

Chesapeake Bay Pollutant Reduction Plan East Lampeter Township

East Lampeter Township
2250 Old Philadelphia Pike
Lancaster, PA 17602

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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 16,424 residents according to the 2010 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 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 second watershed addressed in East Lampeter Township is the Mill Creek. This watershed flows through the center of the Township, from the east in Upper Leacock Township to the west into West Lampeter 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 Chesapeake Bay Pollutant Reduction Plan, or CBPRP, is as follows:

Prior to July 10th:

- Advertised a public notice in Lancaster Newspaper – LNP, Friday June 30, 2017, prior to July 10th Board of Supervisors Meeting
- See Copy of the Public Notice on Page 5
- Advertise at least 45 days prior to September 16, 2017 CBPRP due date

July 10th:

- Introduced the Plan at Board of Supervisors Meeting, explained the contents and timeline
- Fielded verbal comments from **LIST ANY COMMENTS AND INDIVIDUALS**

August 10th:

- 30 Day comment period ends

August 23rd:

- Reivew 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

September 6th:

- Review final CBPRP Draft at East Lampeter internal MS4 meeting
- All comments are addressed within this plan

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 Chesapeake Bay Nutrient/Sediment Pollutant Reduction Plan (CBPRP) required for 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 CBPRP is available for review at the Township office located at 2250 Old Philadelphia Pike, Lancaster, Pennsylvania, 17602, from 8:00 a.m. – 4:00 p.m. Mon-Fri from July 10, 2017 to August 10, 2017. Digital copies are also available at www.eastlampetertownship.org. The Township anticipates submission of the CBPRP to the Department of Environmental Protection on or before September 16, 2017.

The Township shall introduce the plan at the July 10, 2017 Board of Supervisors Meeting at 7:30 p.m., and the Township shall accept written comments for 30 days thereafter. Interested parties may submit written comments which must be postmarked by Tuesday, August 7, 2017 addressed to: Charity Kadwill, Stormwater Coordinator, East Lampeter Township, 2250 Old Philadelphia Pike, Lancaster, Pennsylvania, 17602. In addition, oral comments will be accepted by the Board of Supervisors during their regular public meetings. Currently scheduled public meetings within the time frame are on July 10, 2017 and August 7, 2017 beginning at 7:30 p.m. at the Township Office at the address listed above.

Comments may be submitted electronically to ckadwill@eastlampetertownship.org. Please indicate in the subject line "Comments-East Lampeter Township CBPRP".

BOARD OF SUPERVISORS OF THE
TOWNSHIP OF EAST LAMPETER

By: Stephen M. Kraybill, Solicitor

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 the 11 8.5"x11" small maps which are attached, and one 11x17" Index Map. 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 BMP located at 2003 Pennwyck Dr and 2141 Waterford Dr.

Map 3:

- Conestoga River Sewersheds 7-22: West-Central portion of Township
 - Proposed BMP at 355 Pitney Rd and Zook/Yoder/Esh Property

Map 4:

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

Map 5:

- Conestoga River Sewersheds 23-30: Western portion of the Township (Rt 30 & 462, Eastland Dr)
 - Proposed BMP's at HACC Campus, North Eastland Drive, and Rosewood Terrace Development

Map 6:

- Conestoga River Sewersheds 30-38: Western Portion of the Township (Rt 462 & Rt 340 Intersection)
 - Proposed BMP at 50-52 Pitney Rd.

Map 7:

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

Map 8:

- Mill Creek Sewersheds 15-25: Central portion of the Township (Rt 30 Corridor)
 - Proposed BMP's at Municipal Campus, and ELT Community Park

Map 9:

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

Map 10:

- Mill Creek Sewersheds 34-42: East-Central of the Township (Rt 340 Bird in Hand)
 - Proposed BMP at Gibbons Park

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 BMP at Beiler Farm-Cherry Lane

Map 13:

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

East Lampeter Township

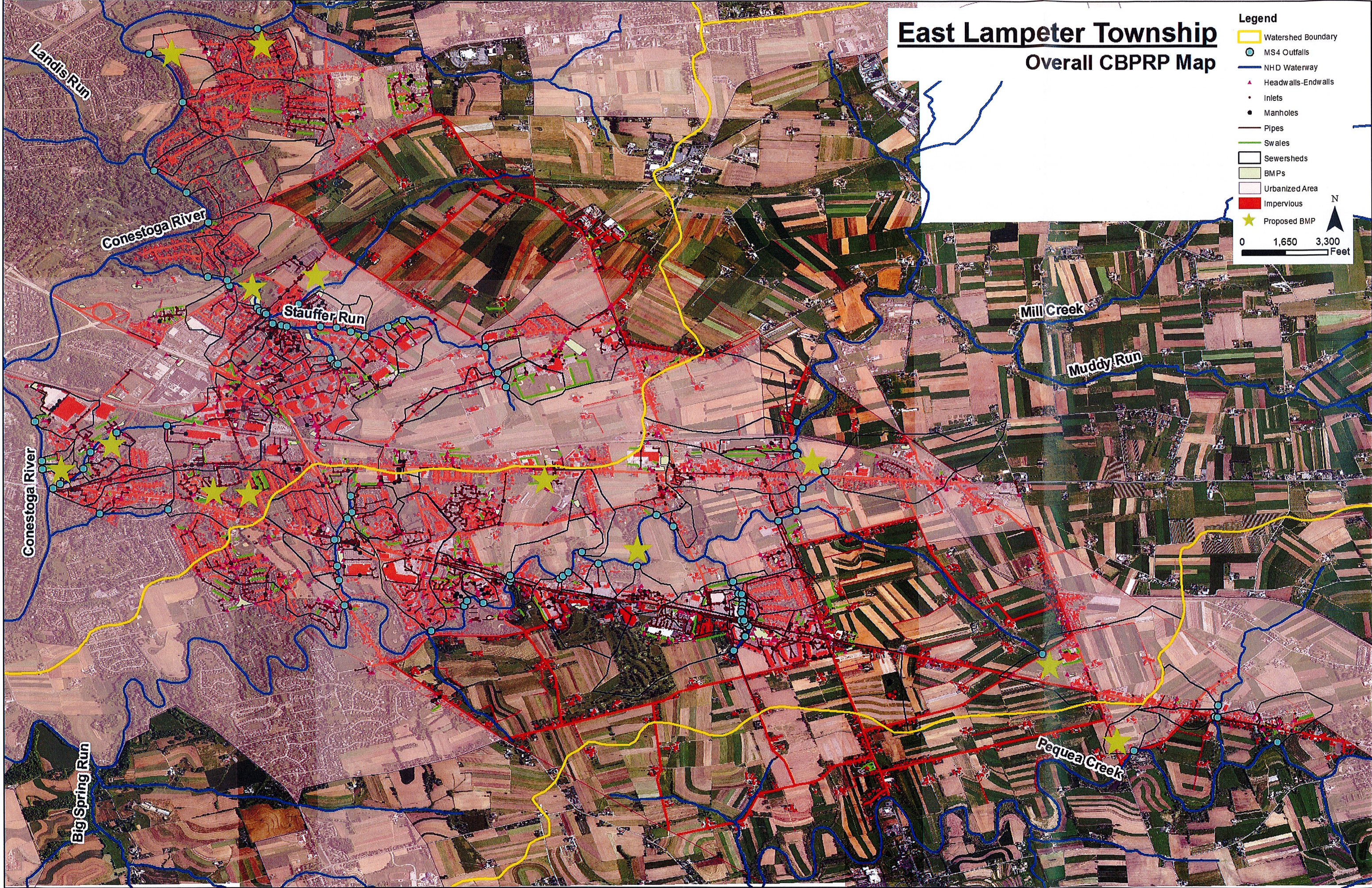
Overall CBPRP Map

Legend

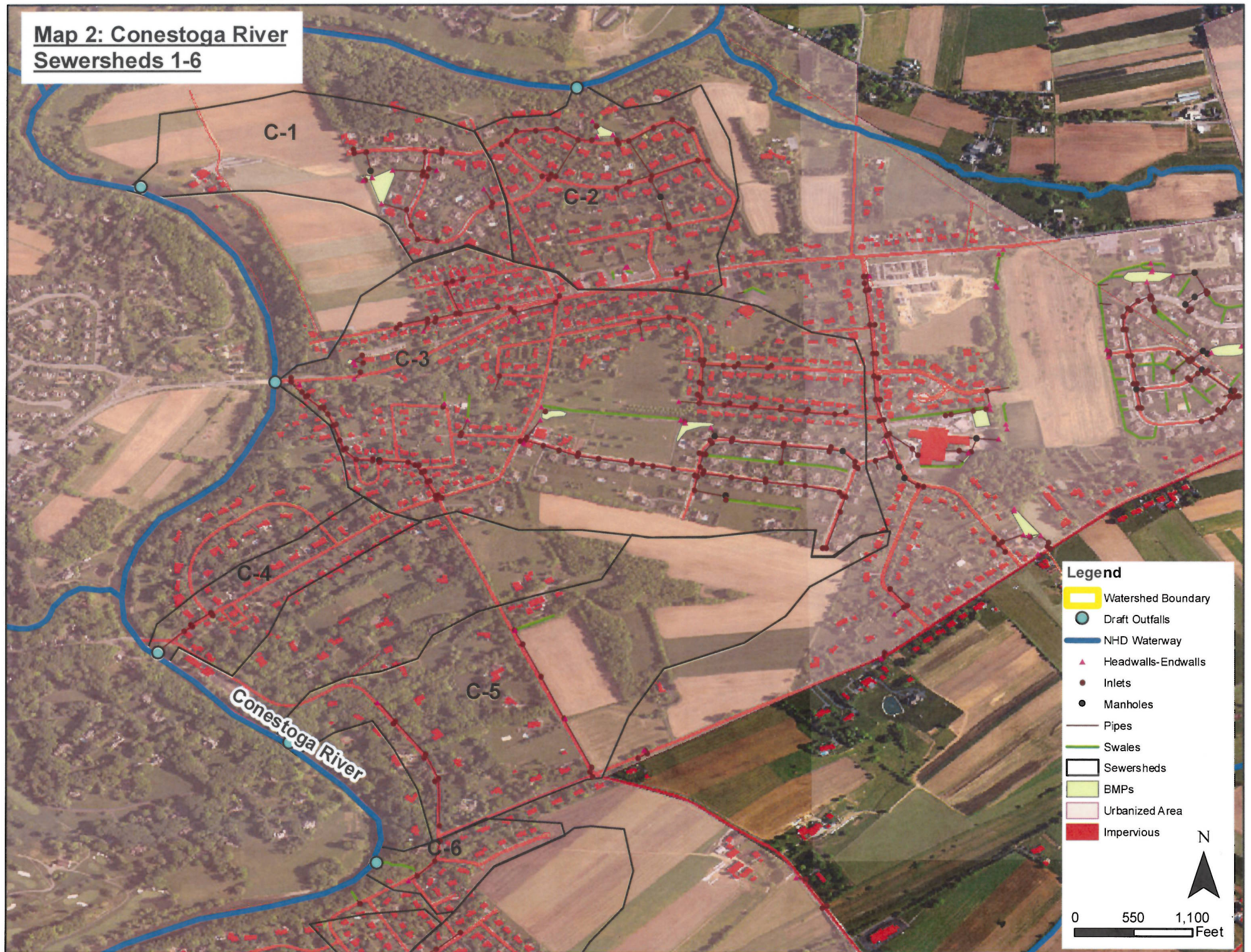
- Watershed Boundary
- MS4 Outfalls
- NHD Waterway
- Headwalls-Endwalls
- Inlets
- Manholes
- Pipes
- Swales
- Sewersheds
- BMPs
- Urbanized Area
- Impervious
- Proposed BMP

0 1,650 3,300 Feet

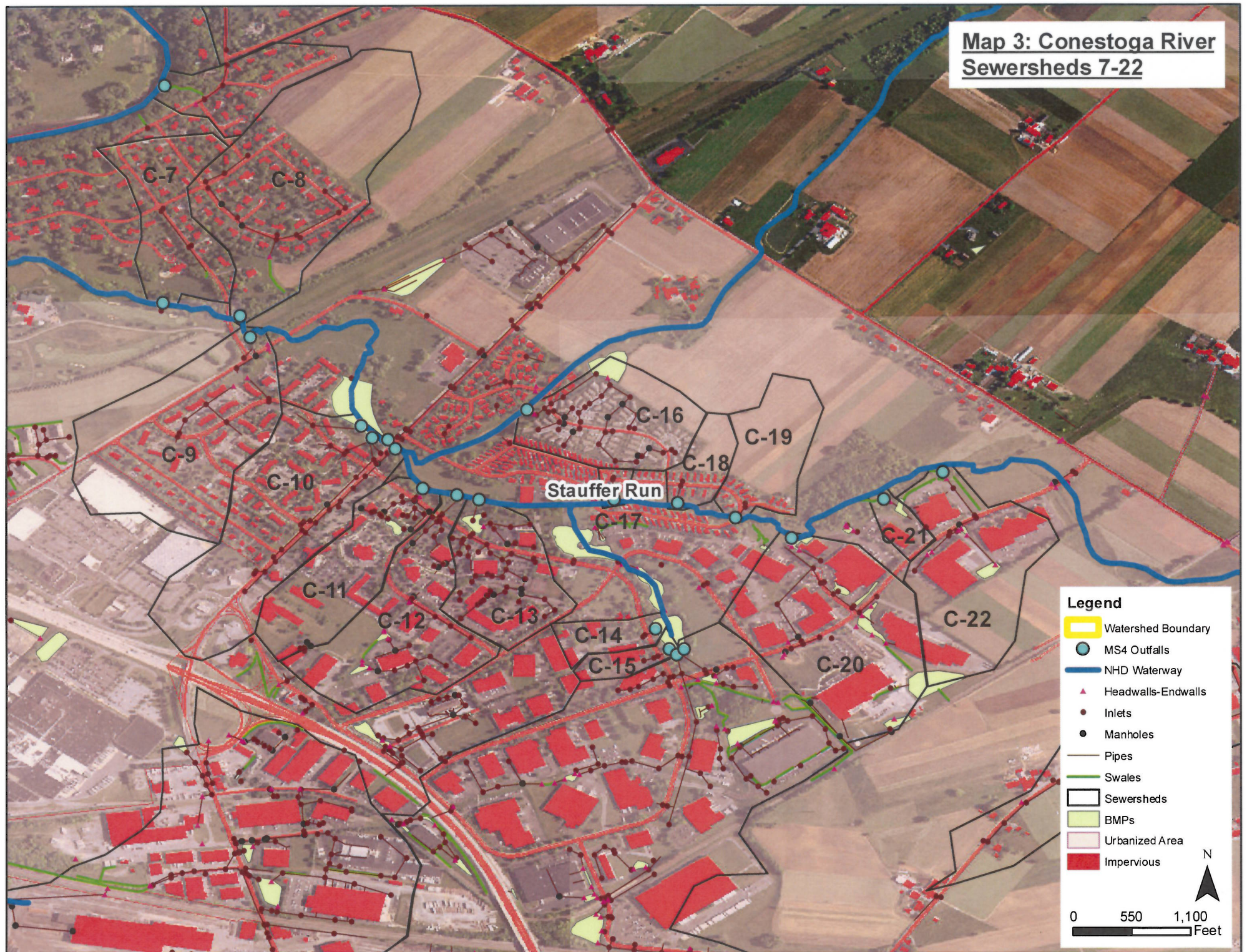
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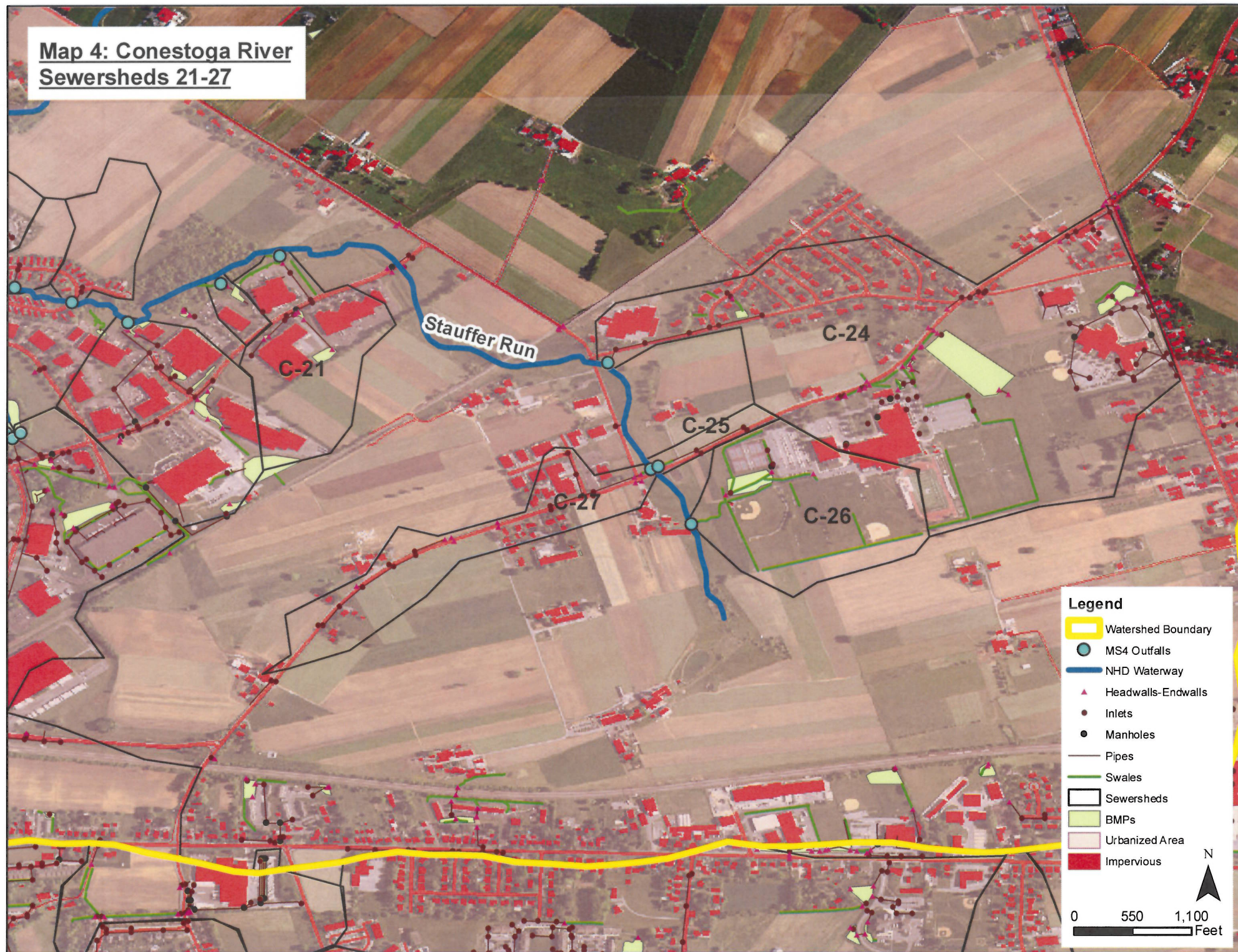
Map 2: Conestoga River Sewersheds 1-6



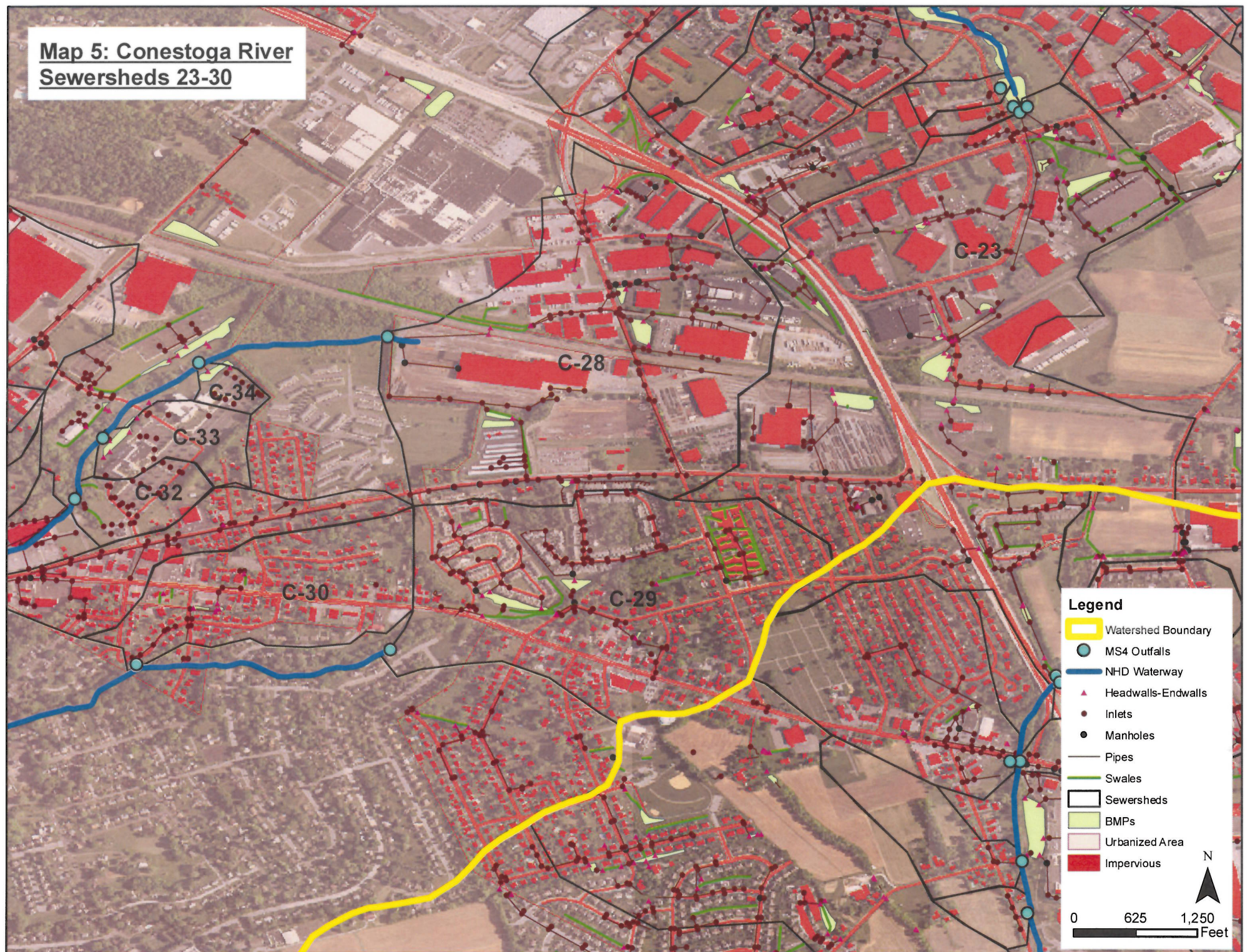
Map 3: Conestoga River
Sewersheds 7-22



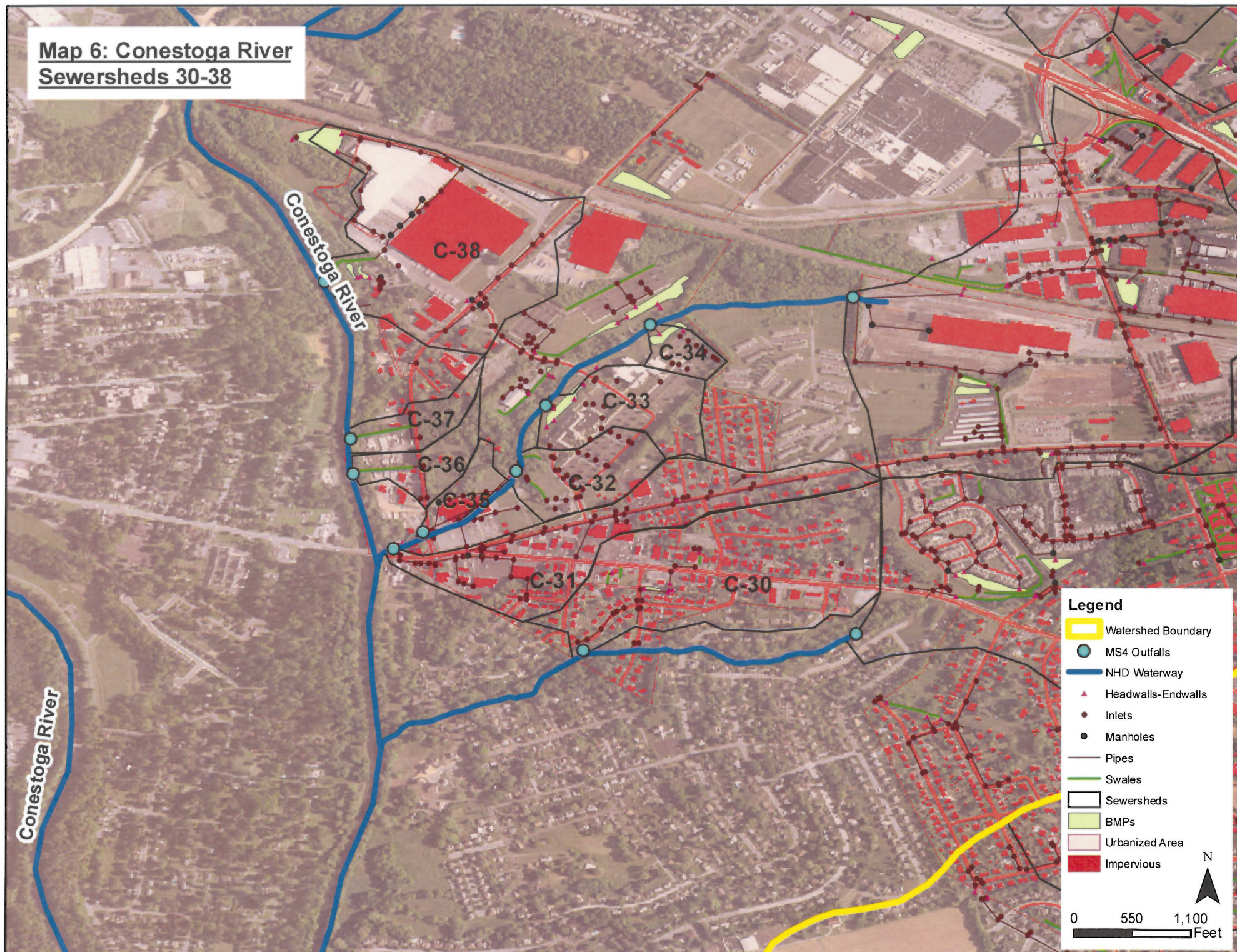
**Map 4: Conestoga River
Sewersheds 21-27**



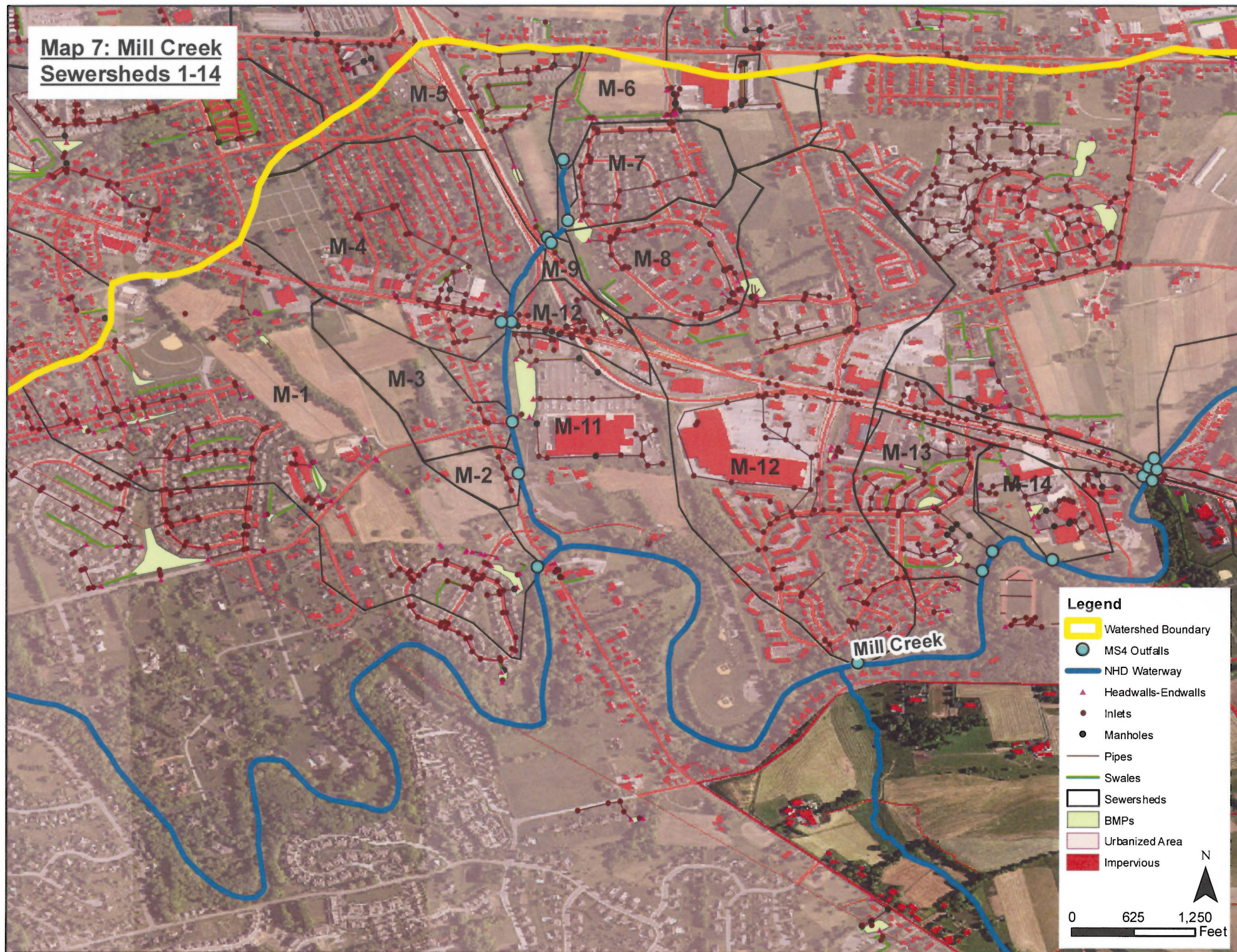
**Map 5: Conestoga River
Sewersheds 23-30**



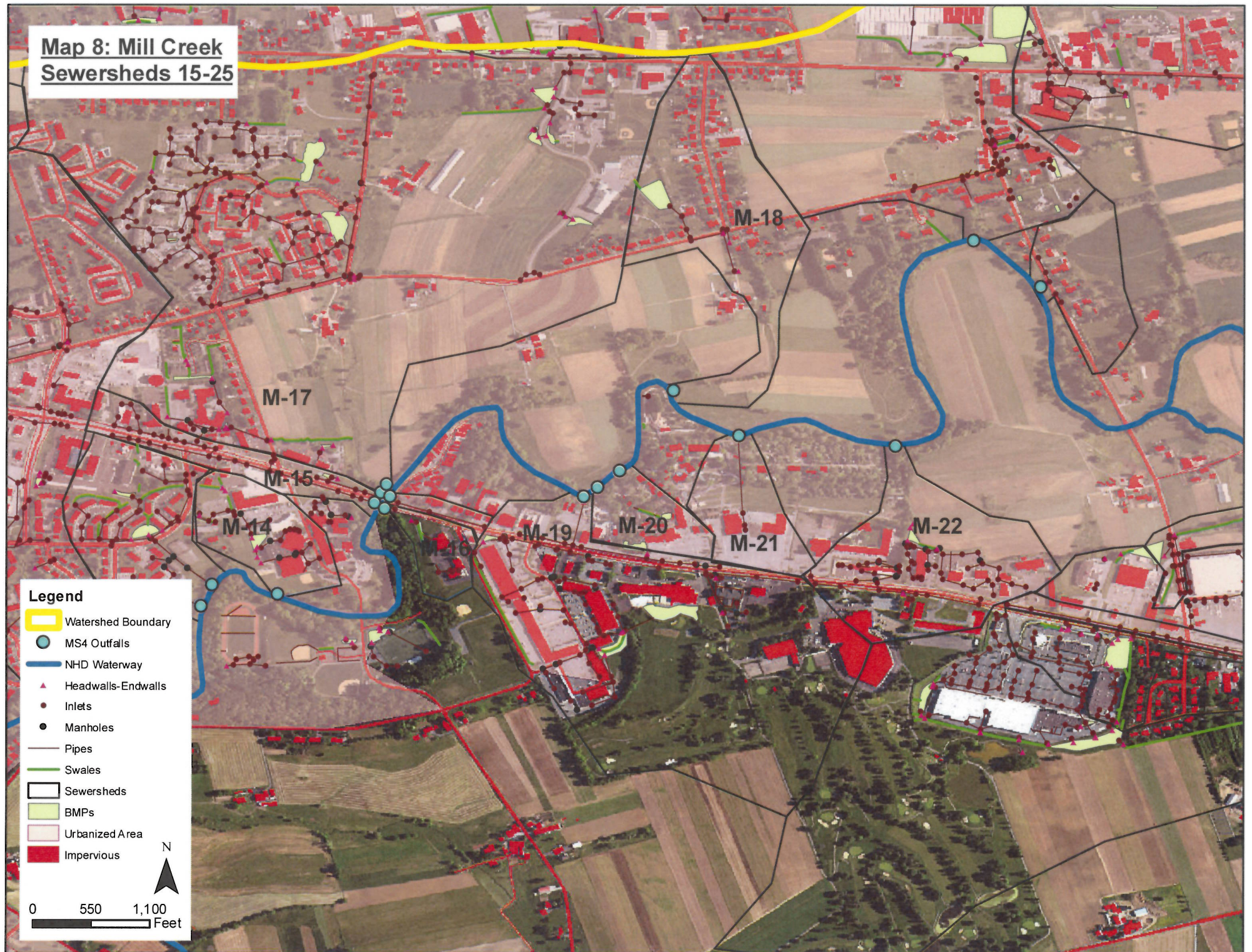
**Map 6: Conestoga River
Sewersheds 30-38**



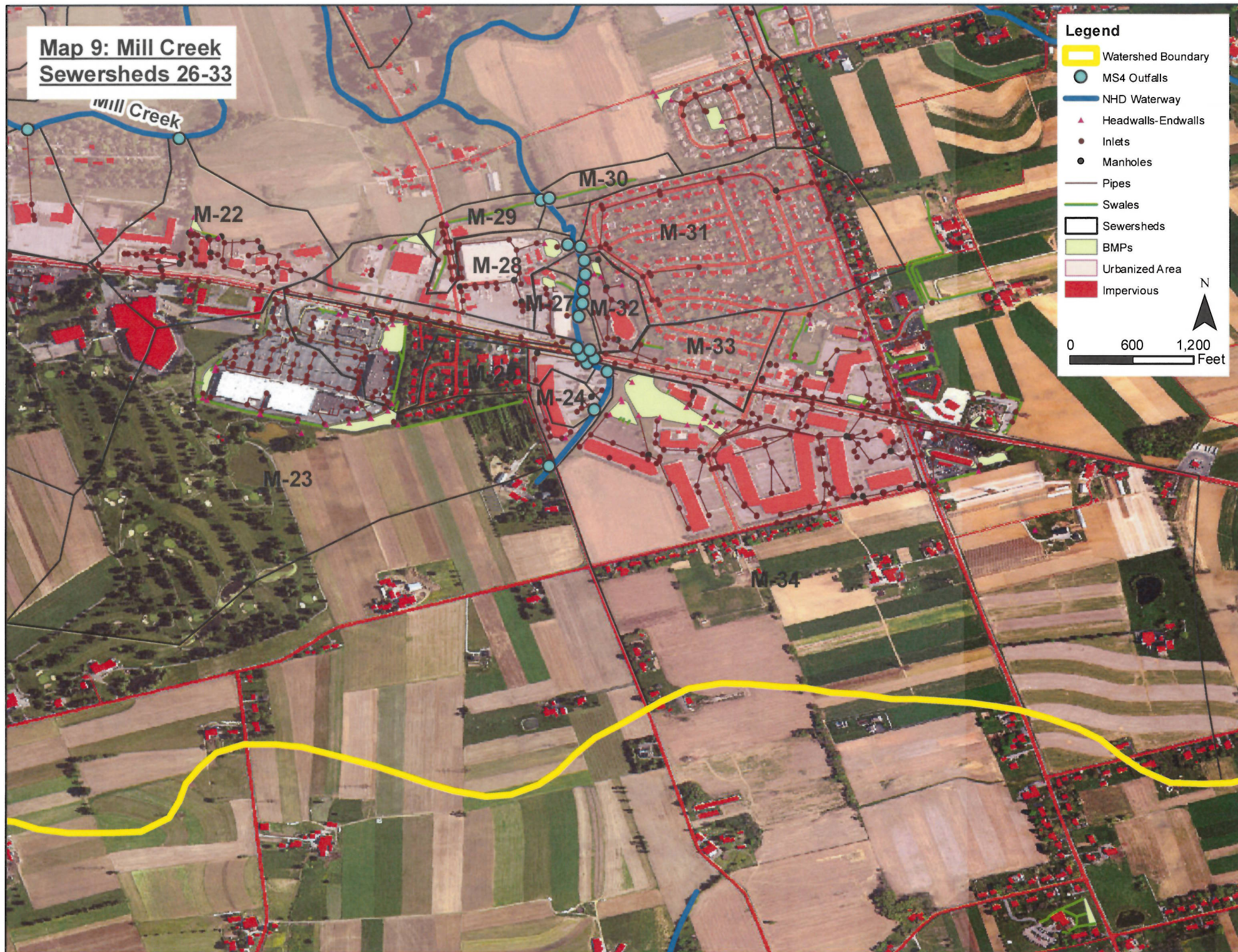
**Map 7: Mill Creek
Sewersheds 1-14**



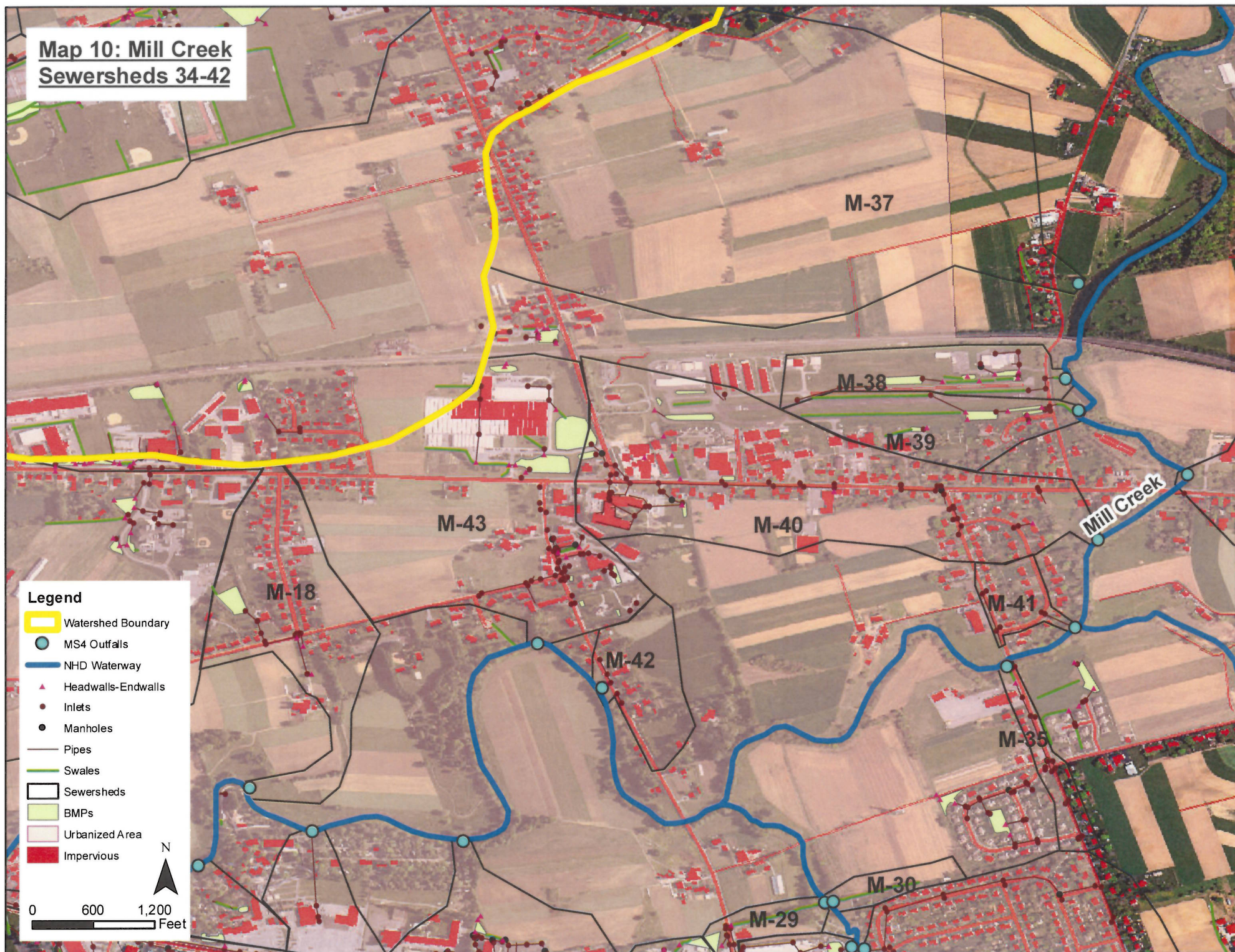
**Map 8: Mill Creek
Sewersheds 15-25**



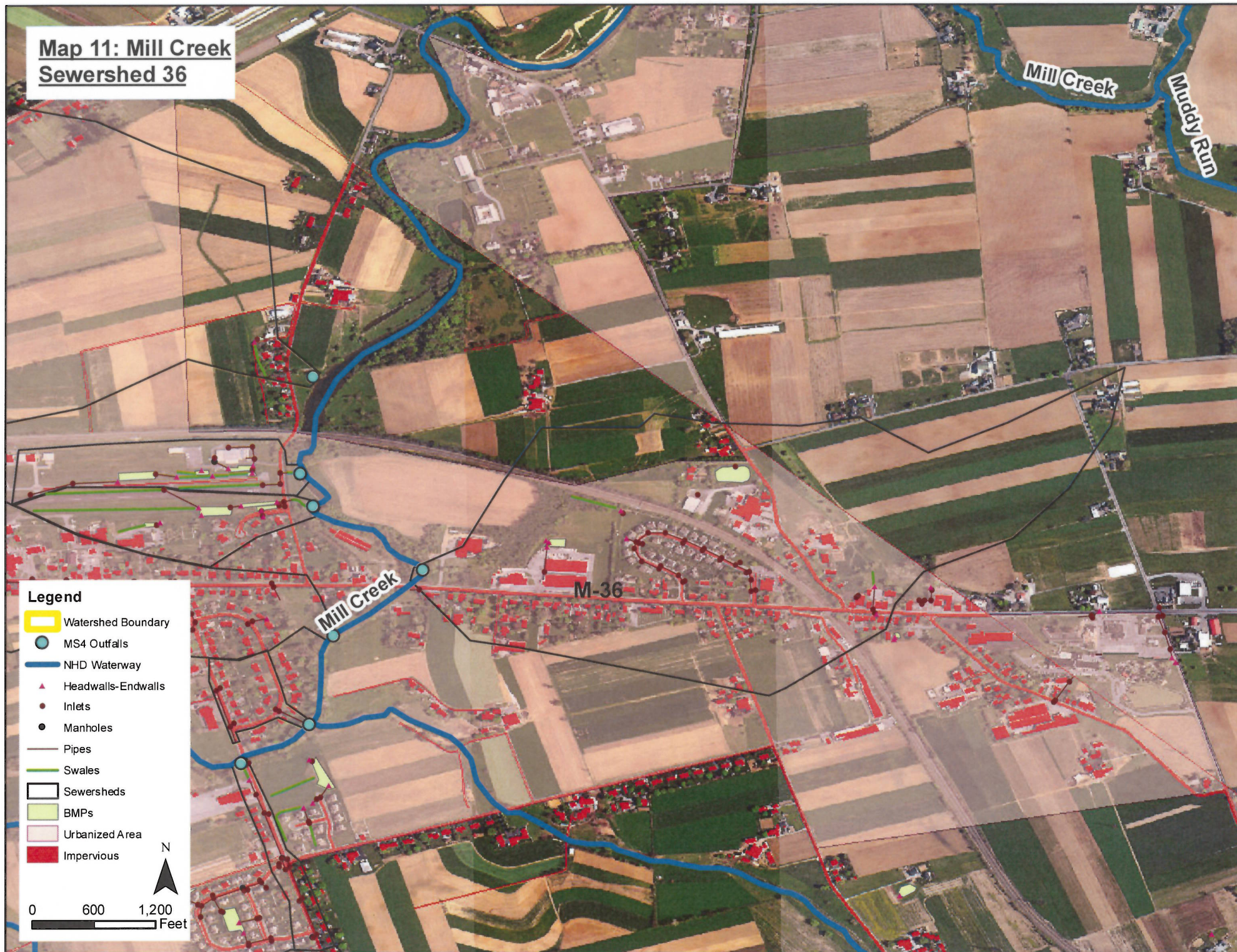
**Map 9: Mill Creek
Sewersheds 26-33**



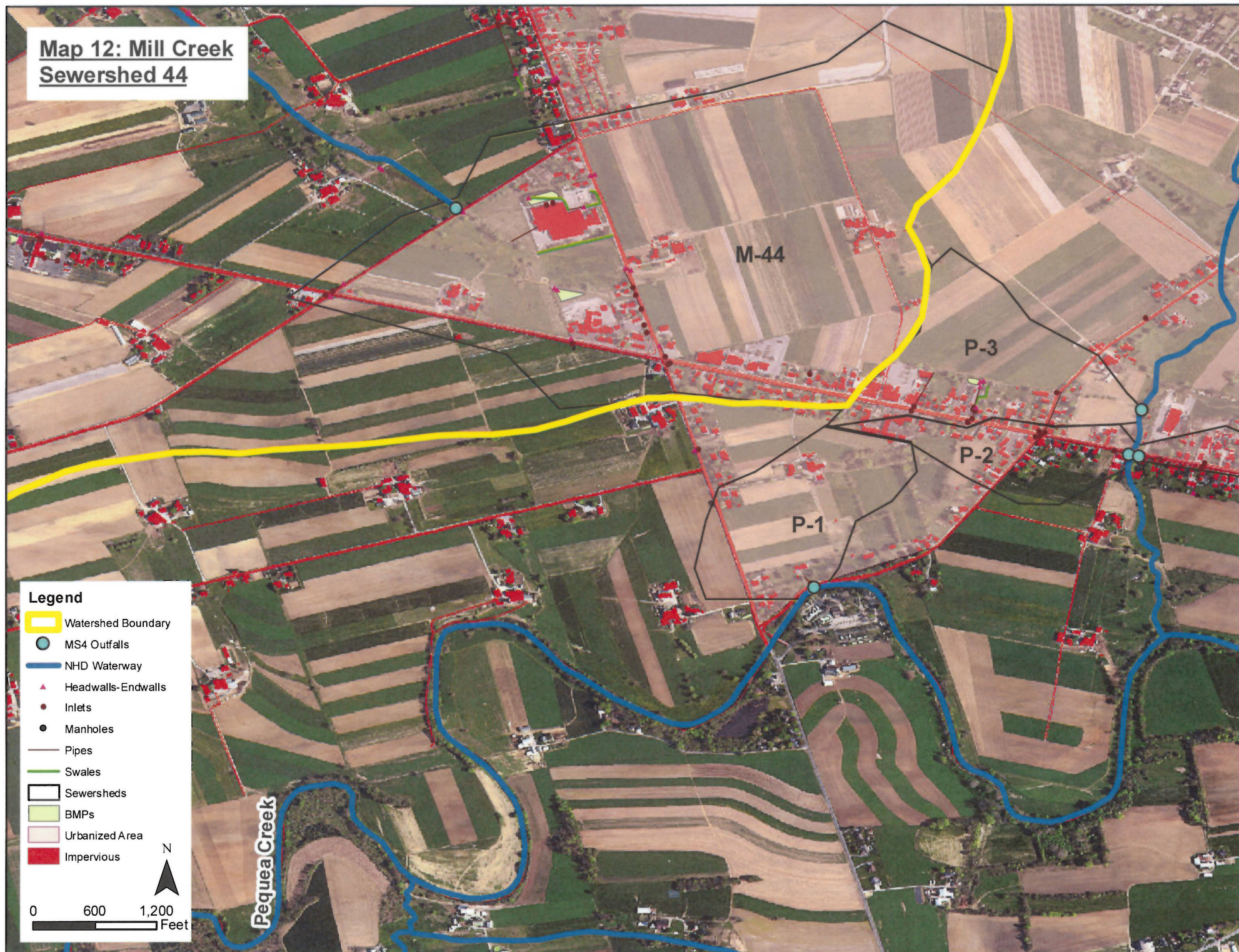
Map 10: Mill Creek Sewersheds 34-42



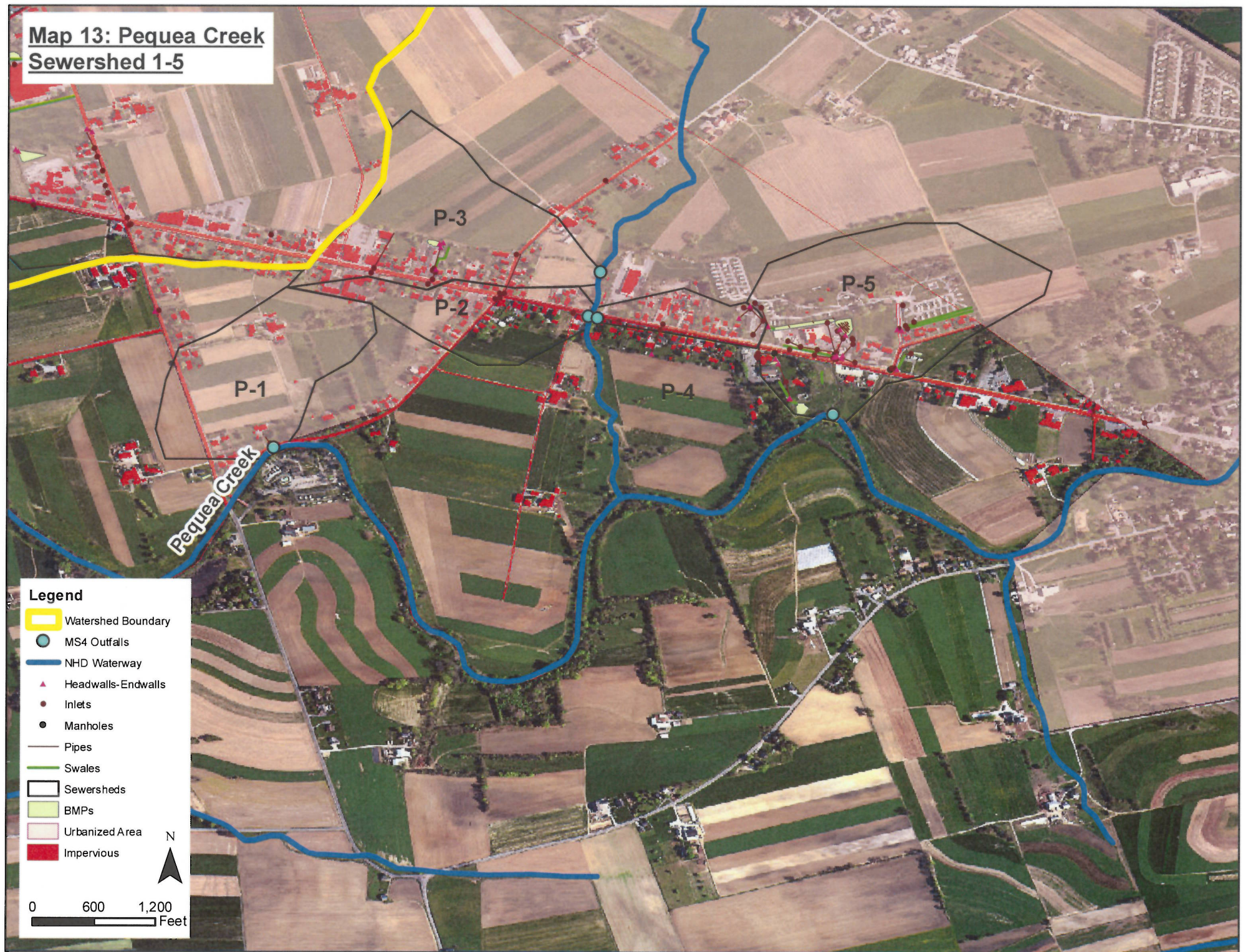
**Map 11: Mill Creek
Sewershed 36**



**Map 12: Mill Creek
Sewershed 44**



Map 13: Pequoa Creek Sewershed 1-5



Section C - Pollutants of Concern:

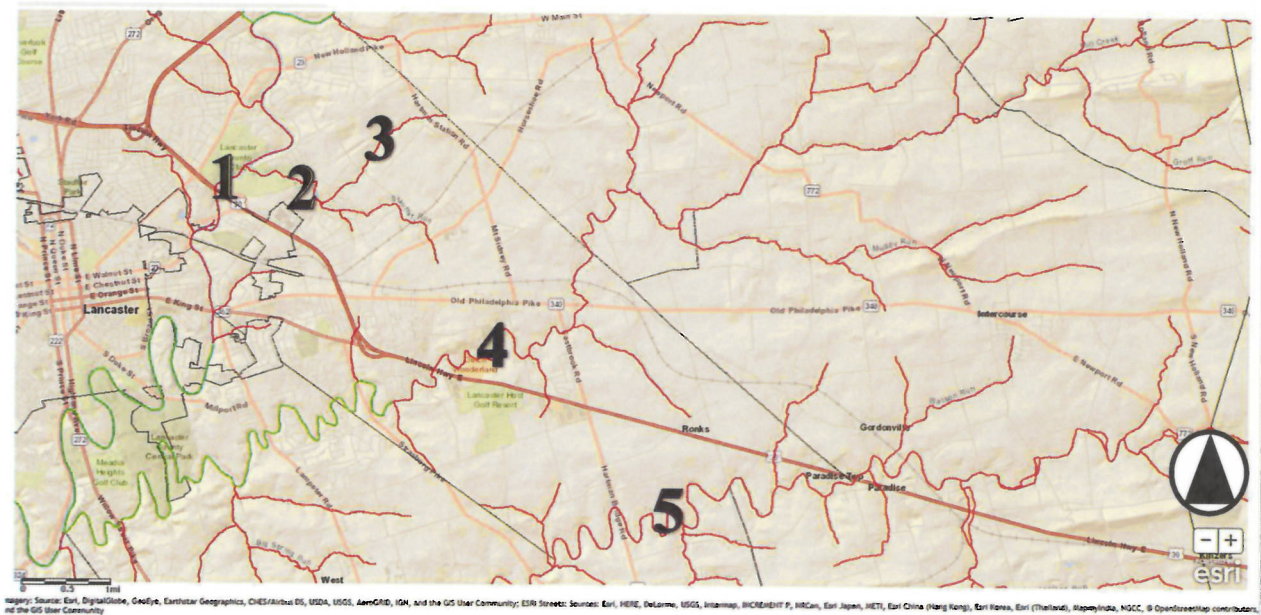


Figure A: eMapPA Impaired Watersheds Map

East Lampeter Township Stream Impairments:

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.

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 was 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.

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).

Figure 4: Overall Loads in East Lampeter Township

	Sediment (lbs)	Phosphorus (lbs)	Nitrogen (lbs)
Conestoga/Mill	5,772,600	8,780.3	94,231.3
Pequea	202,400	372	2,983
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 watersheds, and refer to Figures 7-8 for the parsed out areas within the Pequea Creek watershed.

Figure 5: Conestoga/Mill Creek PennDot Roadway Linear Footages

<u>Roadway</u>	<u>Linear Feet</u>
- 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	46,298 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
- <u>Ronks Rd:</u>	<u>6,458 LF</u>
Total	137,568 LF

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

15' Shoulder	15'	x	137,568 LF	47.37 ac
35' Cartway	35'	x	137,568 LF	110.53 ac
Total				157.9 ac
dev. Open sp.	47.37 ac	x	0.19	9.00 ac
dec. high dens.	110.53 ac	x	0.99	109.42 ac
Impervious	118.42 ac			
Pervious	39.48 ac			
Sediment				
Impervious	1480.43	x	118.42	175,312.52 lbs
Pervious	190.93	x	39.48	7,537.9 lbs
Total				182,850.43 lbs
Phosphorus				
Impervious	1.55	x	118.42	183.55 lbs
Pervious	0.36	x	39.48	14.21 lbs
Total				197.76 lbs
Nitrogen				
Impervious	38.53	x	118.42	4,562.72 lbs
Pervious	22.24	x	39.48	878.03 lbs
Total				5440.75 lbs

Figure 7: Pequea Creek PennDot Roadway Linear Footages

Pequea Creek Watershed:

	<u>Roadway</u>	<u>Linear Feet</u>
-	Route 30	6,185 LF
	Total	6,185 LF

Figure 8: Loads Parsed out of Pequea Creek PennDOT Roads

15' Shoulder	15'	x	6,185 LF	2.12 ac
35' Cartway	35'	x	6,185 LF	4.96 ac
Total				7.08 ac
dev. Open sp.	2.12 ac	x	0.19	0.40 ac
dec. high dens.	4.96 ac	x	0.99	4.91 ac
Impervious	5.31 ac			
Pervious	1.77 ac			
Sediment				
Impervious	1480.43	x	5.31	7,861.08 lbs
Pervious	190.93	x	1.77	337.94 lbs
Total				8199.02 lbs
Phosphorus				
Impervious	1.55	x	5.31	8.23 lbs
Pervious	0.36	x	1.77	0.65 lbs
Total				8.88 lbs
Nitrogen				
Impervious	38.53	x	5.31	204.59 lbs
Pervious	22.24	x	1.77	39.36 lbs
Total				243.95 lbs

Remaining Load to Reduce:

With the baselines calculated, (See Figures 1-4) the PennDot right of ways parsed out (See Figures 5-8), and PA DEP having given East Lampeter Township permission to aggregate the Conestoga River and Mill Creek Watersheds together, (See Appendix A) the following remaining load reductions are required within East Lampeter Township's Watershed planning area:

Conestoga/Mill Creek:

Sediment:

Baseline Load:	5,772,600 lbs. (2,886.3 tons)
Load in PennDot ROW:	<u>182,850.43 lbs</u>
Load Remaining:	5,589,749.6 lbs
10% Reduction:	558,974.96 lbs (279.48 tons)

Phosphorus:

Baseline Load:	8,780.3 lbs.
Load in PennDot ROW:	<u>197.76 lbs</u>
Load Remaining:	8,582.54lbs
5% Reduction:	429.12 lbs

Nitrogen:

Baseline Load:	94,231.3 lbs.
Load in PennDot ROW:	<u>5,440.75 lbs</u>
Load Remaining:	88,790.35 lbs
3% Reduction:	2,663.71 lbs

Pequea Creek:

Sediment:

Baseline Load:	202,400 lbs. (101.2 tons)
Load in PennDot ROW:	<u>8,199.02 lbs</u>
Load Remaining:	194,200 lbs
10% Reduction:	19,420 lbs (9.71 tons)

Phosphorus:

Baseline Load:	372 lbs.
Load in PennDot ROW:	<u>8.88 lbs</u>
Load Remaining:	363.12 lbs
5% Reduction:	18.15 lbs

Nitrogen:

Baseline Load:	2,983 lbs.
Load in PennDot ROW:	<u>243.95lbs</u>
Load Remaining:	2,739.05 lbs
3% Reduction:	82.17 lbs

Section E – Proposed Load Reduction BMPs:

Conestoga/Mill 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 MS4 Permit coverage. The minimum percent reductions outlined by DEP (Department of Environmental Protection) are 10% sediment and 5% phosphorus.

Minimum Sediment Reduction = 558,974.96 lbs (279.48 tons)

Minimum Phosphorus Reduction = 429.12 lbs

The following describes the analysis of BMP's undertaken by East Lampeter Township to reduce sediment and phosphorus loads in the Conestoga and Mill Creek Watersheds.

BMP Option 1: Yearly Inlet Cleaning – Conestoga & Mill Creek

East Lampeter Township participates in yearly inlet cleaning with the assistance of our vacuum truck. Based on the 2016 calendar year, this is a conservative estimate on what we can expect to clean from inlets in the coming years. This has been calculated using the Chesapeake Bay Foundation Expert Panel Report multipliers for sediment and for phosphorus. See calculations below:

Total Sediment loads taken to Frey Farm Landfill:

1. 4.5 tons
2. 5.15 tons
3. 3.97 tons
4. 4.43 tons
5. 4.24 tons

Total: 22.30 tons

Sediment Multiplier's in Chesapeake Bay Foundation Expert Panel Report:

Sediment = 0.7

Organic Matter = 0.2

Average = 0.45

$22.30 \text{ tons} \times 0.45 = 10.03 \text{ tons} / 538 \text{ inlets cleaned} = 0.019 \text{ tons per inlet}$

Sediment:

Conestoga: 240 inlets in watershed $\times 0.019 \text{ tons} = 9,120 \text{ lbs}$

Mill: 265 inlets in watershed $\times 0.019 \text{ tons} = 9,720 \text{ lbs}$

Total: 18,840 lbs

Phosphorus:

Expert Panel Multipliers:

Sediment = 0.0006

Organic Matter = 0.0012

Average = 0.0009

Pequea: 33 inlets/538 = 6.13% of total number of inlets swept

Conestoga: 240 inlets/538 = 44.6 % of total number of inlets swept

Mill: 265 inlets/538 = 49.2 % of total number of inlets swept

Conestoga: 22.30 tons x 0.44 = 9.851 tons, 19,702 lbs

Mill: 22.30 tons x 0.49 = 10.92 tons, 21,854 lbs

Overall Phosphorus Calcs:

Conestoga: 19,702 lbs x 0.0009 = 17.73 lbs

Mill: 21,854 lbs x 0.0009 = 19.66 lbs

Total 37.39 lbs

BMP Option 2: 355 Pitney Road – Riparian Buffer

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 total drainage area to the riparian buffer corridor is 20.83 acres. The DEP Effectiveness Values Table shows the reduction values for riparian buffers are 50% for sediment and 50% for Phosphorus.

Estimated Sediment Load:

Impervious: 3.08 ac x 1480.43 = 4,559.72 lbs.

Pervious: 17.75 ac x 190.93 = 3,389.00 lbs.

Total: 7,948.72 lbs.

Estimated Phosphorus Load:

Impervious: 3.08 ac x 1.55 = 4.77 lbs.

Pervious: 17.75 ac x 0.36 = 6.39 lbs.

Total: 11.16 lbs.

Estimated Reduction in Sediment:

7,948.72 lbs. x 50% = 3,974.36 lbs.

Estimated Reduction in Phosphorus:

11.16 lbs. x 50% = 5.58 lbs

BMP Option 3: Zook/Yoder/Esh - Riparian Buffer

The Township, working with the landowners of the property, is installing a riparian buffer along an unnamed tributary to Stauffer Run which bisects the property. The property is a farm located at the intersection of Greenfield and Willow Roads, across the street from the PA College of Health Sciences. The total drainage area to the riparian buffer corridor is 69.53 acres. The DEP Effectiveness Values Table shows the reduction values for riparian buffers are 50% for sediment and 50% for Phosphorus.

Estimated Sediment Load:

Impervious: $40 \text{ ac} \times 1480.43 = 59,217 \text{ lbs.}$

Pervious: $29.53 \text{ ac} \times 190.93 = 5,638.16 \text{ lbs.}$

Total: 64,855.16 lbs.

Estimated Phosphorus Load:

Impervious: $40 \text{ ac} \times 1.55 = 62 \text{ lbs.}$

Pervious: $29.53 \text{ ac} \times 0.36 = 10.63 \text{ lbs.}$

Total: 72.63 lbs.

Estimated Reduction in Sediment:

$64,855 \text{ lbs.} \times 50\% = 32,427.5 \text{ lbs.}$

Estimated Reduction in Phosphorus:

$72.63 \text{ lbs.} \times 50\% = 36.32 \text{ lbs}$

BMP Option 4: 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 a 1,000 LF section of streambank restoration.

Estimated Reduction in Sediment: $1,000 \text{ LF} \times 115 \text{ lb/ft} = 115,000 \text{ lbs.}$

Estimated Reduction in Phosphorus: $1,000 \text{ LF} \times 0.068 \text{ lb/ft} = 68.0 \text{ lbs}$

BMP Option 5: 2003 Pennwyck Rd – Riparian Buffer

The Township has identified a portion of the property at 2003 Pennwyck Rd., along the Conestoga River as a good candidate for streambank restoration. We are proposing a 35' minimum riparian buffer. The total drainage area to the riparian buffer corridor is 142.8 acres. The DEP Effectiveness Values Table shows the reduction values for riparian buffers are 50% for sediment and 50% for Phosphorus.

Estimated Sediment Load:

Impervious: $18.31 \text{ ac} \times 1480.43 = 27,106.67 \text{ lbs.}$

Pervious: $124.53 \text{ ac} \times 190.93 = 23,776.51 \text{ lbs.}$

Total: 50,883.18 lbs.

Estimated Phosphorus Load:

Impervious: $18.31 \text{ ac} \times 1.55 = 28.38 \text{ lbs.}$

Pervious: $124.53 \text{ ac} \times 0.36 = 44.83 \text{ lbs.}$

Total: 73.21 lbs.

Estimated Reduction in Sediment:

58,883.18 lbs. x 50% = 25,441.59 lbs.

Estimated Reduction in Phosphorus:

73.21 lbs. x 50% = 36.60 lbs

BMP Option 6: HACC Lancaster Campus – Streambank Work

The Township has identified a portion of an unnamed tributary to the Conestoga River on the HACC Lancaster Campus property that is a candidate for some streambank work. We are proposing a 1,410 LF section of restoration.

Estimated Reduction in Sediment: 1,410 LF x 115 lb/ft = 162,150 lbs.

Estimated Reduction in Phosphorus: 1,410 LF x 0.068 lb/ft = 95.88 lbs

BMP Option 7: 2250 Old Phila. Pike: ELT Municipal Campus – Basin Retrofits

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 a project for which East Lampeter has received a DEP Grant to complete. The drainage area to the 4 basins on the municipal 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 and 85% for Phosphorus.

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 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

BMP Option 8: Gibbons Park – Riparian Buffer

The Township has identified a portion of our municipal park property at Gibbons Park at Nolt's Mill, located at 2557 Old Philadelphia Pike and along Millcreek Road, as a good candidate for stream restoration and a riparian buffer. We are proposing a 1,200 LF section of restoration, and equivalent 35' minimum riparian buffer. The total drainage area to the riparian buffer corridor is 49.34 acres. The DEP Effectiveness Values Table shows the reduction values for riparian buffers are 50% for sediment and 50% for Phosphorus.

Estimated Sediment Load:

Impervious: $17.36 \text{ ac} \times 1480.43 = 25,700 \text{ lbs.}$

Pervious: $31.97 \text{ ac} \times 190.93 = 6,104 \text{ lbs.}$

Total: 31,804 lbs.

Estimated Phosphorus Load:

Impervious: $17.36 \text{ ac} \times 1.55 = 26.9 \text{ lbs.}$

Pervious: $31.97 \text{ ac} \times 0.36 = 11.5 \text{ lbs.}$

Total: 38.4 lbs.

Estimated Reduction in Sediment:

$31,804 \text{ lbs.} \times 50\% = 15,902 \text{ lbs.}$

Estimated Reduction in Phosphorus:

$38.4 \text{ lbs.} \times 50\% = 19.2 \text{ lbs}$

BMP Option 9: Gibbons Park – Streambank Work

The Township has identified a portion of our municipal park property at Gibbons Park at Nolt's Mill, located at 2557 Old Philadelphia Pike and Millcreek Road, as a good candidate for stream restoration and a riparian buffer. We are proposing a 1,050 LF section of restoration, and equivalent 35' minimum riparian buffer. The DEP effectiveness value for streambank work is 115 lb/lf in sediment reduction, and 0.068 lb/ft in phosphorus reductions.

Estimated Reduction in Sediment: $1,050 \text{ LF} \times 115 \text{ lb/ft} = 120,750 \text{ lbs.}$

Estimated Reduction in Phosphorus: $1,050 \text{ LF} \times 0.068 \text{ lb/ft} = 71.4 \text{ lbs}$

BMP Option 10: Beiler Property – Riparian Buffer

The Township has identified the Beiler Property, which is a triangular piece of property between N. Cherry Lane, Ronks Road, and State Route 340, as a good potential site for a riparian buffer project. The drainage area to the riparian buffer is approximately 231.6 acres. The DEP BMP effectiveness reduction values for riparian buffers are 50% for sediment and 50% for Phosphorus.

Estimated Sediment Load:

Impervious: $44.4 \text{ ac} \times 1480.43 = 65,731 \text{ lbs.}$

Pervious: $187.5 \text{ ac} \times 190.93 = 33,799 \text{ lbs.}$

Total: 99,530 lbs.

Estimated Phosphorus Load:

Impervious: $44.4 \text{ ac} \times 1.55 = 68.82 \text{ lbs.}$

Pervious: $187.5 \text{ ac} \times 0.36 = 67.5 \text{ lbs.}$

Total: 136.32 lbs.

Estimated Reduction in Sediment:

$99,530 \text{ lbs.} \times 50\% = 49,765 \text{ lbs}$

Estimated Reduction in Phosphorus:
 $136.32 \text{ lbs.} \times 50\% = 68.1 \text{ lbs}$

BMP Alternate: Eastland Dr/Bridgeport - Bioswale

The Township has identified the area behind the homes on North Eastland Drive as an area for a potential bioswale project. This area habitually receives large quantities of water which are not able to be managed by the existing swale and piping that was installed in the 1970's. The total drainage area to the bioswale corridor is 39.59 acres. The DEP effectiveness values table shows reduction values for bioswales are 80% for sediment and 75% for Phosphorus.

Estimated Sediment Load:
Impervious: $17.13 \text{ ac} \times 1480.43 = 25,359.76 \text{ lbs.}$
Pervious: $22.46 \text{ ac} \times 190.93 = 4,288.28 \text{ lbs.}$
Total: 29,648.04 lbs.

Estimated Phosphorus Load:
Impervious: $17.13 \text{ ac} \times 1.55 = 26.55 \text{ lbs.}$
Pervious: $22.46 \text{ ac} \times 0.36 = 8.08 \text{ lbs.}$
Total: 34.63 lbs.

Estimated Reduction in Sediment:
 $29,648.04 \text{ lbs.} \times 80\% = 23,718.43 \text{ lbs.}$

Estimated Reduction in Phosphorus:
 $34.63 \text{ lbs.} \times 75\% = 25.97 \text{ lbs}$

BMP Alternate: 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 and 85% for Phosphorus.

Estimated Sediment Load:
Impervious: $12.06 \text{ ac} \times 1480.43 = 17,853.98 \text{ lbs.}$
Pervious: $39.07 \text{ ac} \times 190.93 = 7,459.63 \text{ lbs.}$
Total: 25,313.61 lbs.

Estimated Phosphorus Load:
Impervious: $12.06 \text{ ac} \times 1.55 = 18.69 \text{ lbs.}$
Pervious: $39.07 \text{ ac} \times 0.36 = 14.06 \text{ lbs.}$
Total: 32.75 lbs.

Estimated Reduction in Sediment:

$25,313.61 \text{ lbs.} \times 90\% = 22,782.24 \text{ lbs}$

Estimated Reduction in Phosphorus:

$32.75 \text{ lbs.} \times 85\% = 27.83 \text{ lbs}$

BMP Alternate: 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.

Estimated Sediment Load:

Impervious: $8.25 \text{ ac} \times 1480.43 = 12,213.54 \text{ lbs.}$

Pervious: $10.73 \text{ ac} \times 190.93 = 2,048.67 \text{ lbs.}$

Total: 14,262.21 lbs.

Estimated Phosphorus Load:

Impervious: $8.25 \text{ ac} \times 1.55 = 12.78 \text{ lbs.}$

Pervious: $10.73 \text{ ac} \times 0.36 = 3.86 \text{ lbs.}$

Total: 16.65 lbs.

Estimated Reduction in Sediment:

$14,262.21 \text{ lbs.} \times 80\% = 11,409.76 \text{ lbs.}$

Estimated Reduction in Phosphorus:

$16.65 \text{ lbs.} \times 75\% = 12.48 \text{ lbs}$

BMP Alternate: 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 and 85% for Phosphorus.

Estimated Sediment Load:

Impervious: $11.23 \text{ ac} \times 1480.43 = 16,625.22 \text{ lbs.}$

Pervious: $8.45 \text{ ac} \times 190.93 = 1,613.35 \text{ lbs.}$

Total: 18,238.57 lbs.

Estimated Phosphorus Load:

Impervious: $11.23 \text{ ac} \times 1.55 = 17.40 \text{ lbs.}$

Pervious: $8.45 \text{ ac} \times 0.36 = 3.04 \text{ lbs.}$

Total: 20.44 lbs.

Estimated Reduction in Sediment:

$$18,238.57 \text{ lbs.} \times 90\% = 16,414.73 \text{ lbs}$$

Estimated Reduction in Phosphorus:

$$20.44 \text{ lbs.} \times 85\% = 17.34 \text{ lbs}$$

BMP Alternate: 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 and 85% for Phosphorus.

Estimated Sediment Load:

$$\text{Impervious: } 0.92 \text{ ac} \times 1480.43 = 1,362 \text{ lbs.}$$

$$\text{Pervious: } 1.25 \text{ ac} \times 190.93 = 239 \text{ lbs.}$$

$$\text{Total: } 1,600.66 \text{ lbs.}$$

Estimated Phosphorus Load:

$$\text{Impervious: } 0.92 \text{ ac} \times 1.55 = 1.42 \text{ lbs.}$$

$$\text{Pervious: } 1.25 \text{ ac} \times 0.36 = 0.45 \text{ lbs.}$$

$$\text{Total: } 1.87 \text{ lbs.}$$

Estimated Reduction in Sediment:

$$1,600.66 \text{ lbs.} \times 90\% = 1,440.59 \text{ lbs}$$

Estimated Reduction in Phosphorus:

$$1.87 \text{ lbs.} \times 85\% = 1.59 \text{ lbs}$$

BMP Alternate: ELT Community Park – Streambank Work

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 stream restoration. We are proposing an 1,875 LF section of restoration, and equivalent 35' minimum riparian buffer. The DEP effectiveness values table shows reductions for streambank work are 115 lb/lf in sediment reduction, and 0.068 lb/ft in phosphorus reductions.

$$\text{Estimated Reduction in Sediment: } 1,875 \text{ LF} \times 115 \text{ lb/ft} = 215,625 \text{ lbs.}$$

$$\text{Estimated Reduction in Phosphorus: } 1,875 \text{ LF} \times 0.068 \text{ lb/ft} = 127.5 \text{ lbs}$$

Figure 9: Proposed Conestoga/Mill Creek BMP Summary:

	Sediment Reduction (lbs/yr)	Phosphorus Reduction (lbs/yr)
Yearly Inlet Cleaning	18,840	37.39
355 Pitney Rd - Buffer	3,974.36	5.58
Zook/Yoder/Esh – Buffer	32,427.5	36.32
Pennwyck Rd – Streambank	115,000	68.0
Pennwyck Rd – Buffer	25,441.59	36.60
HACC – Streambank	162,150	95.88
Municipal Campus- Retrofit	19,280.60	20.96
Gibbons Park – Buffer	15,902	19.2
Gibbons Park – Streambank	120,750	71.4
Beiler Property – Buffer	49,765	68.1
Alt: Rosewood Terr - Retrofit	16,414.73	17.34
Alt: Waterford Drive – Retrofit	22,782.24	27.83
Alt: 50-52 Pitney – Bioswales	11,409.76	12.48
Alt: Bridgeport – Bioswale	23,718.43	25.97
Alt: Community Park - Streambank	215,625	127.5
Alt: Willow Ln – Rain Garden	1,440.59	1.59
Total Required Reductions:	558,974.96	429.12
Total Reductions Proposed*:	563,531.05	459.43
Pounds Over Required Reduction*:	4,556.09	30.31

*Overage does not include alternate BMPs

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 and 5% phosphorus.

Minimum Sediment Reduction = 19,420 lbs (9.71 tons)

Minimum Phosphorus Reduction = 18.15 lbs

The following describes the analysis of BMP's undertaken by East Lampeter Township to reduce sediment and phosphorus loads in the Pequea Creek Watershed.

BMP Option 1: Mill Bridge Camp Resort Streambank Restoration

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. This project is a combined effort that will involve money and time from all 3 municipalities. The total bank restoration project will total 877', but East Lampeter will take credit for a 240' section of the restoration. The DEP streambank sediment reduction value of 115lb/ft and phosphorus reduction value of 0.068 lb/ft were used.

Estimated Reduction in Sediment: $240 \text{ LF} \times 115 \text{ lb/ft} = 27,600 \text{ lbs}$.

Estimated Reduction in Phosphorus: $240 \text{ LF} \times 0.068 \text{ lb/ft} = 16.32 \text{ lbs}$

BMP Option 2: Yearly Inlet Cleaning – Pequea Creek

East Lampeter Township participates in yearly inlet cleaning with the assistance of our vacuum truck. Based on the 2016 calendar year, this is a conservative estimate on what we can expect to clean from inlets in the coming years. This has been calculated using the Chesapeake Bay Foundation Expert Panel Report multipliers for sediment and for phosphorus. See calculations below:

Total Sediment loads taken to Frey Farm Landfill:

6. 4.5 tons
7. 5.15 tons
8. 3.97 tons
9. 4.43 tons
10. 4.24 tons

Total: 22.30 tons

Sediment Multiplier's in Chesapeake Bay Foundation Expert Panel Report:

Sediment = 0.7

Organic Matter = 0.2

Average = 0.45

$22.30 \text{ tons} \times 0.45 = 10.03 \text{ tons} / 538 \text{ inlets cleaned} = 0.019 \text{ tons per inlet}$

Sediment:

Pequea: 33 inlets in watershed x 0.019 tons = 1,254 lbs
 Total: 1,254 lbs

Phosphorus:

Expert Panel Multipliers:

Sediment = 0.0006

Organic Matter = 0.0012

Average = 0.0009

Pequea: 33 inlets/538 = 6.13% of total inlets cleaned

Conestoga: 240 inlets/538 = 44.6 % of total inlets cleaned

Mill: 265 inlets/538 = 49.2 % of total inlets cleaned

Pequea: 22.30 tons x 0.0613 = 1.36 tons, 2,720 lbs

Overall Phosphorus Calcs:

Pequea: 2,720 lbs x 0.0009 = 2.44 lbs

Total 2.44 lbs

Figure 10: Proposed Pequea Creek BMP Summary:

	Sediment Reduction (lbs/yr)	Phosphorus Reduction (lbs/yr)
Yearly Inlet Cleaning	1,254	2.44
Mill Bridge Camp - Streambank	27,600	16.32
Total Required Reductions:	19,420	18.15
Total Reductions Proposed*:	28,854	18.76
Pounds Over Required Reduction*:	9,434	0.61

*Does not include alternate BMPs

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.

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. The bulk of funding for the projects will be handled by East Lampeter Township and private entities. East Lampeter Township is also exploring the potential for enacting a Township Stormwater Authority to defray some of the costs of these proposed BMPs and for future MS4 permit cycles.

Figure 11: Funding Chart: BMP Cost Estimates:

	Low	High	Average	Funding
Conestoga/Mill Creek Projects				
355 Pitney Road Riparian Buffer	0	0	0	Private-Developer
Zook/Yoder/Esh – Riparian Buffer	0	0	0	Private-Developer
ELT Campus – Basins	26,875	26,875	26,875	DEP Grant/Municipal
Beiler Prop Buffer – 1.38 ac	0	0	0	Private/Grant
Pennwyck– Streambank – 1000LF	240,000	360,000	300,000	Municipal/Grant
Pennwyck Rd – Buffer – 0.92 ac	2,340	4,916	2,800	Municipal/Private
Gibbons Pk – Streambank – 1050LF	252,000	378,000	315,000	Municipal/Grant
Gibbons Pk – Buffer – 0.96 ac	2,420	5,108	3,764	Municipal/Grant
HACC Streambank – 1,410 LF	338,400	507,600	423,000	Municipal/Private
Alt: Rosewd. Terr. – Basin – 0.61 ac	85,400	122,000	103,700	Municipal/Private
Alt: Waterford Dr Basin – 0.33 ac	46,200	66,000	56,100	Municipal/Grant
Alt: Eastland Dr Bioswale - 900 LF	216,000	324,000	270,000	Municipal/Private
Alt: Willow Lane – RG – 0.06 ac	8,400	12,000	10,200	Municipal
Alt: Pitney Rd Bioswales – 820 LF	196,800	295,200	246,000	Municipal/Private
Alt: Comm. Park – Stream –1875LF	450,000	675,000	562,500	Municipal
Pequea Creek Projects				
Mill Bridge Streambank – 240 LF	50,000	50,000	50,000	DEP Grant/Municipal
Totals				
Total Cost (not including alternates)	\$912,035	1,332,499	1,121,439	
Yearly Cost (not including alternates)	\$182,400	266,499	224,287	

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

Operation and maintenance for the BMP's proposed will be broken into 2 categories:

- Maintenance of Bioretention, Biofiltration, and Tree Filter Systems
- Maintenance of Stream Channel and Streambank Projects

The first category will include any Bioswales, Riparian Buffers, Stormwater Basin Retrofits, and Rain Gardens (see Figure 12). The second category will strictly be streambank restoration and floodplain restoration (See Figure 13).

Bioswales, Riparian Buffers, Stormwater Basin Retrofits:

The following BMP's will be maintained by East Lampeter Township for a period of time not to exceed 3 years. After that initial 3 year maintenance period, the Township will work with the landowners to train them in the maintenance of the BMPs. 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: (alternates listed in red)

- 355 Pitney Rd: Property Owner, High Steel.
- Zook/Yoder/Esh: Property Owner, High Steel.
- Pennwyck Rd Buffer – Alan Tate – 1740 New Holland Pike
- ELT Campus Basins – East Lampeter Township Public Works
- Gibbons Park Buffer – East Lampeter Township Public Works
- Beiler Property Buffer – Property Owner, John Beiler

- *Rosewood Terrace Basin – Property Owner, SK Limited Partnership
- *Willow Lane Rain Garden – East Lampeter Township Public Works
- *Eastland Drive Bioswale –
 - o Property Owners at:
 - 60 Greenfield Rd – Singh Baljeet
 - 56 Greenfield Rd – Singh Baljeet
 - 48 N Eastland Dr – Romaine Geib
 - 38 N Eastland Dr – Chester Stoltzfoos
 - 34 N Eastland Dr - Linda Creamer
 - 32 N Eastland Dr – Bob & Caroline Dye
 - 30 N Eastland Dr – Matthew Hunt
- *Pitney Rd Bioswales
 - o Property Owners at
 - 52 Pitney Rd – Omar Zook
 - 54 Pitney Rd – George & Peggy Stiffel
 - 40 Pitney Rd – Melvin Weaver
- *Waterford Drive Basin – Robert & Beth Gillio, 2141 Waterford Dr

Figure 12: Bioretention/Biofiltration/Tree Filter Maintenance

Frequency	Activity
After Each 2-year Storm for first 4 months, then biannually	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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:

The following BMP's will be maintained by East Lampeter Township for a period of time not to exceed 3 years. After that initial 3 year maintenance period, the Township will work with the landowners to train them in the maintenance of the BMPs. After the 4th year, after that time the parties listed below will be responsible for maintenance activities in accordance with the frequency and activities listed on Figure 13:

- 2003 Pennwyck Rd - Streambank Restoration – Property Owner, Alan Tate, 1740 New Holland Pike
- HACC Streambank Restoration – Harrisburg Area Community College Maintenance Dept.
- Mill Bridge Camp Resort Streambank Restoration- Brian Kopan/East Lampeter Township Public Works

Figure 13: Stream Channel and Streambank Project Maintenance

Frequency	Activity
Every 2 weeks for the first 2 months	<ul style="list-style-type: none"> - Repair eroded areas & replant - Maintain/Control weeds and invasives - 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	<ul style="list-style-type: none"> - 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 invasives
Biannually from 12 months to 2.5 years	<ul style="list-style-type: none"> - 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 invasives
Yearly after 3 years	<ul style="list-style-type: none"> - 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 invasives

Section H – Works Cited

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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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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
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