MS4 NPDES PERMIT
Pollution Reduction Plan (PRP)

RICHLAND TOWNSHIP
ALLEGHENY COUNTY PA

August 16, 2017

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Purpose:

Richland Township has been issued by the Pennsylvania Department of Environmental Protection (PADEP) a General Permit PAG-13 Authorization to Discharge under the National Pollutant Discharge Elimination System (NPDES) for Stormwater Discharges from Municipal Separate Storm Sewer Systems (MS4s). Richland Township's MS4 NPDES Permit Number is PAG136309. This permit allows the Township to discharge its stormwater in accordance with the permit requirements.

In accordance with the 2018-2023 Permit, Richland Township must prepare and implement a Pollution Reduction Plan (PRP) to reduce sediment and nutrient loadings to various streams in the Township which are impaired due to existing sediment or nutrient loading. For Richland Township, impaired streams include portions of the West Branch of Deer Creek, Crouse Run, Montour Run and Breakneck Creek.

Pollution Reduction Plan Elements

A. Public Participation

Richland Township has made an active effort to solicit public participation and comment regarding this Pollution Reduction Plan. A Public Notice regarding this Plan was published in the Pittsburgh Post Gazette on July 14, 2017 for a 30 day period for inspection and comment by the public. A copy of the Public Notice is included as Appendix A. Written comments received by the public during the 30 day comment period are also included in Appendix A.

A public meeting was held by the Richland Township Board of Supervisors on August 16, 2017 at which time additional comments were received by the public regarding this Plan. Comments received during this public meeting are included in Appendix A.

Richland Township's consideration of each timely comment received by the public during the public comment period and any changes made as a result of the public comments can be found in Appendix A.

B. Mapping

The following GIS maps which are included in Appendix C were prepared for various features identified in this PRP:

Map 1: Stream Location Map (location of all impaired and unimpaired streams)
Map 2: Land Use Map (within the planning area encompassed by this PRP)
Map 3: Storm Sewershed Boundaries and BMP Project Location - Breakneck Creek
Map 4: Storm Sewershed Boundaries - Crouse Run
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C. Pollutants of Concern

Certain streams are identified as impaired by nutrients and/or sediment (siltation) within the Township by the PADEP (See Table 1).

TABLE 1
Stream Impairments

Stream	Impairment	Comment
Breakneck Creek	Siltation	Small Urbanized MS4 area at northern end of Township
Glade Run	Nutrients, Siltation	No MS4 areas exist in this watershed
Pine Creek (Willow Run)	Nutrients, Siltation	This stream is not impaired in the Township
Crouse Run	Nutrients	Impaired Stream
Montour Run	Siltation	Small Urbanized MS4 area in central portion of watershed
West Branch Deer Creek	Nutrients, Siltation	Impaired Stream
Deer Creek (Unnamed Tributary)	Nutrients, Siltation	This stream is not impaired in the Township

D. Existing Loading Calculations of Pollutants of Concern

Existing loading of pollutants were calculated using the PADEP Simplified Method and the loading values are presented in Table 2. Criteria used for calculating the loading values are presented in Table 3. Calculations were also performed using the Wiki Watershed tool from the Stroud Water Research Center, however these pollutant loading values were found to be comparable to or higher than those values calculated by the Simplified Method and were not used.

If the impairment is caused by nutrients, being Total Nitrogen (TN) and Total Phosphorus (TP), a minimum 5% TP loading reduction is required through implementation of the PRP. If the impairment is caused by sediment (siltation), a minimum of 10% reduction of sediment loading is required through implementation of the PRP. If the impairment is caused by both nutrients and sediment (siltation), a 5% TP loading reduction and 10% sediment loading reduction are required.

TABLE 2 Existing Pollutant Loading (July, 2017)			
Stream	**Sediment Loading**	**TN Loading**	**TP Loading**
Breakneck Creek	11,228	N/A	N/A
Crouse Run	N/A	8,998	454
Montour Run	1,146	N/A	N/A
West Branch Deer Creek	416,400	17,817	862

Note: Loading rates are in lbs/year

TABLE 3 Simplified Method Criteria							
		TN Loading Rate		**TP Loading Rate**		**Sediment Loading Rate**	
Urbanized Area Impervious	**Urbanized Area Pervious**	**Impervious**	**Pervious**	**Impervious**	**Pervious**	**Impervious**	**Pervious**
16%	84%	23.06	20.72	2.28	0.84	1,839	265

Note: Loading rates for TN, TP and Sediment are in lbs/acre/year.

Appendix B of this report includes a summary of the existing loadings for each stream. Certain streams include several tributaries which are also outlined in Appendix B. Existing pollutant loads were reduced for existing Post 2003 Best Management Practices (BMPs) that were installed under NPDES permits. Information and calculations for these BMPs can be found in Appendix B.

E. BMPs Selected for Minimum Required Pollutant Loading Reduction

The required reductions in existing loading rates of TP and Sediment are outlined in Table 4.

TABLE 4 Minimum Required Reductions in Pollutant Loading		
Stream	**Minimum Required Reduction TP (5%)**	**Minimum Required Reduction Sediment (10%)**
Breakneck Creek	N/A	1,123
Crouse Run	25	N/A
Montour Run	N/A	115
West Branch Deer Creek	47	41,585

Note: All reduction units are in lbs/year.

A number of BMP projects were evaluated for both eligibility and cost effectiveness. Inspections of the Township's impaired streams revealed that a number of stream restoration projects are needed. Significant portions of the streams were found to have bank and/or channel erosion which led to sedimentation from actively enlarging and incising urban streams. All of the BMP candidate projects were in streams classified as 0 to 3rd order streams that are not tidally influenced. Stream restoration was found to be the most cost effective BMP for both sediment and TP removal in all watersheds.

In the West Branch of Deer Creek watershed, an existing stormwater detention pond (built prior to the PADEP's 2003 Regulations) exists which may also be a cost effective candidate for retrofitting to a dry extended detention basin and/or wet pond. This detention pond known as the Whitetail Ridge (formally Colony Court) detention pond located east of Community Center Drive and north of Paul Revere Drive. Although stream restoration projects are selected as the primary BMP projects in this PRP for reducing sediment and TP loading in this watershed, the Township reserves the right to retrofit this detention pond as a secondary project which for a partial reduction in the needed number of stream restoration projects which will need to occur. The location of the Whitetail Ridge detention pond is shown on Map 9.

The following BMP projects (listed by watershed) were selected as part of this PRP to reduce sediment and/or TP loading:

Table 5
Selected Stream Restoration Projects to Reduce Sediment and/or TP Loading

Stream	BMP (Area #)	Location/Length (Ft)
Breakneck Creek	Area #1	30 feet - west side located north of Dambaugh Avenue bridge
Crouse Run	Area #1 Area #2 Area #3 Area #4 Area #5 Area #6 Area #7 Area #8 Area #9	60 feet - east side of stream 50 feet - west side of stream 40 feet - east side of stream 45 feet - west side of stream; 20 feet east side of stream 50 feet - east side of stream 40 feet - west side of stream 65 feet - west side of stream 50 feet - east side of stream; 25 feet west side of stream 40 feet - west side of stream
Montour Run	Area #1	10 feet - west side of Clearview Road
West Branch Deer Creek	Area #1 Area #2 Area #3 Area #4 Area #5 Area #6 Area #7 Area #8 Area #9 Area #10 Area #11	150 feet - north side of stream 135 feet - south side of stream 65 feet - north side of stream 45 feet - south side of stream 120 feet - south side of stream 75 feet - north side of stream 70 feet - south side of stream 40 feet - north side of stream 100 feet - south side of stream 70 feet - north side of stream 100 feet - north side of stream

Table 6 Selected BMP/Detention Pond Retrofit Projects to Reduce Sediment and/or TP Loading		
Stream	**BMP**	**Location**
West Branch Deer Creek	Whitetail Ridge Stormwater Detention Pond	East of Community Center Drive and north of Paul Revere Drive

Breakneck Creek Watershed

A reduction of 1,123 lbs/year of sediment loading is required under this PRP. A stream restoration area with a total length of 30 feet is required to address this sediment loading reduction. (See Table 5 and Map 3)

Crouse Run Watershed

A reduction of 25 lbs/year of TP loading is required under this PRP. Stream restoration projects with a total length of 350 feet area required to address the nutrient loading reduction. All of the stream restoration projects are along Crouse Run located east of Executive Drive and north of the Hampton Township border. (See Table 5 and Map 7)

Montour Run Watershed

A reduction of 115 lbs/year of sediment loading is required for Montour Run under this PRP. Stream restoration with a total length of 10 feet is required to address this sediment loading reduction (See Table 5 and Map 5).

West Branch Deer Creek Watershed

A reduction of 47 lbs/year of TP loading and 41,585 lbs/year of sediment loading are required under this PRP. Stream restoration projects with a total length of 950 feet are required to address these loading reduction requirements. All of the stream restoration projects are along the West Branch of Deer Creek between Route 8 and the West Deer Township border. Alternatively a retrofit of the Whitetail Ridge stormwater detention basin into a dry extended detention basin and/or wet pond may be performed which will reduce the length of stream restoration projects. (See Table 5 and Maps 8 and 9)

Most of the identified stream restoration project areas are located on private property, so appropriate easements will be required from the property owners to allow for construction activity and future operation and maintenance access. Along the West Branch Deer Creek, stream restoration areas 5, 6, 7, 8 and 9 are located on property owned by Richland Township. The Whitetail Ridge detention pond is located on private property so easement or property acquisition will be necessary.

For all stream restoration projects, wetlands will need to be identified and appropriate PADEP or PADEP/ACOE permits will be required.

Sample photographs of stream restoration candidate project areas in the Crouse Run and West Branch Deer Creek watersheds are shown on the following page.

Preliminary cost estimates for the various BMP projects can be found in Table 7. Detailed design, environmental impacts and landowner participation will be required before final estimates can be obtained.

Table 7
Preliminary Cost Estimates for Selected Projects

Stream	Construction Costs	Design, Construction Management and Easement Costs	Total Costs
Breakneck Creek	$7,500	$2,500	$10,000
Crouse Run	$75,000	$15,000	$90,000
Montour Run	$7,500	$2,500	$10,000
West Branch Deer Creek	$180,000	$36,000	$216,000
			$326,000

F. Funding Mechanisms

Under this PRP Richland Township is required to implement the selected BMP projects within the 5 year 2018-2023 MS4 General Permit cycle.

The anticipated funding mechanism is the use of Township general funds to pay for the selected BMP projects. Grant programs and/or partnerships with environmental groups or other entities will be explored to assist in the funding.

G. Responsible Parties for BMP Operation and Maintenance (O & M)

Once implemented, the BMPs must be maintained in order to continue producing the expected pollutant reductions. The Township must identify the following for each selected BMP:

- The party responsible for ongoing O & M
- The activities involved with O & M of each BMP
- The frequency at which O & M activities will occur

For the stream restoration BMP projects, the Township's Public Works Department shall be responsible for ongoing O & M. If O & M activities are needed beyond the Public Work's capabilities and/or schedule, outside contractors will be engaged to perform the work. Inspections of the BMP projects will be conducted quarterly for the first year and then annually thereafter. Inspections shall be performed by the Township's MS4 Coordinator, Township Engineer or the Township's Public Works Superintendent. O & M activities to be performed following each inspection include but are not limited to removal of volunteer plants and weeds, the replacement of lost or dead plantings, and the repair and/or replacement of stabilization materials.

For the retrofit of the Whitetail Ridge Detention Pond BMP project, the Township's Public Works Department will also be responsible for ongoing O & M. Inspections of the BMP shall be performed annually by the Township's MS4 Coordinator, Township Engineer or the Township's Public Works Superintendent. O & M activities to be performed following each inspection include but are not limited to; cutting and removal of excessive vegetation, removal of debris at inlet/outlet structures and removal and disposal of excessive sediment buildup.

The Township will note all O & M activities in each MS4 Annual Report submitted under the 2018-2023 General Permit.

RICHLAND TOWNSHIP

NOTICE

NOTICE IS HEREBY GIVEN that the Board of Supervisors of Richland Township will receive public comment(s) on a proposed Sediment Pollutant Reduction Plan (PRP) required for their 2018-2023 General MS4 Permit.

The proposed PRP is available for review at the Township Municipal Building located at 4019 Dickey Road, Gibsonia PA 15044, from 8:30 a.m. – 4:30 p.m. Monday – Friday from July 14, 2017 to August 14, 2017. Digital copies are also available for review at the Richland Township website: https://richland.pa.us/. Interested parties may receive a copy of the proposed PRP by visiting the website.

Richland Township will accept written comments on the proposed PRP for 30 days from the date of public notice. Interested parties may submit written comments that must be postmarked by August 14, 2017, and addressed to Dean Bastianini, Richland Township, 4019 Dickey Road, Gibsonia, PA 15044, or may be submitted electronically to dbastianini@richland.pa.us.

The PRP will be considered for adoption at the Board of Supervisors August 16th, 2017 regularly scheduled public meeting in the Municipal Building at 7:00 p.m., where any additional public comments will be accepted.

Dean E. Bastianini
Township Secretary

Post 2003
BMP Reduction
in Loading Rates

Watershed/ Subwatershed	Name	BMP Type	Longitude/ Latitude	NPDES Permit #	TP or Sediment Reduction Credit	Date BMP Installed
Crouse Run Sub 3	Richland Highlands	Detention Pond	40°37'08.10" -79°57'24.53"	PAG-200-02-03-111	3 lbs/yr TP	2003
West Branch Deer Creek Sub 14	Field Brook	Detention Pond	40°38'17.72" -79.56'49.17"	PAG-200-02-03-105R	2 lbs/yr TP 836 lbs/yr sediment	2004
West Branch Deer Creek Sub 15	Richland Township Municipal Building	Detention Pond	40°38'34.76" -79°57'05.39"	PA-R10-A096	4 lbs/yr TP 1,994 lbs/yr sediment	2008
West Branch Deer Creek Sub 36	Grandview Estates North	Detention Pond	40°38'03.41" -79°55'40.37"	PA-R10-A429-1	2 lbs/yr TP 1,031 lbs/yr sediment	2004

Note: All BMPs were inspected and found to function per their original design.

O & M Activities - As needed.

O & M Frequency - Each year based on annual inspections.

POLLUTANT LOADING SUMMARY

MUNICIPALITY: RICHLAND TOWNSHIP
COUNTY: ALLEGHENY COUNTY
STATE: PENNSYLVANIA

WATERSHED: CROUSE RUN
TOTAL SUBWATERSHEDS: SUB 2 SUB 8

TOTAL AREA: 1,910,956.34 SQ. METERS
472.22 ACRES

SUBWATERSHEDS:	AREA (AC.):	PHOSPHOROUS LOADING	BMP REDUCTION	PENNDOT REDUCTION	TOTAL ADJUSTED SEDIMENT LOAD (LB/YR)	TOTAL ADJUSTED NITROGEN (TN) LOAD (LB/YR)	TOTAL ADJUSTED PHOSPHOROUS (TP) LOAD (LB/YR)
SUB 2	17.96	19.22	0.00	0.00	n/a	378.80	19.22
SUB 3	72.27	77.36	2.92	0.00	n/a	1,524.57	74.44
SUB 4	22.39	23.97	0.00	0.00	n/a	472.33	23.97
SUB 5	20.40	21.83	0.00	0.00	n/a	430.25	21.83
SUB 6	78.70	84.24	0.00	0.00	n/a	1,660.19	84.24
SUB 7	29.04	31.09	0.00	0.00	n/a	612.63	31.09
SUB 8	231.45	247.75	0.00	48.88	n/a	3,918.98	198.86
	472.22 ACRES			GRAND TOTAL	n/a (LB/YR)	8,997.75 (LB/YR)	453.66 (LB/YR)

POLLUTANT LOADING SUMMARY

MUNICIPALITY: RICHLAND TOWNSHIP
COUNTY: ALLEGHENY COUNTY
STATE: PENNSYLVANIA

WATERSHED: WEST BRANCH DEER CREEK & UNNAMED TRIBUTARIES 1-5
TOTAL SUBWATERSHEDS: SUB 9 - SUB 36

TOTAL AREA: 2,131,653.53 SQ. METERS
526.75 ACRES

SUBWATERSHEDS	AREA (AC.):	SEDIMENT LOADING	BMP REDUCTION	PENNDOT/ COUNTY REDUCTION	PHOSPHOROUS LOADING	BMP REDUCTION	PENNDOT/ COUNTY REDUCTION	TOTAL ADJUSTED SEDIMENT LOAD (LB/YR)	TOTAL ADJUSTED NITROGEN (TN) LOAD (LB/YR)	TOTAL ADJUSTED PHOSPHOROUS (TP) LOAD (LB/YR)
SUB 9	17.74	9,165.99	0.00	1,718.62	18.98	0.00	3.56	7,447.37	303.98	15.42
SUB 10	8.42	4,353.84	0.00	0.00	9.02	0.00	0.00	4,353.84	177.71	9.02
SUB 11	2.66	1,374.90	0.00	0.00	2.85	0.00	0.00	1,374.90	56.12	2.85
SUB 12	62.08	32,080.94	0.00	0.00	66.45	0.00	0.00	32,080.94	1,309.44	66.45
SUB 13	23.28	12,030.35	0.00	0.00	24.92	0.00	0.00	12,030.35	491.04	24.92
SUB 14	50.10	25,893.86	836.39	0.00	53.63	1.73	0.00	25,057.46	1,039.84	51.90
SUB 15	79.59	41,132.25	1,993.60	1,374.89	85.19	4.13	2.85	37,763.76	1,619.96	78.22
SUB 16	4.43	2,291.49	0.00	0.00	4.75	0.00	0.00	2,291.49	93.53	4.75
SUB 17	54.98	28,414.45	0.00	0.00	58.85	0.00	0.00	28,414.45	1,159.79	58.85
SUB 18	66.95	34,601.48	0.00	0.00	71.67	0.00	0.00	34,601.48	1,412.32	71.67
SUB 19	35.91	18,561.07	0.00	0.00	38.44	0.00	0.00	18,561.07	757.60	38.44
SUB 20	4.43	2,291.49	0.00	343.72	4.75	0.00	0.71	1,947.77	79.50	4.03
SUB 21	10.20	5,270.43	0.00	343.72	10.92	0.00	0.71	4,926.71	201.09	10.20
SUB 22	42.79	22,112.91	0.00	0.00	45.80	0.00	0.00	22,112.91	902.58	45.80
SUB 23	9.31	4,812.14	0.00	0.00	9.97	0.00	0.00	4,812.14	196.42	9.97
SUB 24	53.21	27,497.95	0.00	0.00	56.95	0.00	0.00	27,497.95	1,122.38	56.95

SUB 25	0.67	343.72	0.00	0.00	0.71	0.00	0.00	343.72	14.03	0.71
	526.75 TOTAL AREA (AC.)			MAIN BRANCH				GRAND TOTAL 265,618.31 (LB/YR)	10,937.33 (LB/YR)	550.14 (LB/YR)
SUB 26	3.99	2,063.75	0.00	1,374.90	4.27	0.00	2.85	688.85	28.12	1.43
SUB 27	68.06	35,174.44	0.00	0.00	72.85	0.00	0.00	35,174.44	1,435.71	72.85
	72.05 TOTAL AREA (AC.)			UNNAMED TRIBUTARY #1				GRAND TOTAL 35,863.30 (LB/YR)	1,463.83 (LB/YR)	74.28 (LB/YR)
SUB 28	47.66	24,633.55	0.00	17,529.93	51.02	0.00	36.31	7,103.63	994.57	14.71
SUB 29	2.44	1,260.32	0.00	0.00	2.61	0.00	0.00	1,260.32	51.44	2.61
	50.10 TOTAL AREA (AC.)			UNNAMED TRIBUTARY #2				GRAND TOTAL 8,363.95 (LB/YR)	1,046.01 (LB/YR)	17.32 (LB/YR)
SUB 30	112.62	58,203.87	0.00	12,488.62	120.55	0.00	25.87	45,715.24	1,865.95	94.68
	112.62 TOTAL AREA (AC.)			UNNAMED TRIBUTARY #3				GRAND TOTAL 45,715.24 (LB/YR)	1,865.95 (LB/YR)	94.68 (LB/YR)
SUB 31	11.31	5,843.31	0.00	0.00	12.10	0.00	0.00	5,843.31	238.51	12.10
SUB 32	5.32	2,749.79	0.00	0.00	5.70	0.00	0.00	2,749.79	112.24	5.70
SUB 33	5.32	2,749.79	0.00	0.00	5.70	0.00	0.00	2,749.79	112.24	5.70
SUB 34	5.76	2,978.94	0.00	0.00	6.17	0.00	0.00	2,978.94	121.59	6.17
	27.71 TOTAL AREA (AC.)			UNNAMED TRIBUTARY #4				GRAND TOTAL 14,321.84 (LB/YR)	584.57 (LB/YR)	29.66 (LB/YR)
SUB 35	6.65	3,437.24	0.00	0.00	7.12	0.00	0.00	3,437.24	140.30	7.12
SUB 36	85.35	44,111.24	1,031.17	0.00	91.36	2.14	0.00	43,080.07	1,779.44	89.23
	92.00 TOTAL AREA (AC.)			UNNAMED TRIBUTARY #5				GRAND TOTAL 46,517.31 (LB/YR)	1,919.73 (LB/YR)	96.35 (LB/YR)
	881.25 TOTAL AREA (AC.)			FULL WATERSHED				GRAND TOTAL 416,399.96 (LB/YR)	17,817.43 (LB/YR)	862.44 (LB/YR)

POLLUTANT LOADING SUMMARY

MUNICIPALITY: RICHLAND TOWNSHIP
COUNTY: ALLEGHENY COUNTY
STATE: PENNSYLVANIA

WATERSHED: MONTOUR RUN
TOTAL SUBWATERSHEDS: SUB 1

TOTAL AREA: 8,971.60 SQ. METERS
2.22 ACRES

SUBWATERSHEDS:	AREA (AC.):	SEDIMENT LOADING	BMP REDUCTION	PENNDOT REDUCTION	TOTAL ADJUSTED SEDIMENT LOAD (LB/YR)	TOTAL ADJUSTED NITROGEN (TN) LOAD (LB/YR)	TOTAL ADJUSTED PHOSPHOROUS (TP) LOAD (LB/YR)
SUB 1	2.22	1,145.75	0.00	0.00	1,145.75	n/a	n/a

2.22 TOTAL AREA (AC.)

GRAND TOTAL 1,145.75 (LB/YR) n/a (LB/YR) n/a (LB/YR)

POLLUTANT LOADING SUMMARY

MUNICIPALITY: RICHLAND TOWNSHIP
COUNTY: ALLEGHENY COUNTY
STATE: PENNSYLVANIA

WATERSHED: BREAKNECK CREEK
TOTAL SUBWATERSHEDS: SUB 37 - SUB 38

TOTAL AREA: 112,144.49 SQ. METERS
27.71 ACRES

SUBWATERSHEDS:	AREA (AC.):	SEDIMENT LOADING	BMP REMOVAL	PENNDOT REDUCTION	TOTAL ADJUSTED SEDIMENT LOAD (LB/YR)	TOTAL ADJUSTED NITROGEN (TN) LOAD (LB/YR)	TOTAL ADJUSTED PHOSPHOROUS (TP) LOAD (LB/YR)
SUB 37	20.84	10,769.96	0.00	3,093.50	7,676.46	n/a	n/a
SUB 38	6.87	3,551.80	0.00	0.00	3,551.80	n/a	n/a

27.71 TOTAL AREA (AC.)

GRAND TOTAL 11,228.25 (LB/YR) n/a (LB/YR) n/a (LB/YR)

LOCATION: RICHLAND HIGHLANDS
BMP TYPE: DETENTION POND
PHOSPHOROUS REMOVAL EFFECTIVENESS: 10 %

WATERSHED: CROUSE RUN
SUBWATERSHED: SUB 3

TOTAL AREA: 110351.06
27.27 ACRES

DEP SIMPLIFIED METHOD

	%	AREA(AC.)	IMPERVIOUS AREA % (16%)	PERVIOUS AREA % (84%)	IMPERVIOUS LOAD (LB/YR)	PERVIOUS LOAD (LB/YR)
TOTAL AREA:	100	27.27	4.36	22.91	9.95	19.24

TOTAL BMP PHOSPHOROUS LOAD (LB/YR): 29.19

ADJUSTMENT FOR BMP: 2.92

TOTAL ADJUSTED PHOSPHOROUS LOAD (LB/YR): 74.44

LOCATION: FIELD BROOK
BMP TYPE: DETENTION POND
SEDIMENT REMOVAL EFFECTIVENESS: 10 %

WATERSHED: WEST BRANCH DEER CREEK
SUBWATERSHED: SUB 14

TOTAL AREA: 65492.72
16.18 ACRES

SEDIMENT
DEP SIMPLIFIED METHOD

	%	AREA(AC.)	IMPERVIOUS AREA % (16%)	PERVIOUS AREA % (84%)	IMPERVIOUS LOAD (LB/YR)	PERVIOUS LOAD (LB/YR)
TOTAL AREA:	100	16.18	2.59	13.59	4,761.95	3,601.99

TOTAL WATERSHED SEDIMENT LOAD (LB/YR): 25,893.86

TOTAL SEDIMENT LOAD (LB/YR): 8,363.95

REDUCTION FOR BMP: 836.39

TOTAL ADJUSTED SEDIMENT LOAD (LB/YR): 25,057.46

PHOSPHOROUS
DEP SIMPLIFIED METHOD

	%	AREA(AC.)	IMPERVIOUS LOAD (LB/YR)	PERVIOUS LOAD (LB/YR)
TOTAL AREA:	100	16.18	5.90	11.42

TOTAL WATERSHED PHOSPHOROUS LOAD (LB/YR): 53.63

TOTAL PHOSPHOROUS LOAD (LB/YR): 17.32

REDUCTION FOR BMP: 1.73

TOTAL ADJUSTED PHOSPHOROUS LOAD (LB/YR): 51.90

LOCATION: RICHLAND TWP MUNICIPAL BUILDING
BMP TYPE: DETENTION FACILITY
SEDIMENT REMOVAL EFFECTIVENESS: 10 %

WATERSHED: WEST BRANCH DEER CREEK
SUBWATERSHED: SUB 15

TOTAL AREA: 156105.81
38.58 ACRES

SEDIMENT
DEP SIMPLIFIED METHOD

	%	AREA(AC.)	IMPERVIOUS AREA % (16%)	PERVIOUS AREA % (84%)	IMPERVIOUS LOAD (LB/YR)	PERVIOUS LOAD (LB/YR)
TOTAL AREA:	100	38.58	6.17	32.40	11,350.40	8,585.57

TOTAL WATERSHED SEDIMENT LOAD (LB/YR): 41,132.25

TOTAL SEDIMENT LOAD (LB/YR): 19,935.97

REDUCTION FOR BMP: 1,993.60

TOTAL ADJUSTED SEDIMENT LOAD (LB/YR): 39,138.66

PHOSPHOROUS
DEP SIMPLIFIED METHOD

	%	AREA(AC.)	IMPERVIOUS LOAD (LB/YR)	PERVIOUS LOAD (LB/YR)
TOTAL AREA:	100	38.58	14.07	27.22

TOTAL WATERSHED PHOSPHOROUS LOAD (LB/YR): 85.19

TOTAL PHOSPHOROUS LOAD (LB/YR): 41.29

REDUCTION FOR BMP: 4.13

TOTAL ADJUSTED PHOSPHOROUS LOAD (LB/YR): 81.06

LOCATION: GRANDVIEW ESTATES NORTH
BMP TYPE: DETENTION POND
SEDIMENT REMOVAL EFFECTIVENESS: 10 %

WATERSHED: WEST BRANCH DEER CREEK
SUBWATERSHED: SUB 36

TOTAL AREA: 80744.47
19.95 ACRES

SEDIMENT
DEP SIMPLIFIED METHOD

	%	AREA(AC.)	IMPERVIOUS AREA % (16%)	PERVIOUS AREA % (84%)	IMPERVIOUS LOAD (LB/YR)	PERVIOUS LOAD (LB/YR)
TOTAL AREA:	100	19.95	3.19	16.76	5,870.90	4,440.82

TOTAL WATERSHED PHOSPHOROUS LOAD (LB/YR): 44,111.24

TOTAL SEDIMENT LOAD (LB/YR): 10,311.72

REDUCTION FOR BMP: 1,031.17

TOTAL ADJUSTED SEDIMENT LOAD (LB/YR): 43,080.07

PHOSPHOROUS
DEP SIMPLIFIED METHOD

	%	AREA(AC.)	IMPERVIOUS LOAD (LB/YR)	PERVIOUS LOAD (LB/YR)
TOTAL AREA:	100	19.95	7.28	14.08

TOTAL WATERSHED PHOSPHOROUS LOAD (LB/YR): 91.36

TOTAL PHOSPHOROUS LOAD (LB/YR): 21.36

REDUCTION FOR BMP: 2.14

TOTAL ADJUSTED SEDIMENT LOAD (LB/YR): 89.23

RICHLAND TOWNSHIP
ALLEGHENY COUNTY PA

MAP #1

STREAM LOCATION MAP

Legend

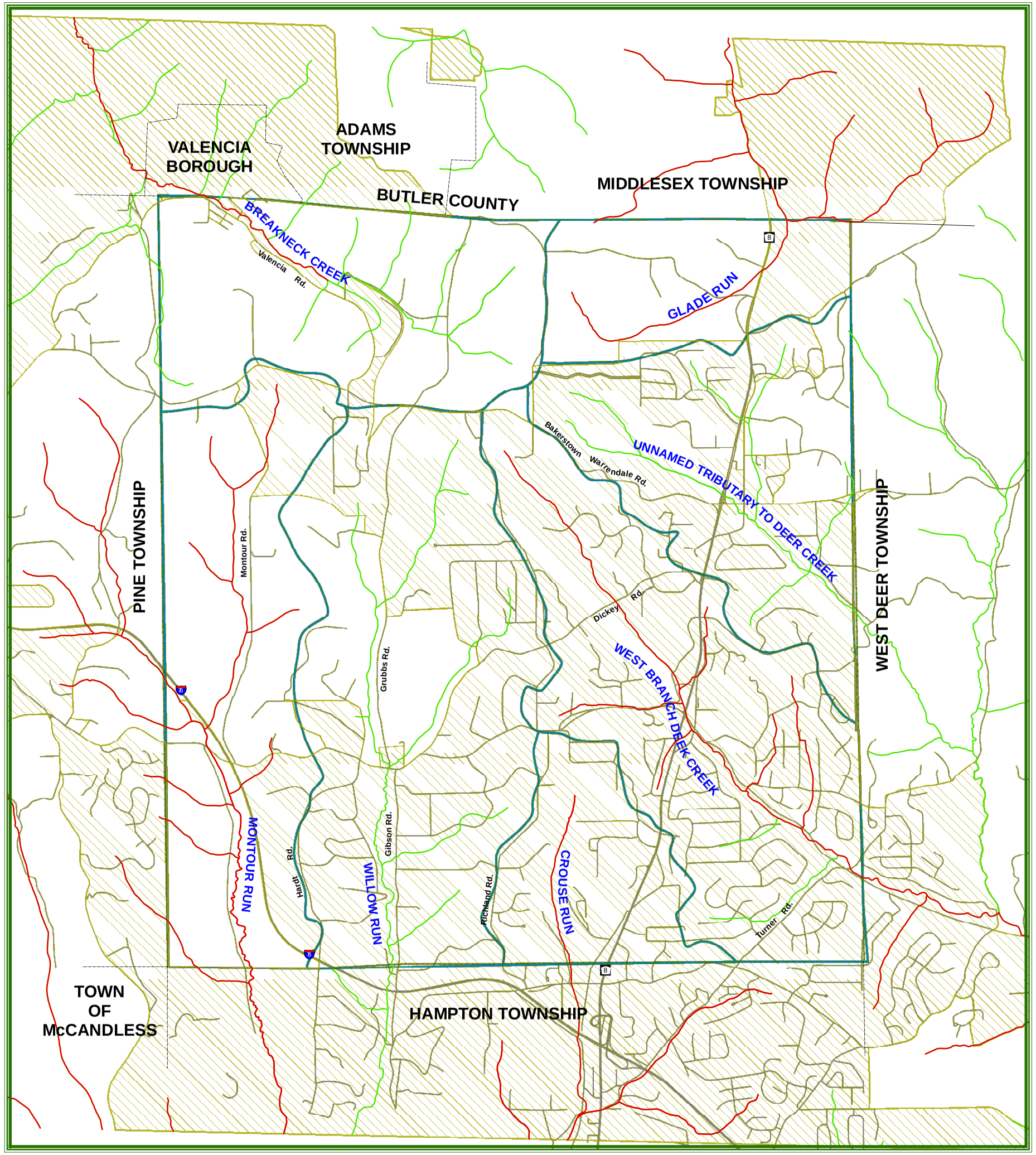
- Non-Attaining Streams
- Other Streams
- Urban Areas 2010
- Richland Township Boundary
- Watershed Boundary

N W E S

3,000 1,500 0 3,000 6,000 Feet

SHOUP ENGINEERING
FOR OVER 50 YEARS
329 Summerfield Dr., Baden PA 15005

JULY 2017



RICHLAND TOWNSHIP
ALLEGHENY COUNTY PA

MAP 2

LAND USE MAP

Legend

- Non-Attaining Streams
- Other Streams
- Outfall Sewersheds

LAND USE

- Mobile Homes
- Single Family
- Duplex
- Townhomes
- Apartment
- Commercial
- Commercial/Residential
- Commercial/Industrial
- Watershed Boundary
- Office
- Office/Commercial
- Office/Residential
- Office/Industrial
- Industrial
- Institutional
- Institutional - Medical
- Agricultural
- Public Park/Recreation
- Private Park/Recreation
- Vacant
- Vacant Structure
- Richland Township Boundary

N W E S

3,000 1,500 0 3,000 6,000 Feet

Land Use Data Provided By Environmental Planning and Design LLC

SHOUP ENGINEERING
FOR OVER 50 YEARS
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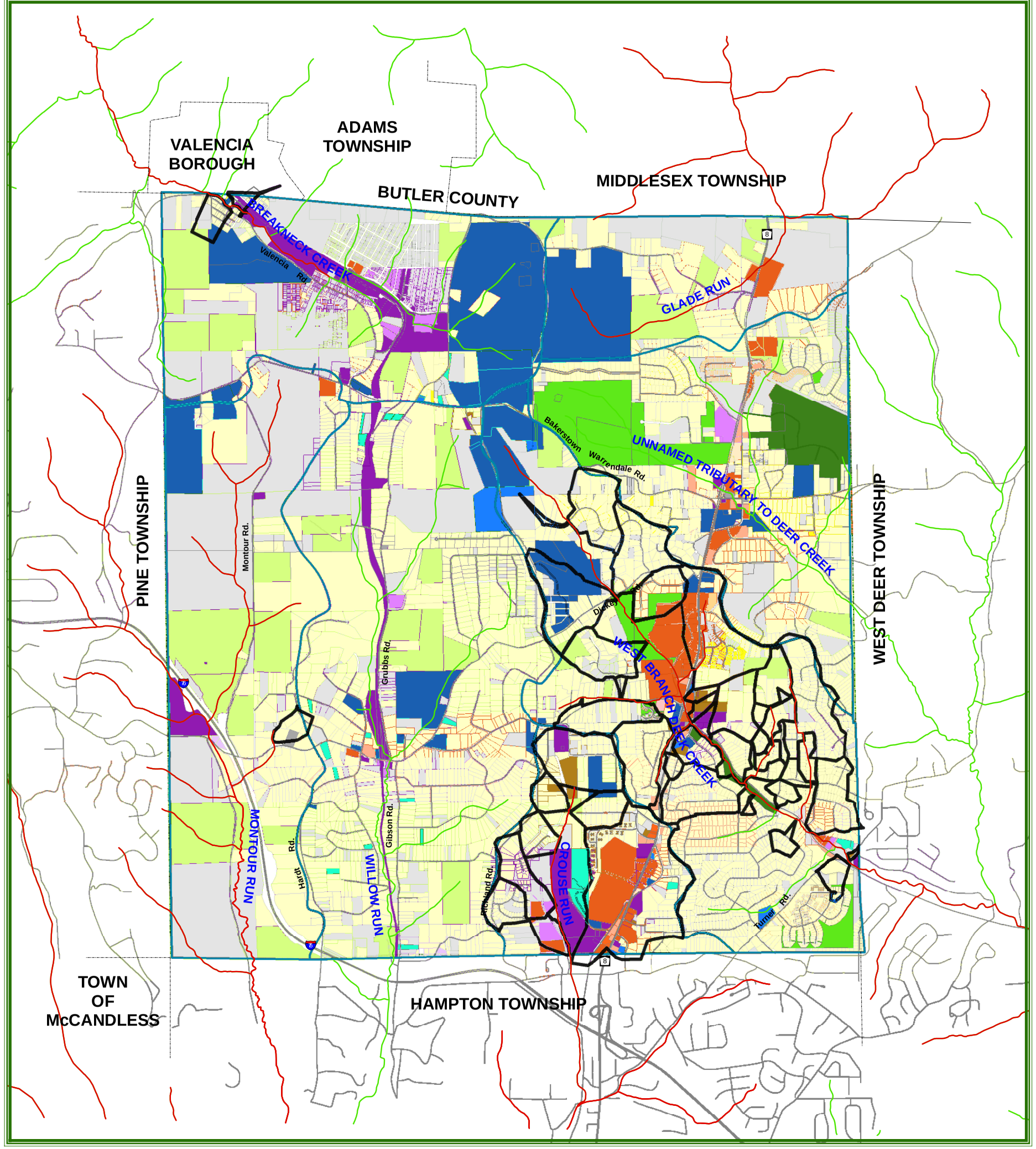
JULY 2017



RICHLAND TOWNSHIP
ALLEGHENY COUNTY PA

MAP #3

STORM SEWERSHED BOUNDARIES
BREAKNECK CREEK

Legend

- Non-Attaining Streams
- Other Streams
- Urban Areas 2010
- Richland Township Boundary
- ★001 OUTFALL/NUMBER
- OUTFALL SEWERSHEDS

CREDIT/PARSED AREAS

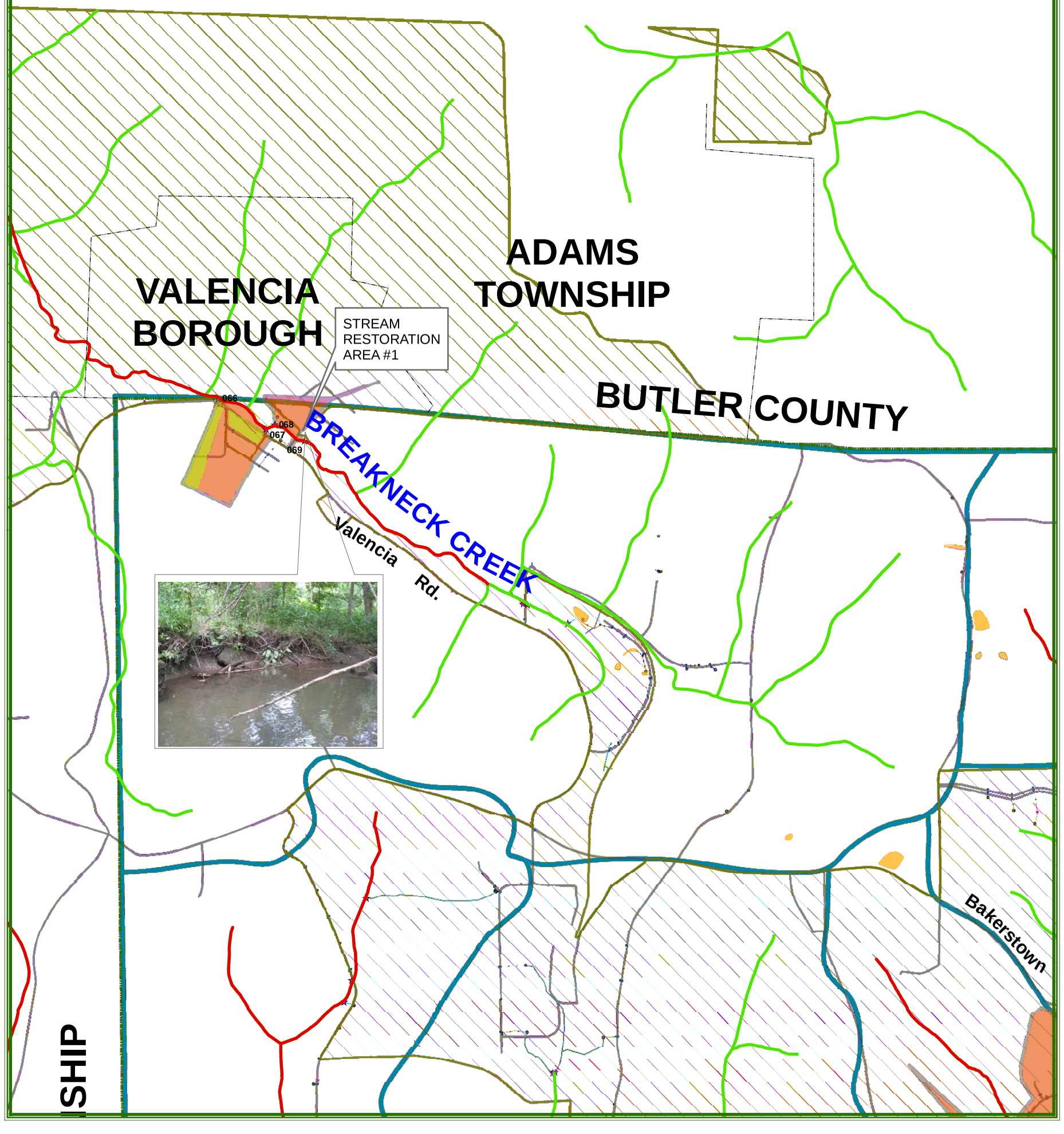
- BMP CREDIT AREA
- COUNTY PARSED AREA
- PENNDOT PARSED AREA
- OUTSIDE MUN. BNDY. PARSED AREA
- WATERSHED BOUNDARY

N
W E
S

1,400 700 0 1,400 2,800 Feet

SHOUP ENGINEERING
FOR OVER 50 YEARS
329 Summerfield Dr., Baden PA 15005

JULY 2017



RICHLAND TOWNSHIP
ALLEGHENY COUNTY PA

MAP #4

STORM SEWERSHED BOUNDARIES
CROUSE RUN

Legend

- Non-Attaining Streams
- Other Streams
- Urban Areas 2010
- Richland Township Boundary
- ☆001 OUTFALL/NUMBER
- OUTFALL SEWERSHEDS
- Watershed Boundary

CREDIT/PARSED AREAS

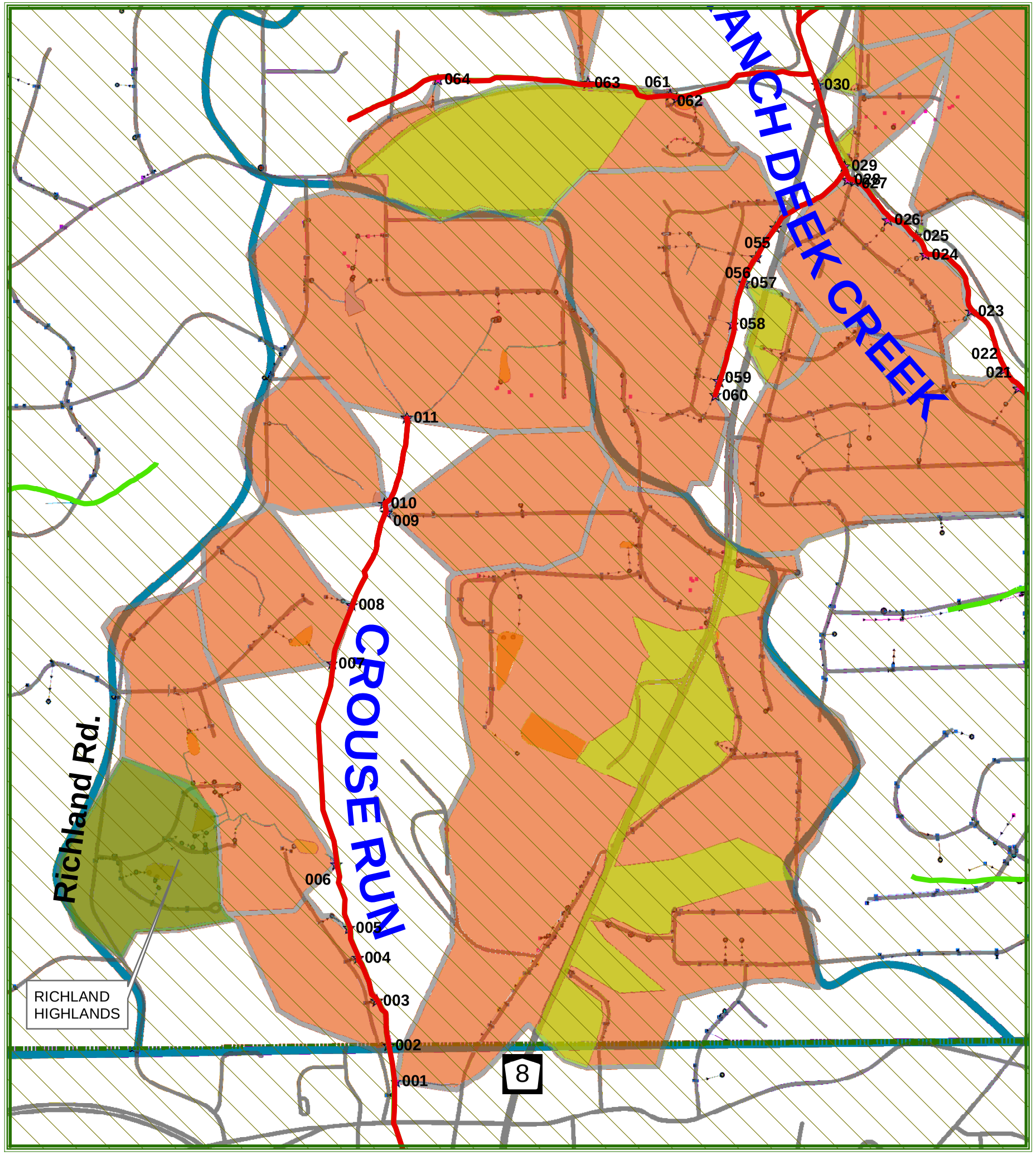
- BMP CREDIT AREA
- COUNTY PARSED AREA
- PENNDOT PARSED AREA
- OUTSIDE MUN. BNDY. PARSED AREA

N W E S

800 400 0 800 1,600 Feet

SHOUP ENGINEERING
FOR OVER 50 YEARS
329 Summerfield Dr., Baden PA 15005

JULY 2017



RICHLAND TOWNSHIP
ALLEGHENY COUNTY PA

MAP #5

STORM SEWERSHED BOUNDARY
MONTOUR RUN

Legend

- Non-Attaining Streams
- Other Streams
- Urban Areas 2010
- Richland Township Boundary
- ★001 OUTFALL/NUMBER
- OUTFALL SEWERSHEDS
- Watershed Boundary

CREDIT/PARSED AREAS

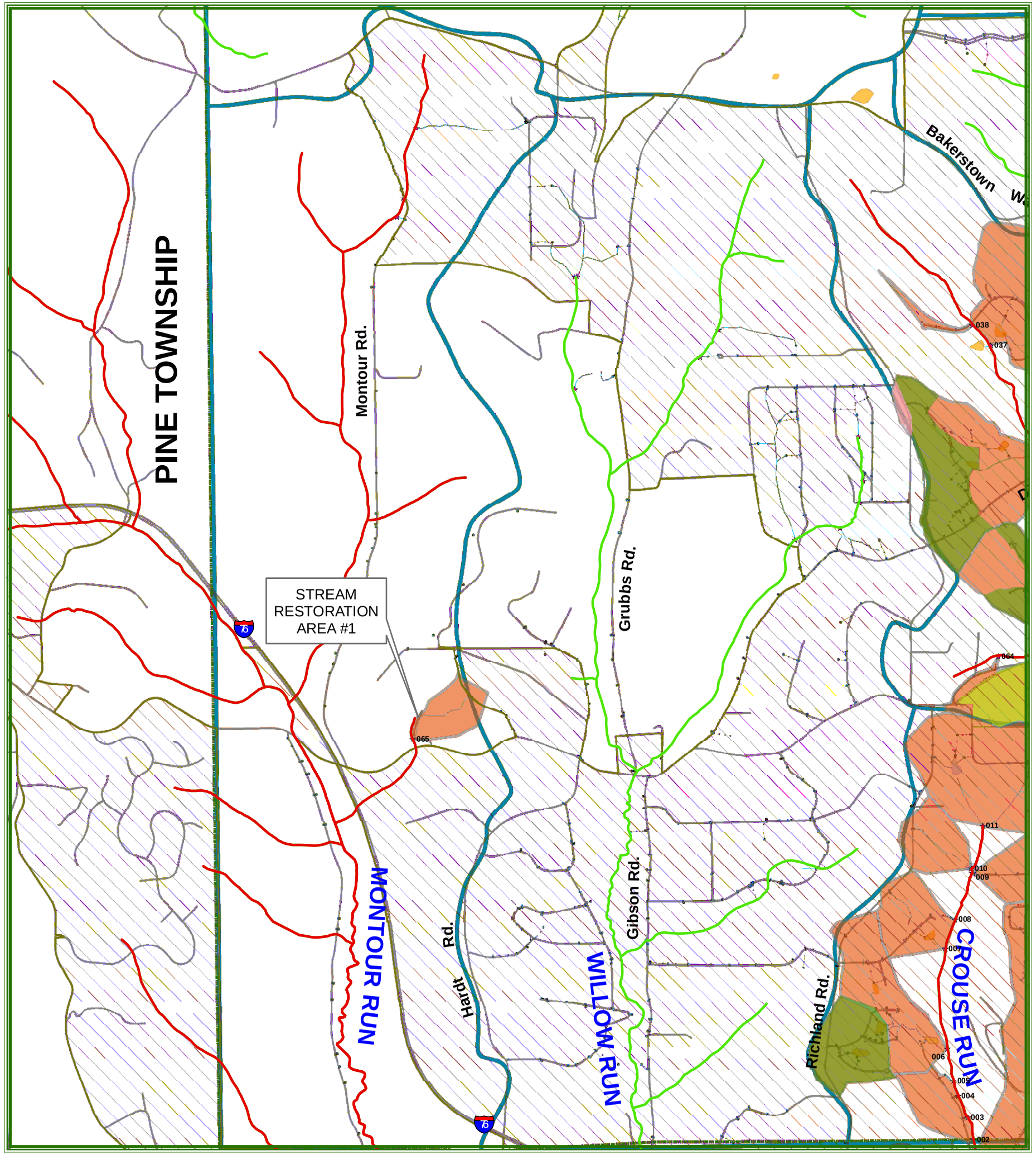
- BMP CREDIT AREA
- COUNTY PARSED AREA
- PENNDOT PARSED AREA
- OUTSIDE MUN. BNDY. PARSED AREA

N W E S

1,600 800 0 1,600 3,200 Feet

SHOUP ENGINEERING
FOR OVER 50 YEARS
329 Summerfield Dr., Baden PA 15005

JULY 2017



RICHLAND TOWNSHIP
ALLEGHENY COUNTY PA

MAP #6

STORM SEWERSHED BOUNDARIES
WEST BRANCH DEER CREEK

Legend

- Non-Attaining Streams
- Other Streams
- Urban Areas 2010
- Richland Township Boundary
- ★001 OUTFALL/NUMBER
- OUTFALL SEWERSHEDS
- Watershed Boundary

CREDIT/PARSED AREAS

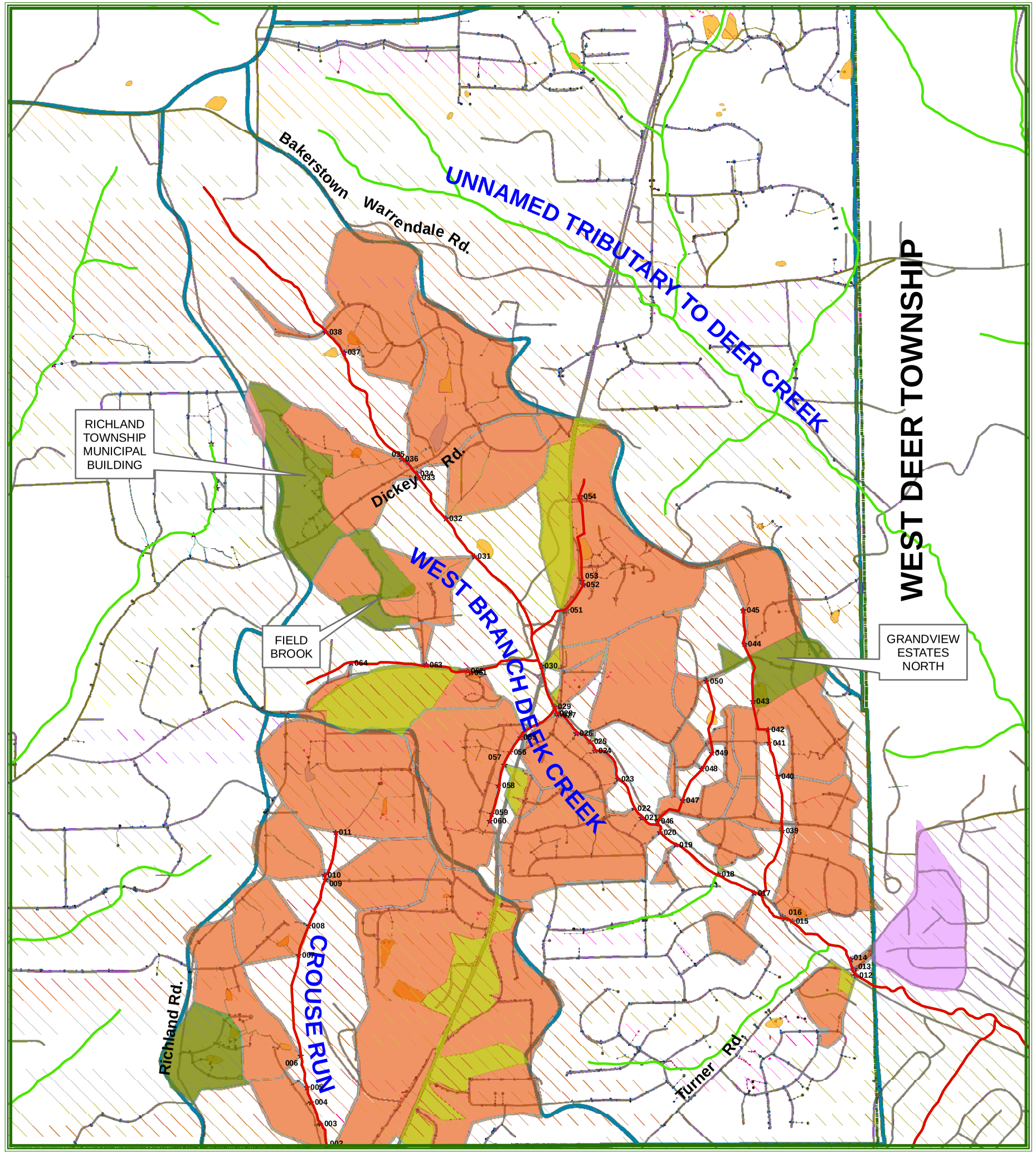
- BMP CREDIT AREA
- COUNTY PARSED AREA
- PENNDOT PARSED AREA
- OUTSIDE MUN. BNDY. PARSED AREA

N W E S

1,600 800 0 1,600 3,200 Feet

SHOUP ENGINEERING
FOR OVER 50 YEARS
329 Summerfield Dr., Baden PA 15005

JULY 2017



RICHLAND TOWNSHIP
ALLEGHENY COUNTY PA

MAP #7

BMP SELECTION - STREAM RESTORATION
CROUSE RUN (EXECUTIVE DRIVE AREA)

Legend

- Non-Attaining Streams
- Other Streams
- Urban Areas 2010
- Richland Township Boundary
- OUTFALL SEWERSHEDS
- Watershed Boundary

STREAM RESTORATION AREAS

- AREA #

N W E S

150 75 0 150 300 Feet

SHOUP ENGINEERING
FOR OVER 50 YEARS
329 Summerfield Dr., Baden PA 15005

JULY 2017

RICHLAND TOWNSHIP
ALLEGHENY COUNTY PA

MAP #8

BMP SELECTION - STREAM RESTORATION
WEST BRANCH DEER CREEK (ROUTE 910 AREA)

Legend

- Non-Attaining Streams
- Other Streams
- Urban Areas 2010
- Richland Township Boundary
- OUTFALL SEWERSHEDS
- Watershed Boundary

STREAM RESTORATION AREAS

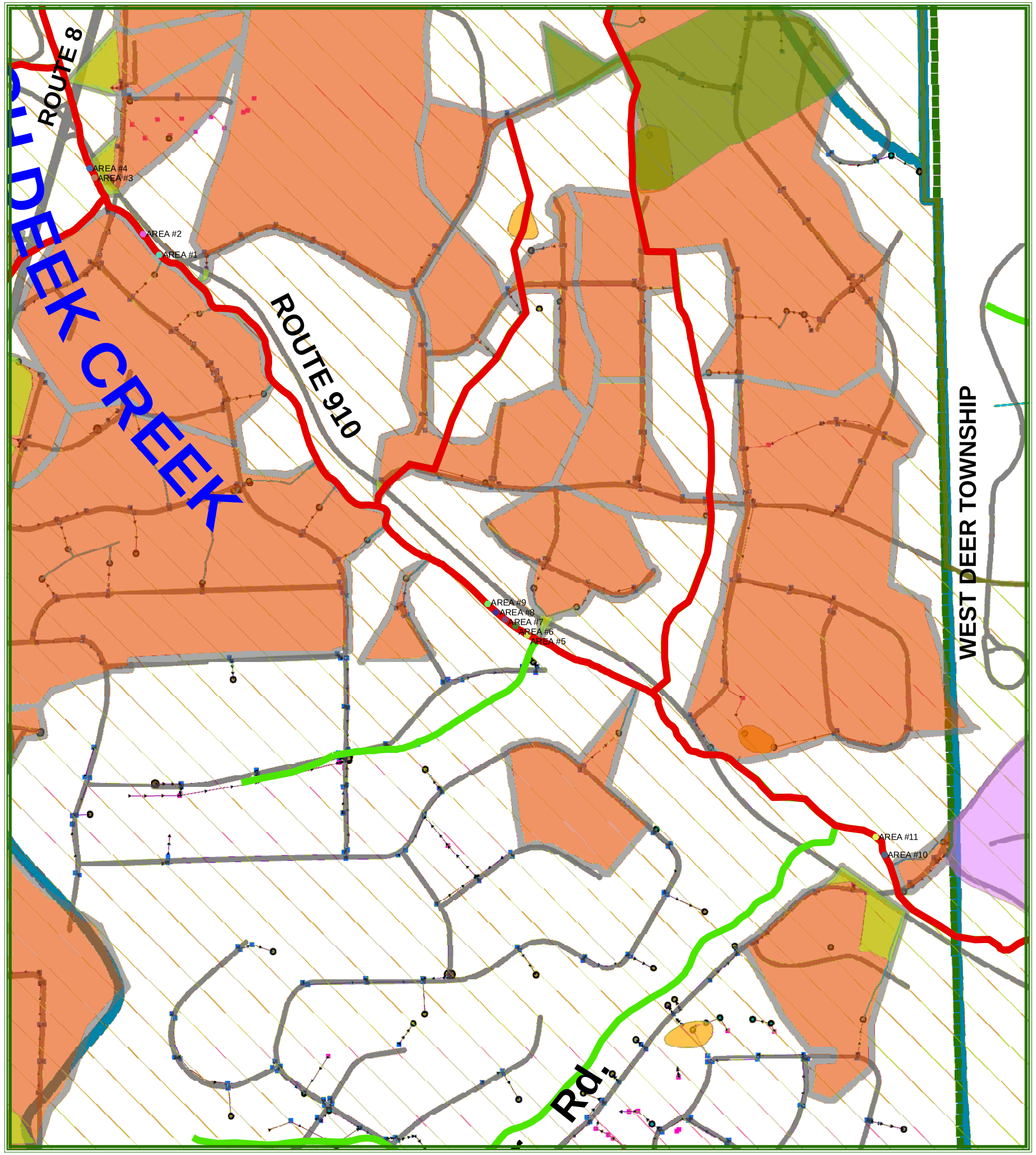
- AREA #

N W E S

600 300 0 600 1,200 Feet

SHOUP ENGINEERING
FOR OVER 50 YEARS
329 Summerfield Dr., Baden PA 15005

JULY 2017



RICHLAND TOWNSHIP
ALLEGHENY COUNTY PA

MAP #9

WHITETAIL RIDGE DETENTION POND RETROFIT PROJECT

Legend

- Non-Attaining Streams
- Other Streams
- Urban Areas 2010
- Richland Township Boundary
- OUTFALL SEWERSHEDS
- Watershed Boundary

N
W E
S

150 75 0 150 300 Feet

SHOUP ENGINEERING
FOR OVER 50 YEARS
329 Summerfield Dr., Baden PA 15005

JULY 2017