MS4 Pollution Reduction Plan (PRP)

Bern Township

August 2, 2017

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Prepared for: Bern Township
1069 Old Bernville Road
Reading PA 19605

August 2, 2017

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SSM File 107990.0140

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Bern Township

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GENERAL DESCRIPTION

Bern Township (the MS4) is located in Berks County, Pennsylvania immediately west of the City of Reading and consists of primarily rural residential with a mix of agricultural land uses. The Urbanized Area (UA) from the 2010 census does not cover the entire Township and extends outward from the City, across the Reading Regional Airport Authority (RRAA) property and further into the Township. A second portion of the UA extends into the northern portion of the Township and is an extension of the UA from the Borough of Leesport and Center Township (The Hamburg UA) municipalities. The extents of the UA are shown on Map #1. All maps associated with this document may be found in Appendix B.

Geographically, the Township is bound by two primary water sources, the Schuylkill River and the Tulpehocken Creek.

WATERSHEDS AND IMPAIRMENTS

There are three primary watersheds within the Township and a fourth secondary watershed identified by the Pennsylvania Department of Environmental Protection (PaDEP) in the requirements table (Appendix A of this document) that are impaired or have sub watersheds that are impaired. The overall watersheds are shown on Map #2. Their names and impairments are:

Impaired Downstream Waters Name	**Impairment**	**Applicable PaDEP Permit Appendix**
Unnamed Tributaries to Plum Creek[1]	Pesticides	C
Tulpehocken Creek	Nutrients	E
Schuylkill River	PCB	C
Irish Creek	Siltation	E
Unnamed Tributaries to Schuylkill River	Nutrients and Siltation	E

[1]Plum Creek is a tributary to Tulpehocken Creek

PaDEP requires that the MS4 address each impairment in accordance with the appendix noted. Appendix C requires that the MS4 "Map and Inventory" all suspected and known sources of the impairment within the drainage area of *outfalls* and identify if they are suspected or known, the basis for this determination, the responsible party (if known), and any corrective action the permittee has taken or plans to take for any of these sources. The inventory shall be submitted to PaDEP with an annual MS4 Status Report due no later than September 30, 2020.

For those impairments that require the Township to address impairments of Nutrients and/or Sediment (Siltation), the MS4 is required to prepare a Pollution Reduction Plan (PRP) that demonstrates that the pollutant reduction(s) (lbs/year) proposed in the PRP have been achieved within 5 years following the PaDEP's approval of coverage under the General Permit. Nutrients shall be reduced by 5% and Sediments shall be reduced by 10%. In order to achieve a 5% reduction in nutrients, the PaDEP considers this requirement to be met if the MS4 reduces sediments by 10%. The following pollution reduction plan demonstrates that Bern Township will reduce sediments by 10% in accordance with the General Permit requirements.

POLLUTION REDUCTION PLAN (PRP)

1. Mapping Sewersheds

As required by the original permit, Bern Township had mapped their entire storm sewer system prior to the current permit renewal. In order to meet the requirements of the permit renewal for load reductions, efficiently map sewersheds, and provide a PRP that identifies Best Management Practices (BMPs) that can meet the required 10% sediment reductions, the Township has taken a very systematic approach to delineating storm sewersheds.

The overall storm sewersheds were delineated first, parsing out areas not within the UA as well as areas not within the impaired watershed and only upstream of the lowest outfall. These maps were not finalized nor were existing loading calculations finalized until the Township, along with its engineer, identified potential areas for BMPs. One of the most efficient and cost effective means to address sediment reduction is through the conversion of conventional detention basins to extended detention wet basins or naturalized basins that more efficiently remove pollutants. Cost efficiency can be greater if the Township already owns the basins. Unfortunately, the preliminary sewersheds do not contain a detention basin that is readily available for conversion. The only basin potentially available is located in the Tulpehocken Creek watershed and on the Reading Regional Airport Authority (RRAA) property along PA Route 183 and since the RRAA has its own NPDES permit, it was determined that it was better to parse this out and thus reduce existing loading. Then, the Township identified prime areas to place BMPs and based on their locations refined storm sewersheds. However, in many instances, where multiple storm sewersheds are adjacent to each other the storm sewershed was delineated as one when it was known that BMPs were not likely to be placed in those sewersheds. This saved time and costs of delineating multiple sewersheds and their individual loadings when only their cumulative loading was needed. The final planning areas may be found on Map #3 and the overall storm sewer is shown on Map #4.

Tulpehocken Creek Watershed

The Township has identified an area (within the right-of-way) in which a BMP (a rain garden/filter) could be constructed. The area is located at the southwest portion of the intersection of Mayo Dr. and Fisher Rd. (identified incorrectly as W. Apron Rd on GoogleMaps). The area was developed prior to the 1970s and a storm sewer piping system was not constructed. Storm water throughout the development is conveyed via gutter flow. The proposed BMP will likely consist of a trench drain across the roadway to intercept runoff and convey it to a rain garden immediately downstream of it where it is treated and then released (see photograph 1, below) and Map #5.

Photo #1

Schuylkill River Watershed

The Township has identified another area (within the right-of-way) in which a BMP (a rain garden/filter) could be constructed. The area is located at the southwest corner of the intersection of Snyder Dr. and Grange Rd. This BMP would be similar to the BMP for the Tulpehocken Creek and would include a rain garden/filter within the existing swale along Snyder Dr. (see photograph #2, below) and Map #6.

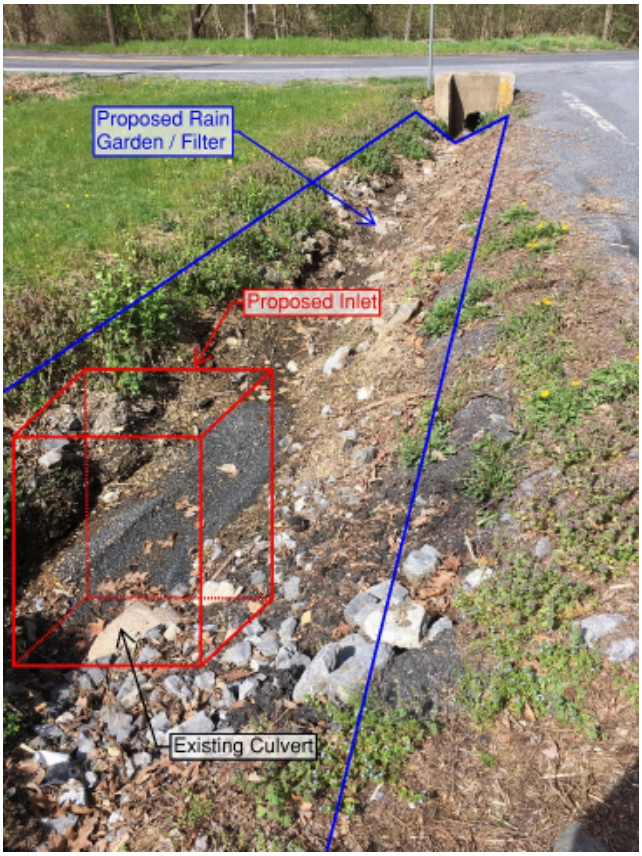


Photo #2

Irish Creek Watershed

This watershed consists of primarily country roads with culverts that allow runoff to pass from one side of the road to the other. The Township has identified these as outfalls, but respectfully requests clarification of the identification of these, as it is believed that these are not MS4 outfalls. If the PaDEP confirms this, then there are no outfalls in the Irish Creek watershed and BMPs are not required. However, if PaDEP does identify these as outfalls, an infiltration/filtering swale will be constructed within the right-of-way on the upstream side of outfall #16 or #20 on Map #6. Only one of these BMPs must be constructed in order to meet the 10% reduction requirements for this watershed. The BMP would consist of installing an inlet at the upstream end of the culvert and underdrain pipes within the road side swales with amended soil above them to filter the runoff.

2. Existing Loading and Reduction Calculations

The Township Engineer chose to use the simplified method (excel spreadsheet) for the calculations. The data source for the impervious and pervious areas were developed from the 2011 National Land Cover Database (NLCD 2011). The BMP effectiveness utilized in this analyses are taken from the PaDEP BMP Effectiveness Values Table document 3800-PM-BCW0100m.

Tulpehocken Creek Watershed

Planning Area	Land Cover	Total Area (Ac)	Percent Total Area	Percent Impervious	Impervious Area (Ac)	Pervious Area (Ac)
T.1	Developed, Open Space	7.22	52.31%	19%	1.37	5.85
	Developed, Low Intensity	3.19	23.08%	49%	1.56	1.62
	Developed, Medium Intensity	2.55	18.46%	79%	2.01	0.54
	Developed, High Intensity	0.64	4.62%	100%	0.64	0.00
	Pasture/Hay	0.21	1.54%	0%	0.00	0.21
Total		**13.80**			**5.58**	**8.22**
T.2	Developed, Open Space	9.48	35.11%	19%	1.80	7.68
	Developed, Low Intensity	5.36	19.85%	49%	2.63	2.73
	Developed, Medium Intensity	3.09	11.45%	79%	2.44	0.65
	Developed, High Intensity	0.82	3.05%	100%	0.82	0.00
	Deciduous Forest	0.82	3.05%	0%	0.00	0.82
	Pasture/Hay	7.42	27.48%	0%	0.00	7.42
Total		**27.01**			**7.70**	**19.31**
T.3	Developed, Open Space	21.56	38.89%	19%	4.10	17.46
	Developed, Low Intensity	21.35	38.52%	49%	10.46	10.89
	Developed, Medium Intensity	2.87	5.19%	79%	2.27	0.60
	Deciduous Forest	1.23	2.22%	0%	0.00	1.23
	Pasture/Hay	8.21	14.81%	0%	0.00	8.21
	Cultivated Crops	0.21	0.37%	0%	0.00	0.21
Total		**55.44**			**16.83**	**38.61**
T.4	Developed, Open Space	146.02	82.47%	19%	27.74	118.28
	Developed, Low Intensity	20.33	11.48%	49%	9.96	10.37
	Developed, Medium Intensity	0.22	0.12%	79%	0.17	0.05
	Deciduous Forest	8.96	5.06%	0%	0.00	8.96
	Emergent Herbaceous Wetlands	1.53	0.86%	0%	0.00	1.53
Total		**177.06**			**37.88**	**139.18**
Tulpehocken Creek Total		**273.31**			**67.99**	**205.32**

Land Cover	Area (Ac)	Loading Rate (lbs/ac/yr)	Sediment Loading (lbs/yr)	Required Sediment Reduction (lbs/yr) (10%)
Impervious	67.99	1925.79	130930.16	
Pervious	205.32	264.29	54264.72	
	273.31		**185195**	**18519**

Tulpehocken Creek Existing Sediment Loading and Required Sediment Reduction

Tulpehocken Creek BMP Design

Planning Area	Outfall	Land Cover	Total Area (Ac)	Percent Total Area	Percent Impervious	Impervious Area (Ac)	Pervious Area (Ac)
T.3.BMP	30	Developed, Open Space	16.63	41.71%	19%	3.16	13.47
		Developed, Low Intensity	14.71	36.90%	49%	7.21	7.50
		Developed, Medium Intensity	0.85	2.14%	79%	0.67	0.18
		Pasture/Hay	7.46	18.72%	0%	0.00	7.46
		Cultivated Crops	0.21	0.53%	0%	0.00	0.21
Total			**39.86**			**11.04**	**28.82**

Land Cover	Area (Ac)	Loading Rate (lbs/ac/yr)	Sediment Loading (lbs/yr)	Sediment Reduction (lbs/yr) (80%)[1]
Impervious	11.04	1925.79	21261.38	
Pervious	28.82	264.29	7617.74	
	39.86		**28879**	**23103**

T.3.BMP Existing Sediment Loading
[1]Effectiveness value is filtering practice taken from the PaDEP BMP Effectiveness Values Table document 3800-PM-BCW0100m

Conclusion: The removal of 23,103 lbs/yr by the BMP is greater than the 10% reduction requirement (18,519 lbs/year) and therefore the design meets the permit requirements for this watershed.

Schuylkill River Watershed

Planning Area	Land Cover	Total Area (Ac)	Percent Total Area	Percent Impervious	Impervious Area (Ac)	Pervious Area (Ac)
S.1	Deciduous Forest	0.18	0.99%	0%	0.00	0.18
	Developed, Low Intensity	7.57	42.03%	49%	3.71	3.86
	Developed, Medium Intensity	0.38	2.10%	79%	0.30	0.08
	Developed, Open Space	4.99	27.67%	19%	0.95	4.04
	Pasture/Hay	4.90	27.21%	0%	0.00	4.90
Total		**18.02**			**4.96**	**13.06**
S.2	Pasture/Hay	2.55	100.00%	0%	0.00	2.55
Total		**2.55**			**0.00**	**2.55**

S.3	Developed, Open Space	42.28	30.78%	19%	8.03	34.25
	Developed, Low Intensity	14.90	10.85%	49%	7.30	7.60
	Developed, Medium Intensity	0.44	0.32%	79%	0.35	0.09
	Deciduous Forest	25.63	18.66%	0%	0.00	25.63
	Evergreen Forest	1.10	0.80%	0%	0.00	1.10
	Pasture/Hay	37.68	27.43%	0%	0.00	37.68
	Cultivated Crops	15.34	11.16%	0%	0.00	15.34
Total		**137.37**			**15.68**	**121.69**
Schuylkill River Total		**157.93**			**20.64**	**137.30**

Land Cover	Area (Ac)	Loading Rate (lbs/ac/yr)	Sediment Loading (lbs/yr)	Required Sediment Reduction (lbs/yr) (10%)
Impervious	20.64	1925.79	39744.71	
Pervious	137.30	264.29	36285.98	
	157.93		**76031**	**7603**

Schuylkill River Existing Sediment Loading and Required Sediment Reduction

Schuylkill River BMP Design

Planning Area	Outfall	Land Cover	Total Area (Ac)	Percent Total Area	Percent Impervious	Impervious Area (Ac)	Pervious Area (Ac)
S.3.BMP	29	Developed, Open Space	19.95	59.51%	19%	3.79	16.16
		Developed, Low Intensity	2.26	6.75%	49%	1.11	1.15
		Developed, Medium Intensity	0.21	0.61%	79%	0.16	0.04
		Deciduous Forest	2.26	6.75%	0%	0.00	2.26
		Pasture/Hay	8.84	26.38%	0%	0.00	8.84
Total			**33.52**			**5.06**	**28.46**

Land Cover	Area (Ac)	Loading Rate (lbs/ac/yr)	Sediment Loading (lbs/yr)	Sediment Reduction (lbs/yr) (80%)[1]
Impervious	5.06	1925.79	9747.64	
Pervious	28.46	264.29	7522.54	
	33.52		**17270**	**13816**

S.3.BMP Existing Sediment Loading
[1]Effectiveness value is filtering practice taken from the PaDEP BMP Effectiveness Values Table document 3800-PM-BCW0100m

Conclusion: The removal of 13,816 lbs/yr by the BMP is greater than the 10% reduction requirement (7,603 lbs/year) and therefore the design meets the permit requirements for this watershed.

Irish Creek Watershed

Planning Area	Land Cover	Total Area (Ac)	Percent Total Area	Percent Impervious	Impervious Area (Ac)	Pervious Area (Ac)
I.1	Developed, Open Space	2.27	40.74%	19%	0.43	1.84
	Developed, Low Intensity	0.62	11.11%	49%	0.30	0.32
	Pasture/Hay	2.07	37.04%	0%	0.00	2.07
	Cultivated Crops	0.62	11.11%	0%	0.00	0.62
Total		**5.58**			**0.74**	**4.84**
I.2	Cultivated Crops	1.74	6.38%	0%	0.00	1.74
	Deciduous Forest	2.08	7.64%	0%	0.00	2.08
	Developed, Low Intensity	2.80	10.29%	49%	1.37	1.43
	Developed, Open Space	7.58	27.85%	19%	1.44	6.14
	Pasture/Hay	13.02	47.84%	0%	0.00	13.02
Total		**27.21**			**2.81**	**24.40**
Irish Creek Total[1]		**32.79**			**3.55**	**29.24**

[1]Note: The total represents all drainage areas to all of the outfalls shown on the maps.

Land Cover	Area (Ac)	Loading Rate (lbs/ac/yr)	Sediment Loading (lbs/yr)	Required Sediment Reduction (lbs/yr) (10%)
Impervious	3.55	1925.79	6829.92	
Pervious	29.24	264.29	7727.46	
	32.79		**14557**	**1456**

Irish Creek Existing Sediment Loading and Required Sediment Reduction

Irish Creek BMP Design

Land Cover	Area (Ac)	Loading Rate (lbs/ac/yr)	Sediment Loading (lbs/yr)	Sediment Reduction (lbs/yr) (80%)[1]
Impervious	1.65	1925.79	3183.76	
Pervious	7.37	264.29	1947.27	
	9.02		**5131**	**4105**

Outfall 20 Existing Sediment Loading
[1]Effectiveness value is filtering practice taken from the PaDEP BMP Effectiveness Values Table document 3800-PM-BCW0100m

OR

Land Cover	Area (Ac)	Loading Rate (lbs/ac/yr)	Sediment Loading (lbs/yr)	Sediment Reduction (lbs/yr) (80%)[1]
Impervious	0.68	1925.79	1309.80	
Pervious	9.37	264.29	2476.98	
	10.05		**3787**	**3029**

Outfall 16 Existing Sediment Loading
[1]Effectiveness value is filtering practice taken from the PaDEP BMP Effectiveness Values Table document 3800-PM-BCW0100m

Conclusion: The removal of 4,105 or 3,029 lbs/yr by the BMP is greater than the 10% reduction requirement (1,456 lbs/year) and therefore the design meets the permit requirements for this watershed.

BMP INSTALLATION AND FINANCING PLAN

Background

Bern Township realizes the importance to establish a designed infrastructure to reduce pollution being transmitted to our waterways and, even more importantly, properly plan for the installation of such facilities, including how to finance the costs of these installations. A proper sequencing plan of installations and a pro-active financing plan increase the potential for success to accomplish our goals of reducing our waterway pollution.

Bern Township has identified three sites for BMP (Best Management Practice) facility installations. The first location is at one of either two locations along Ziegler Road, between Center Road and Fairview Drive, or along Butter Lane. Either location will be the same type of BMP and will satisfy the PRP requirements. This location is identified as the Irish Creek location. The second location is at Snyder Road immediately adjacent to Grange Road. This location is identified as the Schuylkill River location. The third and final location is at Mayo Drive and Fisher Road. This location is identified as the Tulpehocken River location. Preliminary designs have been completed for the three BMP facility locations.

After the completion of the facility design, a comprehensive material list must be created and evaluated for pricing purposes of each facility. The types of material needs are recognized, catalog cut information is secured for those materials to develop minimum quantity requirements and the proper sequencing of the work. This task has also been completed for the three BMP facilities.

Bern Township is a community that has significant tax exempt landholdings. Therefore, the municipality must take the time and effort to carefully plan expenditures so as not to overextend resources in any given year. Bern Township currently has a number of physical plant challenges as any municipality may have. These challenges range from old vehicles that staff continues to use to the building envelope challenges of our campus. The additional physical plant demands of the BMP facilities must be managed in harmony with the township's other physical plant demands.

The township has completed the cost estimates of each BMP facility. If the township were inclined to hire an outside contractor to install all three facilities at one time, the estimated cost is $85,000, including engineering and permitting. Unfortunately, the township does not have the financial resources to implement that type of program. Therefore, the township completed the cost estimate to install the BMP facilities using in-house staff, more specifically the five person crew of the Bern Township Road Department. While having the road department construct these facilities will save labor cost (as the department members will be paid to be here whether installing these facilities or not), the time involved with the installation will detract the department members from other duties.

The total construction and engineering/permitting cost using in-house staff is estimated to be $54,000. Inspections will be conducted on a routine basis after major storm events (a minimum of once every 3 months) and yearly by someone familiar with the construction and maintenance of these types of facilities (e.g. engineer or similar professional). The Township will own and maintain the BMP in accordance with proper BMP maintenance protocols. The estimated annual maintenance costs for all three facilities if the Township were to publically bid the work would be approximately $2,500. However, whereas the Township staff will be constructing the facilities, they too will be able to maintain them. Therefore, the estimated cost is only $1,500.

1. Goal

The goal of the Bern Township BMP Installation and Financing Plan is to lay out a specific set of criteria to install and finance our Best Management Practice sites to achieve measurable milestones and goals. This set of specific criteria shall be kept simple for continuity purposes with any staff changes yet detailed enough to provide accountability by the township. The program shall be arranged to allow some flexibility in the event of extenuating circumstances taking place outside of the Bern Township Pollution Reduction Plan that may conflict with or impact the ability to implement this plan.

2. Strategies to Achieve Measurable Goals

The next MS4 Permit period will contain five years from March 16, 2018 through March 15, 2023. This allows time for the township to plan, prepare, secure material and arrange financing to complete the three required BMP facilities within the five year period. Obviously, due to the nature of the work, these BMP facilities will need to be constructed during suitable weather conditions free from freezing temperatures.

3. Timing of Projects

Each of the three BMP facility projects will likely be installed in separate years to minimize the overall financial impact to the township in any given year. However, all BMPs will be installed and functioning by the end of the permit period.

No BMP facilities will be installed in the first year of the permit cycle. This will allow the township to properly prepare for the projects, secure material and adjust for any design modifications. This one year period will also allow the township to reinforce the financial planning of these projects.

Although it is likely that the facilities will be constructed one each in consecutive years from 2019 to 2021, Bern Township is only committing to have the three facilities constructed and functioning by the end of the permit period.

4. Method of Installation

To save contractor's labor costs, mark-ups, overhead and mobilization costs, the township will install these facilities utilizing the Bern Township Road Department five crew member staff.

5. Financing

It is currently anticipated that all material, labor and equipment costs associated with the installation of these facilities will be paid for through the Bern Township General Fund. This will allow the BMP facilities to be financially supported without compromising the Capital Improvement Plan financing program that the township has in place. However, the Township will consider other options should they become available (e.g. grants, volunteers, etc.) or if they deem other methods (e.g. stormwater fee, etc.) to be a better means to finance these projects.

The General Fund Chart of Accounts shall include section 446.000 for the BMP facility installations.

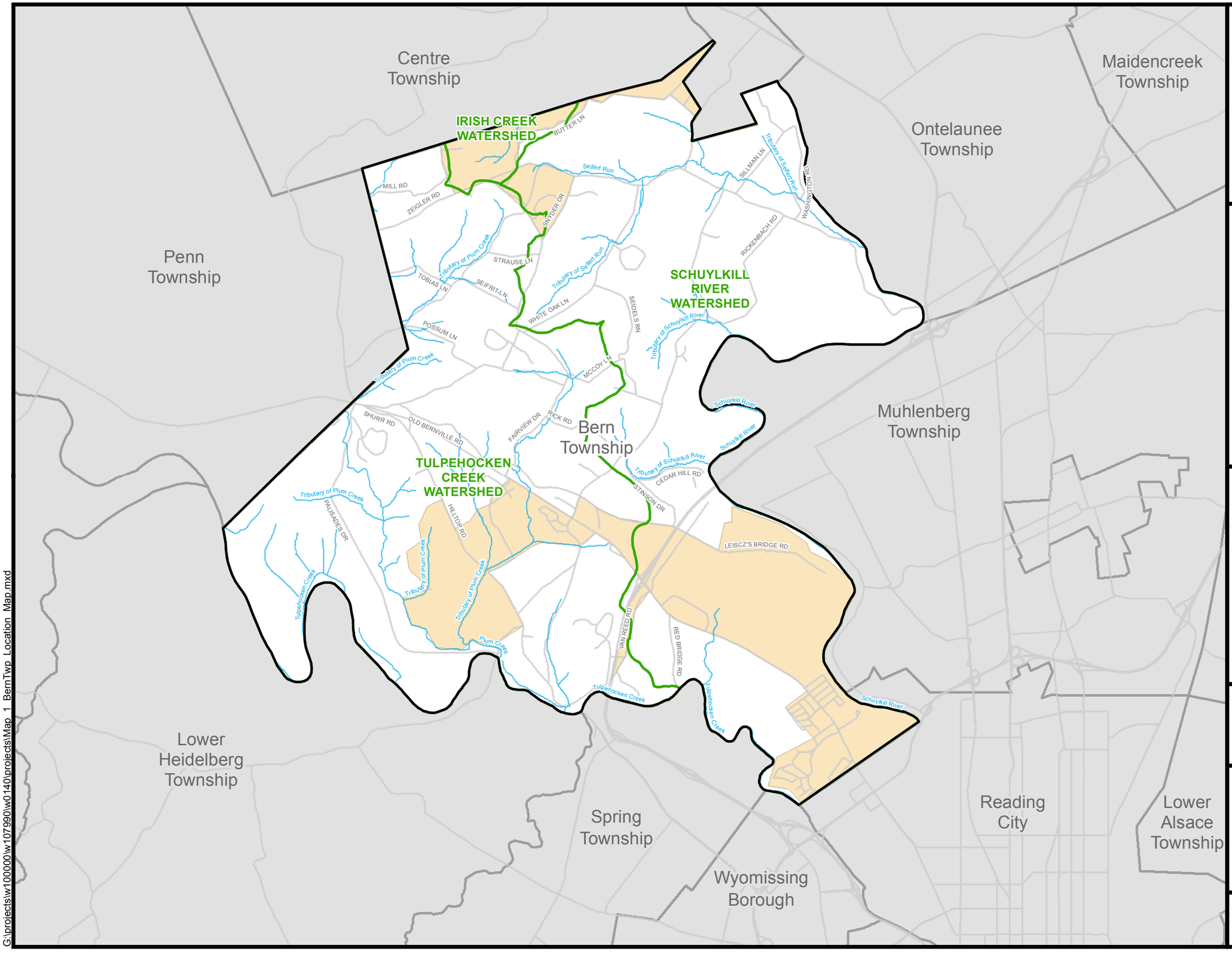
Appendix A

Pennsylvania Department of Environmental Protection (PaDEP) Requirements Table

MS4 Name	NPDES ID	Individual Permit Required?	Reason	Impaired Downstream Waters or Applicable TMDL Name	Requirement(s)	Other Cause(s) of Impairment
Berks County						
ALSACE TWP	PAG133501	No		Schuylkill River	Appendix C-PCB (4a)	
				Unnamed Tributaries to Schuylkill River		Other Habitat Alterations, Water/Flow Variability (4c), TDS (4a)
				Laurel Run	Appendix E-Siltation (5)	Other Habitat Alterations (4c)
				Bernhart Creek		TDS (4a)
				Antietam Creek	Appendix B-Pathogens (5)	
AMITY TWP	PAG133511	No		Unnamed Tributaries to Schuylkill River		Cause Unknown (5)
				Schuylkill River	Appendix C-PCB (4a)	
				Schuylkill River PCB TMDL	Appendix C-PCB (4a)	
BALLY BORO	PAG133502	No		Green Lane Reservoir	Appendix E-Organic Enrichment/Low D.O. (4a)	
BECHTELSVILLE BORO	PAI133509	Yes	SP, IP	Swamp Creek	Appendix E-Siltation (5)	Cause Unknown (5)
BERN TWP	PAG133531	No		Schuylkill River	Appendix C-PCB (4a)	
				Schuylkill River PCB TMDL	Appendix C-PCB (4a)	
				Tulpehocken Creek	Appendix E-Nutrients (5)	
				Unnamed Tributaries to Plum Creek	Appendix C-Pesticides (5)	
				Irish Creek	Appendix E-Siltation (5)	
				Unnamed Tributaries to Schuylkill River	Appendix E-Nutrients, Siltation (5)	
BIRDSBORO BORO	PAG133530	No		Schuylkill River	Appendix C-PCB (4a)	
				Schuylkill River PCB TMDL	Appendix C-PCB (4a)	
				Unnamed Tributaries to Schuylkill River	Appendix E-Siltation (5)	
BOYERTOWN BORO	PAG133529	No		Swamp Creek	Appendix E-Siltation (5)	Cause Unknown (5)
BRECKNOCK TWP	PAI133508	Yes	SP, IP	Wyomissing Creek	Appendix E-Siltation (4a)	Cause Unknown (4a), Water/Flow Variability (4c)
				Schuylkill River	Appendix C-PCB (4a)	
				Chesapeake Bay Nutrients/Sediment	Appendix D-Nutrients, Siltation (4a)	
				Little Muddy Creek	Appendix E-Siltation (5)	
CENTERPORT BORO		No		Irish Creek	Appendix E-Siltation (5)	
				Plum Creek	Appendix E-Siltation (5)	

Appendix B

Maps #1 through #5



Map# 1
Location Map
Bern Township MS4
Berks County, PA

Stream
Road
Urbanized Area
Watershed
Bern Twp Boundary
Surrounding Municipal Boundary

N

0 4,000 8,000 Feet

1:48,000

Data Source:
Stream, NHD USGS, 2012
Roads, PENNDOT, 2013
Urbanized Area,PENNDOT, 2016
Boundaries, PENNDOT, 2014

SSM
SPOTTS | STEVENS | MCCOY
Engineering and Environmental Services
Reading | Lehigh Valley | Central Pennsylvania
P: 610.621.2000 F: 610.621.2001
ssmgroup.com

08/02/17

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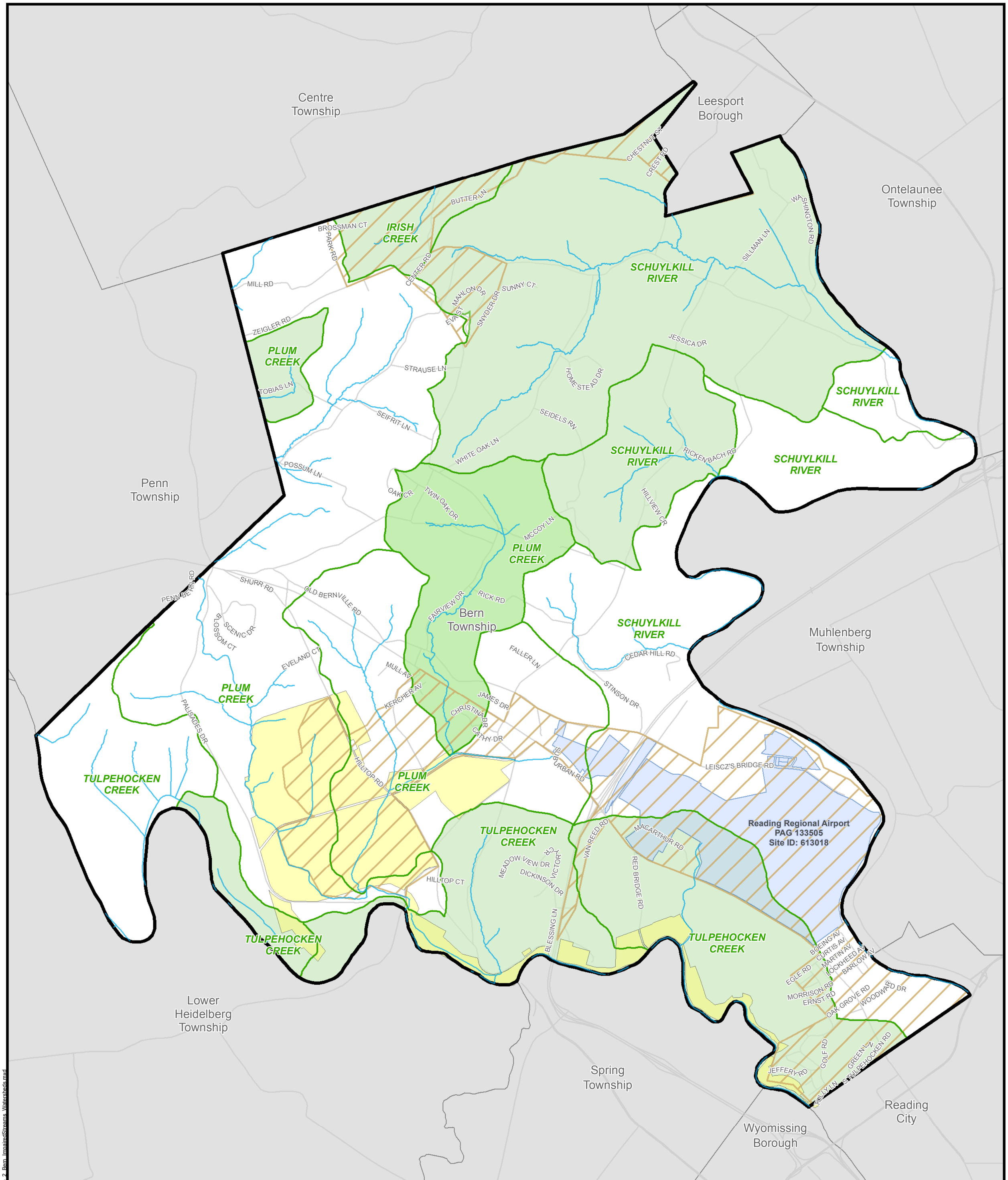

N

0 2,000 4,000 Feet

1 inch = 2,000 feet

Map# 2
Impaired Streams/Watersheds
Bern Township MS4
Proj.# 107990.0140

- Stream
- Road
- Watershed
- Watershed Impaired Stream (Pesticides)
- Watershed Impaired Stream (Sediment)
- Urbanized Area
- Reading Regional Airport Authority Property
- Berks County Owned Parcel
- Surrounding Municipal Boundary

08/02/17

SSM
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Reading | Lehigh Valley | Central Pennsylvania
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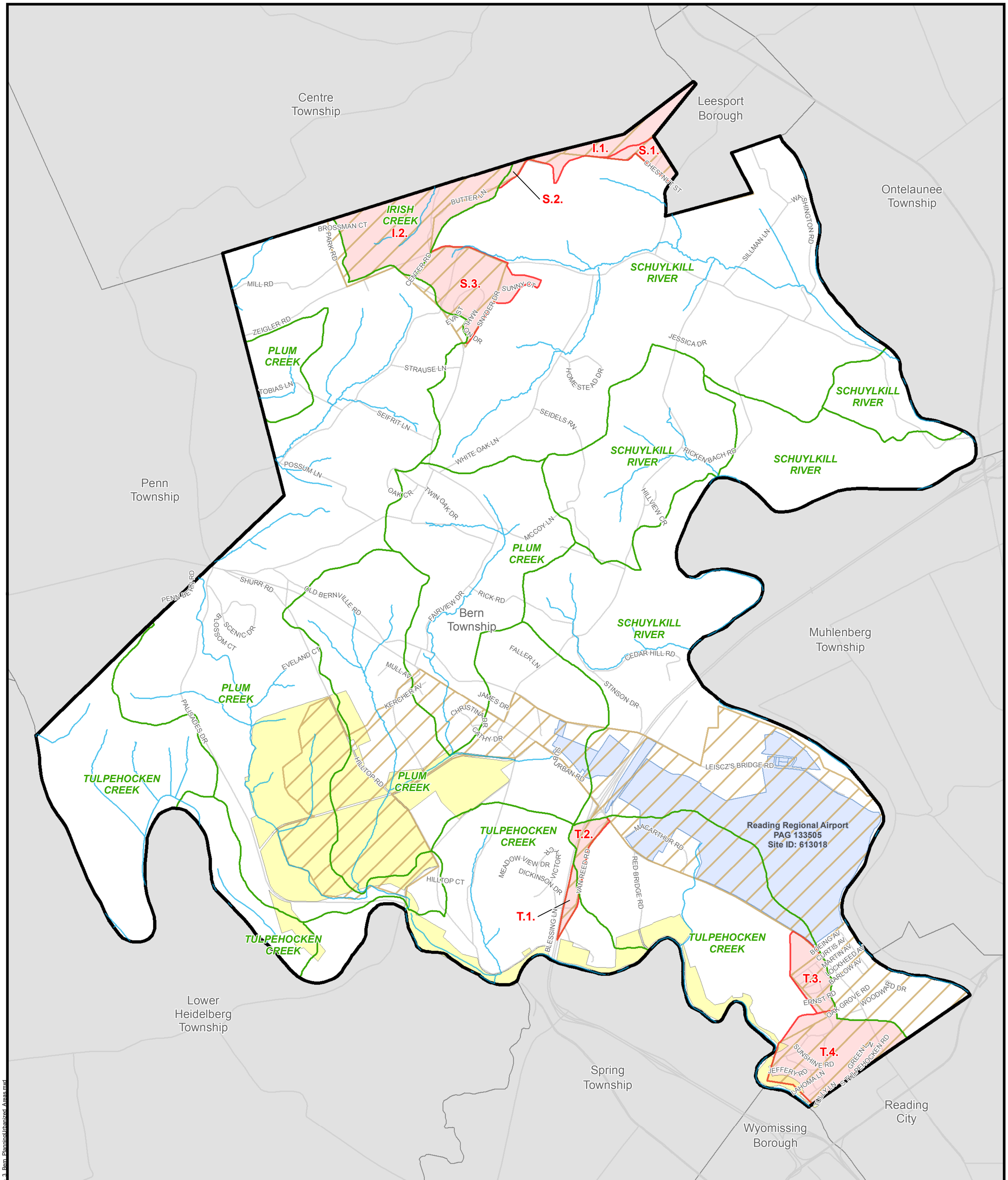

N

0 2,000 4,000 Feet

1 inch = 2,000 feet

Map# 3
Bern Township MS4
Planning Areas
Proj.# 107990.0140

Stream
Road
Watershed
Urbanized Area
Planning Area
Berks County Owned Parcel
Reading Regional Airport Authority Property
Surrounding Municipal Boundary

08/02/17

SSM
SPOTTS | STEVENS | MCCOY
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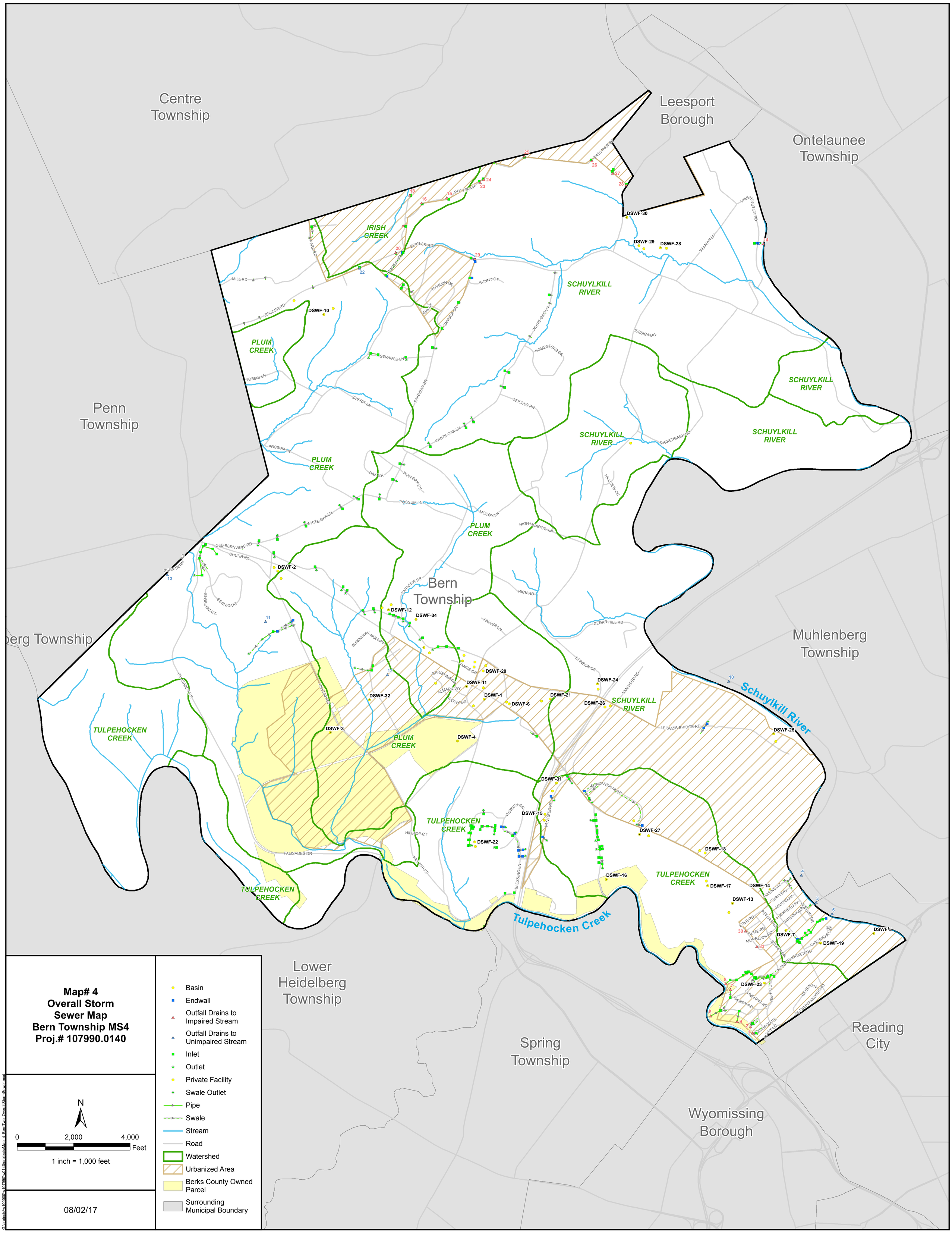
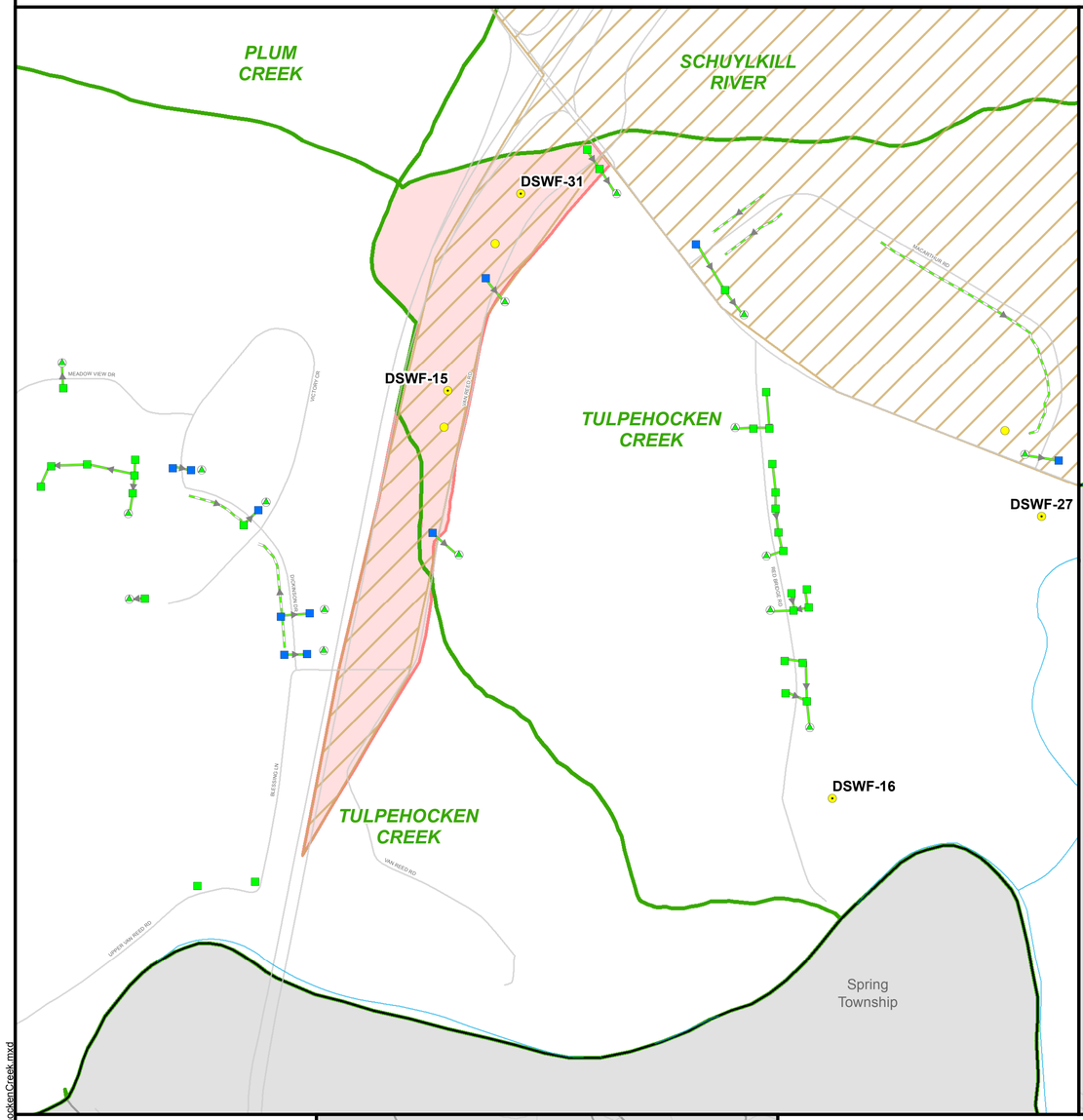


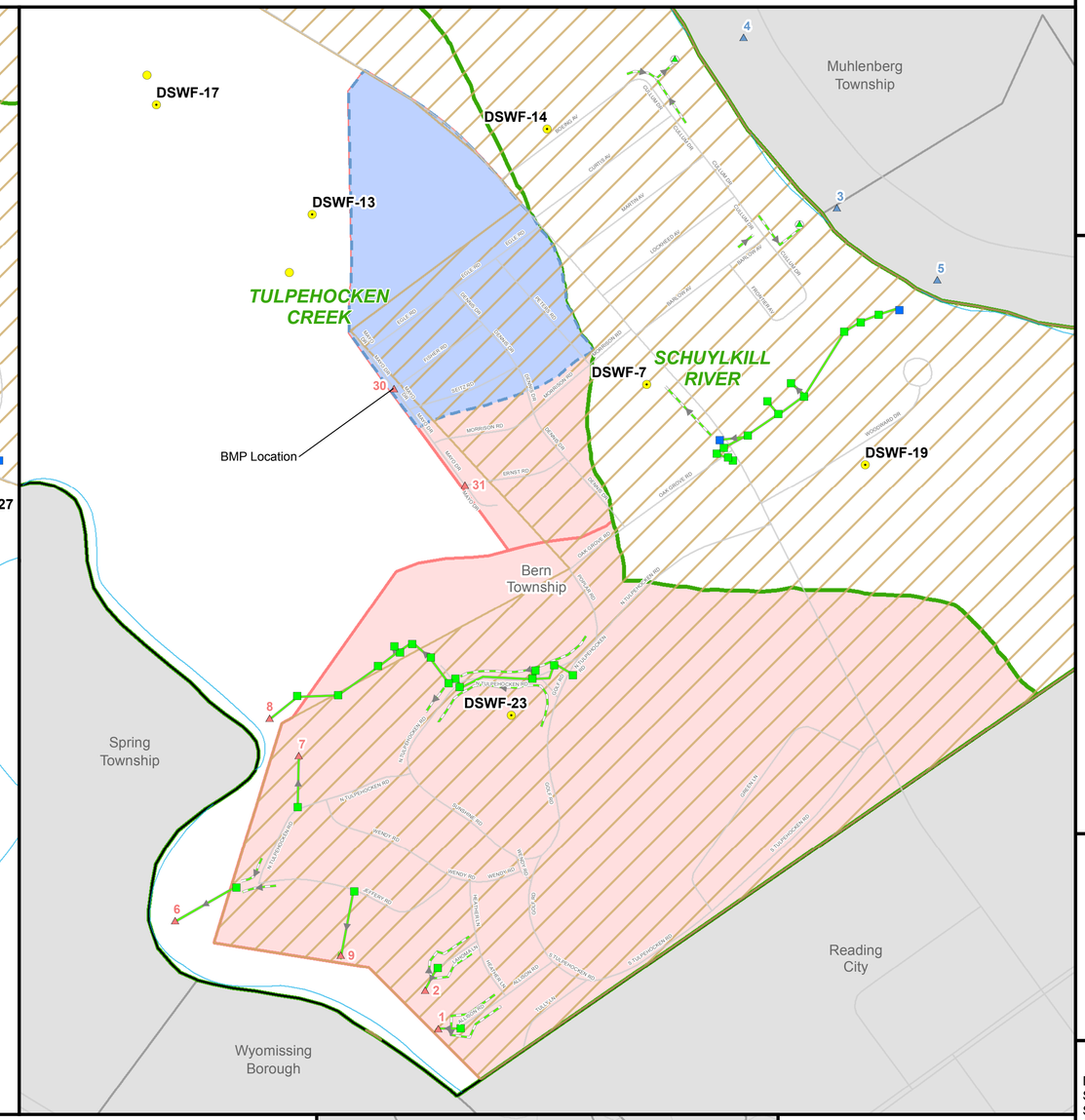
Map# 4
Overall Storm Sewer Map
Bern Township MS4
Proj.# 107990.0140

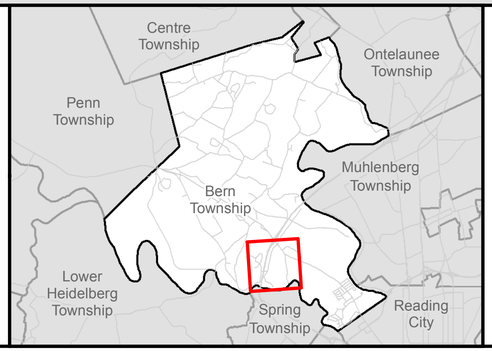
Map# 5
Tulepehocken Creek Impaired/BMP Storm Sewer Maps
Bern Township MS4
Berks County, PA

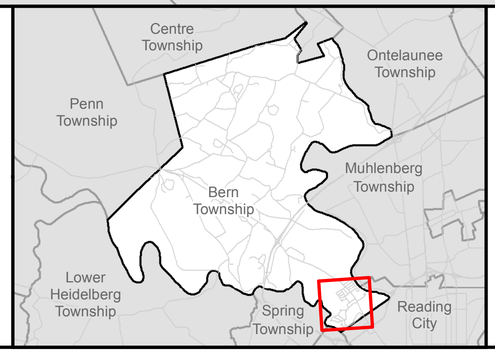
Focus 1



Focus 2







- Outfall Drains to Impaired Stream
- Outfall Drains to Unimpaired Stream
- Inlet
- Outlet
- Basin
- Endwall
- Private Facility
- Pipe
- Swale
- Stream
- Road
- Urbanized Area
- Storm Sewersheds
- Watershed
- Planning Area
- Bern Twp Boundary
- Surrounding Municipal Boundary

N

0 600 1,200 Feet

1:5,000

Data Sources:
Storm Sewer System, SSM, Bern Twp, 2017
Stream, NHD USGS, 2012
Roads, PENNDOT, 2013
Urbanized Area, PENNDOT, 2016
Watershed, ERRI, 2007
Planning Area, SSM, 2017
Boundaries, PENNDOT, 2014

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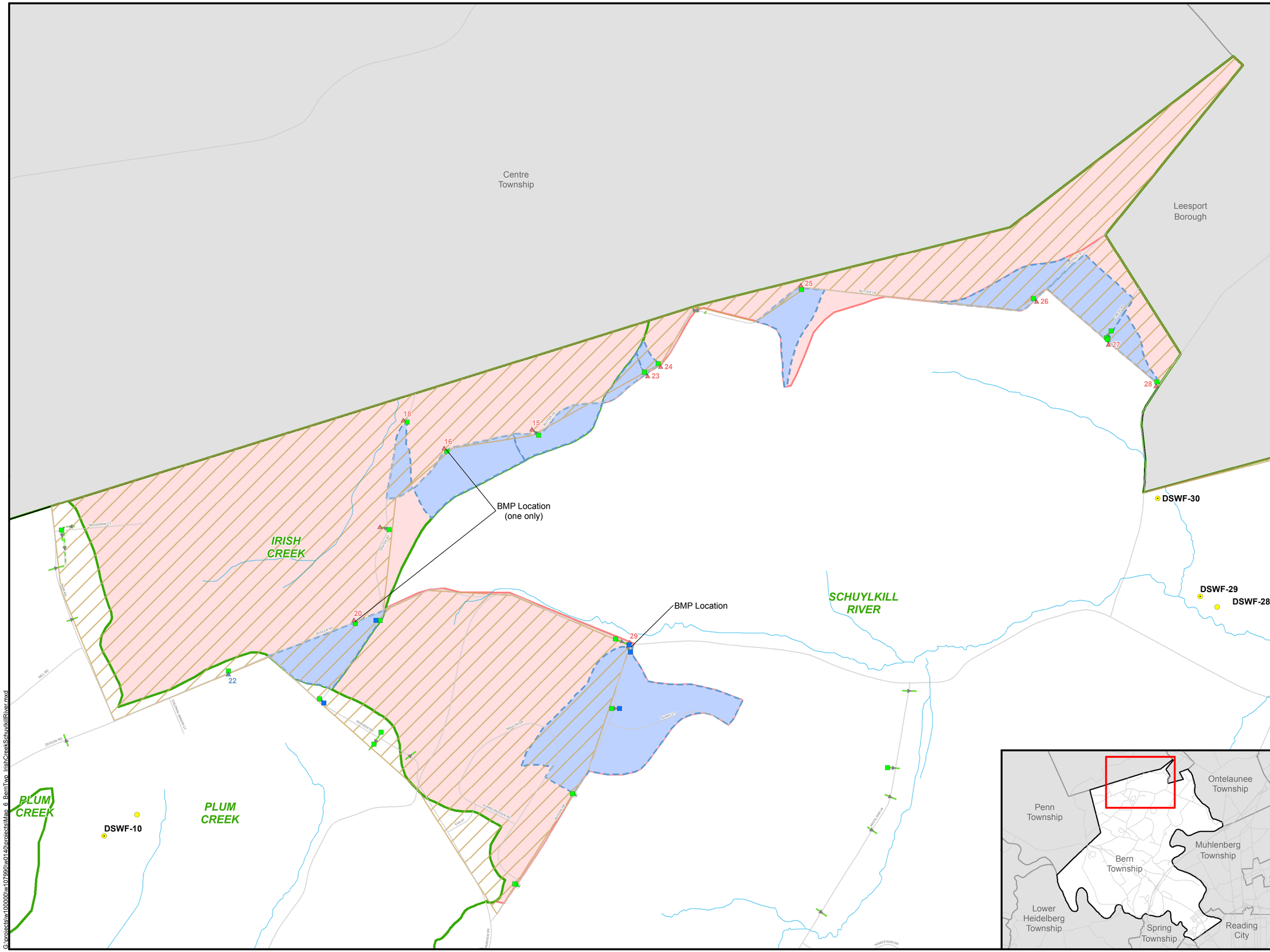
Map# 6
Irish Creek & Schuylkill River Impaired Storm Sewer Map
Bern Township MS4
Berks County, PA



Outfall Drains to Impaired Stream
Outfall Drains to Unimpaired Stream
Inlet
Outlet
Basin
Endwall
Private Facility
Pipe
Swale
Stream
Road
Urbanized Area
Storm Sewersheds
Watershed
Planning Area
Bern Twp Boundary
Surrounding Municipal Boundary

N

0 600 1,200 Feet

1:5,400

Data Sources:
Storm Sewer System, SSM, Bern Twp, 2017
Stream, NHD USGS, 2012
Roads, PENNDOT, 2013
Urbanized Area, PENNDOT, 2016
Watershed, ERRI, 2007
Planning Area, SSM, 2017
Boundaries, PENNDOT, 2014

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