 lb./ft = 126,500 lbs.

Estimated Reduction in Phosphorus: 1,100 LF x 0.068 lb./ft = 74.8 lbs.

Estimated Reduction in Nitrogen: 1,100 LF x 0.075 lb./ft = 82.5 lbs.

BMP Option 30 : 2141 Waterford Drive – Basin Retrofit

The Township has identified a privately-owned Stormwater basin at 2141 Waterford Drive to install a basin retrofit. This basin is surrounded by residential properties, it is owned and maintained by the homeowner, and has A/B soils which are good for infiltration. The drainage area to this basin is approximately 51.13 acres, which includes most of the development surrounding it. The DEP BMP effectiveness table shows reduction values for bioretention/rain gardens in A/B soils without underdrains are 90% for sediment, 85% for phosphorus, and 80% for nitrogen.

Estimated Sediment Load:
Impervious: 12.06 ac x 1480.43 =17,853.98 lbs.
Pervious: 39.07 ac x 190.93 = 7,459.63 lbs.
Total: 25,313.61 lbs.

Estimated Phosphorus Load:
Impervious: 12.06 ac x 1.55 =18.69 lbs.
Pervious: 39.07 ac x 0.36 = 14.06 lbs.
Total: 32.75 lbs.

Estimated Nitrogen Load:
Impervious: 12.06 ac x 38.53 = 464.67 lbs.
Pervious: 39.07 ac x 22.24 = 868.92 lbs.
Total: 1,333.59 lbs.

Estimated Reduction in Sediment: 25,313.61 lbs. x 90% = 22,782.24 lbs.

Estimated Reduction in Phosphorus: 32.75 lbs. x 85% = 27.83 lbs.

Estimated Reduction in Nitrogen: 1,333.59 lbs. x 80% = 1,066.87 lbs.

BMP Option 31 : 50-52 Pitney Road - Bioswales

The Township has identified the swales draining from Pitney Road to the Conestoga River between the properties at 40, 50, 52, and 54 Pitney Road as being good candidates for bioswale conversion. The total drainage area to the bioswale corridor is 18.99 acres. The DEP effectiveness values table shows reductions for bioswales are 80% for sediment and 75% for Phosphorus, and 70% for nitrogen reductions.

Estimated Sediment Load:
Impervious: 8.25 ac x 1480.43 =12,213.54 lbs.
Pervious: 10.73 ac x 190.93 = 2,048.67 lbs.
Total: 14,262.21 lbs.

Estimated Phosphorus Load:
Impervious: 8.25 ac x 1.55 = 12.78 lbs.
Pervious: 10.73 ac x 0.36 = 3.86 lbs.
Total: 16.65 lbs.

Estimated Nitrogen Load:

Impervious: 8.25 ac x 38.53 = 317.87 lbs.
Pervious: 10.73 ac x 22.24 = 238.64 lbs.
Total: 556.51 lbs.

Estimated Reduction in Sediment: 14,262.21 lbs. x 80% = 11,409.76 lbs.

Estimated Reduction in Phosphorus: 16.65 lbs. x 75% = 12.48 lbs.

Estimated Reduction in Nitrogen: 556.51 lbs. x 70% = 389.56 lbs.

BMP Option 32 : Rosewood Terrace Community – Basin Retrofit

The Township has identified a community owned Stormwater basin at the Rosewood Terrace Apartment complex to install a basin retrofit. This basin is owned and maintained by SK Limited partnership, and has A/B soils which are good for infiltration. The drainage area to this basin is approximately 19.68 acres, which includes most of the development surrounding it. The DEP BMP effectiveness values table shows reduction values for bioretention/rain gardens in A/B soils without underdrains are 90% for sediment, 85% for phosphorus, and 80% for nitrogen reductions.

Estimated Sediment Load:
Impervious: 11.23 ac x 1480.43 =16,625.22 lbs.
Pervious: 8.45 ac x 190.93 = 1,613.35 lbs.
Total: 18,238.57 lbs.

Estimated Phosphorus Load:
Impervious: 11.23 ac x 1.55 =17.40 lbs.
Pervious: 8.45 ac x 0.36 = 3.04 lbs.
Total: 20.44 lbs.

Estimated Nitrogen Load:
Impervious: 11.23 ac x 38.53 = 432.69 lbs.
Pervious: 8.45 ac x 22.24 = 187.93 lbs.
Total: 620.62 lbs.

Estimated Reduction in Sediment: 18,238.57 lbs. x 90% = 16,414.73 lbs.

Estimated Reduction in Phosphorus: 20.44 lbs. x 85% = 17.34 lbs.

Estimated Reduction in Nitrogen: 620.62 lbs. x 80% = 496.50 lbs.

BMP Option 33 : Willow Lane – Rain Garden

The Township has identified a grass area within the community along the roadway at Willow Lane and Oak Grove Drive to install a small rain garden. This grass area had always been maintained by the residents, however it is the responsibility of ELT to maintain the grass area. The drainage area to this grass area is approximately 2.17 acres, which includes most of the directly adjacent low-density residential development surrounding it. The DEP BMP effectiveness values table shows reductions

for bioretention/rain gardens in A/B soils without underdrains are 90% for sediment, 85% for Phosphorus, and 80% for nitrogen reductions.

Estimated Sediment Load:
Impervious: 0.92 ac x 1480.43 =1,362 lbs.
Pervious: 1.25 ac x 190.93 = 239 lbs.
Total: 1,600.66 lbs.

Estimated Phosphorus Load:
Impervious: 0.92 ac x 1.55 =1.42 lbs.
Pervious: 1.25 ac x 0.36 = 0.45 lbs.
Total: 1.87 lbs.

Estimated Nitrogen Load:
Impervious: 0.92 ac x 38.53 = 35.45 lbs.
Pervious: 1.25 ac x 22.24 = 27.8 lbs.
Total: 63.25 lbs.

Estimated Reduction in Sediment: 1,600.66 lbs. x 90% = 1,440.59 lbs.

Estimated Reduction in Phosphorus: 1.87 lbs. x 85% = 1.59 lbs.

Estimated Reduction in Nitrogen: 63.25 lbs. x 80 % = 50.6 lbs.

BMP Option 34 : 2003 Pennwyck Rd – Riparian Buffer

The Township has identified a portion of the property at 2003 Pennwyck Rd., along the East side of the Conestoga River as a good candidate for streambank restoration. We are proposing a 35' minimum riparian buffer. The total proposed riparian buffer area is 1.6 acres; therefore the drainage area cannot exceed 3.21 acres for TSS and P, and 6.4 acres for N. The DEP Effectiveness Values Table shows the reduction values for riparian buffers are 50% for sediment and 50% for Phosphorus, and 25% for nitrogen reductions.

Estimated Sediment Load:
Impervious: 0.42 ac x 1480.43 = 621.79 lbs.
Pervious: 2.79 ac x 190.93 = 532.69 lbs.
Total: 1,154.48 lbs.

Estimated Phosphorus Load:
Impervious: 0.42 ac x 1.55 = 0.65 lbs.
Pervious: 2.79 ac x 0.36 = 1.0 lbs.
Total: 1.65 lbs.

Estimated Nitrogen Load:
Impervious: 0.42 ac x 38.53 = 16.18 lbs.
Pervious: 6 ac x 22.24 = 133.44 lbs.
Total: 149.62 lbs.

Estimated Reduction in Sediment: 1,154.48 lbs. x 50% = 577.24 lbs.

Estimated Reduction in Phosphorus: 1.65 lbs. x 50% = 0.83 lbs.

Estimated Reduction in Nitrogen: 149.62 lbs. x 25% = 37.40 lbs.

Figure 9: Proposed Conestoga/Mill Creek/Pequea Creek BMP Summary:

Option	Implemented BMP's	Sediment Red. (lbs./yr.)	Sediment Red. (lbs./yr.)
1	Inlet Cleaning/Advanced Sweeping	57839.50	
2	ELT Campus - Basins	19280.60	
3	355 Pitney Rd. -Riparian Bufer	1469.12	
4A	Agricultural Conservation BMP's	8782.10	
4B	Agricultural Conservation BMP's	1013.77	
	Proposed BMP's	**Max. Red. BMP**	**Min. Red. BMP**
4C	Agricultural Conservation BMP's	2890.00	
4D	Agricultural Conservation BMP's	4207.99	
4E	Agricultural Conservation BMP's	4859.72	
5	Mill Bridge Camp-Stream Rest.	41289.00	
6A	Greenleaf Enterprises Basin A	11974.26	
6B	Greenleaf Enterprises Basin B	5995.62	
7	HACC Lancaster Campus-Streambank	246215.00	
8	ELT Community Park	209875.00	
9	58 Witmer Rd.-Streambank	175950.00	
10	I2 Capital Investments Pollution Reduction	150000.00	100000.00
11	Colleens Way-Dry Extended Detention Basin	14738.40	
12	2040 Pine Drive-Wet Retention Basin	5363.09	
13	2040 Pine Drive-Vegetated Swale	291.23	
14A	High Assoc -Bioretention Basin retrofit A/B soils	25049.73	
14B	High Assoc -Bioretention Basin retrofit A/B soils	11173.18	
14C	High Assoc -Bioretention Basin retrofit A/B soils	11460.73	
14D	High Assoc -Bioretention Basin retrofit A/B soils	7327.60	
15	231 Lynnwood-Riparian buffer	239.82	
16A	521 Willow-Streambank	109135.00	
16B	521 Willow - Buffer		291.17
17A	624 Willow-Streambank	163300.00	
17B	624 Willow- Buffer		217.66
18A	527 Mt. Sidney-Vegetated Swale		13002.00
18B	527 Mt. Sidney-Bioswale	20803.20	
19A	2353 Horseshoe-Dry Extended Detention Basin		2125.47
19B	2353 Horseshoe-Infiltration Practices w/sand	3365.33	
20A	63 Witmer-Bioswale	15210.65	
20B	63 Witmer- Vegetated Swale		13309.32
21A	63 Witmer - Streambank	126500.00	
21B	63 Witmer - Buffer		168.98
22A	39 S. Soudersburg-Streambank	550850.00	
22B	39 S. Soudersburg- Buffer		735.08
23A	2588 Bachmantown-Streambank	287500.00	
23B	2588 Bachmantown - Buffer		381.86
24A	231 Strasburg Pike-Streambank	334420.00	
24B	231 Strasburg Pike - Buffer		891.64
25A	2098 Millstream-Strambank	104190.00	
25B	2098 Millstream - Buffer		278.76
26A	351 Gridley -Streambank	293940.00	
26B	351 Gridley - Buffer		784.72
27	93 Strasburg Pike-Streambank	40250.00	
28	Conservaton Tillage/Residue Management program	55672.88	12684.96
29	Pennwyck Rd. Streambank	126500.00	
30	2141 Waterford Drive-Basin Retrofit	22782.24	
31	50-52 Pitney Rd - Bioswales	11409.76	
32	Rosewood Terrace - Basin Retrofit	16414.73	
33	Willow Lane-Rain Garden	1440.59	
34	Pennwyck Rd. - Riparian Buffer		577.24
4C-34	**Total Sediment Reduction Potential from Proposed BMP's**	**3212584.75**	145448.86

Section F – Proposed Funding Mechanisms:

With the specification of 10 different BMP's and 7 alternate BMP's, there is a specific cost associated with installation and maintenance of the BMP's. Specific sources of funding are shown for each BMP in Figure 11.

East Lampeter Township implemented a stormwater fee in 2020 to create a fund source to facilitate the implementation of projects. Some projects are done in coordination/partnership with the Township and may involve funding by private parties and or NGO"s. Some of the projects are being funded by various DEP Grants (See cost breakdown below). Local funding opportunities, such as grants from the Lancaster County Clean Water Consortium (LCCWC) and the Lancaster County Conservation District (LCCD), will be pursued. Federal grants such as NFWF, NRCS-CREP & EQIP may also be pursued.

Figure 10: Funding Chart: BMP Cost Estimates:

OPTION	SITE	EXTENT	LOW	HIGH	AVERAGE	FUNDING
	Conestoga/Mill Creek/Pequea Creek Projects					
1	Inlet Cleaning/Advanced Sweeping	annual work by ELT				Municipal-SW Funds
2	ELT Campus - Basins	installed and maintained ELT				DEP Grant
3	355 Pitney Rd. -Riparian Buffer	installed and maintained Owner				Private
4A	Ag BMP's	installed and maintained Owner				LFT,NFWF
4B	Ag BMP's	installed and maintained Owner				LFT,NFWF
4C	Ag BMP's					REAP, EQIP,CEG
4D	Ag BMP's					REAP, EQIP,CEG
4E	Ag BMP's					REAP, EQIP,CEG
5	Mill Bridge Camp-Stream Rest.	installed and maintained Owner				DEP Grant
6A	Greenleaf Enterprises Basins A	22,302 SF	38399.00	63998.00	51198.00	Private
6B	Greenleaf Enterprises Basins B	16,237 SF	27956.00	46593.00	37275.00	Private
7	HACC Lancaster Campus-Streambank	2141 LF	556660.00	856400.00	706530.00	LCCWP,Municipal, HACC
8	ELT Community Park	1825 LF	474500.00	730000.00	602250.00	Municipal/Grants
9	58 Witmer Rd.-Streambank	1530 LF	397800.00	612000.00	504900.00	Municipal/Grants
10	I2 Capital Investments Pollution Reduction	100,000 - 150,000 lbs.@7.64	764000.00	1146000.00	955000.00	Municipal-SW Funds
11	Colleens Way-Dry Extended Detention Basin	0.32 AC	19200.00	21200.00	20200.00	Municipal-SW Funds
12	2040 Pine Drive-Wet Retention Basin	0.29 AC	17400.00	29000.00	25600.00	Municipal-SW Funds,Private
13	2040 Pine Drive-Vegetated Swale	978 LF	5868.00	9780.00	7824.00	Municipal-SW Funds
14A	High Assoc -Bioretention Basin retrofit	0.43 AC	32250.00	53750.00	43000.00	Private
14B	High Assoc -Bioretention Basin retrofit	0.22 AC	16500.00	27500.00	22000.00	Private
14C	High Assoc -Bioretention Basin retrofit	0.12 AC	9000.00	15000.00	12000.00	Private
14D	High Assoc -Bioretention Basin retrofit	0.72 AC	54000.00	90000.00	72000.00	Private
15	231 Lynnwood-Riparian buffer	0.82 AC	2132.00	4428.00	3280.00	Private Grant-Stroud
16A	521 Willow-Streambank	949 LF	246740.00	379600.00	313170.00	Municipal-SW Funds,Private
16B	521 Willow - Buffer	1.525 AC	3965.00	8235.00	6100.00	DEP,CREP,Private,ELT
17A	624 Willow-Streambank	1420 LF	369200.00	568000.00	468600.00	Municipal-SW Funds,Private
17B	624 Willow - Buffer	1.15 AC	2990.00	6210.00	4600.00	DEP,CREP,Private,ELT
18A	527 Mt. Sidney-Vegetated Swale	656 LF	3936.00	6560.00	5248.00	LCCD-CEG,REAP,ELT
18B	527 Mt. Sidney-Bioswale	656 LF	7872.00	10496.00	9184.00	LCCD-CEG,REAP,ELT
19A	2353 Horseshoe-Dry Extended Detention Basin	0.3 AC	18000.00	30000.00	24000.00	Municipal-SW Funds,Private
19B	2353 Horseshoe-Infiltration Practices w/sand	0.3 AC	22500.00	37500.00	30000.00	Municipal-SW Funds,Private
20A	63 Witmer-Bioswale	718 LF	8616.00	11488.00	10052.00	Municipal-SW Funds,Private
20B	63 Witmer- Vegetated Swale	718 LF	4308.00	7180.00	5744.00	Municipal-SW Funds,Private
21A	63 Witmer - Streambank	1100 LF	286000.00	440000.00	363000.00	Municipal,DEP, PAF&B,
21B	63 Witmer - Buffer	0.88 AC	2280.00	4752.00	3520.00	DEP,CREP,Private,ELT
22A	39 S. Soudersburg-Streambank	4790 LF	1245400.00	1916000.00	1580700.00	Municipal,DEP, PAF&B,
22B	39 S. Soudersburg - Buffer	3.85 LF	10010.00	20790.00	15400.00	DEP,CREP,Private,ELT
23A	2588 Bachmantown-Streambank	2500 LF	650000.00	1000000.00	825000.00	Municipal,DEP, PAF&B,
23B	2588 Bachmantown - Buffer	2 AC	5200.00	10800.00	8000.00	DEP,CREP,Private,ELT
24A	231 Strasburg Pike-Streambank	2908 LF	756080.00	1163200.00	959640.00	Municipal, DEP,REAP,NFWF
24B	231 Strasburg Pike - Buffer	4.67 AC	12142.00	25218.00	18680.00	DEP,CREP,Private,ELT
25A	2098 Millstream-Streambank	906 LF	235560.00	362400.00	298980.00	Municipal, DEP,REAP,NFWF
25B	2098 Millstream - Buffer	1.46 AC	3796.00	7884.00	5840.00	DEP,CREP,Private,ELT
26A	351 Gridley -Streambank	2556 LF	664560.00	1022400.00	843480.00	Municipal, DEP,REAP,NFWF
26B	351 Gridley - buffer	4.11 ac	10686.00	22194.00	16440.00	DEP,CREP,Private,ELT
27	93 Strasburg Pike-Streambank	350 LF	91000.00	140000.00	115500.00	Private, LCCWP,ELT,DEP
28	Conservation Tillage/Residue Management	184 acres	2760.00	5778.00	4269.00	Municipal-SW Funds,Private
29	Pennwyck Rd. Streambank	1100LF	286000.00	440000.00	363000.00	DEP,NFWF,LCCWP,
30	2141 Waterford Drive-Basin Retrofit	20,285 SF	34,567.00	58210.00	46347.00	Municipal-SW Funds,Private
31	50-52 Pitney Rd - Bioswales	820 LF	9840.00	13120.00	11480.00	Municipal-SW Funds,Private
32	Rosewood Terrace - Basin Retrofit	0.61 ac	45750.00	76250.00	61000.00	Municipal-SW Funds,Private
33	Willow Lane-Rain Garden	0.06 Ac	8400.00	12000.00	10200.00	Municipal-SW Funds,Private
34	Pennwyck Rd. - Riparian Buffer	1.6 AC	4160.00	8640.00	6400.00	DEP,CREP,Private,ELT
			7467983.00	11520554.00	9496631.00	

Section G – Operation & Maintenance (O&M):

Operation and maintenance for the BMP's proposed will be broken into 3 categories:

- Maintenance of Bioretention, Biofiltration, and Tree Filter Systems
- Maintenance of Stream Channel, Streambank Restoration, and Riparian Buffer Projects
- Maintenance of Agricultural Agronomic and Structural BMP's that come under Conservation System Planning

The first category will include any Bioswales, Stormwater Basin Retrofits, and Rain Gardens (see Figure 12). The second category will strictly be streambank restoration, floodplain restoration, and Riparian Buffers. (See Figure 13). The third category will include the agronomic practice of Residue Management as outlined by DEP, and other Agricultural Conservation Practices installed to meet the USDA NRCS practice standards as planned and maintained under the respective planning system.

Bioswales, Infiltration Systems, Stormwater Basin Retrofits:

The following BMP's will be maintained by East Lampeter Township for a minimum period of 3-5 years. After that initial maintenance period, the Township will work with the landowners to train them in the maintenance of the BMPs. The Township will work with the private owners through the 4th – 5th years to provide education and technical assistance as the projects become well established and vegetation/tree canopies fill in. After the 4th year, the parties listed below will be responsible for maintenance activities in accordance with the frequency and activities listed on Figure 12:

- ELT Campus Basins – East Lampeter Township Public Works
- 355 Pitney Rd: Property Owner, High Steel.
- Greenleaf Enterprises – Owner
- 2137 Colleens Way – John Fischer
- 2040 Pine Drive – John Beiler
- High Associates – Owner
- 527 Mt. Sidney – Levi Stoltzfus
- 2353 Horseshoe - Enos Stoltzfus
- Pitney Rd Bioswales
    - Property Owners at
        - 52 Pitney Rd – Omar Zook
        - 54 Pitney Rd – George & Peggy Stiffel
        - 40 Pitney Rd – Melvin Weaver
- Waterford Drive Basin – Joseph Baione, 2141 Waterford Dr
- Rosewood Terrace Basin – Property Owner, SK Limited Partnership
- Willow Lane Rain Garden – East Lampeter Township Public Works

Figure 12: Bioretention/Biofiltration/Tree Filter Maintenance

Frequency	Activity
After Each 2-year Storm for first 4 months, then biannually	• Check to see if the filter surface drains completely after 72 hours. If filter is clogged or poorly draining, remove top few inches of discolored material, and re-rake remaining material • Keep a record of inspections after storm events

Quarterly for first year, then biannually	• Check for leaves & debris. Rake leaves/debris out of the system if structures/flow is obstructed. • Ensure filter bed does not contain more than 2 inches of accumulated material. Remove sediment as necessary. If 2" or more has been removed, replace with amended soils • Inspect plants for signs of distress in periods of little rainfall. Plants should be watered until established for the first 3 months.
Annually	• Inspect structures to ensure good condition and no evidence of deterioration. Repair or replace any damaged structural elements of the system. • Check for robust vegetation coverage throughout the system. If 50% of vegetation coverage is not reached in 2 years, reinforcement planting should be performed.
As Needed	• Check for dead and dying plants. Dead and dying vegetation should be cut and removed from the system. Pruning and thinning should occur if crowding is observed. • Check for tree tubes and tree plantings to be in good condition. Any broken tree tubes found within the first 3 years should be replaced.

Streambank and Floodplain Restoration, Riparian Buffers:

The following BMP's will be maintained by East Lampeter Township for a period of 3-5 years. After that initial 3 year maintenance period, the Township will work with the landowners to train them in the maintenance of the BMPs. The Township will work with the private owners through the 4th – 5th years to provide education and technical assistance as the projects become well established and the tree canopies fill in. After the 4th year, the parties listed below will be responsible for maintenance activities in accordance with the frequency and activities listed on Figure 13:

- Mill Bridge Camp Resort Streambank Restoration- Brian Kopan/East Lampeter Township Public Works
- HACC Streambank Restoration – Harrisburg Area Community College Maintenance Dept.
- 231 Lynnwood – Eli Beiler
- 521 Willow – Oscar's Pet Resort
- ELT Community Park – East Lampeter Township Public Works
- 58 Witmer – Daniel Stoltzfus
- 624 Willow – Daniel Beiler
- 63 Witmer – Ben Beiler
- 39 S. Soudersburg – Daniel Stoltzfus
- 2588 Bachmantown – Samuel Fisher
- 231 Strasburg Pike – Todd and Mandie Denlinger
- 2098 Millstream – Andy Hoover
- 351 Gridley – Leroy King
- 93 Strasburg Pike – Suzy Sutton
- 2003 Pennwyck Rd - Streambank Restoration – Amos Stoltzfus

Figure 13: Stream Channel and Streambank Project -Riparian Buffer Maintenance

Frequency	Activity
Every 2 weeks for the first 2 months	• Repair eroded areas & replant • Maintain/Control weeds and invasive species • Control damage from wildlife or vehicles/machinery • Check Structures for anchoring & soundness. Repair any weaknesses immediately • Remove any debris that hinders the system • Maintain Fences • Remove Large tree species that grow in the lower bank areas, small species may be left to grow • Inspect after major storm events
Monthly from 3-6 months	• Check Structures for anchoring & soundness. Repair any weaknesses immediately • Remove any debris that hinders the system • Maintain Fences • Remove Large tree species that grow in the lower bank areas, small species may be left to grow • Inspect after major storm events • Repair eroded areas & replant as needed • Maintain/Control weeds and invasive species
Biannually from 12 months to 2.5 years	• Check Structures for anchoring & soundness. Repair any weaknesses immediately • Remove any debris that hinders the system • Maintain Fences • Remove Large tree species that grow in the lower bank areas, small species may be left to grow • Inspect after major storm events • Repair eroded areas & replant • Maintain/Control weeds and invasive species
Yearly after 3 years and as needed	• Check Structures for anchoring & soundness. Repair any weaknesses immediately • Remove any debris that hinders the system • Maintain Fences • Remove Large tree species that grow in the lower bank areas, small species may be left to grow • Inspect after major storm events • Check for dead and or dying plants that should be removed and replaced as needed • Check for tree tubes, staking and tree/shrub maintenance for repair/replacement • Repair eroded areas & replant • Maintain/Control weeds and invasive species

Agricultural Agronomic and Structural Conservation BMP's:

The following BMP's will be maintained by the land owner and or land operator for the period of the BMP's practice life. The conservation planning technical service provider will work with the landowners to train them in the maintenance of the BMPs as outlined in the O & M plan and the conservation system plan applicable to each practice. Such technical assistance may come from agencies such as the Lancaster County Conservation District, USDA NRCS in Lancaster, and or private consultants such as Team Ag, Red Barn Consulting and or AET Consulting. The maintenance activities will follow Figure 14:

- Agricultural BMP's – Property Owners at:
    - 623 Willow – Elmer Beiler
    - 2061 Jarvis – Samuel Beiler
    - 419 Mt Sidney – Dan King
    - 624 Willow – Daniel Beiler
    - 2063 Horseshoe – Jonas Stoltzfus
  - Conservation Tillage/Residue Management – see eligible acres list
  - I2 Capital Investments Pollution Reduction Credit Revolving Fund – Stauffer Run Watershed

Cropland Acres in the Urban area map excluding the Stauffer Run Watershed	Acres
2828A Bachmantown	34
2870 Bachmantown	5
Stauffer Run Watershed	9.5
2725 N. Cherry Lane	8
2816 N Cherry Lane	31
162 Lynnwood	20.5
231 Lynnwood	29
281 Lynnwood	10
336 Lynnwood	27.5
386 Lynnwood	36
2571D Siegrist	35
148 N Ronks	16
200 N. Ronks	52
2576 Old Philadelphia Pike	3
2557 OPP	5
2448 OPP	4
180 Eastbrook	25
63 Witmer	35
58 Witmer	57.5
135 Witmer	9.5
2300 Hobson	33
2244 Hobson	29
2198 Hobson	35
133 Hobson	28
216 Hobson	32
69 Strasburg	5.2
1964 Millport	10
1926 Millport	8.6
1916 E Lincoln Hwy	13.5
1876B E Lincoln Hwy	18
2025 OPP	12
361 Mt Sidney	46
479 Mill Creek	54
399 Mill Creek	46
419 Mt Sidney	56.2
2447 Stumptown	42
	921

Figure 14: Agricultural Agronomic and Structural BMP's Maintenance

Frequency	Activity
Every 2 weeks for the first 2 months	• Repair eroded areas & replant • Maintain/Control weeds and invasive species • Control damage from wildlife or vehicles/machinery • Check Structures for anchoring & soundness. Repair any weaknesses immediately • Remove any debris that hinders the system • Maintain Fences • Inspect after major storm events
Monthly from 3-6 months	• Check Structures for systems to function as designed. Repair any deficiencies immediately • Maintain Fences & heavy use surfaces per standards • Inspect after major storm events • Repair eroded areas & replant as needed • Maintain/Control weeds and invasive species
Follow the practice specific O & M plan for the life of the practice.	• Follow the Operation and Maintenance plan for each BMP respectively as outlined in the following plans: Soil Conservation Water Quality Plan, Ag Erosion and Sediment Control Plan, Waste System Management Plan, Nutrient Management Plan, and or Grazing Plan, as planned to apply the USDA Natural Resource Conservation Service BMP standards and specifications.
Agronomic practices to be inspected at least semiannually for certification and compliance	• Check practice implementation for certification of residue management per the NRCS practice standards. • Inspect after major storm events • Maintain/Control weeds and invasive species

Section H – Works Cited

1. LandStudies, Inc. May 2016. Baseline Study and Implementation Strategies; Conestoga River and Mill Creek Watersheds. Lancaster County, PA.

2. LandStudies, Inc. September 7, 2016. Pequea Watershed; Baseline Study and Implementation Strategies. Lancaster County, PA.

3. Pennsylvania Department of Environmental Protection (PADEP). 2016. PRP/TMDL Plans MS4 Workshop.

4. The University of New Hampshire Stormwater Center. January 15, 2011. Regular Inspection and Maintenance Guidance for Bioretention Systems/Tree Filters. www.epa.gov/green-infrastructure-operations-and-maintenance

5. Seattle Public Utilities. August 2009. Green Stormwater Operations and Maintenance Manual. www.epa.gov/green-infrastructure-operations-and-maintenance

6. Tom Schueler; Chesapeake Stormwater Network, Emma Giese; CBP Management Board, David Wood; Chesapeake Research Consortium, Jeremy Hanson; Virginia Tech. May 19, 2016. Recommendations of the Expert Panel to Define Removal Rates for Street and Storm Drain Cleaning Practices.

Appendix A – Aggregation Approval

From: "Arwood, Scott" <sarwood@pa.gov>
Date: June 13, 2017 at 9:25:34 AM EDT
To: Charity Kadwill <Charity@westlampeter.com>
Subject: RE: Aggregating Watersheds for East and West Lampeter Township

Charity,

I believe the aggregation of loading and reductions in the Conestoga and Mill Creek HUC12 watersheds for the upcoming permit cycle will be acceptable. As I understand, your PRPs will address three aggregations-the Conestoga/Mill Creek, the Pequea, and the combined Chesapeake Bay. The plans will be subject to technical review for parsing and planning area delineation, loading and reduction calculations, quality of restoration, etc. Also, any collaborative efforts will need agreements meeting the requirements that we have released.

Please include language in the PRP describing the aggregation and pre-approval from me. Also include some language that the other listed impairments not addressed in this upcoming permit cycle will be addressed in future permit cycles.

Let me know if you have questions.

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

On Jun 13, 2017, at 8:36 AM, Arwood, Scott <sarwood@pa.gov> wrote:

So you want to aggregate Conestoga and Mill, and keep Pequea separate?

Scott M. Arwood, P.E. | Environmental Engineer Manager
Department of Environmental Protection | Clean Water Program
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909 Elmerton Avenue | Harrisburg, PA 17110
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From: Charity Kadwill [mailto:Charity@westlampeter.com]
Sent: Monday, June 12, 2017 3:09 PM
To: Arwood, Scott <sarwood@pa.gov>
Subject: Aggregating Watersheds for East and West Lampeter Township

Good afternoon, Scott,

I was reaching out to see if East and West Lampeter Township could receive pre-approval to aggregate the watersheds of the Conestoga River and Mill Creek together within our PRP plans. Mike LaSala suggested I reach out to you based on something similar that he was able to get preapproval for on one of his PRPs, as it sounded like a similar scenario.

As we are putting our PRP plans together in each municipality we are finding that more opportunities are available to perform projects in the Mill Creek watershed. Both the Mill Creek and the Conestoga Watersheds are HUC 12, and the Mill Creek which runs through both East and West Lampeter, flows into the Conestoga.(see attached map) This seemed like a scenario where we would be able to do more quality projects in the Mill Creek during this permit cycle in both East and West Lampeter. This would give us the opportunity to pass more of the downstream benefits to the Conestoga, and then concentrate on the Conestoga in the 2023-2028 permit cycle.

It is our goal to be able to show the property owners in the Conestoga that our projects in the Mill were successful in order to get them on board for the next permit cycle.

Please let me know if this is a scenario which we would be able to aggregate the Mill and Conestoga Watersheds together in our PRP's or if you have any questions regarding the situation that I have not clarified.

Thanks!

Charity

Charity L. Kadwill, RLA
West Lampeter Township
Stormwater Coordinator
852 Village Road, PO Box 237
Lampeter, PA 17537
(717) 464-8019
Fax 717-464-5047
Check us out on Facebook!

Email indicating that aggregation of the three HUC watersheds in East Lampeter Township is approved.

From: Arwood, Scott <sarwood@pa.gov>
Sent: Tuesday, July 5, 2022 1:19 PM
To: Charity Hain <chain@dmai.com>
Cc: Staley, Leah <lestaley@pa.gov>
Subject: RE: [External] RE: East Lampeter MS4 PRP

Ok, good. Looked like a no-brainer from the mapping, but I can't keep track of all of them off the top of my head

From: Charity Hain <chain@dmai.com>
Sent: Tuesday, July 5, 2022 1:14 PM
To: Arwood, Scott <sarwood@pa.gov>
Cc: Staley, Leah <lestaley@pa.gov>
Subject: RE: [External] RE: East Lampeter MS4 PRP

We definitely did ask to aggregate the three HUC watersheds together prior to submitting the 2018-2023 PRP Plan, and we had received approval from you on that.

Charity Hain, RLA, LEED AP

MS4 Program Manager | Landscape Architect

DAVID MILLER/ASSOCIATES, INC.

1076 Centerville Road, Lancaster, PA 17601

Phone: (717) 898-3402

Cell: (717) 413-5256

Visit our website at www.dmai.com

From: Arwood, Scott <sarwood@pa.gov>
Sent: Tuesday, July 5, 2022 1:09 PM
To: Charity Hain <chain@dmai.com>
Cc: Staley, Leah <lestaley@pa.gov>
Subject: RE: [External] RE: East Lampeter MS4 PRP

Thanks. Pretty sure he is asking about aggregating the loads/reductions across the 3 HUC12s, which I don't have a problem with. I have a vague recollection that it was asked previously, but I am not sure.

From: Charity Hain <chain@dmai.com>
Sent: Tuesday, July 5, 2022 12:05 PM
To: Arwood, Scott <sarwood@pa.gov>
Cc: Staley, Leah <lestaley@pa.gov>
Subject: [External] RE: East Lampeter MS4 PRP

Hi Scott,

Unfortunately, I am not. I knew that ELT was working on a much-needed PRP revision, and we offered to assist the Township, but they wanted to keep it in house. We do not assist them with their annual reports either.

We are helping them with some of the permitting and design of the PRP projects if there is anything that Charlie is asking that may not make sense, maybe I can shed some light on it.

Charity

Charity Hain, RLA, LEED AP

MS4 Program Manager | Landscape Architect

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From: Arwood, Scott <sarwood@pa.gov>
Sent: Tuesday, July 5, 2022 10:37 AM
To: Charity Hain <chain@dmai.com>
Cc: Staley, Leah <lestaley@pa.gov>
Subject: East Lampeter MS4 PRP

Hi Charity,

Are you working on PRP revision for East Lampeter? We received a question from Charles Hayes about it.

Scott M. Arwood, P.E. | Environmental Engineer Manager
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