

Pollutant Reduction Plan

Prepared for

**West Brandywine Township
Chester County, PA**

For the

**Culbertson Run & East Branch of the
Brandywine Creek**

and

**The Unnamed Tributary to the West Branch of
the Brandywine Creek**

in the

Christina River Basin

July 27, 2017



**Herbert E. MacCombie, Jr., PE.
Consulting Engineers & Surveyors, Inc.**

Environmental Control, Municipal, Sanitary
Hydraulic, Site Planning,
Subdivision & Land Development

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1.0 Executive Summary

West Brandywine Township has been operating under a Municipal Separate Storm Sewer System (MS4) permit issued by the Pennsylvania Department of Environmental Protection (PA DEP) since 2003. The permit needs to be renewed in 2018 and the proposed application requires the Township to prepare a plan that will address the reduction of sediments and nutrients in the streams within the Christina River Basin. Based upon the analysis it has been determined that the sediment load within the designated storm sewersheds, which drain to the impaired streams is 74,250 lbs./yr. The load must be reduced during the 5-year permit cycle by 10% or 7,425 lbs./yr. The most effective method to achieve the required reduction is a stream stabilization project. The location selected to implement this project is in an unnamed branch to the Culbertson Run north of Horseshoe Pike for approximately 170 linear feet. The property owned by the Township, which is adjacent to the Kimberwick Development. The anticipated cost is estimated to be \$160,000.00, which includes engineering and environmental permitting. Funding through Growing Green Grants or other sources will be evaluated. Alternative Best Management Practices such as, retrofitting existing stormwater management basins to be wet ponds, the installation of infiltration trenches, as well as bioretention swales were considered. However, due to the limitations of suitable locations in which to achieve the required reduction utilizing those methods resulted in the selection of the proposed project.

2.0 Purpose and Scope

West Brandywine Township is responsible for developing and implementing a Pollutant Reduction Plan (PRP)/ Total Maximum Daily Load (TMDL) for all discharges covered under Municipal Separate Storm Sewer System (MS4) within the Brandywine Creek Watershed. These discharges include those to the impaired streams of Culbertson Run and the Unnamed Tributary to the West Branch of Brandywine Creek (for siltation), and to the Christina River Basin (for nutrients), as part of the 2018 National Pollutant Discharge Elimination System (NPDES) MS4 Individual Permit application to the Pennsylvania Department of Environmental Protection (PA DEP). This plan has been prepared using the most current guidelines available by PA DEP. All relevant definitions of regulatory terminology can be referenced in Section 6.0 of this report.

3.0 Permit Requirements

West Brandywine Township is required by the PA DEP and Environmental Protection Agency (EPA) to address siltation in the impaired stream sections of the Culberston Run and the Unnamed Tributary to the Culbertson Run within the Township, which then go on to discharge into the East Branch of the Brandywine Creek in the Christina River Basin. Appendix E of the Permit stipulates that a PRP plan must be developed in order to address this siltation impairment. In addition, the requirements table indicates that a TMDL plan also would be required to specifically address nutrients for the Christina River Basin. The assigned reductions are 22.96% for Nitrogen and 13.35% for Phosphorous.

PADEP has stipulated in their Instruction Guidelines, General Information (B) that a PRP Plan that is developed to address impaired waters for siltation, must achieve a minimum 10% reduction in sediment. It is acceptable to use the presumptive approach in which it is assumed that a achieving a

10% reduction in sediment will also accomplish the required 5% nutrient reduction in Total Phosphorus (TP). Thus, a separate TMDL plan for nutrients does not need to be prepared for this permit cycle.

The other noted requirements in the table for PCBs and Organic Enrichment/Low D.O. do not need to be addressed at this time.

The previously mentioned impairments and the corresponding streams can be found in revision 06/26/2017 of the 2014 Pennsylvania Integrated Water Quality Monitoring and Assessment Report (Integrated Report) and are highlighted in Table 1 below.

Table 1: MS4 Requirements Table (Municipal) Excerpt

MS4 Name	NPDES ID	Individual Permit Required?	Reason	Impaired Downstream Waters or Applicable TMDL Name	Requirement(s)	Other Cause(s) of Impairment
West Brandywine Township, Chester County	PAI130544	Yes	PRP/TMDL Plan, SP, IP	West Branch Brandywine Creek	Appendix C-PCB (4a), Appendix E-Siltation (4a)	Water/Flow Variability (4c)
				Beaver Creek		Cause Unknown (4a), Other Habitat Alterations, Water/Flow Variability (4c)
				Christina River Basin Nutrients	TMDL Plan-Nutrients, Organic Enrichment/ Low D.O. (4a)	
				Unnamed Tributaries to West Branch Brandywine Creek		Cause Unknown (4a)
				East Branch Brandywine Creek		Cause Unknown (4a), Other Habitat Alterations, Water/Flow Variability (4c)

These reductions must occur over the 5-year term of the permit, which will be from March 16, 2018 to March 15, 2023 through the implementation of Best Management Practices (BMPs) as provided for in the Stormwater BMP Manual for PA. The development of sewersheds contributing storm runoff to the impaired streams, the calculation of the loads, the determination of the BMPs to be implemented and a cost analysis are presented in the report.

4.0 Background/Setting

West Brandywine Township comprises approximately 13.25 square miles located between the East and West branches of the Brandywine Creek in Chester County, in southeast Pennsylvania (Figure 1).

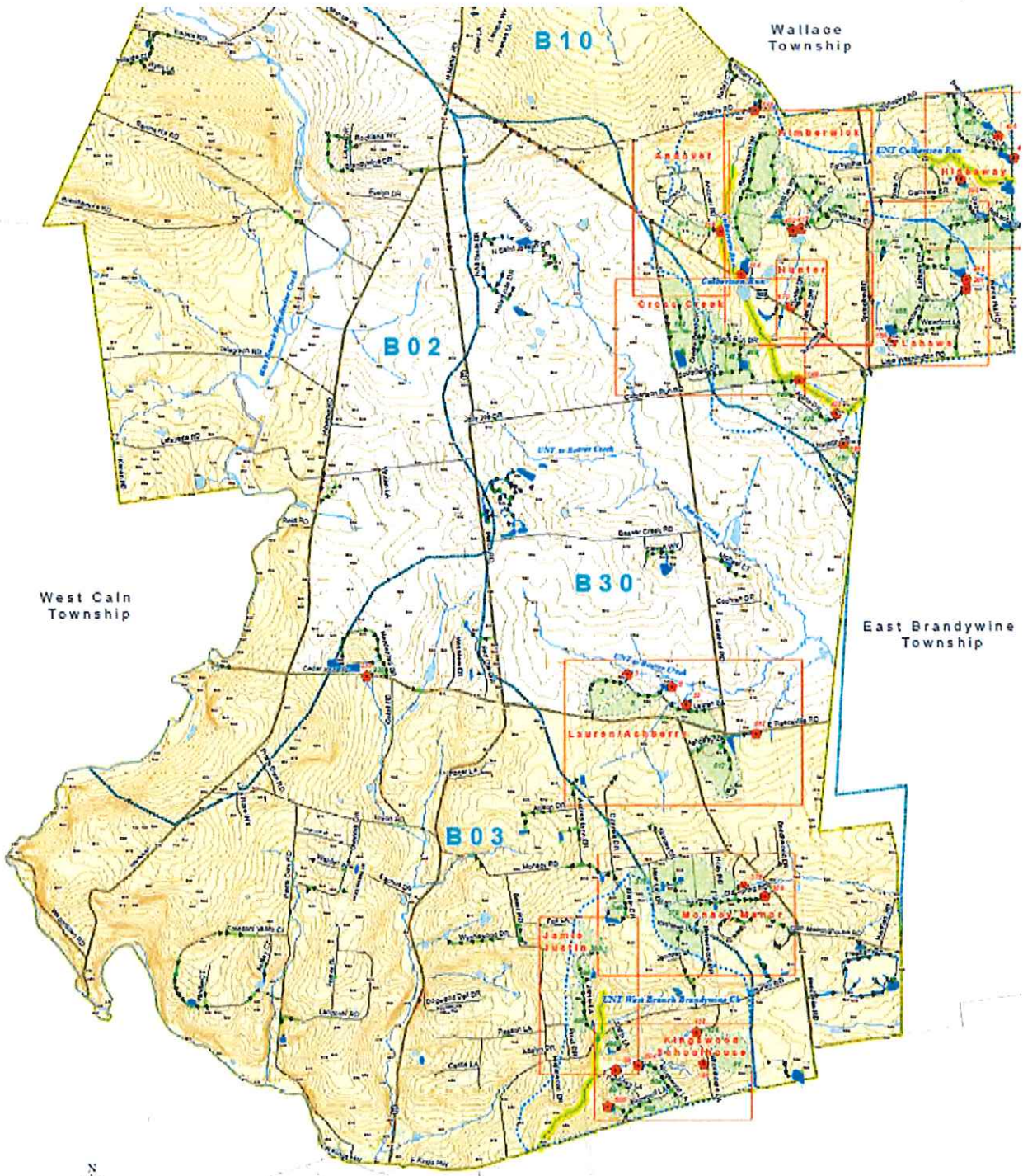
Figure 1: West Brandywine Township Location Map¹



¹https://en.wikipedia.org/wiki/West_Brandywine_Township,_Chester_County,_Pennsylvania#/media/File:Chester_County_Pennsylvania_incorporated_and_unincorporated_areas_West_Brandywine_highlighted.svg

Figure 2 below displays a map of the streams in West Brandywine Township along with the 2010 Urbanized Area (tan color). The Urbanized Area, as determined by the 2010 Census encompasses approximately 5,217 acres (8.15 sq.miles), which encompasses 61.5% of the Township. The Impaired stream segments are highlighted yellow.

Figure 2: West Brandywine Township MS4 Storm Sewer System and Outfall Location Map - Urbanized Area (tan) Impaired Streams (yellow)



4.1 Culbertson Run

Culbertson Run and an unnamed tributary of Culbertson Run are located in the northeastern part of the township. Both flow in a southeasterly direction meeting in East Brandywine Township. These two sections of Culbertson Run are locally impaired for Siltation and Other Habitat Alterations. A PRP plan is required to address the siltation in accordance with the provision of Appendix E.

There are twenty-one (21) MS4 outfalls that discharge to these sections of Culbertson Run. Refer to the Appendices for MS4 mapping.

4.2 West Branch Brandywine Creek (Unnamed Tributary)

The Unnamed Tributary to the West Branch of Brandywine Creek in the south central portion of the Township flows into Caln Township before converging with the main stem of the West Branch. This unnamed tributary is noted to be locally impaired from Causes Unknown. However, the west Branch is noted to be impaired for Siltation, and therefore a PRP plan needs to be prepared, in accordance with the provisions of Appendix E, as it is within the

There are nine (9) MS4 outfalls that discharge to this section of the West Branch of Brandywine Creek. Refer to the Appendices for MS4 mapping.

4.3 Christina River Basin

The whole of West Brandywine Township is within the Christina River Basin. As noted previously in this report this Basin is currently impaired for nutrients for which a waste load allocation has been assigned to the Township, which would require a TMDL Plan to be prepared. However, since the presumptive approach is being utilized to address the siltation requirement, which includes a 5% reduction for TP, a separate TMDL Plan is not required for this permit cycle. There are a total of thirty (30) MS4 outfalls in the urbanized area that discharge to the three impaired waterways within West Brandywine Township. Refer to the Appendices for MS4 mapping.

5.0 Pollutant Reduction

5.1 Public Participation

West Brandywine Township made this PRP available to the public for review and comment for thirty (30) days. This was initiated by publishing a notice in the Daily Local News, a daily newspaper of general circulation, on July 26, 2017. A copy of the public notice published is included in Appendix A.

Public Comments were accepted at the regularly schedule Board of Supervisors meeting on August 17, 2017 and can be found in Appendix A.

5.2 Storm Sewersheds

Storm sewersheds that drain to each of the thirty (30) designated outfalls were manually digitized using a standard watershed delineation technique including a “heads up”, on screen approach using PAMAP program, LIDAR derived two (2) foot topographic contours for elevation reference. Parsing was not implemented to eliminate areas within the designated storm sewersheds to calculate the required sediment load. No storm sewersheds extend outside of the municipal boundary. Therefore, the storm sewershed boundaries are synonymous with the planning area boundaries. A map illustrating the storm sewersheds can be found in Appendix B.

The following table (Table 2) includes a list of outfalls and the associated storm sewershed acreage that drain to each outfall. Also listed is the receiving water for each outfall and United States Geological Survey (USGS) National Hydrography Dataset (NHD) Hydrologic Unit Code (HUC) 12 watershed.

Table 2: West Brandywine Township Outfalls and Storm Sewershed Acreage

Receiving Water	HUC 12	Outfall Number	Storm Sewershed (acres)
West Branch Brandywine Creek	020402050202	89	2.17
		348	6.19
		380	5.31
		495	6.87
		496	3.86
		498	2.53
		504	3.02
		505	6.78
		519	1.97
Culbertson Run	020402050102	145	22.81
		149	6.36
		151	2.58
		155	22.8
		159	5.31
		170	2.37
		201	3.8
		214	34
		216	5.27
		390	13.19
		393	7.26
		396	4.30
		402	4.01
		412	23.11

		415	28.15
		416	1.68
		419	1.74
		422	5.2
		424	9.00
		426	7.77
		518	3.87
Total			253.29

5.3 Pollutants of Concern

West Brandywine Township is responsible for both sediment reduction and nutrient reduction. To meet the requirements, a minimum of ten (10) percent sediment reduction is covered in this plan. Per the “NPDES Stormwater Discharges From Small Municipal Separate Storm Sewer Systems PRP Instructions” (dated 3/2017) “PRPs may use a presumptive approach in which it is assumed that a 10% sediment reduction will also accomplish a 5% TP reduction.” Therefore, this plan covers both the sediment and nutrient reduction requirement. Loading and BMP reduction calculations can be found in Appendix C.

5.4 Existing Sediment Loading

To determine existing sediment loading to West Branch Brandywine Creek, Christina River Basin Nutrients, and the general methodology described in “NPDES Stormwater Discharges from Small Municipal Separate Storm Sewer Systems PRP Instructions” (dated 3/2017) was utilized. In order to calculate the load using the simplified method recommended by DEP the loading rates for PA “All Other Counties” at the bottom of Attachment B were utilized, as seen in Table 3 below.

Table 3: Attachment B: Developed Land Loading Rates for PA Counties

County	Category	Acres	TN lbs/acre/yr	TP lbs/acre/yr	TSS (Sediment) lbs/acre/yr
McKean	impervious developed	38.7	20.93	3.21	1,843.27
	pervious developed	5.3	22.58	1.45	249.26
Mifflin	impervious developed	5,560.2	21.83	1.79	1,979.13
	pervious developed	16,405.5	21.13	0.71	296.07
Montour	impervious developed	5,560.2	21.83	1.79	1,979.13
	pervious developed	16,405.5	21.13	0.71	296.07
Northumberland	impervious developed	8,687.3	25.73	1.54	2,197.08
	pervious developed	25,168.3	24.63	0.54	367.84
Perry	impervious developed	5,041.1	26.77	1.32	2,314.7
	pervious developed	9,977	23.94	0.51	343.16
Potter	impervious developed	2,936.3	16.95	2.75	1,728.34
	pervious developed	2,699.3	17.11	1.09	265.2
Schuylkill	impervious developed	5,638.7	30.49	1.56	1,921.08
	pervious developed	14,797.2	29.41	0.57	264.04
Snyder	impervious developed	4,934.2	28.6	1.11	2,068.16
	pervious developed	14,718.1	24.35	0.4	301.5
Somerset	impervious developed	1,013.6	25.13	2.79	1,845.7
	pervious developed	851.2	25.71	1.14	293.42
Sullivan	impervious developed	3,031.7	19.08	2.85	2,013.9
	pervious developed	3,943.4	21.55	1.31	301.58
Susquehanna	impervious developed	7,042.1	19.29	2.86	1,405.73
	pervious developed	14,749.7	20.77	1.21	203.85
Tioga	impervious developed	7,966.9	12.37	2.09	1,767.75
	pervious developed	18,090.3	12.22	0.76	261.94
Union	impervious developed	4,382.6	22.98	2.04	2,393.55
	pervious developed	14,065.3	20.88	0.69	343.81
Wayne	impervious developed	320.5	18.69	2.89	1,002.58
	pervious developed	509	21.14	1.31	158.48
Wyoming	impervious developed	3,634.4	16.03	2.53	2,022.32
	pervious developed	10,792.9	13.75	0.7	238.26
York	impervious developed	10,330.7	29.69	1.18	1,614.15
	pervious developed	40,374.8	18.73	0.29	220.4
All Other Counties	impervious developed	-	23.06	2.28	1,839
	pervious developed	-	20.72	0.84	264.96

The total loading rate for West Brandywine Township was then calculated based on pervious and impervious acreage per sewershed. Resulting in an overall sediment load of 134,933.19 pounds per year. Further detail on outfall designation as well as acreage and load can be found in Table 4 below.

Table 4: West Brandywine Township Load Calculation

TOTAL LOAD CALCULATION						
Sewershed	Outfall	Pervious	Pervious Loading Rate	Impervious	Impervious Loading Rate	Total Load
		acres	lbs/acre/yr	acres	lbs/acre/yr	lbs/yr
20	89	1.60	264.96	0.58	1,839.00	1,481.20
42	145	18.28	264.96	4.53	1,839.00	13,179.93
11	149	5.42	264.96	0.94	1,839.00	3,170.28
13	151	2.48	264.96	0.10	1,839.00	835.76
32	155	18.22	264.96	4.58	1,839.00	13,257.41
39	159	4.32	264.96	0.99	1,839.00	2,968.99
5	170	1.47	264.96	0.90	1,839.00	2,052.58
10	201	3.16	264.96	0.64	1,839.00	2,007.09
2	214	25.35	264.96	8.65	1,839.00	22,617.49
1	216	4.24	264.96	1.03	1,839.00	3,021.24
29	348	4.61	264.96	1.58	1,839.00	4,126.10
28	380	4.83	264.96	0.48	1,839.00	2,162.14
37	390	12.27	264.96	0.91	1,839.00	4,929.12
36	393	5.80	264.96	1.46	1,839.00	4,218.90
8	396	3.72	264.96	0.57	1,839.00	2,040.50
3	402	3.51	264.96	0.51	1,839.00	1,857.98
4	412	17.42	264.96	5.69	1,839.00	15,075.29
9	415	23.43	264.96	4.72	1,839.00	14,890.80
38	416	1.35	264.96	0.33	1,839.00	967.47
43	419	1.32	264.96	0.42	1,839.00	1,115.79
12	422	4.10	264.96	1.10	1,839.00	3,108.74
26	495	5.86	264.96	1.01	1,839.00	3,404.36
27	496	3.37	264.96	0.49	1,839.00	1,796.03
25	498	1.95	264.96	0.59	1,839.00	1,594.71
21	504	2.30	264.96	0.72	1,839.00	1,931.92
35	505	5.73	264.96	1.06	1,839.00	3,461.35
44	518	2.77	264.96	1.10	1,839.00	2,750.08
45	519	1.73	264.96	0.25	1,839.00	909.94
TOTAL		190.60		45.91		134,933.19

Three existing BMP types serve to manage the discharges from the designated outfalls in the two watershed were utilized to determine a reduction to the existing loads and are indicated on the map in Appendix B. A summary of the effectiveness of the BMPs and their impact on the load is included in Table 5 below.

Table 5: BMP Load Reduction Chart

BMP NAME	BMP EFFECTIVENESS VALUES			TOTAL IMPERVIOUS ACRES	IMPERVIOUS LOADING RATE	IMPERVIOUS LOAD	TOTAL PERVIOUS ACRES	PERVIOUS LOADING RATE	PERVIOUS LOAD	BMP LOAD REDUCTION
	TN	TP	SEDIMENT	ACRES	LBS/ACRE/YR	LBS/YR	ACRES	LBS/ACRE/YR	LBS/YR	LBS/YR
WET PONDS AND WETLANDS	20%	45%	60%	29.73	1,839.00	54,675.64	138.42	264.96	36,676.20	54,811.10
DRY DETENTION BASINS AND HYDRODYNAMIC STRUCTURES	5%	10%	10%	1.10	1,839.00	2,016.30	2.77	264.96	733.77	275.01
FOREST BUFFERS	25%	50%	50%	4.37	1,839.00	8,027.35	11.92	264.96	3,159.16	5,593.26
TOTAL										60,679.36

When taking into account the current BMP effectiveness the overall load in West Brandywine Township was decreased from 134,933.14 pounds/year to 74,253.79 pounds/year (134,933.14 – 60,679.36). Based on this new total load and a 10% reduction requirement, West Brandywine Township is responsible for removal of 7,425.38 pounds/year.

5.5 Proposed Best Management Practices (BMPs)

The total resultant sediment load that the Township will be ultimately responsible to remove from being discharged to the impaired streams in their effort to eliminate the impairment is 74,253 Lbs. As noted throughout this report, BMPs will need to be implanted during this ensuing 5-year permit cycle to achieve the minimum reduction of 10% or 7,425 lbs.

The most effective method to achieve the required reduction is a stream stabilization project. It is being recommended that the Township endorses an initial plan to stabilize a section of an unnamed branch to the Culbertson Run north of Horseshoe Pike. The property is owned by the Township, which is adjacent to the Ramblewood & Kimberwick Developments. Using the approved allowable reduction of 44 lbs/ft/yr. of channel stabilization, as provided for in the BMP Effectiveness Values Table, approximately 170 LF would need to be stabilized. The waterway is situated in an area that does have an adequate vegetated buffer along both sides of the stream.

5.5.1 Short-Term Reduction

This BMP would satisfy the Township’s required 10% sediment reduction requirement for this permit term.

5.5.2 Long-Term Reduction

In order to achieve the ultimate sediment reduction of an additional 68,670 lb/yr, along with the commensurate reductions for Nutrients, within the following three (3) to four (4) permit cycles or by 2042, the Township would need to undertake an load reduction program that would require reductions in the range of 25% (17,000 lbs) to 35% (26,000 lbs) per permit cycle. This would require expenditures of \$350,000 to \$500,000 per permit cycle. It is obvious that funding expenditures of that magnitude will be extremely difficult to support through existing Township revenue sources and grants. Even if additional funding sources are developed and implemented, such as a Stormwater Management Fee Program, this timeframe may need to be extended in order to achieve the required reductions.

Future BMPs would most likely need to occur in existing stormwater basins or stream sections that are on lands owner by Homeowners Associations, which require their cooperation related to access and future operation and maintenance responsibilities.

5.6 Funding Mechanisms

It is estimated the stream stabilization improvements would cost a total of \$160,000.00 to implement. Funding would be through the Township’s General Operating Budget, unless outside grant funding could be secured.

BMP	Design Cost	Construction Cost	Total Estimated Cost
Stream Stabilization	\$35,000	\$125,000	\$160,000
Total			\$160,000.00

5.7 Operations and Maintenance

The stream stabilization would not impose any significant additional operating and maintenance costs to the Township. The stream would need to be inspected annually or after a major storm event to ensure the stabilization has not been compromised.

6.0 Conclusion

Based upon the analysis of the sediment loads being generated from the sewersheds to the designated MS4 outfalls, it has been determined that the required 10% sediment reduction will be achieved through the implementation of the proposed stream channel stabilization project for this permit cycle and are considered to be in accordance with the various methods and protocols approved by PADEP.

7.0 Definitions

Best Management Practices (BMPs) means schedules of activities, prohibitions of practices, maintenance procedures and other management practices to prevent or reduce pollutant loading to surface waters of this Commonwealth. The term includes treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. The term includes activities, facilities, measures, planning or procedures used to minimize accelerated erosion and sedimentation and manage stormwater to protect, maintain, reclaim and restore the quality of waters and the existing and designated uses of waters within this Commonwealth before, during and after earth disturbance activities. (25 Pa. Code § 92a.2)

Clean Water Act (CWA) means the Federal Water Pollution Control Act, as amended, 33 U.S.C.A. §§ 1251 - 1387.

Cleaning Agent means any product, substance or chemical other than water that is used to clean the exterior surface of vehicles.

Designated Uses are those uses specified in 25 Pa. Code §§ 93.4(a) and 93.9a – 93.9z for each water body or segment whether or not they are being attained. (25 Pa. Code § 93.1)

Dry Weather means a condition in which there are no precipitation, snowmelt, drainage or other events producing a stormwater discharge for more than 48 consecutive hours.

Existing Permittee means any entity that has been designated as a regulated small MS4 and has previously obtained permit coverage under the PAG-13 General Permit or obtained an Individual NPDES MS4 Permit.

Existing Uses are those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards. (25 Pa. Code § 93.1)

Illicit Connection means any physical connection to a municipal separate storm sewer system that can convey illicit discharges into the system and/or is not authorized or permitted by the permittee.

Illicit Discharge means any discharge to a municipal separate storm sewer that is not composed entirely of stormwater, except non-stormwater discharges as described in the “Discharges Authorized by this General Permit” section of this General Permit. Examples of illicit discharges include dumping of motor vehicle fluids, household hazardous wastes, grass clippings, leaf litter, animal wastes, or unauthorized discharges of sewage, industrial waste, restaurant wastes, or any other non-stormwater waste into a municipal separate storm sewer system. Illicit discharges can be accidental or intentional. **3800-PM-BCW0100d 5/2016 Permit**

Impaired Waters means surface waters that fail to attain one or more of its designated uses under 25 Pa. Code Chapter 93 and as listed in Categories 4 and 5 of Pennsylvania’s Integrated Water Quality Monitoring and Assessment Report.

Integrated Water Quality Monitoring and Assessment Report means the report published every other year by DEP to report on the conditions of Pennsylvania’s surface waters to satisfy sections 305(b) and 303(d) of the CWA.

Intermittent Stream means a body of water flowing in a channel or bed composed primarily of substrates associated with flowing water, which, during periods of the year, is below the local water table and obtains its flow from both surface runoff and groundwater discharges. (25 Pa. Code § 92a.2)

Load Allocation means the portion of a surface water’s loading capacity that is assigned or allocated to existing and future nonpoint sources and natural quality. (25 Pa. Code § 96.1)

Low Impact Development (LID) means site design approaches and small-scale stormwater management practices that promote the use of natural systems for infiltration, evapotranspiration, and reuse of rainwater. LID can be applied to new development, urban retrofits, and revitalization projects. LID utilizes design techniques that infiltrate, filter, evaporate, and store runoff close to its source. Rather than rely on costly large-scale conveyance and treatment systems, LID addresses stormwater through a variety of small, cost-effective landscape features located on-site.

MS4 Requirements Table is a compilation of information regarding Pennsylvania MS4s, surface waters that receive stormwater discharges from MS4s, surface water impairments and TMDLs that is posted to DEP’s website, www.dep.pa.gov/MS4. The MS4 Requirements Table has been assembled by DEP to assist

MS4 permittees in determining applicable requirements for the development of plans and implementation of BMPs, as well as eligibility for the PAG-13 General Permit. In general, the MS4 Requirements Table will be updated prior to each renewal of this General Permit based on DEP's latest published Integrated Water Quality Monitoring and Assessment Report.

Municipal separate storm sewer means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to surface waters; (ii) Designed or used for collecting or conveying stormwater; (iii) Which is not a combined sewer; and (iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2. (25 Pa. Code § 92a.32(a) and 40 CFR § 122.26(b)(8))

Municipal Separate Storm Sewer System (MS4) means all separate storm sewers that are defined as "large" or "medium" or "small" municipal separate storm sewer systems pursuant to 40 CFR §§ 122.26(b)(4), (b)(7), and (b)(16), respectively, or designated under 40 CFR § 122.26(a)(1)(v). (25 Pa. Code § 92a.32(a) and 40 CFR § 122.26(b)(18))

Municipality means a city, town, borough, county, township, school district, institution, authority or other public body created by or pursuant to State law and having jurisdiction over disposal of sewage, industrial wastes or other wastes. (25 Pa. Code § 92a.2)

New Permittee means any entity that has been designated as a regulated small MS4 and has not previously obtained permit coverage under the PAG-13 General Permit or obtained an Individual NPDES MS4 Permit.

NOI means the Notice of Intent for coverage under the NPDES General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems.

Non-Municipal Permittee means a regulated small MS4 that is not a municipality, e.g., military bases, large hospital or prison complexes, and highways and other thoroughfares. **3800-PM-BCW0100d 5/2016 Permit**

Non-Structural BMPs means actions that involve management and source controls such as: (1) policies and ordinances that provide requirements and standards to direct growth to identified areas, promote redevelopment, protect areas such as wetlands and riparian areas, maintain and/or increase open space, provide buffers along water bodies, minimize impervious surfaces, and minimize disturbance of soils and vegetation; (2) education programs for developers and the public about minimizing water quality impacts; (3) measures such as minimizing the percentage of impervious area after development, use of measures to minimize directly connected impervious areas, street sweeping, and source control measures such as good housekeeping, maintenance, and spill prevention; and other BMPs as referenced in Chapter 5 of the Pennsylvania Stormwater BMP Manual (363-0300-002).

Ordinance means a law enacted by the government of a municipality.

Outfall means a point source as defined by 40 CFR § 122.2 at the point where a municipal separate storm sewer discharges to surface waters and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels or other conveyances which connect segments of the same stream or other surface waters and are used to convey surface waters. (25 Pa. Code § 92a.32(a) and 40 CFR § 122.26(b)(9))

Owner or Operator means the owner or operator of any “facility” or “activity” subject to regulation under the NPDES program. (25 Pa. Code § 92a.3(b)(1) and 40 CFR § 122.2)

Permittee means the owner or operator of a regulated small MS4 authorized to discharge under the terms of this General Permit.

Point Source means a discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, Concentrated Aquatic Animal Production Facility (CAAP), Concentrated Animal Feeding Operation (CAFO), landfill leachate collection system, or vessel or other floating craft from which pollutants are or may be discharged. (25 Pa. Code § 92a.2)

Pollutant means any contaminant or other alteration of the physical, chemical, biological, or radiological integrity of surface water which causes or has the potential to cause pollution as defined in section 1 of the Pennsylvania Clean Streams Law, 35 P.S. § 691.1. (25 Pa. Code § 92a.2)

Qualifying Development or Redevelopment Project means an earth disturbance activity that requires an NPDES permit for stormwater discharges associated with construction activity per 25 Pa. Code Chapter 102.

Regulated Small MS4 means any small MS4 that is covered by the federal Phase II stormwater program, either through automatic nationwide designation under 40 CFR § 122.32(a)(1) (via the Urbanized Area criteria) or by designation on a case-by-case basis by DEP pursuant to 40 CFR § 122.32(a)(2). “Regulated small MS4s” are a subset of “small MS4s” as defined in this section.

Riparian Forest Buffer means an area of permanent vegetation consisting of native trees, shrubs, forbs and grasses along surface water that is maintained in a natural state or sustainably managed to protect and enhance water quality, stabilize stream channels and banks, and buffer land use activities from surface waters.

Small Municipal Separate Storm Sewer System (Small MS4) means an MS4, as defined in this section, that is not a large or medium MS4 pursuant to 40 CFR §§ 122.26(b)(4) and 122.26(b)(7). The term small MS4 includes systems similar to separate storm sewer systems in municipalities, such as systems at military bases, large hospital or prison complexes, and highways and other thoroughfares. The term does not include separate storm sewers in very discrete areas, such as individual buildings. (25 Pa. Code § 92a.32(a) and 40 CFR § 122.26(b)(16))

Standard Operating Procedure (SOP) means a policy or set of procedures that are enacted by a non-municipal permittee to implement a stormwater management program.

Storm Sewershed means the land area that drains to an individual MS4 outfall from within the jurisdiction of the MS4 permittee. The term “combined storm sewershed” means the drainage areas of

all MS4 outfalls that discharge to a specific surface water or to waters within the Chesapeake Bay watershed. **3800-PM-BCW0100d 5/2016 Permit**

Stormwater means runoff from precipitation, snow melt runoff and surface runoff and drainage. "Stormwater" has the same meaning as "storm water." (25 Pa. Code § 92a.2)

Structural BMPs means stormwater storage and management practices including, but not limited to, wet ponds and extended detention outlet structures; filtration practices such as grassed swales, sand filters and filter strips; infiltration practices such as infiltration basins and infiltration trenches; and other BMPs as referenced in Chapter 6 of the Pennsylvania Stormwater BMP Manual (363-0300-002).

Surface Waters means perennial and intermittent streams, rivers, lakes, reservoirs, ponds, wetlands, springs, natural seeps and estuaries, excluding water at facilities approved for wastewater treatment such as wastewater treatment impoundments, cooling water ponds and constructed wetlands used as part of a wastewater treatment process. (25 Pa. Code § 92a.2)

Total Maximum Daily Load (TMDL) means the sum of individual waste load allocations for point sources, load allocations for nonpoint sources and natural quality and a margin of safety expressed in terms of mass per time, toxicity or other appropriate measures. (25 Pa. Code § 96.1)

Urbanized Area (UA) means land area comprising one or more places (central place(s)) and the adjacent densely settled surrounding area (urban fringe) that together have a residential population of at least 50,000 and an overall population density of at least 1,000 people per square mile, as defined by the United States Bureau of the Census and as determined by the latest available decennial census. The UA outlines the extent of automatically regulated areas. UA maps are available at :
<http://www.epa.gov/npdes/stormwater/urbanmaps>, or at:
<http://www.epa.gov/enviro/html/em/index.html>. [PAG-13]

Wasteload Allocation (WLA) means the portion of a surface water's loading capacity that is allocated to existing and future point source discharges. (25 Pa. Code § 96.1)

Water Quality Criteria means numeric concentrations, levels or surface water conditions that need to be maintained or attained to protect existing and designated uses. (25 Pa. Code § 93.1)

Water Quality Standards means the combination of water uses to be protected and the water quality criteria necessary to protect those uses. (25 Pa. Code § 92a.2)

Appendix A

Published Notice & Public Comment and Response

July 21, 2017

To: Daily Local News

From: Linda Formica
Secretary/Treasurer

Subject: **Advertisement Request**

Please place the following ad in the Legal Section of your publication once, namely, Wednesday July 26, 2017

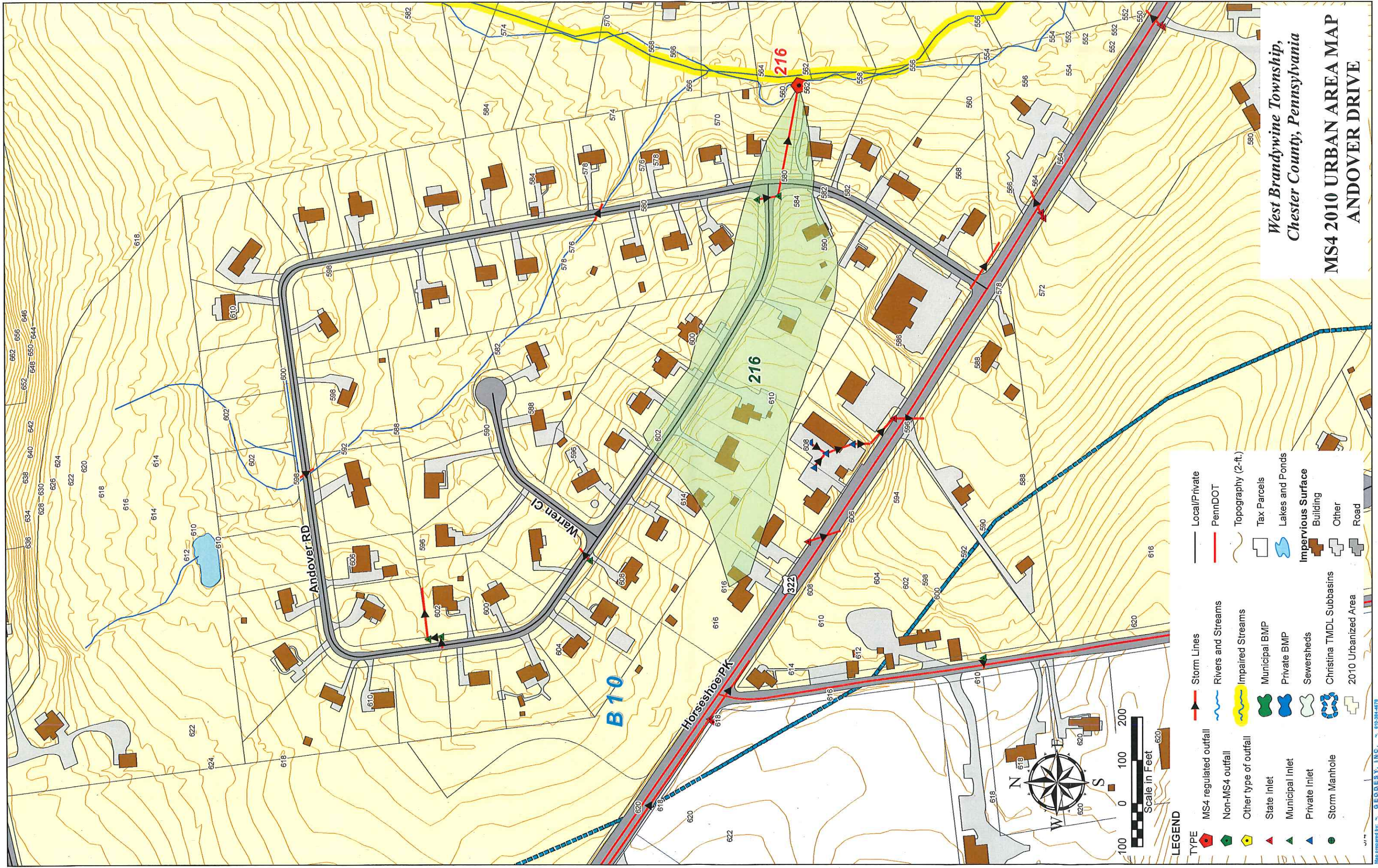
PUBLIC NOTICE
West Brandywine Township
Chester County, PA

NOTICE IS HEREBY GIVEN that beginning August 1, 2017, the Board of Supervisors of West Brandywine Township, will accept written public comments for 30 days on the Pollutant Reduction Plan (PRP) for West Brandywine Township. A copy of the PRP is available for public review at the Township Building located at 198 Lafayette Road, West Brandywine, PA 19320. Interested persons will also be able to provide comments at the regularly scheduled public Board of Supervisors Meeting on **August 17, 2017 at 7:30 P.M.** (EDT) at the Township Building. The Plan provides the Township guidance on measures to be taken to address impaired surface waters within the Township. If you wish to attend the meeting and are a person with a disability requiring service or other accommodation, please contact the township office (610) 380-8200 to discuss how the Township can best accommodate your needs.

Linda Formica
Township Secretary / Treasurer

Appendix B

Storm Sewershed/Planning Area Map



**West Brandywine Township,
Chester County, Pennsylvania**

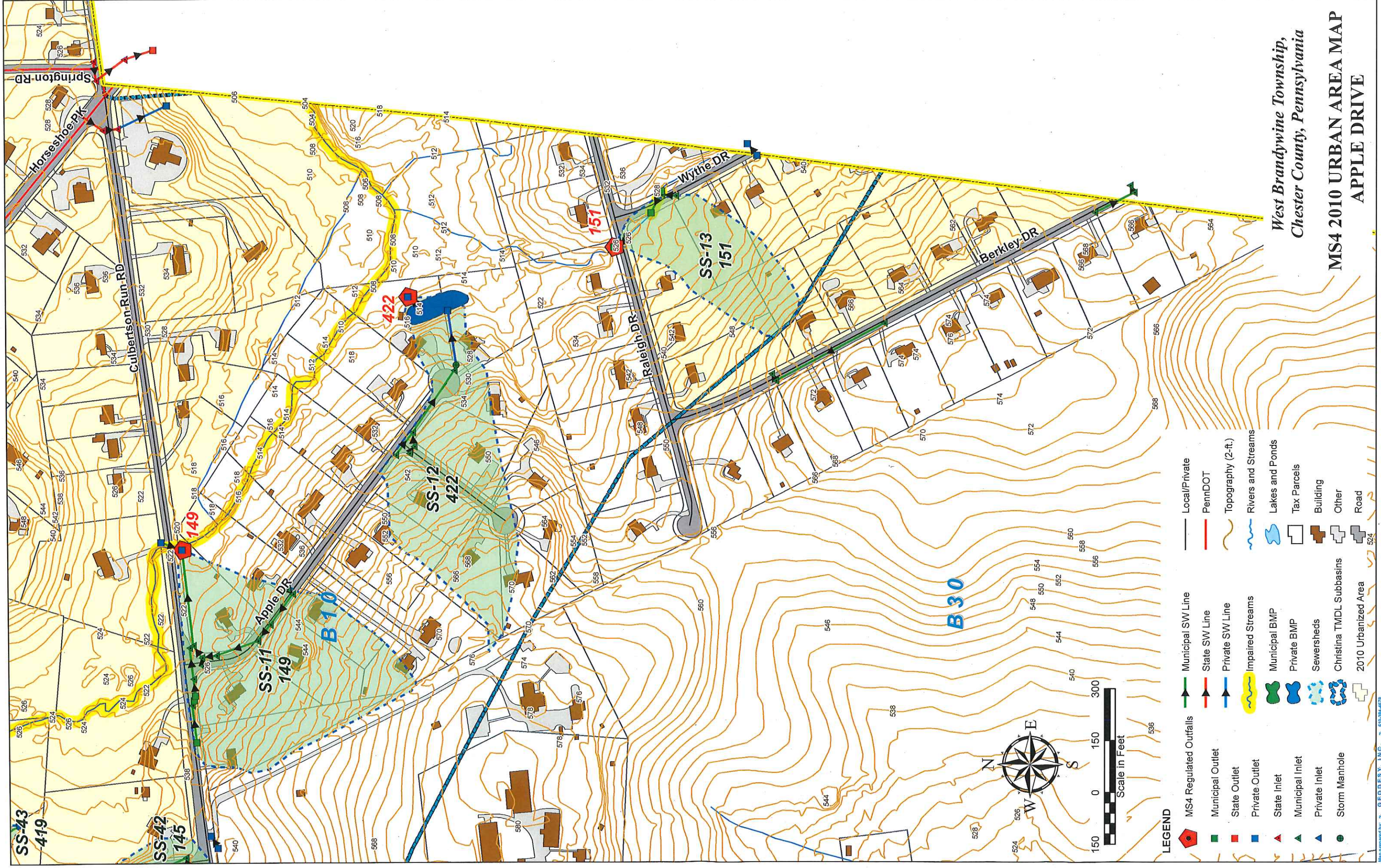
**MS4 2010 URBAN AREA MAP
ANDOVER DRIVE**

LEGEND

MS4 regulated outfall	Storm Lines	Local/Private
Non-MS4 outfall	Rivers and Streams	PennDOT
Other type of outfall	Impaired Streams	Topography (2-ft.)
State Inlet	Municipal BMP	Tax Parcels
Municipal Inlet	Private BMP	Lakes and Ponds
Private Inlet	Sewersheds	Impervious Surface Building
Storm Manhole	Christina TMDL Subbasins	Other
	2010 Urbanized Area	Road

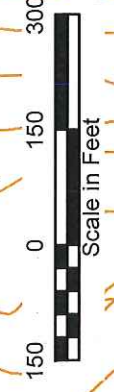


Map prepared by: GEODESY, INC. - 410-341-4474



West Brandywine Township,
 Chester County, Pennsylvania
MS4 2010 URBAN AREA MAP
APPLE DRIVE

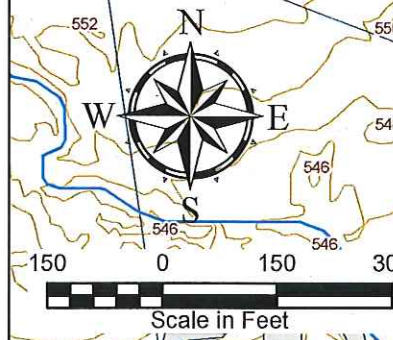
- LEGEND**
- MS4 Regulated Outfalls
 - Municipal Outlet
 - State Outlet
 - Private Outlet
 - State Inlet
 - Municipal Inlet
 - Private Inlet
 - Storm Manhole
 - Municipal SW Line
 - State SW Line
 - Private SW Line
 - Impaired Streams
 - Municipal BMP
 - Private BMP
 - Sewersheds
 - Christina TMDL Subbasins
 - 2010 Urbanized Area
 - Local/Private
 - PennDOT
 - Topography (2-ft.)
 - Rivers and Streams
 - Lakes and Ponds
 - Tax Parcels
 - Building
 - Other
 - Road

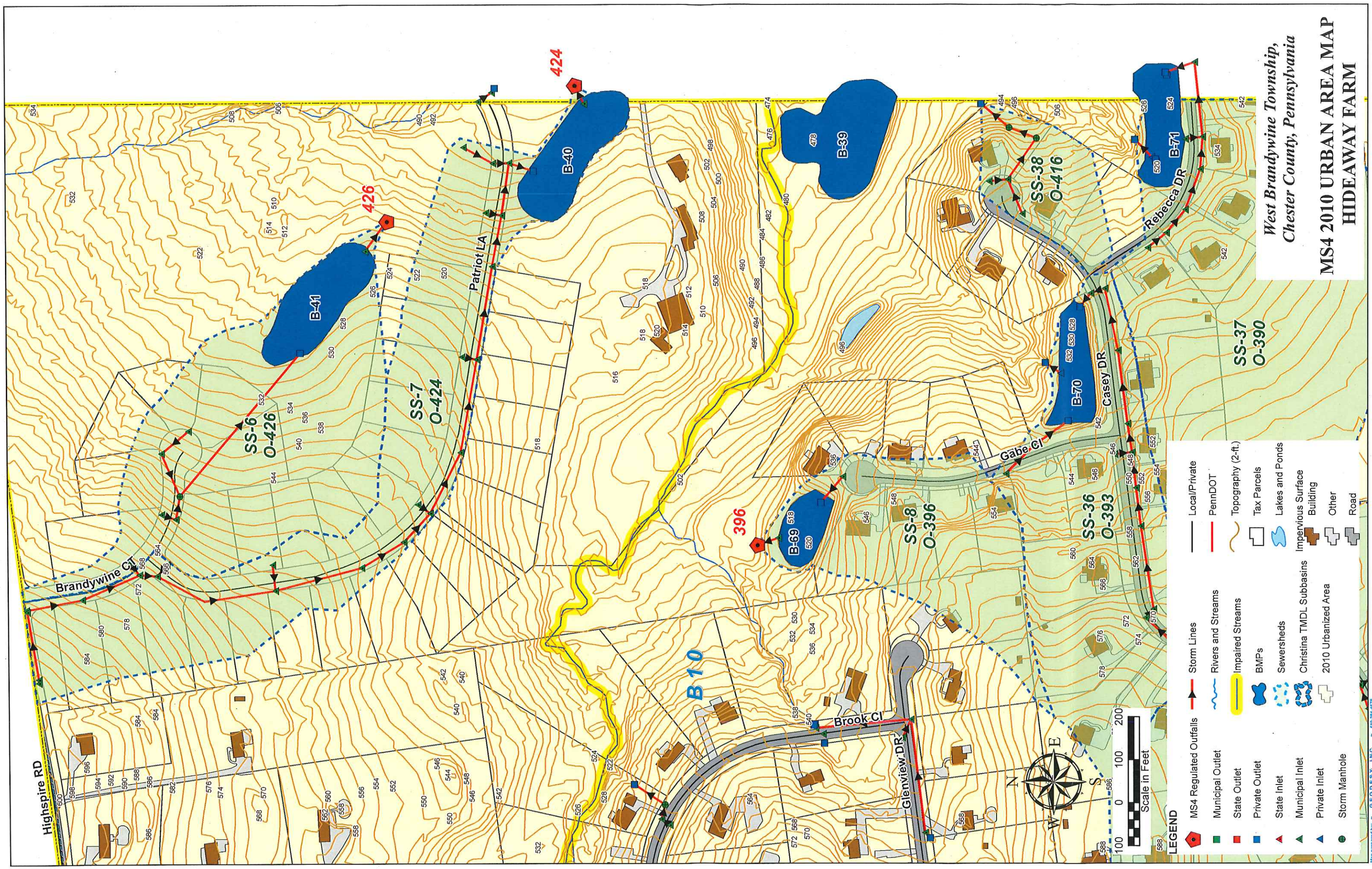




West Brandywine Township,
 Chester County, Pennsylvania
**MS4 2010 URBAN AREA MAP
 CROSS CREEK**

- LEGEND**
- ◆ MS4 Regulated Outfalls
 - Municipal Outlet
 - State Outlet
 - Private Outlet
 - ▲ State Inlet
 - ▲ Municipal Inlet
 - ▲ Private Inlet
 - Storm Manhole
 - Storm Lines
 - ~ Rivers and Streams
 - ~ Impaired Streams
 - ⊕ Municipal BMP
 - ⊕ Private BMP
 - ⊕ Sewersheds
 - ⊕ Christina TMDL Subbasins
 - ⊕ 2010 Urbanized Area
 - Local/Private
 - PennDOT
 - Topography (2-ft.)
 - Tax Parcels
 - ⊕ Lakes and Ponds
 - Impervious Surface
 - Building
 - Other
 - Road





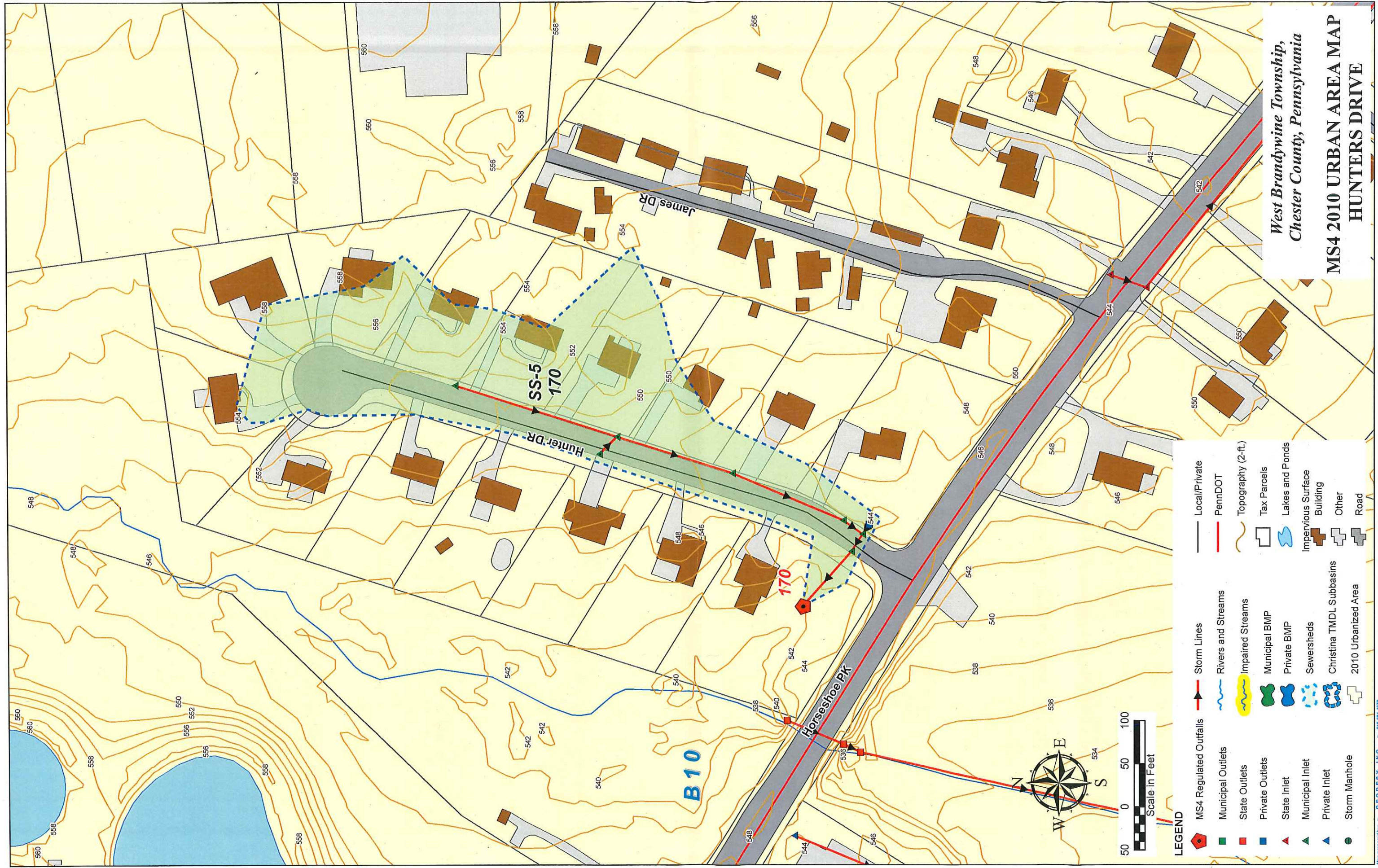
West Brandywine Township,
Chester County, Pennsylvania

MS4 2010 URBAN AREA MAP
HIDEAWAY FARM

LEGEND

	MS4 Regulated Outfalls		Storm Lines		Local/Private
	Municipal Outlet		Rivers and Streams		PennDOT
	State Outlet		Impaired Streams		Topography (2-ft.)
	Private Outlet		BMPs		Tax Parcels
	State Inlet		Sewersheds		Lakes and Ponds
	Municipal Inlet		Christina TMDL Subbasins		Impervious Surface Building
	Private Inlet		2010 Urbanized Area		Other
	Storm Manhole				Road



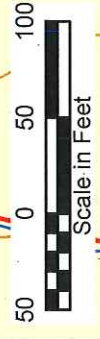


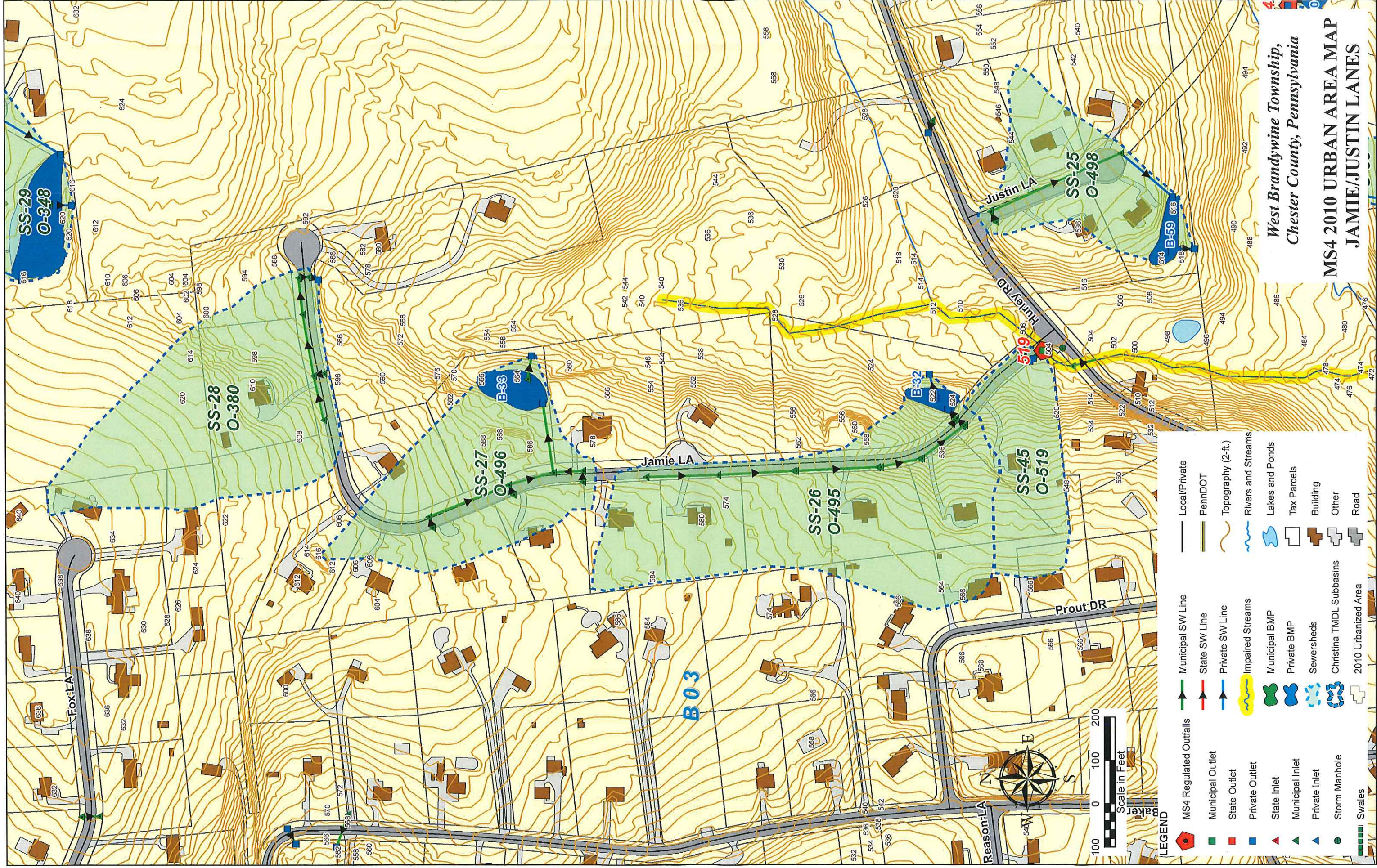
West Brandywine Township,
Chester County, Pennsylvania

MS4 2010 URBAN AREA MAP
HUNTERS DRIVE

LEGEND

MS4 Regulated Outfalls	Storm Lines	Local/Private	PennDOT
Municipal Outlets	Rivers and Streams	Topography (2-ft.)	Tax Parcels
State Outlets	Impaired Streams	Lakes and Ponds	Impervious Surface Building
Private Outlets	Municipal BMP	Sewersheds	Other
State Inlet	Private BMP	Christina TMDL Subbasins	Road
Municipal Inlet	Storm Manhole	2010 Urbanized Area	
Private Inlet			



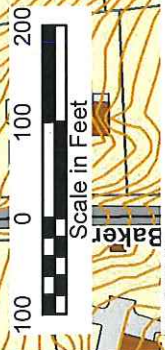


West Brandywine Township,
Chester County, Pennsylvania

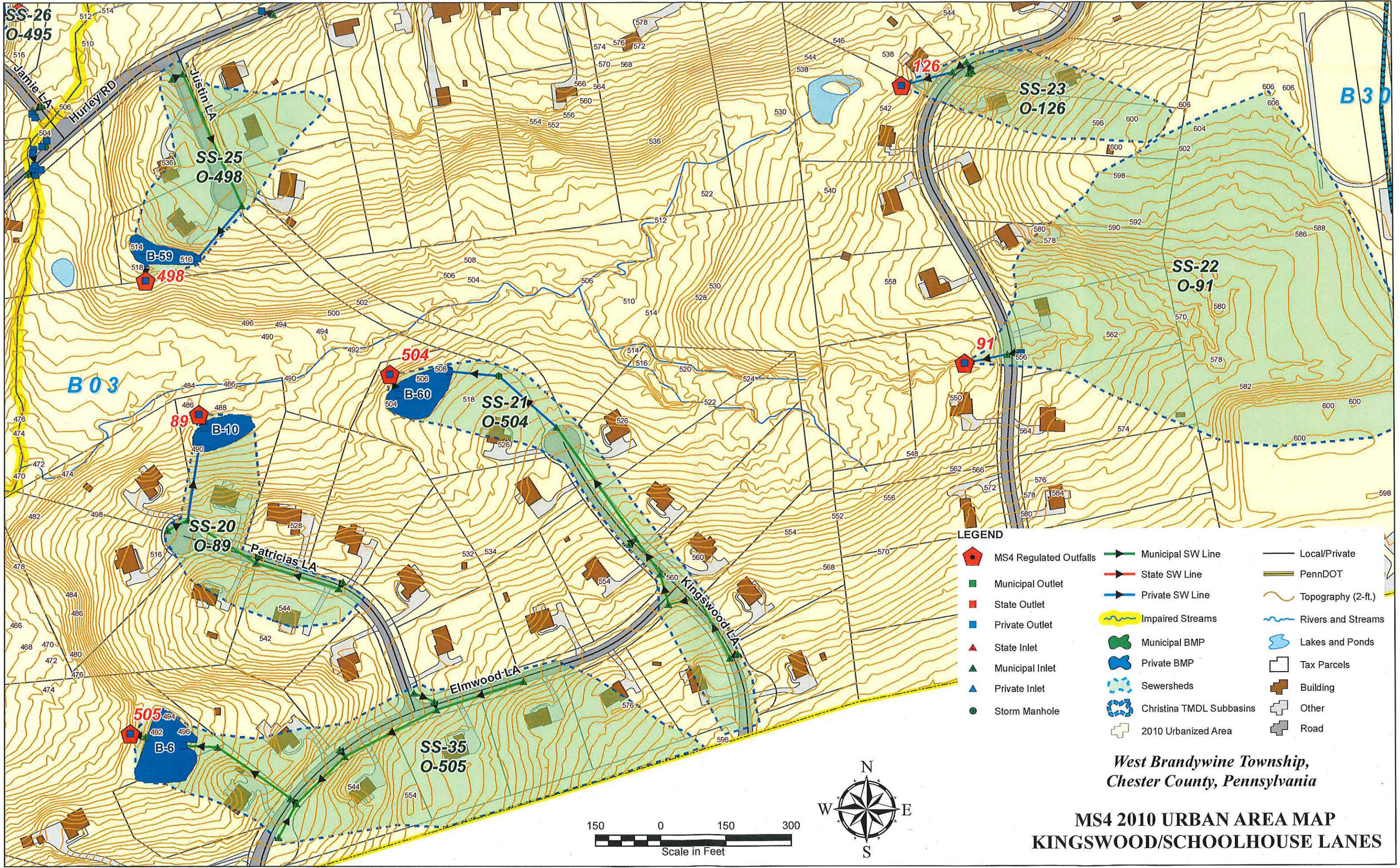
MS4 2010 URBAN AREA MAP
JAMIE/JUSTIN LANES

LEGEND

	MS4 Regulated Outfalls		Municipal SW Line		Local/Private
	Municipal Outlet		State SW Line		PennDOT
	State Outlet		Private SW Line		Topography (2-ft.)
	Private Outlet		Impaired Streams		Rivers and Streams
	State Inlet		Municipal BMP		Lakes and Ponds
	Municipal Inlet		Private BMP		Tax Parcels
	Private Inlet		Sewersheds		Building
	Storm Manhole		Christina TMDL Subbasins		Other
	Swales		2010 Urbanized Area		Road



Map prepared by: GEODESY, INC., 610-384-4871

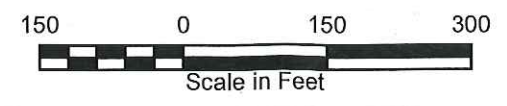


LEGEND

- | | | |
|------------------------|--------------------------|--------------------|
| MS4 Regulated Outfalls | Municipal SW Line | Local/Private |
| Municipal Outlet | State SW Line | PennDOT |
| State Outlet | Private SW Line | Topography (2-ft.) |
| Private Outlet | Impaired Streams | Rivers and Streams |
| State Inlet | Municipal BMP | Lakes and Ponds |
| Municipal Inlet | Private BMP | Tax Parcels |
| Private Inlet | Sewersheds | Building |
| Storm Manhole | Christina TMDL Subbasins | Other |
| | 2010 Urbanized Area | Road |

*West Brandywine Township,
Chester County, Pennsylvania*

**MS4 2010 URBAN AREA MAP
KINGSWOOD/SCHOOLHOUSE LANES**



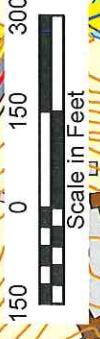
Map prepared by: GEODESY, INC. 610-384-4678



*West Brandywine Township,
Chester County, Pennsylvania*

MS4 2010 URBAN AREA MAP
KIMBERWICK

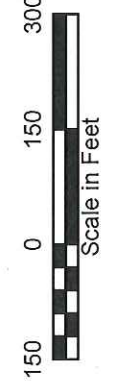
- LEGEND**
- MS4 Regulated Outfalls
 - Municipal Outlet
 - State Outlet
 - Private Outlet
 - State Inlet
 - Municipal Inlet
 - Private Inlet
 - Storm Manhole
 - Storm Lines
 - Rivers and Streams
 - Impaired Streams
 - Municipal BMP
 - Private BMP
 - Sewersheds
 - Christina TMDL Subbasins
 - 2010 Urbanized Area
 - Local/Private
 - PennDOT
 - Topography (2-ft.)
 - Tax Parcels
 - Lakes and Ponds
 - Impervious Surface Building
 - Other
 - Road





LEGEND

- MS4 Regulated Outfalls
- Municipal SW Line
- State SW Line
- Private SW Line
- Impaired Streams
- BMPs
- Sewersheds
- Christina TMDL Subbasins
- 2010 Urbanized Area
- Municipal Outlet
- State Outlet
- Private Outlet
- State Inlet
- Municipal Inlet
- Private Inlet
- Storm Manhole
- Local/Private
- PennDOT
- Topography (2-ft.)
- Rivers and Streams
- Lakes and Ponds
- Tax Parcels
- Building
- Other
- Road

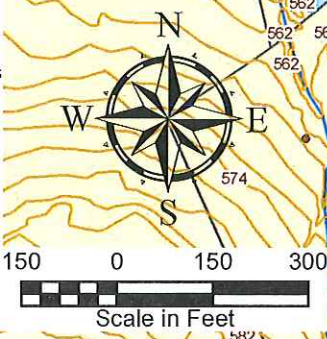


West Brandywine Township,
Chester County, Pennsylvania
MS4 2010 URBAN AREA MAP
LAHAWA DRIVE



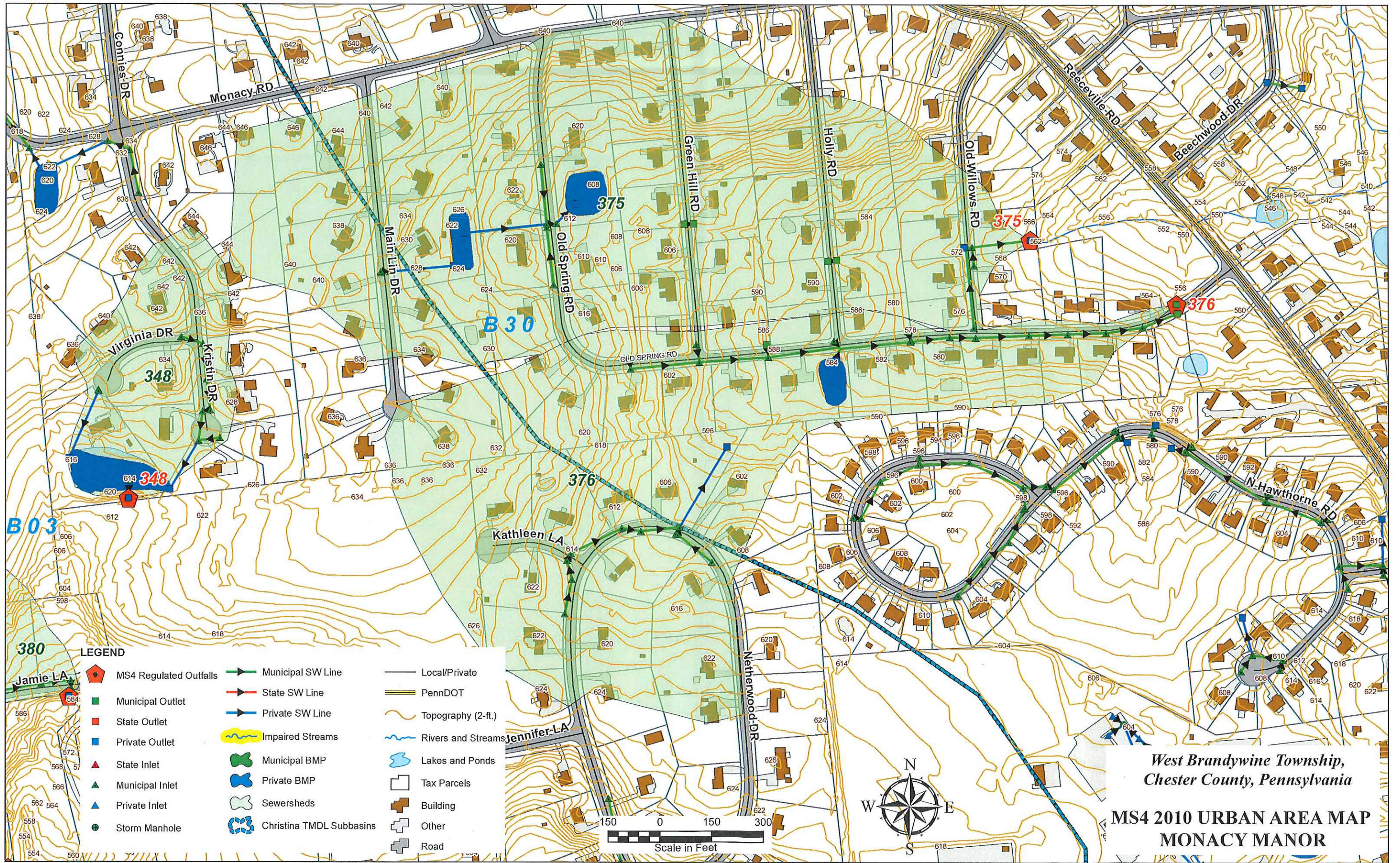
LEGEND

MS4 Regulated Outfalls	Municipal SW Line	Local/Private
Municipal Outlet	State SW Line	PennDOT
State Outlet	Private SW Line	Topography (2-ft.)
Private Outlet	Impaired Streams	Rivers and Streams
State Inlet	Municipal BMP	Lakes and Ponds
Municipal Inlet	Private BMP	Tax Parcels
Private Inlet	Sewersheds	Building
Storm Manhole	Christina TMDL Subbasins	Other
2010 Urbanized Area	Road	



*West Brandywine Township,
Chester County, Pennsylvania*

**MS4 2010 URBAN AREA MAP
LAUREN LAND/ASHBERRY**

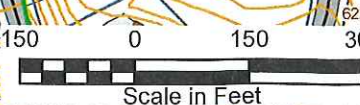


West Brandywine Township,
 Chester County, Pennsylvania

**MS4 2010 URBAN AREA MAP
 MONACY MANOR**

LEGEND

	MS4 Regulated Outfalls		Municipal SW Line		Local/Private
	Municipal Outlet		State SW Line		PennDOT
	State Outlet		Private SW Line		Topography (2-ft.)
	Private Outlet		Impaired Streams		Rivers and Streams
	State Inlet		Municipal BMP		Lakes and Ponds
	Municipal Inlet		Private BMP		Tax Parcels
	Private Inlet		Sewersheds		Building
	Storm Manhole		Christina TMDL Subbasins		Other
					Road



Appendix C
Supporting Calculations
And
Land Use Maps

TOTAL LOAD CALCULATION

Sewershed	Outfall	Pervious	Pervious Loading Rate	Impervious	Impervious Loading Rate	Total Load
		acres	lbs/acre/yr	acres	lbs/acre/yr	lbs/yr
20	89	1.60	264.96	0.58	1,839.00	1,481.20
42	145	18.28	264.96	4.53	1,839.00	13,179.93
11	149	5.42	264.96	0.94	1,839.00	3,170.28
13	151	2.48	264.96	0.10	1,839.00	835.76
32	155	18.22	264.96	4.58	1,839.00	13,257.41
39	159	4.32	264.96	0.99	1,839.00	2,968.99
5	170	1.47	264.96	0.90	1,839.00	2,052.58
10	201	3.16	264.96	0.64	1,839.00	2,007.09
2	214	25.35	264.96	8.65	1,839.00	22,617.49
1	216	4.24	264.96	1.03	1,839.00	3,021.24
29	348	4.61	264.96	1.58	1,839.00	4,126.10
28	380	4.83	264.96	0.48	1,839.00	2,162.14
37	390	12.27	264.96	0.91	1,839.00	4,929.12
36	393	5.80	264.96	1.46	1,839.00	4,218.90
8	396	3.72	264.96	0.57	1,839.00	2,040.50
3	402	3.51	264.96	0.51	1,839.00	1,857.98
4	412	17.42	264.96	5.69	1,839.00	15,075.29
9	415	23.43	264.96	4.72	1,839.00	14,890.80
38	416	1.35	264.96	0.33	1,839.00	967.47
43	419	1.32	264.96	0.42	1,839.00	1,115.79
12	422	4.10	264.96	1.10	1,839.00	3,108.74
26	495	5.86	264.96	1.01	1,839.00	3,404.36
27	496	3.37	264.96	0.49	1,839.00	1,796.03
25	498	1.95	264.96	0.59	1,839.00	1,594.71
21	504	2.30	264.96	0.72	1,839.00	1,931.92
35	505	5.73	264.96	1.06	1,839.00	3,461.35
44	518	2.77	264.96	1.10	1,839.00	2,750.08
45	519	1.73	264.96	0.25	1,839.00	909.94
TOTAL		190.60		45.91		134,933.19

SEDIMENT 10% REDUCTION

	ACRES		TN		TP		SEDIMENT	
			LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR
TOTAL PERVIOUS	190.60	3,949.26	160.11	50,501.77				
Building	10.49	241.85	23.91	19,286.94				
Road	20.31	468.39	46.31	37,353.34				
Other	15.11	348.48	34.46	27,791.15				
TOTAL IMPERVIOUS	45.91	1,058.72	104.68	84,431.42				
TOTAL	236.51	5,007.98	264.78	134,933.19				

SEDIMENT 10% REDUCTION	
LBS/YR	7,425.38

BMP NAME	BMP EFFECTIVENESS VALUES				TOTAL IMPERVIOUS		TOTAL PERVIOUS		TOTAL PERVIOUS		BMP LOAD	
	TN	TP	SEDIMENT		ACRES	ACRES	ACRES	ACRES	LOADING RATE	LOADING RATE	PERVIOUS LOAD	REDUCTION
	LBS/YR	LBS/YR	LBS/YR		LBS/ACRE/YR	LBS/YR	LBS/ACRE/YR	YR	LBS/ACRE/YR	LBS/YR	LBS/YR	LBS/YR
WET PONDS AND WETLANDS	20%	45%	60%		29.73	54,675.64	1,839.00	138.42	254.96	36,676.20	54,811.10	
DRY DETENTION BASINS AND HYDRODYNAMIC STRUCTURES	5%	10%	10%		1.10	2,016.30	1,839.00	2.77	264.96	733.77	275.01	
FOREST BUFFERS	25%	50%	50%		4.37	8,027.35	1,839.00	11.92	264.96	3,159.16	5,593.28	
TOTAL												60,679.36

ANDOVER

COUNTY	CATEGORY	ACRES	TN		TP		SEDIMENT	
			LBS/ACRE/YR	LBS/ACRE/YR	LBS/ACRE/YR	LBS/ACRE/YR	LBS/ACRE/YEAR	LBS/ACRE/YEAR
ALL OTHER COUNTIES	IMPERVIOUS DEVELOPED		23.06	2.28		1,839.00		
	PERVIOUS DEVELOPED		20.72	0.84		264.96		
	UNDEVELOPED LAND		10	0.33		234.6		

	ACRES	TN		TP		SEDIMENT	
		LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR
TOTAL PERVIOUS	4.24	87.80	3.56		1,122.78		
Building	0.25	5.80	0.57		462.92		
Road	0.38	8.67	0.86		691.66		
Other	0.40	9.33	0.92		743.87		
TOTAL IMPERVIOUS	1.03	14.48	1.43		1,154.58		
TOTAL	5.27	102.28	4.99		2,277.37		

CROSS CREEK

COUNTY	CATEGORY	ACRES	TN LBS/ACRE/YR	TP LBS/ACRE/YR	SEDIMENT LBS/ACRE/YEAR
ALL OTHER COUNTIES	IMPERVIOUS DEVELOPED		23.06	2.28	1,839.00
	PERVIOUS DEVELOPED		20.72	0.84	264.96
	UNDEVELOPED LAND		10	0.33	234.6

	ACRES	TN LBS/YR	TP LBS/YR	SEDIMENT LBS/YR
TOTAL PERVIOUS	48.05	995.59	40.36	12731.24
Building	2.42	55.89	5.53	4456.76
Road	5.17	119.11	11.78	9498.49
Other	3.12	72.04	7.12	5745.18
TOTAL IMPERVIOUS	10.71	206.67	20.43	16481.78
TOTAL	58.76	1,202.26	60.80	29,213.03

CULBERTSON RUN

COUNTY	CATEGORY	ACRES	TN LBS/ACRE/YR	TP LBS/ACRE/YR	SEDIMENT LBS/ACRE/YEAR
ALL OTHER COUNTIES	IMPERVIOUS DEVELOPED		23.06	2.28	1,839.00
	PERVIOUS DEVELOPED		20.72	0.84	264.96
	UNDEVELOPED LAND		10	0.33	234.6

	ACRES	TN LBS/YR	TP LBS/YR	SEDIMENT LBS/YR
TOTAL PERVIOUS	151.94	3148.15	127.63	40257.44
Building	9.05	208.61	20.63	16636.34
Road	17.08	393.80	38.94	31404.96
Other	13.39	308.87	30.54	24631.86
TOTAL IMPERVIOUS	39.52	854.78	84.51	68167.40
TOTAL	191.46	4,002.93	212.14	108,424.84

HIDEAWAY

COUNTY	CATEGORY	ACRES	TN LBS/ACRE/YR	TP LBS/ACRE/YR	SEDIMENT LBS/ACRE/YEAR
ALL OTHER COUNTIES	IMPERVIOUS DEVELOPED		23.06	2.28	1,839.00
	PERVIOUS DEVELOPED		20.72	0.84	264.96
	UNDEVELOPED LAND	10	0.33		234.6

	ACRES	TN LBS/YR	TP LBS/YR	SEDIMENT LBS/YR
TOTAL PERVIOUS	39.90	826.82	33.52	10573.07
Building	0.92	21.17	2.09	1688.46
Road	1.33	30.65	3.03	2444.22
Other	1.04	23.95	2.37	1910.24
TOTAL IMPERVIOUS	3.29	75.77	7.49	6042.93
TOTAL	43.19	902.59	41.01	16,616.00

HUNTER

COUNTY	CATEGORY	ACRES	TN LBS/ACRE/YR	TP LBS/ACRE/YR	SEDIMENT LBS/ACRE/YEAR
ALL OTHER COUNTIES	IMPERVIOUS DEVELOPED		23.06	2.28	1,839.00
	PERVIOUS DEVELOPED		20.72	0.84	264.96
	UNDEVELOPED LAND		10	0.33	234.6

	ACRES	TN LBS/YR	TP LBS/YR	SEDIMENT LBS/YR
TOTAL PERVIOUS	1.47	30.43	1.23	389.09
Building	0.10	2.35	0.23	187.14
Road	0.51	11.70	1.16	933.10
Other	0.30	6.81	0.67	543.25
TOTAL IMPERVIOUS	0.90	14.05	1.39	1,120.24
TOTAL	2.37	44.47	2.62	1,509.33

JAMIE JUSTIN

COUNTY	CATEGORY	ACRES	TN LBS/ACRE/YR	TP LBS/ACRE/YR	SEDIMENT LBS/ACRE/YEAR
ALL OTHER COUNTIES	IMPERVIOUS DEVELOPED		23.06	2.28	1,839.00
	PERVIOUS DEVELOPED		20.72	0.84	264.96
	UNDEVELOPED LAND	10	0.33		234.6

	ACRES	TN LBS/YR	TP LBS/YR	SEDIMENT LBS/YR
TOTAL PERVIOUS	22.34	462.97	18.77	5920.35
Building	0.84	19.26	1.90	1536.25
Road	2.34	54.02	5.34	4307.82
Other	1.21	27.95	2.76	2228.85
TOTAL IMPERVIOUS	4.39	101.23	10.01	8072.92
TOTAL	26.73	564.20	28.78	13,993.28

KIMBERWICK

COUNTY	CATEGORY	ACRES	TN LBS/ACRE/YR	TP LBS/ACRE/YR	SEDIMENT LBS/ACRE/YEAR
ALL OTHER COUNTIES	IMPERVIOUS DEVELOPED		23.06	2.28	1,839.00
	PERVIOUS DEVELOPED		20.72	0.84	264.96
	UNDEVELOPED LAND		10	0.33	234.6

	ACRES	TN LBS/YR	TP LBS/YR	SEDIMENT LBS/YR
TOTAL PERVIOUS	49.05	1016.28	41.20	12995.86
Building	3.87	89.30	8.83	7121.91
Road	6.98	160.97	15.92	12837.34
Other	5.08	117.19	11.59	9345.72
TOTAL IMPERVIOUS	15.94	367.47	36.33	29304.97
TOTAL	64.98	1,383.75	77.53	42,300.83

KINGSWOOD SCHOOLHOUSE

COUNTY	CATEGORY	ACRES	TN LBS/ACRE/YR	TP LBS/ACRE/YR	SEDIMENT LBS/ACRE/YEAR
ALL OTHER COUNTIES	IMPERVIOUS DEVELOPED		23.06	2.28	1,839.00
	PERVIOUS DEVELOPED		20.72	0.84	264.96
	UNDEVELOPED LAND		10	0.33	234.6

	ACRES	TN LBS/YR	TP LBS/YR	SEDIMENT LBS/YR
TOTAL PERVIOUS	24.61	509.92	20.67	6520.69
Building	0.67	15.47	1.53	1234.03
Road	1.84	42.49	4.20	3388.19
Other	0.98	22.57	2.23	1800.18
TOTAL IMPERVIOUS	3.49	74.07	7.32	5907.26
TOTAL	28.10	583.99	28.00	12,427.95

LAHAWA

COUNTY	CATEGORY	ACRES	TN		TP		SEDIMENT	
			LBS/ACRE/YR	LBS/ACRE/YR	LBS/ACRE/YR	LBS/ACRE/YR	LBS/ACRE/YEAR	LBS/ACRE/YEAR
ALL OTHER COUNTIES	IMPERVIOUS DEVELOPED		23.06		2.28		1,839.00	
	PERVIOUS DEVELOPED		20.72		0.84		264.96	
	UNDEVELOPED LAND		10		0.33		234.6	

	ACRES	TN		TP		SEDIMENT	
		LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR	LBS/YR
TOTAL PERVIOUS		49.13	1018.05	41.27		13018.47	
Building		2.40	55.27	5.46		4407.61	
Road		4.05	93.35	9.23		7444.38	
Other		4.49	103.50	10.23		8253.84	
TOTAL IMPERVIOUS		10.93	252.12	24.93		20105.82	
TOTAL		60.07	1,270.17	66.20		33,124.29	

UNT

COUNTY	CATEGORY	ACRES	TN LBS/ACRE/YR	TP LBS/ACRE/YR	SEDIMENT LBS/ACRE/YEAR
ALL OTHER COUNTIES	IMPERVIOUS DEVELOPED		23.06	2.28	1,839.00
	PERVIOUS DEVELOPED		20.72	0.84	264.96
	UNDEVELOPED LAND		10	0.33	234.6

	ACRES	TN LBS/YR	TP LBS/YR	SEDIMENT LBS/YR
TOTAL PERVIOUS	45.01	932.56	37.81	11925.21
Building	1.39	32.00	3.16	2552.08
Road	3.87	89.36	8.83	7125.95
Other	2.03	46.88	4.63	3738.41
TOTAL IMPERVIOUS	7.30	161.77	16.00	12901.30
TOTAL	52.30	1,094.33	53.80	24,826.52

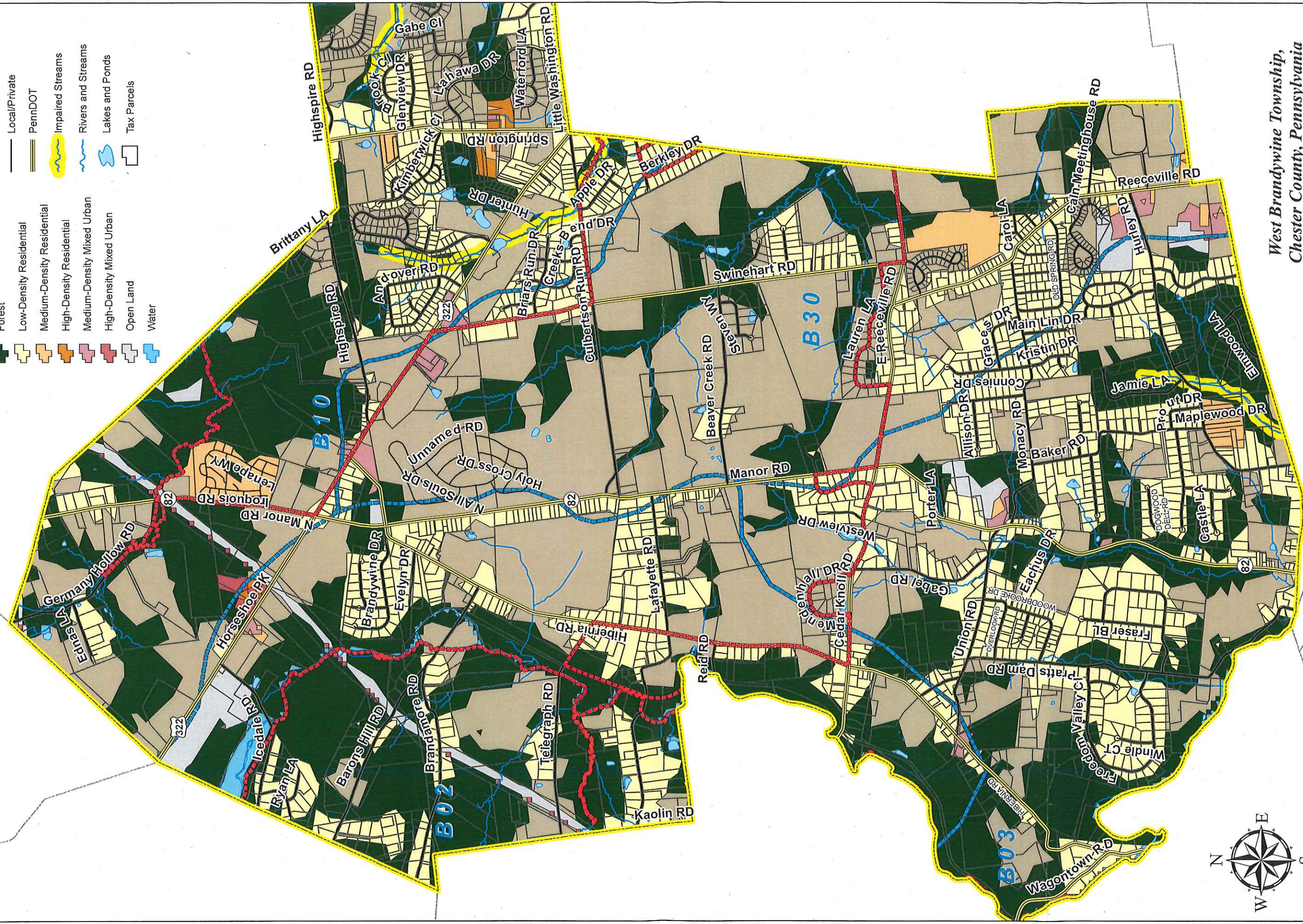
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WBT_SS_1	216	Pervious	4.24
WBT_SS_1	216	Building	0.25
WBT_SS_1	216	Other	0.40
WBT_SS_1	216	Road	0.38
WBT_SS_2	214	Pervious	25.35
WBT_SS_2	214	Building	2.15
WBT_SS_2	214	Other	3.18
WBT_SS_2	214	Road	3.32
WBT_SS_3	402	Pervious	3.51
WBT_SS_3	402	Building	0.15
WBT_SS_3	402	Other	0.15
WBT_SS_3	402	Road	0.20
WBT_SS_4	412	Pervious	17.42
WBT_SS_4	412	Building	1.30
WBT_SS_4	412	Other	1.50
WBT_SS_4	412	Road	2.89
WBT_SS_5	170	Pervious	1.47
WBT_SS_5	170	Building	0.10
WBT_SS_5	170	Other	0.30
WBT_SS_5	170	Road	0.51
WBT_SS_6	426	Pervious	7.77
WBT_SS_7	424	Pervious	8.99
WBT_SS_7	424	Road	0.01
WBT_SS_8	396	Pervious	3.72
WBT_SS_8	396	Building	0.18
WBT_SS_8	396	Other	0.16
WBT_SS_8	396	Road	0.24
WBT_SS_9	415	Pervious	23.43
WBT_SS_9	415	Building	1.15
WBT_SS_9	415	Other	2.05
WBT_SS_9	415	Road	1.52
WBT_SS_10	201	Pervious	3.16
WBT_SS_10	201	Building	0.16
WBT_SS_10	201	Other	0.16
WBT_SS_10	201	Road	0.32
WBT_SS_11	149	Pervious	5.42
WBT_SS_11	149	Building	0.24
WBT_SS_11	149	Other	0.30
WBT_SS_11	149	Road	0.40
WBT_SS_12	422	Pervious	4.10
WBT_SS_12	422	Building	0.19
WBT_SS_12	422	Other	0.38
WBT_SS_12	422	Road	0.53
WBT_SS_13	151	Pervious	2.48
WBT_SS_13	151	Building	0.02
WBT_SS_13	151	Other	0.00

1995 LAND USE

- <all other values>
- Cropland
- Forest
- Low-Density Residential
- Medium-Density Residential
- High-Density Residential
- Medium-Density Mixed Urban
- High-Density Mixed Urban
- Open Land
- Water

LEGEND

- Christina TMDL Subbasins
- 2010 Urbanized Area
- Local/Private
- PennDOT
- Impaired Streams
- Rivers and Streams
- Lakes and Ponds
- Tax Parcels



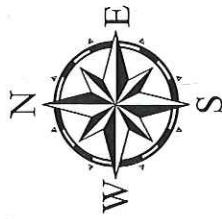
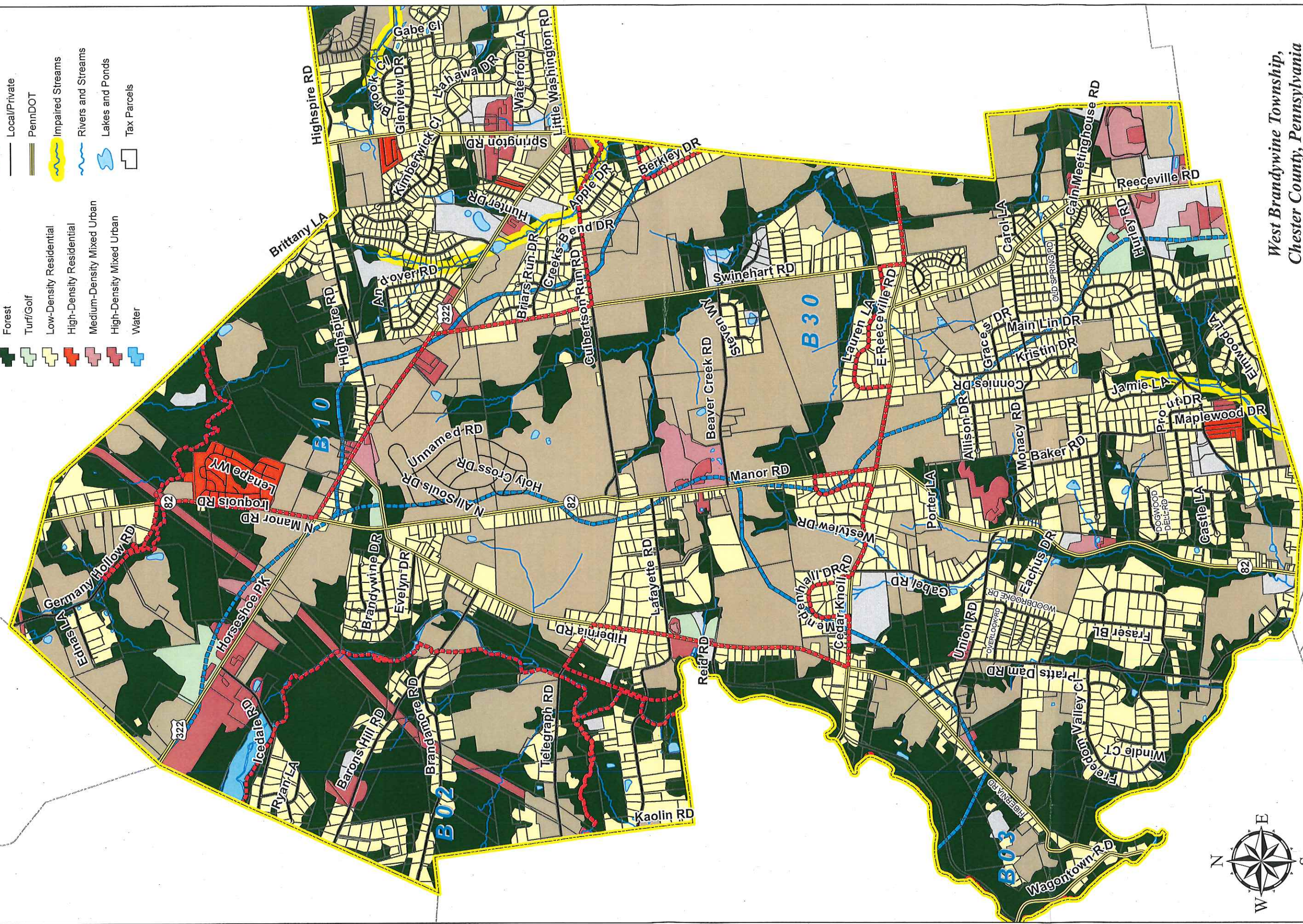
Map prepared by: GEODESY, INC. 610-381-4878

*West Brandywine Township,
Chester County, Pennsylvania*

**MS4 2010 URBAN AREA MAP
AND 1995 MAPPED LAND USE**

- 2012 LAND USE**
- Cropland
 - Disturbed
 - Forest
 - Turf/Golf
 - Low-Density Residential
 - High-Density Residential
 - Medium-Density Mixed Urban
 - High-Density Mixed Urban
 - Water

- LEGEND**
- Christina TMDL Subbasins
 - 2010 Urbanized Area
 - Local/Private
 - PennDOT
 - Impaired Streams
 - Rivers and Streams
 - Lakes and Ponds
 - Tax Parcels



Map prepared by: GEODESY, INC. 610-381-4078

West Brandywine Township,
Chester County, Pennsylvania

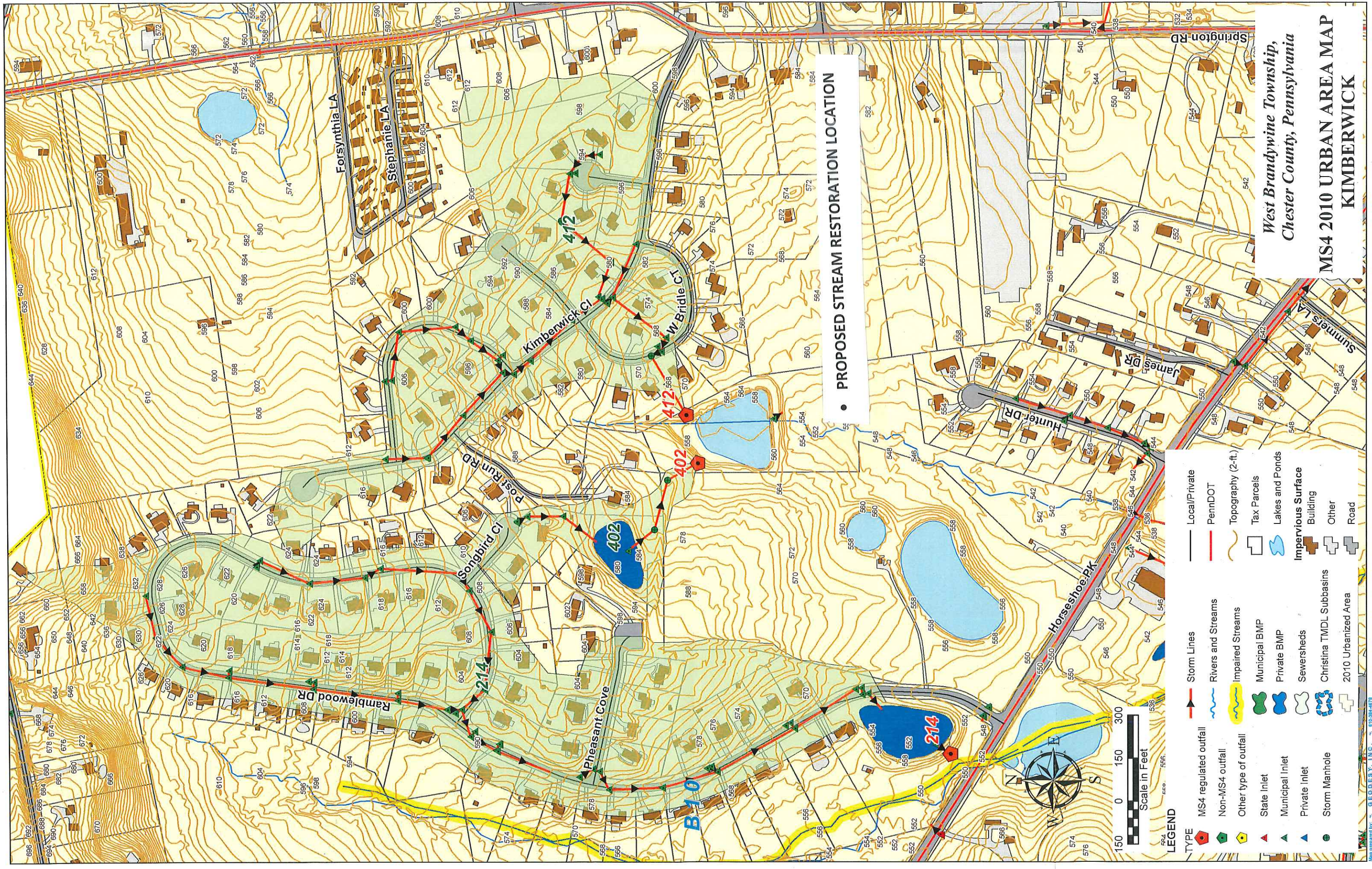
**MS4 2010 URBAN AREA MAP
AND 2012 MAPSHEDED LAND USE**

WBT_SS_13	151	Road	0.08
WBT_SS_14	3	Pervious	5.79
WBT_SS_14	3	Building	0.31
WBT_SS_14	3	Other	0.51
WBT_SS_14	3	Road	0.73
WBT_SS_17	5	Pervious	7.03
WBT_SS_17	5	Building	0.35
WBT_SS_17	5	Other	0.49
WBT_SS_17	5	Road	0.36
WBT_SS_18	22	Pervious	4.54
WBT_SS_18	22	Building	0.22
WBT_SS_18	22	Other	0.38
WBT_SS_18	22	Road	0.48
WBT_SS_19	517	Pervious	13.37
WBT_SS_19	517	Building	1.49
WBT_SS_19	517	Other	1.18
WBT_SS_19	517	Road	1.71
WBT_SS_20	89	Pervious	1.60
WBT_SS_20	89	Building	0.11
WBT_SS_20	89	Other	0.15
WBT_SS_20	89	Road	0.32
WBT_SS_21	504	Pervious	2.30
WBT_SS_21	504	Building	0.06
WBT_SS_21	504	Other	0.09
WBT_SS_21	504	Road	0.57
WBT_SS_22	91	Pervious	11.62
WBT_SS_22	91	Building	0.03
WBT_SS_22	91	Other	0.10
WBT_SS_22	91	Road	0.06
WBT_SS_23	126	Pervious	1.41
WBT_SS_23	126	Building	0.07
WBT_SS_23	126	Other	0.18
WBT_SS_23	126	Road	0.12
WBT_SS_25	498	Pervious	1.95
WBT_SS_25	498	Building	0.12
WBT_SS_25	498	Other	0.16
WBT_SS_25	498	Road	0.31
WBT_SS_26	495	Pervious	5.86
WBT_SS_26	495	Building	0.26
WBT_SS_26	495	Other	0.22
WBT_SS_26	495	Road	0.53
WBT_SS_27	496	Pervious	3.37
WBT_SS_27	496	Building	0.03
WBT_SS_27	496	Other	0.11
WBT_SS_27	496	Road	0.35
WBT_SS_28	380	Pervious	4.83
WBT_SS_28	380	Building	0.09

WBT_SS_28	380	Other	0.13
WBT_SS_28	380	Road	0.27
WBT_SS_29	348	Pervious	4.61
WBT_SS_29	348	Building	0.29
WBT_SS_29	348	Other	0.54
WBT_SS_29	348	Road	0.75
WBT_SS_31	233	Pervious	2.07
WBT_SS_31	233	Building	0.14
WBT_SS_31	233	Other	0.17
WBT_SS_31	233	Road	0.37
WBT_SS_32	155	Pervious	18.22
WBT_SS_32	155	Building	0.89
WBT_SS_32	155	Other	1.96
WBT_SS_32	155	Road	1.74
WBT_SS_33	375	Pervious	29.77
WBT_SS_33	375	Building	2.34
WBT_SS_33	375	Other	1.90
WBT_SS_33	375	Road	1.94
WBT_SS_34	376	Pervious	23.64
WBT_SS_34	376	Building	1.40
WBT_SS_34	376	Other	1.30
WBT_SS_34	376	Road	2.00
WBT_SS_35	505	Pervious	5.73
WBT_SS_35	505	Building	0.28
WBT_SS_35	505	Other	0.31
WBT_SS_35	505	Road	0.47
WBT_SS_36	393	Pervious	5.80
WBT_SS_36	393	Building	0.25
WBT_SS_36	393	Other	0.49
WBT_SS_36	393	Road	0.72
WBT_SS_37	390	Pervious	12.27
WBT_SS_37	390	Building	0.40
WBT_SS_37	390	Other	0.31
WBT_SS_37	390	Road	0.20
WBT_SS_38	416	Pervious	1.35
WBT_SS_38	416	Building	0.09
WBT_SS_38	416	Other	0.08
WBT_SS_38	416	Road	0.17
WBT_SS_39	159	Pervious	4.32
WBT_SS_39	159	Building	0.20
WBT_SS_39	159	Other	0.32
WBT_SS_39	159	Road	0.47
WBT_SS_41	182	Pervious	28.45
WBT_SS_41	182	Building	1.22
WBT_SS_41	182	Other	1.75
WBT_SS_41	182	Road	2.79
WBT_SS-42	145	Pervious	18.28

WBT_SS-42	145	Building	1.12
WBT_SS-42	145	Other	1.24
WBT_SS-42	145	Road	2.17
WBT_SS_43	419	Pervious	1.32
WBT_SS_43	419	Building	0.08
WBT_SS_43	419	Other	0.13
WBT_SS_43	419	Road	0.20
WBT_SS_44	518	Pervious	2.77
WBT_SS_44	518	Building	0.27
WBT_SS_44	518	Other	0.25
WBT_SS_44	518	Road	0.58
WBT_SS_45	519	Pervious	1.73
WBT_SS_45	519	Building	0.05
WBT_SS_45	519	Other	0.07
WBT_SS_45	519	Road	0.13

Appendix D
Proposed BMP Maps



● PROPOSED STREAM RESTORATION LOCATION

LEGEND

Storm Lines	Local/Private
MS4 regulated outfall	PennDOT
Non-MS4 outfall	Topography (2-ft.)
Other type of outfall	Tax Parcels
State Inlet	Lakes and Ponds
Municipal Inlet	Impervious Surface Building
Private Inlet	Other
Storm Manhole	Road
Municipal BMP	Christina TMDL Subbasins
Private BMP	2010 Urbanized Area
Sewersheds	

West Brandywine Township,
Chester County, Pennsylvania

MS4 2010 URBAN AREA MAP
KIMBERWICK

Map prepared by: G.E.O.E.S.Y., INC. #10304-0075