Establishing Baseline- Impervious Area Assessment
Impervious Surfaces Treated to the MEP

NPDES MS4 Permit No. MD0068306 (11-DP-3316)
2014 Annual Report
Addendum

Anne Arundel County
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BACKGROUND

Anne Arundel County's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit requires an impervious area assessment to be submitted to the Maryland Department of the Environment (MDE) within one year of permit issuance. The County is required to determine the total impervious area for which it is responsible, and to delineate those portions that are treated to the maximum extent practicable (MEP), partially treated, or untreated and available for retrofit. This impervious area assessment will then provide the baseline used to calculate the twenty percent restoration requirement.

PURPOSE

This purpose of this report is to document the methodology used to assess the Anne Arundel County's impervious surface area baseline.

As described in more detail in the sections that follow, this task was accomplished by first determining the portion of impervious area within the County that falls under County jurisdiction (jurisdictional impervious area). Impervious acreage that is outside of the County's jurisdictional impervious area includes Federal and State properties, and municipal properties that are regulated under other stormwater permits. These areas are identified as Non-County MS4 Jurisdictional Impervious Areas. Table 2 provides a breakdown of these areas. Following identification of County jurisdictional impervious area, the portion of that jurisdictional area managed to the MEP was determined. County jurisdictional impervious lands that are not treated to the MEP, or are untreated, were considered "unmanaged" impervious area.

From that total jurisdictional area, the portion subject to stormwater treatment to the MEP is identified as the baseline of managed impervious area. The portion of jurisdictional impervious area that has no stormwater management treatment, or only partial treatment, is identified as the County's baseline of unmanaged impervious area.

The NPDES MS4 Permit requires the County to implement restoration to address 20% of the identified unmanaged impervious area

The breakdown of the managed acreage, unmanaged acreage, and the required 20% impervious area restoration goal that resulted from this work effort is presented in Summary Table 11 and 12.

IMPERVIOUS AREA ASSESSMENT

The following sections detail Anne Arundel County's process for determining managed and unmanaged impervious surfaces as outlined in the August 2014 MDE guidance document titled "Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated Guidance for National Pollutant Discharge Elimination System Stormwater Permits."

Establishing County MS4 Jurisdictional Impervious Area

The first step in the impervious areas assessment was to establish the lands within the County's MS4 jurisdiction. The following geoprocessing steps are utilized to prepare a GIS layer that identifies the County MS4 jurisdictional impervious areas.

The County joined the Parcels GIS layer to the State's Consolidated Property File (CPF) table via tax account number. Ownership information in the CPF ASST_FIRST field was manually reviewed one record at a time by sorting the field and identifying publically-owned entities based on the name. This was done because various properties were found to have the same owner but had various naming conventions. For example, 'MARYLAND STATE HIGHWAY ADM', 'SHA', 'STATE HIGHWAY ADMIN', etc. were grouped together and attributed as 'Maryland State Highway Administration' properties. The CPF property description fields (PROP_DESC, PROP_DESC1, and PROP_DESC2) were also used to assist in this process as they often provide additional ownership information. This extensive research was done to identify and group County, Federal, State, and City of Annapolis owned properties. The results were then verified and further honed against several other County GIS layers based on property ownership, such as the Recreation and Parks GIS layer, DPW infrastructure layers, etc. This final output is a subset of the Parcels GIS layer, referred to as the Public Lands GIS layer, and contains refined property owner attributes, including City of Annapolis, County Board of Education, County Community College, County General, Fort Meade Military Reservation, Maryland Aviation Administration, Maryland DNR Lands, Maryland Department of Transportation, Maryland State Highway Administration, Maryland State Institutional Lands, Other DOD Facilities, Patuxent Wildlife Reservation, Smithsonian Institution, US Coast Guard, US Navy, US Park Service, and US Postal Service. The County then added a database field called Jurisdictional and attributed all County owned and private parcels within the County MS4 area as "Jurisdictional". Federal, State, and City of Annapolis owned parcels regulated under other stormwater permits were identified as "NonJurisdictional".
Using ArcGIS ArcToolbox, the County ran the Identity tool on the County's Public Lands GIS layer against the Impervious Surfaces GIS layer. This map layer was created via heads-up digitizing using 6 inch aerial photography. The layer was attributed into 11 classifications, including athletic courts, buildings, driveways, other paved areas, parking lots, patios/decks, piers, rails, roads/highways, sidewalks, and swimming pools. This geoprocessing output, both manual and automated, allows for easy querying of Impervious Surfaces on County Jurisdictional and Non-Jurisdictional properties.

The above process established the County's MS4 Jurisdictional Area, and the portion of impervious surfaces under the County's jurisdiction which is 30,950 acres. These areas are represented on Maps 1 and Map 2 and the GIS layer in Appendix A.

Table 1- County Area and Impervious Acres by Ownership

Anne Arundel County Land Cover Categories	City of Annapolis	State	Federal	County	Private	City of Annapolis	State	Federal	County	Private	City of Annapolis	State	Federal	County	Private
	Land Acres					Impervious Acres					Percent Impervious				
Airport	0	1032	0	68	105	0	844	0	48	74	0%	82%	22%	71%	70%
Commercial	980	691	1611	1881	7412	638	331	899	1160	4776	65%	48%	56%	62%	64%
Industrial	21	512	369	424	3925	13	285	168	191	2421	61%	56%	46%	45%	62%
Transportation	189	3779	929	3059	1726	145	2798	528	1974	502	77%	74%	57%	65%	29%
Pasture/Hay	0	147	576	231	5059	0	1	4	5	18	0%	1%	1%	2%	0%
Row Crops	0	135	565	395	10977	0	2	0	8	39	0%	1%	0%	2%	0%
Residential 1/2-acre	110	60	46	1226	9444	28	14	11	644	1709	26%	24%	24%	53%	18%
Residential 1/4-acre	1786	99	129	2783	14726	640	14	33	1614	3386	36%	14%	25%	58%	23%
Residential 1/8-acre	568	132	678	3319	15411	243	33	211	1831	4665	43%	25%	31%	55%	30%
Residential 1-acre	46	108	21	909	10528	9	13	1	376	1484	19%	12%	7%	41%	14%
Residential 2-acre	35	224	59	1207	22216	9	24	5	402	2512	26%	11%	8%	33%	11%
Open Space	254	2952	2929	3747	11008	15	154	94	172	217	6%	5%	3%	5%	2%
Water	18	340	286	519	1018	1	1	1	2	207	5%	0%	0%	0%	20%
Open Wetland	1	296	107	406	802	0	0	0	0	1	0%	0%	0%	0%	0%
Forested Wetland	0	64	94	53	75	0	0	0	0	0	0%	0%	0%	0%	0%
Woods	524	9038	12940	12795	70404	7	81	36	197	280	1%	1%	0%	2%	0%
Utility	0	39	216	75	1600	0	2	1	6	30	0%	4%	0%	7%	2%
SubTotal	4533	19648	21556	33098	186433	1748	4595	1993	8630	22320	39%	23%	9%	26%	12%
Total	265269					8335			30950		15%				
						39285									

Table 2 –Breakdown of Non-County Jurisdictional Impervious Areas

Jurisdiction	Land Owner Entity	Acreage
City of Annapolis	City of Annapolis	1748
Federal	Fort Meade Military Reservation	1183
State	Maryland Aviation Administration	1102
State	Maryland Department of Transportation	107
State	Maryland DNR Lands	51
State	Maryland State Highway Administration	3171
State	Maryland State Institutional Lands	163
Federal	Other DOD Facilities	153
Federal	Patuxent Wildlife Reservation	45
Federal	Smithsonian Institution	18
Federal	US Coast Guard	68
Federal	US Navy	288
Federal	US Park Service	208
Federal	US Postal Service	29

Total Impervious Area (Non-County Jurisdictional) = **8,335 Acres**

County and Non-County Jurisdictional Impervious Area Summary:

- The Total County MS4 impervious area is the sum of the County area plus the private area, which is **(8,630+22,320) = 30,950 acres. This area was used in the County's impervious area assessment.**
- The Non-County Jurisdictional Impervious area is the sum of City of Annapolis, Federal, and State impervious areas, which is **(1,748+4,595+1,993) = 8,335 acres; this area was excluded from County's Impervious area assessment.** Table 2 presents a more detailed break-down of Federal, State and Municipal property ownership.

After identifying those lands within the County's MS4 jurisdiction, the next step in the impervious area assessment identified all managed impervious surfaces. A systematic review was completed, using records from the County's Urban BMP database that have a documented water quality volume. Additionally, information for stream restoration projects and living shoreline restoration projects completed prior to February 2014, rooftop disconnects, open section roads, septic conversions to waste water treatment plants, and upgraded septic systems to enhanced nitrogen removal systems were assessed. Note that this assessment did **not** apply the credits from street sweeping towards the baseline.

The following details the methods utilized by the County to determine impervious surface credit for each of the practices. These credits were then applied to the County's jurisdictional impervious area to determine the managed impervious area.

1. Existing BMP Credit

Using the criteria outlined in the August 2014 guidance document, BMP records from the County's Urban BMP database that were found to meet the requirements for providing a documented water quality volume (as identified from either the grading permit application or stormwater completion report) and had an inspection record in the last three years were queried and selected. This resulted in a listing of 238 BMPs. The BMPs consisted of mostly infiltration trenches, dry wells, and wet ponds. The associated GIS layers are included in Appendix A of this report and are attributed with the BMP unique identifier Storm ID that links back to the Urban BMP database.

Impervious area credit was calculated as: [(WQv Provided/Targeted WQv) x Impervious Area] Targeted WQv was based on treating 1" of rainfall and WQv provided was the actual WQv provided by the practice. For the 238 BMPs, the associated credit was 263 equivalent impervious acres.

Table 3 summarizes how the impervious area was calculated based on the actual water quality provided by the BMP (e.g., partial or full WQv). When less than 1 inch of rainfall was treated, impervious area treatment credit was calculated based on the proportion of the targeted WQv to actual WQv treated.

It should be noted that the County has recently increased its BMP inspection efforts. As additional BMPs are inspected, the impervious credit associated with these practices will be applied toward the County's 20% impervious surface restoration goal.

2. Water Quality Improvement Project Credit

Restoration Projects Prior to February 2014: Prior to the issuance of the August 2014 guidance document, the County did not track water quality volume treatment for environmental restoration projects. Under the current guidance, the County is allowed to claim equivalent impervious surface treatment credits for stream restoration and living shoreline restoration projects implemented prior to February 2014 based on the linear foot of treatment per project. The County identified 58 previously implemented restoration projects providing an equivalent impervious surface treatment credit of 461 acres. Each project has been assigned a unique Storm ID and incorporated into the Urban BMP database. The County has been working to calculate water quality volumes for additional pre-February 2014 implemented water quality improvement projects. As water quality

volume treatment is determined for these projects, the equivalent impervious surface treatment credit will be applied towards the 20% impervious surface restoration target.

Table 4 summarizes how the impervious area was calculated for each of these 58 projects.

Restoration Projects after February 2014: Equivalent impervious area treatment credit for water quality improvement projects constructed after February 2014 also utilized the August 2014 guidance. Impervious surface treatment credit is based on the water quality volume provided in relation to the one inch rainfall runoff water quality volume. During this time period (February to July 2014), the County constructed 9 pond retrofits and 2 stream restoration projects for a total equivalent impervious surface restoration credit of 28.7 acres. This impervious area restoration credit was applied to the County's 20% impervious surface restoration goal.

GIS layers depicting both pre and post February 2014 water quality improvement project impervious surfaces are found in Appendix A of this report. Table 5 summarizes how the impervious area was calculated for each of the post-February 2014 projects. It should be noted that the County used the August 2014 guidance to calculate the credit associated with these projects.

3. Rooftop Disconnect Credit and Open Section Roadway Credit

The County conducted a systematic review (e.g., tiered analysis), including representative field survey, to document and verify the portion of impervious surfaces within the rural areas of County's MS4 jurisdiction that are treated to the MEP.

Based upon this review, 660 acres (456 acres of rooftop disconnection and 204 acres of open section roads) of existing impervious cover within the rural RA and RLD zones of Anne Arundel County were determined to treat stormwater to the MEP for the purposes of the County's MS4 baseline. The assessment report is presented as Appendix B and includes both the assessment for rooftop disconnects and opens road sections. A summary is provided in Table 6 below.

Table 6 – Rooftop Disconnect and Open Section Roadway Credit Summary table

Analysis	Impervious area (in acres)	Notes
RA/RLD Zoning Countywide	4,788	5% impervious overall
Tier 1 Desktop Analysis	710	499 acres for rooftop; 211 non-rooftop/open section roadway
Tier 2 Desktop Analysis	660	456 acres from rooftop; 204 non-rooftop/open section roadway
Representative field Survey	660	Validated acreage from field surveys

4. Septic System Connection to Wastewater Treatment Plant Credit (WWTP)

Connections to WWTP Prior to February 2014: The August 2014 MDE guidance allows an impervious area credit equivalent of 0.39 acres for each septic system that was connected to the

County's wastewater treatment system. The County made 180 connections prior to February 2014. As such 70 acres in equivalent impervious surfaces credit were applied to the baseline. A summary & breakdown of the connections and impervious area credits is presented in Table 7.

Connections to WWTP After February 2014: After February 2014, the County made an additional 40 connections and thus applied 15.6 acres as equivalent impervious surface reduction credits toward the County's 20% impervious area restoration goal. Table 8 provides a summary & breakdown of the connections and impervious area credits.

A GIS layer depicting the above septic system connection impervious surfaces is included in Appendix A of this report.

5. Septic Systems Upgraded to Enhanced Denitrification System Credit

Upgrades prior to February 2014: The August 2014 MDE guidance allows an impervious area credit of 0.26 acres for each septic system upgrade to enhanced denitrification systems. Prior to February 2014 the County made 710 upgrades and thus applied 185 acres in equivalent impervious surfaces credit to the baseline. Table 7 presents a summary and breakdown of the connections and impervious area credits

Upgrades after February 2014: After February 2014, the County made an additional 15 upgrades and as such 3.9 acres will be claimed as equivalent impervious surface reduction credits toward the County's 20% impervious area restoration goal. Table 7 presents a summary and breakdown of the connections and impervious area credits for these upgrades.

A GIS layer depicting the above septic system upgrade impervious surfaces is included in Appendix A of this report.

Conclusion and Summary Table

From the above impervious area assessment, the managed acreage prior to February 2014 is 1639 acres. This can be subtracted from the total County MS4 impervious area of 30,950 acres. This results in 20% restoration acreage of 5862 acres over the 5 year permit term.

Table 7- Impervious Area Assessment Summary

Activity	Acres	Notes	Reference
Ex. BMPs	263	238 BMPs that were inspected within the past 3 years and passed Inspection	Appendix A
Water Quality Projects	461	Prior to Feb 2014 constructed by the County	Appendix A
Open Roadway Section	204	Disconnected impervious areas, treated to MEP	Appendix B
Rooftop Disconnection	456	Disconnected impervious areas, treated to MEP	Appendix B
Septic Connection to WWTP	70	Septic connections to WWTP	Appendix A
Septic Upgrades to ENR	185	Septic systems upgraded to Enhanced Denitrification System;	Appendix A
Total Managed Impervious Area	**1639**	Sum of all acres treated; Use this to calculate the baseline	

Table 8– Required Twenty Percent Restoration Summary

	Acres	Notes & References
Total County MS4 Impervious area	30,950	Appendix A; Tables I & 2; Maps 1 & 2
Total Managed Impervious area	1639	From Impervious area Assessment (See above)
Baseline	29,311	Difference between Total impervious and Managed areas
20% Restoration (over 5-yrs)	**5862**[i]	

Table 9 – Restoration Acres towards 20% Target (Between February 2014 and 30 June 2014)

Activity	Acres	Reference
Water Quality Projects	28	Appendix A
Septic Connection to WWTP	16	Appendix A
Septic Upgrades to ENR	4	Appendix A
	48	Sum of all restoration Acres (between February 2014 and June 30 2014)

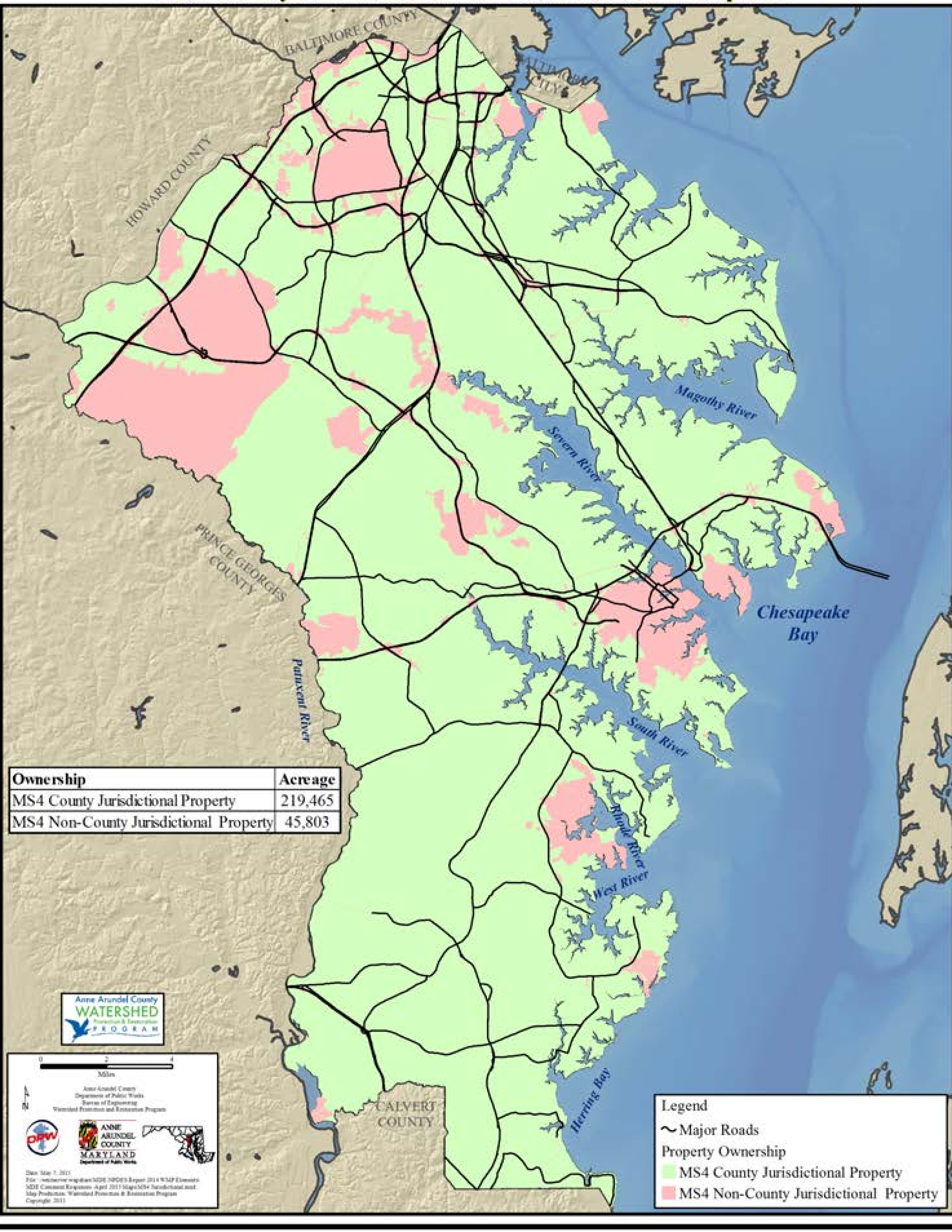
References:

1. Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated Guidance for National Pollutant Discharge Elimination System Stormwater Permits."- Guidance for NPDES Stormwater Permits, August 2014.

[i] All acreages in the report are rounded to the nearest acre

Anne Arundel County
MS4 County Jurisdictional and Non-Jurisdictional Properties

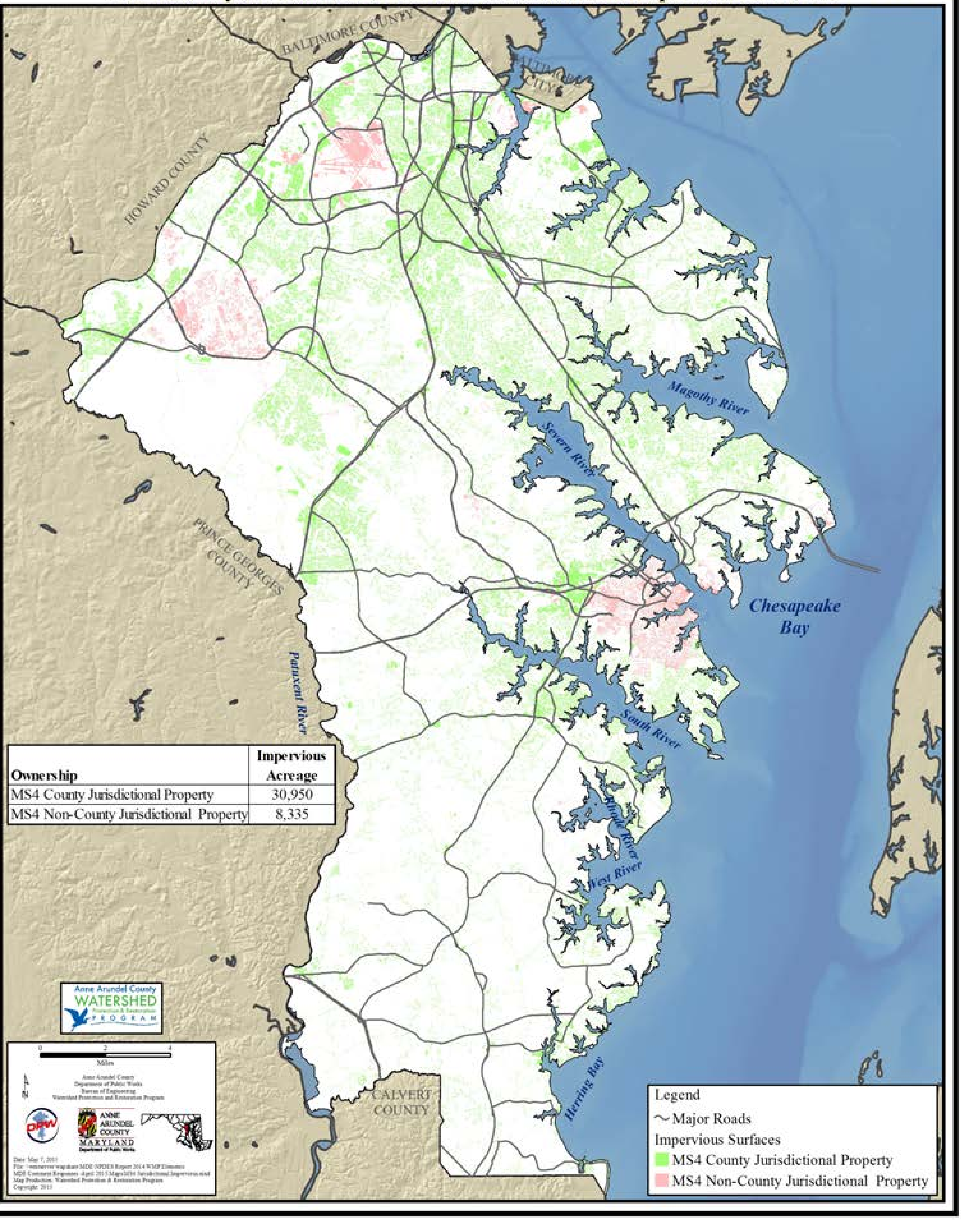
MAP 1



Ownership	Acreage
MS4 County Jurisdictional Property	219,465
MS4 Non-County Jurisdictional Property	45,803

Anne Arundel County
MS4 County Jurisdictional and Non-Jurisdictional Impervious Surfaces

MAP 2



Ownership	Impervious Acreage
MS4 County Jurisdictional Property	30,950
MS4 Non-County Jurisdictional Property	8,335

TABLE 3 -EX. BMP Impervious Area Credit Calculation (Full WQv Vs. Partial WQv)

Storm ID	Structure Name	Watershed	Structure Type	Drainage Area (acres)	Impervious Area (acres)	Targeted WQ_v [1] (ac-ft)	WQ_v Provided (ac-ft) Reported by Design Consultant	R_v [2]	Impervious Credit Reported [3] (acres)
2830	SAYBROOKE/ SECTION III IT#1	02-13-09-02	ITCE	0.444	0.094	0.009	0.027	0.240	0.28
3083	SAYBROOKE/ SECTION III IT#2	02-13-09-02	ITCE	0.063	0.063	0.005	0.004	0.950	0.05
4369	BODKIN PLAINS/ LOT 249RA & 250RA	02-13-09-02	ITCE	0.068	0.068	0.005	0.103	0.950	1.30
6010	Paradise Estates/ Lot 4	02-13-09-02	ESDRTD	0.172	0.172	0.014	0.011	0.950	0.14
6269	BODKIN POINT/ LOT 2/ SECTION 3	02-13-09-02	BR	0.292	0.292	0.023	0.010	0.950	0.13
6699	Ventnor Property	02-13-09-02	ESDSFNAC	0.116	0.116	0.009	0.043	0.950	0.54
9819	1733 Bayside Beach Road	02-13-09-02	ESDRTD	0.114	0.114	0.009	0.008	0.950	0.10
9829	7810 Ducks Cove Road	02-13-09-02	BR	0.106	0.106	0.008	0.004	0.950	0.05
13254	402 Carvel Beach Rd	02-13-09-03	ESDRG	0.006	0.000	0.000	0.000	0.119	0.00
13286	1229 Kenwood Rd	02-13-09-03	ESDRG	0.006	0.006	0.000	0.002	0.950	0.03
13323	7790 East Shore Road	02-13-09-03	ESDIL	0.024	0.005	0.000	0.003	0.233	0.04
13409	637 Cyril Avenue	02-13-09-03	ESDPERMP	0.012	0.010	0.001	0.003	0.842	0.03
13410	322 Seward Ave	02-13-09-03	ESDRG	0.006	0.006	0.000	0.001	0.950	0.01
13488	7926 Solley Road	02-13-09-03	ESDIL	0.529	0.076	0.008	0.047	0.180	0.45
13497	Tanyard Spring, Sec C, Ph 1	02-13-09-03	SF	0.679	0.152	0.014	0.105	0.251	1.12
13498	Tanyard Springs	02-13-09-03	IB	9.137	4.937	0.408	0.420	0.536	5.08
13499	39 Cedar Ln	02-13-09-03	ESDDW	0.006	0.002	0.000	0.001	0.401	0.01
406	TWIN RIDGE ADDITION	02-13-09-03	ITPE	3.959	1.145	0.102	0.032	0.310	0.36
1009	POINT PLEASANT	02-13-09-03	ITPE	0.030	0.021	0.002	0.003	0.701	0.04
1745	INTERNATIONAL TRADE CENTER LOTS 2/3/8 & 9	02-13-09-03	EDSD	5.792	3.846	0.313	0.160	0.648	1.97
1746	INTERNATIONAL TRADE CENTER LOTS 2/3/8 & 9	02-13-09-03	EDSD	5.558	4.100	0.331	0.170	0.714	2.11
1814	ROYAL FARM STORE	02-13-09-03	EDSD	2.055	0.741	0.064	0.016	0.375	0.19
3023	WINDY KNOLLS WEST	02-13-09-03	ITCE	0.304	0.171	0.014	0.010	0.555	0.12
3411	WINDY KNOLLS WEST	02-13-09-03	ITCE	1.918	0.605	0.053	0.008	0.334	0.09
3719	WINDY KNOLLS WEST	02-13-09-03	ITCE	0.326	0.118	0.010	0.038	0.377	0.43

TABLE 3 -EX. BMP Impervious Area Credit Calculation (Full WQv Vs. Partial WQv)

4469	PARADISE BEACH/ LOT 195R	02-13-09-03	ITPE	0.006	0.006	0.000	0.003	0.950	0.04
4607	STERLING COLLISION CENTER	02-13-09-03	ITCE	0.935	0.830	0.066	0.034	0.849	0.43
4767	MADISON PARK PH.2	02-13-09-03	IB	0.720	0.286	0.024	0.156	0.407	1.82
5062	PASADENA CAR WASH	02-13-09-03	EDSD	1.027	0.833	0.067	0.054	0.780	0.67
6463	BROOKSTONE	02-13-09-03	BR	1.506	0.655	0.055	0.136	0.441	1.61
6630	Chase Wood Run/ Lot 2	02-13-09-03	IT	0.006	0.006	0.000	0.019	0.950	0.24
6719	Glen Burnie Convenience Center	02-13-09-03	SF	1.680	1.079	0.088	0.139	0.628	1.71
7216	Wendy's at Marley Station	02-13-09-03	SF	0.741	0.337	0.028	0.036	0.459	0.43
7583	Greenhaven, Lots 1-5 & 9	02-13-09-03	IT	0.676	0.341	0.028	0.044	0.504	0.53
7847	Elvaton Heights-Foxwell, Lots 32 & 33	02-13-09-03	IT	0.964	0.240	0.022	0.012	0.274	0.13
7848	Elvaton Heights-Foxwell, Lots 32 & 33	02-13-09-03	IT	0.371	0.141	0.012	0.010	0.392	0.12
7873	Howard Trust	02-13-09-03	BR	1.686	0.824	0.069	0.150	0.490	1.80
7993	Bar Harbor, Lots 1-3	02-13-09-03	BR	4.051	1.039	0.095	0.016	0.281	0.17
7994	Bar Harbor, Lots 1-3	02-13-09-03	BR	0.708	0.400	0.033	0.024	0.559	0.29
8117	Picnics by Gerard	02-13-09-03	IT	0.863	0.151	0.015	0.014	0.207	0.14
8566	North County HS, Gymnasium	02-13-09-03	BR	2.433	1.214	0.101	0.152	0.499	1.82
8577	Ferndale School, Early Childhood Center	02-13-09-03	BR	0.984	0.350	0.030	0.038	0.371	0.44
8681	7 Queen Anne Road	02-13-09-03	IT	0.006	0.006	0.000	0.002	0.917	0.03
8758	239 Wanda Road	02-13-09-03	DW	0.006	0.006	0.000	0.009	0.950	0.11
9013	Quarterfield 100	02-13-09-03	IT	0.206	0.068	0.006	0.480	0.347	5.48
9014	Quarterfield 100	02-13-09-03	BR	0.372	0.219	0.018	0.041	0.579	0.50
9015	Quarterfield 100	02-13-09-03	BR	0.526	0.442	0.035	0.031	0.806	0.39
9016	Quarterfield 100	02-13-09-03	SW	1.543	0.885	0.073	0.034	0.566	0.41
9041	442 Carvel Beach Road	02-13-09-03	IT	0.006	0.005	0.000	0.005	0.885	0.06
9124	825 Duvall Highway	02-13-09-03	IT	0.077	0.014	0.001	0.012	0.216	0.13
9340	Tanyard Springs, Section C, Phase 1	02-13-09-03	IB	0.765	0.002	0.003	1.133	0.052	0.67
9342	Tanyard Springs, Section C, Phase 3	02-13-09-03	SW	0.501	0.078	0.008	0.011	0.190	0.11
9442	174 Carroll Road	02-13-09-03	IT	0.203	0.057	0.005	0.004	0.304	0.05

TABLE 3 -EX. BMP Impervious Area Credit Calculation (Full WQv Vs. Partial WQv)

9482	2421 Mountain Road	02-13-09-03	IT	0.218	0.012	0.002	0.042	0.100	0.28
9631	Old Mill High School Concession Stand	02-13-09-03	IT	0.570	0.145	0.013	0.005	0.278	0.05
9780	600 Willowdale Ct	02-13-09-03	SF	1.334	0.310	0.029	0.027	0.259	0.29
9908	772 20th Street	02-13-09-03	BR	0.006	0.006	0.000	0.002	0.926	0.02
9989	Oak Heights, Birch Ave	02-13-09-03	IT	0.006	0.006	0.000	0.004	0.950	0.04
10230	H. A. Wagner Power Plant	02-13-09-03	SW	1.157	0.715	0.058	0.037	0.606	0.45
10979	8200 West End Drive	02-13-09-03	DW	0.006	0.006	0.000	0.001	0.925	0.01
11204	702 Kearneys Lane	02-13-09-03	IT	0.006	0.005	0.000	0.011	0.797	0.14
11554	334 Bar Harbor Road	02-13-09-03	DW	0.006	0.005	0.000	0.001	0.770	0.02
12528	1570 Annapolis Drive	02-13-09-03	ESDRG	0.006	0.002	0.000	0.001	0.439	0.02
12529	1570 Annapolis Drive	02-13-09-03	ESDRG	0.006	0.006	0.000	0.002	0.950	0.03
12530	1570 Annapolis Drive	02-13-09-03	ESDRG	0.006	0.006	0.000	0.002	0.950	0.03
12772	1305 Second Ave	02-13-09-03	ESDIL	0.246	0.005	0.001	0.003	0.067	0.01
6151	BWI TECHNOLOGY PARK	02-13-09-06	EDSD	18.184	15.351	1.227	1.070	0.810	13.39
7882	Staybridge Suites	02-13-09-06	UGS	0.704	0.565	0.045	0.244	0.773	3.04
8064	Townes Place Suites at BWI, LOt 8	02-13-09-06	SF	0.270	0.021	0.003	0.109	0.121	0.85
8269	BWI, Sheraton & Weston Motels	02-13-09-06	IT	4.399	2.618	0.215	0.293	0.586	3.57
8270	BWI, Sheraton & Westin Motels	02-13-09-06	IT	4.220	3.073	0.248	0.367	0.705	4.55
8663	Arundel Overlook Business Park, Lot 1	02-13-09-06	SF	4.808	2.630	0.217	0.601	0.542	7.28
8664	Arundel Overlook Businedd Park, Lot 1	02-13-09-06	SF	0.275	0.202	0.016	0.530	0.711	6.57
11487	Arundel Mills, Darden Resturants Inc	02-13-09-06	ESDMB	0.288	0.087	0.008	0.160	0.321	1.80
11488	Arundel Mills, Darden Resturants Inc	02-13-09-06	ESDMB	1.755	0.162	0.019	0.160	0.133	1.33
11489	Arundel Mills, Darden Resturants Inc	02-13-09-06	ESDMB	0.545	0.228	0.019	0.160	0.427	1.88
11491	Arundel Mills, Darden Resturants Inc	02-13-09-06	ESDMB	0.016	0.016	0.001	0.160	0.950	2.02
11492	Arundel Mills, Darden Resturants Inc	02-13-09-06	ESDMB	0.062	0.057	0.005	0.160	0.888	2.01
13404	Bay Head Park	02-13-10-01	BR	0.831	0.027	0.005	0.035	0.079	0.17

TABLE 3 -EX. BMP Impervious Area Credit Calculation (Full WQv Vs. Partial WQv)

13408	606 Riverside Drive	02-13-10-01	FPU	1.371	0.289	0.027	0.004	0.240	0.04
13420	223 Ambleside Dr	02-13-10-01	ESDPERMP	0.291	0.041	0.004	0.019	0.176	0.18
13431	1054 Trails End Road	02-13-10-01	ESDSGW	0.439	0.179	0.015	0.009	0.416	0.10
13434	1257 Magothy Road	02-13-10-01	FPU	0.073	0.026	0.002	0.010	0.370	0.11
13467	1729 Grandview Road	02-13-10-01	ITWQE	0.102	0.102	0.008	0.003	0.950	0.04
390	ARNOLD PET STATION	02-13-10-01	EDSD	0.724	0.314	0.027	0.146	0.441	1.72
4376	SHORE ACRES/ BURNETT AVE.	02-13-10-01	ITCE	0.154	0.154	0.012	0.011	0.950	0.14
4827	ANNE ARUNDEL COMMUNITY COLLEGE GYMNASIUM RENOVATIO	02-13-10-01	ITWQE	0.170	0.170	0.013	0.005	0.950	0.06
5691	Harris Property/ Lot 5	02-13-10-01	IT	0.111	0.111	0.009	0.002	0.950	0.02
5903	BRANDI KNOLL/ LOTS 1-9	02-13-10-01	ITPE	9.212	1.732	0.168	0.037	0.219	0.38
6088	CRESTON PARK/ LOT 1	02-13-10-01	ITCE	0.092	0.092	0.007	0.006	0.950	0.08
6677	Magothy Park Beach/ Lots 347	02-13-10-01	IT	0.094	0.094	0.007	0.005	0.950	0.07
6960	Ulmstead Estates/ Lot 26/ Sec 5	02-13-10-01	IT	0.130	0.130	0.010	0.012	0.950	0.15
7283	Sheridan Road, Lots 36-39	02-13-10-01	UGS	0.453	0.159	0.014	0.002	0.365	0.02
7389	Mill Creek Road, Lot 56-57	02-13-10-01	IT	0.091	0.091	0.007	0.006	0.950	0.08
7444	Twin Harbors, Lot 77	02-13-10-01	ESDSFNAC	0.111	0.111	0.009	0.008	0.950	0.10
7683	Shore Acres, Lot 197	02-13-10-01	IT	1.318	0.105	0.013	0.018	0.121	0.14
7751	Jones Station Fire Detartment	02-13-10-01	BR	0.125	0.093	0.008	0.024	0.725	0.29
7775	Cattail Passage	02-13-10-01	SW	0.092	0.056	0.005	0.009	0.600	0.12
7776	Cattail Passage	02-13-10-01	IT	0.270	0.094	0.008	0.007	0.361	0.08
7777	Cattail Passage	02-13-10-01	ESD	1.398	0.441	0.039	0.022	0.334	0.25
7950	Shore Acres, Parcel 41	02-13-10-01	ESD	0.219	0.219	0.017	0.003	0.950	0.03
8009	Athey Property, Lot 2R	02-13-10-01	ITWQE	0.238	0.238	0.019	0.035	0.950	0.44
8112	Mount Carmmel United Methodist Church	02-13-10-01	BR	0.628	0.339	0.028	0.018	0.536	0.21
8113	Mount Carmmel United Methodist Church	02-13-10-01	BR	0.556	0.227	0.019	0.015	0.416	0.18
8114	Mount Carmmel United Methodist Church	02-13-10-01	IT	0.727	0.692	0.055	0.885	0.906	11.14

TABLE 3 -EX. BMP Impervious Area Credit Calculation (Full WQv Vs. Partial WQv)

8589	Severn School, Gym Addition	02-13-10-01	IT	1.070	0.178	0.018	0.033	0.199	0.33
8632	21 Nicholson Dr	02-13-10-01	IT	3.442	1.133	0.099	0.007	0.346	0.08
8863	Park Meadows Court	02-13-10-01	IT	0.049	0.049	0.004	0.013	0.950	0.17
8865	Park Meadows Court	02-13-10-01	IT	0.054	0.054	0.004	0.007	0.950	0.09
8866	Park Meadows Court	02-13-10-01	IT	0.051	0.051	0.004	0.006	0.950	0.08
8867	Park Meadows Court	02-13-10-01	IT	0.052	0.052	0.004	0.006	0.950	0.07
8877	Broadwater Way, Blair Property	02-13-10-01	IT	0.130	0.130	0.010	0.015	0.950	0.20
8946	1226 Jones Station Road	02-13-10-01	IT	0.146	0.146	0.012	0.016	0.950	0.20
9280	1402 Cape St Claire Road	02-13-10-01	IT	0.071	0.071	0.006	0.011	0.950	0.14
9367	366 Eagle Hill Road	02-13-10-01	ESD	0.296	0.296	0.023	0.116	0.950	1.47
9412	1167 Summit Dr	02-13-10-01	IT	0.047	0.047	0.004	0.005	0.950	0.06
9532	807 Pasadena Road	02-13-10-01	DW	0.201	0.201	0.016	0.047	0.950	0.60
9536	416 Asbury Dr	02-13-10-01	ESDRTD	0.140	0.140	0.011	0.032	0.950	0.40
9830	8365 Baltimore Annapolis Blvd	02-13-10-01	BR	0.162	0.162	0.013	0.417	0.950	5.26
9891	Sabrina Lane	02-13-10-01	SW	0.058	0.058	0.005	0.086	0.950	1.09
9892	Sabrina Lane	02-13-10-01	SW	0.045	0.045	0.004	0.049	0.950	0.62
9893	Sabrina Lane	02-13-10-01	SW	0.409	0.161	0.014	0.100	0.404	1.17
9894	Sabrina Lane	02-13-10-01	SW	1.923	0.831	0.070	0.052	0.439	0.61
9895	Sabrina Lane	02-13-10-01	SW	0.059	0.059	0.005	0.012	0.950	0.15
9921	1017 Magothy Ave	02-13-10-01	ESDRTD	0.035	0.035	0.003	0.001	0.950	0.01
9931	Elvaton Park office Building	02-13-10-01	BR	1.473	1.011	0.082	0.150	0.668	1.85
9944	1150 River Bay Road	02-13-10-01	ESDRTD	0.120	0.120	0.010	0.010	0.950	0.13
10046	Wallgreens, Severna Park	02-13-10-01	IT	0.554	0.554	0.044	0.010	0.950	0.13
10047	Wallgreens, Severna Park	02-13-10-01	IT	0.320	0.320	0.025	0.001	0.950	0.01
10286	819 Riverside Drive	02-13-10-01	IT	0.254	0.254	0.020	0.012	0.950	0.15
10969	200 11th Street	02-13-10-01	ESDRG	0.062	0.062	0.005	0.004	0.950	0.05
11006	8264 Warterford Road	02-13-10-01	DW	0.042	0.042	0.003	0.013	0.950	0.16
11552	8310 Sycamore Road	02-13-10-01	ESDRG	0.040	0.040	0.003	0.007	0.950	0.09
11729	1084 River Bay Road	02-13-10-01	ESDRTD	0.153	0.153	0.012	0.007	0.950	0.09
11999	St John the Evangilest Church & School Additions	02-13-10-01	IT	1.405	0.802	0.066	0.046	0.564	0.56

TABLE 3 -EX. BMP Impervious Area Credit Calculation (Full WQv Vs. Partial WQv)

12507	694 White Swan Drive	02-13-10-01	ESDDW	0.071	0.071	0.006	0.001	0.950	0.02
12508	694 White Swan Drive	02-13-10-01	ESDDW	0.077	0.077	0.006	0.007	0.950	0.08
12509	694 White Swan Drive	02-13-10-01	ESDDW	0.090	0.090	0.007	0.004	0.950	0.05
12594	1053 St Margarets Drive	02-13-10-01	ESDRG	0.062	0.001	0.000	0.007	0.064	0.02
19	BRISTOL HILLS AT HERALD HARBOR	02-13-10-02	WP	3.481	0.812	0.075	0.095	0.260	1.02
402	NAPORA MINOR SUBDIVISION	02-13-10-02	EDSW	0.344	0.110	0.010	0.120	0.337	1.36
1083	HOLY TEMPLE CHURCH OF ANNAPOLIS	02-13-10-02	EDSW	1.773	0.252	0.026	0.130	0.178	1.25
1272	NAPORA MINOR SUBDIVISION	02-13-10-02	EDSW	0.102	0.025	0.002	0.018	0.268	0.20
2851	MANRESA ASSISTED LIVING	02-13-10-02	ITWQE	0.261	0.218	0.017	0.009	0.804	0.11
2894	ODENTON ELEMENTARY SCHOOL	02-13-10-02	ITPE	51.355	19.625	1.686	0.248	0.394	2.89
3063	MANRESA ASSISTED LIVING	02-13-10-02	ITWQE	0.136	0.116	0.009	0.006	0.817	0.07
4443	ODENTON COMMUTER RAIL STATION	02-13-10-02	IB	10.597	3.906	0.337	0.088	0.382	1.02
4592	WOODS THE/ LOT-1 RESUB.OR REV.LOT-13	02-13-10-02	ITCE	0.076	0.075	0.006	0.018	0.946	0.23
5009	HERALD HARBOR LOTS 27-32	02-13-10-02	ITCE	0.045	0.044	0.004	0.030	0.929	0.37
5718	ONE SEVENTY EIGHT SELF STORAGE	02-13-10-02	IB	4.801	1.661	0.145	0.201	0.361	2.30
6031	Beechwood on the Burley/ Lot 74	02-13-10-02	IT	0.051	0.050	0.004	0.007	0.940	0.09
6064	Cranberry Woods/ R.L. Howard	02-13-10-02	IT	0.083	0.082	0.007	0.027	0.940	0.34
6380	PARISH HOUSE PROPERTY	02-13-10-02	ITCE	2.100	0.411	0.040	0.025	0.226	0.26
6709	Williams Woods	02-13-10-02	IT	17.712	5.987	0.523	0.478	0.354	5.47
6853	Nantucket on the Severn	02-13-10-02	SF	0.323	0.118	0.010	0.011	0.377	0.13
6854	Nantucket on the Severn	02-13-10-02	SF	0.511	0.161	0.014	0.012	0.334	0.14
6855	Nantucket on the Severn	02-13-10-02	SF	1.593	0.263	0.026	0.011	0.198	0.11
6856	Nantucket on the Severn	02-13-10-02	IT	0.373	0.166	0.014	0.022	0.451	0.26
6857	Nantucket on the Severn	02-13-10-02	SF	0.096	0.002	0.001	0.004	0.073	0.02
6858	Nantucket on the Severn	02-13-10-02	SF	1.477	0.190	0.020	0.033	0.166	0.31

TABLE 3 -EX. BMP Impervious Area Credit Calculation (Full WQv Vs. Partial WQv)

6859	Nantucket on the Severn	02-13-10-02	SW	0.145	0.016	0.002	0.020	0.151	0.17
6860	Nantucket on the Severn	02-13-10-02	SW	0.064	0.010	0.001	0.012	0.184	0.11
7114	Zients Property, Bl 7, Par 80	02-13-10-02	IT	1.280	0.492	0.042	0.044	0.396	0.51
9320	Arundel HS, Science Building	02-13-10-02	SF	7.695	5.538	0.447	0.186	0.698	2.30
9567	Oppertunity Builders	02-13-10-02	WP	5.199	0.862	0.086	1.430	0.199	14.28
9579	Sullivans Retreat	02-13-10-02	IT	0.742	0.288	0.025	0.012	0.400	0.14
9580	Sullivans Retreat	02-13-10-02	IT	1.848	0.496	0.045	0.012	0.292	0.13
10209	Chesapeake Montessori School	02-13-10-02	IT	0.702	0.218	0.019	0.048	0.329	0.54
10250	Catholic Charities Odenton II	02-13-10-02	BR	0.326	0.271	0.022	0.029	0.796	0.36
10251	Catholic Charities Odenton II	02-13-10-02	BR	0.130	0.058	0.005	0.029	0.453	0.34
10252	Catholic Charities Odenton II	02-13-10-02	BR	2.314	0.943	0.080	0.029	0.417	0.34
11515	672 Old Herald harbor Road	02-13-10-02	SW	7.333	0.796	0.090	0.034	0.148	0.30
12189	Wallgreens Store 12559	02-13-10-02	SF	0.572	0.132	0.012	0.054	0.257	0.58
13259	238 Cape St John Road	02-13-10-03	ESD	0.170	0.037	0.003	0.002	0.243	0.02
13271	160 Shore Dr	02-13-10-03	ESDIL	0.017	0.011	0.001	0.007	0.638	0.08
13356	3979 Bayside Drive	02-13-10-03	ESDRG	0.036	0.024	0.002	0.006	0.633	0.07
13370	1161 Goldfinch Lane	02-13-10-03	ESDMB	0.122	0.011	0.001	0.007	0.129	0.05
5482	TROPIC BAY WATER GARDENS	02-13-10-03	ITPE	1.450	0.329	0.031	0.018	0.254	0.19
5932	SOUTH ANNAPOLIS FOREST DRIVE HOME DEPOT	02-13-10-03	ITCE	6.731	6.372	0.506	0.014	0.902	0.18
6447	BARKDOLL/LOT 4	02-13-10-03	ITCE	0.012	0.004	0.000	0.013	0.392	0.15
6456	POPLAR POINT LOT26	02-13-10-03	ITCE	0.118	0.009	0.001	0.004	0.118	0.03
7335	DiPietro Property	02-13-10-03	IT	0.158	0.052	0.005	0.005	0.348	0.06
7351	Idlewild Farms, Lot 7	02-13-10-03	IT	0.241	0.027	0.003	0.011	0.152	0.10
7736	Selby on the Bay, Lots 10 & 11	02-13-10-03	SF	0.087	0.046	0.004	0.003	0.519	0.04
8199	Annapolis Neck Library, Parking Lot Expsns	02-13-10-03	SF	0.699	0.203	0.018	0.106	0.312	1.19

TABLE 3 -EX. BMP Impervious Area Credit Calculation (Full WQv Vs. Partial WQv)

8470	Annapolis Town Center at Parole Infrastructure	02-13-10-03	SF	0.939	0.175	0.017	0.285	0.218	2.93
8471	Annapolis Town Center at Parole Infrastructure	02-13-10-03	SF	2.382	2.204	0.175	0.015	0.883	0.18
8475	Annapolis Town Center at Parole Infrastructure	02-13-10-03	SF	0.229	0.178	0.014	0.018	0.748	0.23
8500	Hillsmere Estates, Lot 15	02-13-10-03	ESDRTD	0.006	0.003	0.000	0.004	0.549	0.05
8615	957 Melvin Road	02-13-10-03	IT	0.060	0.019	0.002	0.009	0.342	0.10
8616	957 Melvin Road	02-13-10-03	IT	0.028	0.003	0.000	0.005	0.135	0.05
8771	Hambleton Estates, Lot 12	02-13-10-03	IT	0.096	0.065	0.005	0.009	0.661	0.11
8806	23 Elm Road	02-13-10-03	SF	0.079	0.056	0.005	0.002	0.692	0.02
9020	110 Poplar Road	02-13-10-03	Redevelopm	0.016	0.016	0.001	0.002	0.928	0.02
9026	1211 Tilghmans Landing Way	02-13-10-03	ESD	0.026	0.025	0.002	0.021	0.894	0.27
9157	1005 Shepherd Court	02-13-10-03	DW	0.013	0.013	0.001	0.000	0.950	0.00
9330	Conte Annex Building, Lot 2	02-13-10-03	BR	1.044	0.919	0.073	0.073	0.842	0.91
9331	Conte Annex Building, Lot 2	02-13-10-03	ITPE	1.316	1.154	0.092	0.073	0.839	0.91
9337	Falls Grove at Riva Trace	02-13-10-03	SF	0.651	0.402	0.033	0.113	0.606	1.38
9461	3204 Dillon Dr	02-13-10-03	DW	0.006	0.005	0.000	0.015	0.867	0.18
9462	3204 Dillon Dr	02-13-10-03	IT	0.051	0.028	0.002	0.001	0.541	0.01
9467	132 Island View Drive	02-13-10-03	BR	0.094	0.024	0.002	0.005	0.283	0.05
9748	496 Ferry Point Road, Arbutis Banks	02-13-10-03	BR	0.251	0.024	0.003	0.045	0.138	0.39
9749	496 Ferry Point Road, Arbutis Banks	02-13-10-03	BR	0.035	0.003	0.000	0.004	0.122	0.03
9752	496 Ferry Point Road, Arbutis Banks	02-13-10-03	ESDNRTD	0.239	0.140	0.012	0.105	0.579	1.28
9896	Friends Road, Lot 15	02-13-10-03	IT	0.061	0.036	0.003	0.005	0.586	0.06
10184	1723 Oldtown Road	02-13-10-03	DW	0.006	0.006	0.000	0.002	0.950	0.02
10202	3244-B Arundel on the Bay Road	02-13-10-03	ESDRTD	0.145	0.001	0.001	0.012	0.055	0.01
10217	1345 Rossback Road	02-13-10-03	ESD	0.129	0.053	0.004	0.144	0.419	1.69
10255	579 Coover Road	02-13-10-03	ESDRTD	0.124	0.065	0.005	0.098	0.522	1.19
11393	118 Mayo Road	02-13-10-03	BR	0.187	0.173	0.014	0.003	0.880	0.04
11730	204 Allensway Drive	02-13-10-03	ESDRTD	0.055	0.046	0.004	0.024	0.800	0.29

TABLE 3 -EX. BMP Impervious Area Credit Calculation (Full WQv Vs. Partial WQv)

12114	740 South River Landing Road	02-13-10-03	ESDRH	0.006	0.005	0.000	0.006	0.871	0.07
12157	3355 Oak Dr	02-13-10-03	ESDRG	0.649	0.203	0.018	0.009	0.332	0.10
12158	3355 Oak Dr	02-13-10-03	ESDRG	0.059	0.018	0.002	0.004	0.330	0.05
12495	332 Salisbury Road	02-13-10-03	ESDRH	0.006	0.005	0.000	0.006	0.896	0.08
12593	1602 Knoxville Road	02-13-10-03	ITWQE	0.063	0.030	0.003	0.004	0.484	0.04
13445	1414 E Central Ave	02-13-10-04	ESDRG	0.159	0.006	0.001	0.004	0.083	0.02
5937	SCHUELKE PROPERTY	02-13-10-04	SW	0.157	0.018	0.002	0.005	0.153	0.04
10042	Heron Cove, Infrastructure	02-13-10-04	WP	11.157	2.329	0.221	0.108	0.238	1.14
10043	Heron Cove, Infrastructure	02-13-10-04	WP	3.083	0.853	0.077	0.207	0.299	2.29
13118	3939 Shore Drive	02-13-10-04	FPU	0.024	0.013	0.001	0.010	0.556	0.12
993	JONES PROPERTY/ FRANKLIN GIBSON RD	02-13-10-05	ITCE	1.077	0.434	0.037	0.021	0.412	0.25
3535	TRACEYS CREEK	02-13-10-05	ITCE	10.870	0.932	0.115	0.019	0.127	0.15
5768	WILKERSON/HUGH W.PROPERTY/LOT-4	02-13-11-02	ITCE	0.065	0.037	0.003	0.005	0.564	0.06
7038	Burton Property, Lot 3	02-13-11-02	ESDSFNAC	0.075	0.001	0.000	0.010	0.059	0.02
8379	Tracy's Landing Elementary School	02-13-11-02	BR	1.084	0.867	0.070	0.144	0.770	1.79
6353	BROCKBRIDGE TOWNHOUSES REINSTATED BY PAC	02-13-11-04	EDSD	0.824	0.197	0.018	0.066	0.265	0.71
7642	Lopez Property, Bl 12, Par 173	02-13-11-04	SW	0.171	0.037	0.003	0.052	0.245	0.55
13405	Courts of Crofton Pond Retrofit	02-13-11-05	MP	15.227	6.516	0.552	0.500	0.435	5.90
846	SETON WOODS	02-13-11-05	WP	27.239	5.697	0.541	1.700	0.238	17.91
6026	James Residence/ Lots 42 & 48	02-13-11-05	IT	0.166	0.048	0.004	0.055	0.310	0.62
6903	Hopkins Plaza	02-13-11-05	IT	0.201	0.193	0.015	0.048	0.915	0.61
6904	Hopkins Plaza	02-13-11-05	BR	1.079	0.411	0.035	0.028	0.393	0.32
6905	Hopkins Plaza	02-13-11-05	BR	0.246	0.193	0.016	0.005	0.756	0.07
6906	Hopkins Plaza	02-13-11-05	BR	0.291	0.238	0.019	0.011	0.784	0.13
2596	ANNAPOLIS JUNCTION TRANSFER STATION	02-13-11-05	WP	5.280	0.140	0.033	13.900	0.074	59.96
9715	2681 Evergreen Ave	02-13-11-05	IT	0.023	0.015	0.001	0.007	0.647	0.09

TABLE 3 -EX. BMP Impervious Area Credit Calculation (Full WQv Vs. Partial WQv)

Total	**263.0**

Q_v = [(P)(R_v)(A)]/12

th in inches and is equal to 1.0"

nentric runoff coefficient

rainage area in acres

Impervious Area/Drainage Area) x 100]

[3] Impervious Credit Reported = (WQv Provided/Targeted WQv) x Impervious Area

Table 4- Water Quality Projects Pre February 2014 Impervious Credit Calculation

MDE_STRU_ID	Structure Name	Watershed	Structure Type	Length of Restoration (ft)	Impervious Acre Equilivent [1] (acres)	Equilivent Impervious Credit Reported [2] (acres)
AA020058	Camp Woodlands Living Shoreline	02-13-10-03	SHST	540	0.04	21.60
AA020021	Cabin Branch SPSC Outfall Retrofit	02-13-10-02	STRE	600	0.01	6.00
AA020022	Cabin Branch Sand Seepage Wetland	02-13-10-02	STRE	900	0.01	9.00
AA020027	Crofton Storage-Mart Coastal Plain Outfall	02-13-11-05	STRE	200	0.01	2.00
AA020023	Homestead Gardens SPSC	02-13-10-03	STRE	350	0.01	3.50
AA020024	Davidsonville Wildlife Sanctuary Wetland SPSC	02-13-10-03	STRE	300	0.01	3.00
AA020025	Camp Letts SPSC	02-13-10-04	STRE	250	0.01	2.50
AA020026	Saefern Outfall Stabilization Phase II	02-13-10-02	STRE	275	0.01	2.75
AA020057	Arundel on the Bay Living Shoreline	02-13-10-02	SHST	200	0.04	8.00
AA020043	Crofton Tributary Restoration Phase II	02-13-11-05	STRE	1800	0.01	18.00
AA020032	Crofton Tributary Restoration Phase I	02-13-11-05	STRE	1494	0.01	14.94
AA020055	Massing Residential Living Shoreline	02-13-10-03	SHST	200	0.04	8.00
AA020056	South River Farm Park Living Shoreline	02-13-10-03	SHST	600	0.04	24.00
AA020054	Homeport Farms Experimental Living Shoreline	02-13-10-03	SHST	200	0.04	8.00
AA020015	Homeport Farms SPSC	02-13-10-03	STRE	250	0.01	2.50
AA020014	Lionsgate Stream Stabilization	02-13-11-05	STRE	200	0.01	2.00
AA020035	Dulls Corner Stream Restoration	02-13-10-02	STRE	2200	0.01	22.00
AA020037	Gray's Creek Bog	02-13-10-01	STRE	1100	0.01	11.00
AA020038	Harundel SWM Facility	02-13-09-03	STRE	1000	0.01	10.00
AA020052	Aurora Hills SWM Rehabilitation 1	02-13-10-02	STRE	360	0.01	3.60
AA020001	Aurora Hills SWM Rehabilitation 2	02-13-10-02	STRE	250	0.01	2.50
AA020002	Aurora Hills SWM Rehabilitation 3	02-13-10-02	STRE	750	0.01	7.50
AA020031	Brockbridge Elem. Stream Restoration	02-13-11-04	STRE	950	0.01	9.50
AA020039	Marley Station Wetland	02-13-09-03	STRE	500	0.01	5.00
AA020040	Riva Annapolis Stormdrain & Outfall Rehabilitation	02-13-10-03	STRE	375	0.01	3.75
AA020044	Sloop, Eli, & Long Coves Retrofits, Site 2	02-13-09-03	STRE	275	0.01	2.75
AA020041	Riverdale Outfall Rehabilitation	02-13-10-01	STRE	285	0.01	2.85
AA020033	Cypress Creek Retrofit	02-13-10-01	STRE	3000	0.01	30.00
AA020042	Ruppert Ravine Phase 2	02-13-11-05	STRE	900	0.01	9.00

Table 4- Water Quality Projects Pre February 2014 Impervious Credit Calculation

AA020045	North Carolina @ Severn Rd. Storm Drain Outfall.	02-13-10-01	STRE	175	0.01	1.75
AA020011	Wells Branch @ Aurora Hills	02-13-10-02	STRE	546	0.01	5.46
AA020034	Four Seasons Stream Rehabilitation	02-13-11-05	STRE	2016	0.01	20.16
AA020051	Western Tributary Stream Restoration	02-13-10-03	STRE	1000	0.01	10.00
AA020030	Broadneck Rd. Stream Repair	02-13-10-01	STRE	475	0.01	4.75
AA020050	Sunnyfield Outfall Restoration	02-13-09-03	STRE	275	0.01	2.75
AA020047	Whitehall Creek Stream Rehabilitation	02-13-10-01	STRE	950	0.01	9.50
AA020048	Windsor Ridge Stream Stabilization	02-13-10-01	STRE	450	0.01	4.50
AA020029	Beacrane Road Bog Rehab.	02-13-10-01	STRE	500	0.01	5.00
AA020046	Wilelinor SWM Rehabilitation	02-13-10-03	STRE	1050	0.01	10.50
AA020049	Central Sanitation Facility Stream Restoration	02-13-10-02	STRE	2000	0.01	20.00
AA020003	Church Creek Stream Restoration	02-13-10-03	STRE	2000	0.01	20.00
AA020004	Fairoaks Outfall Retrofit Phase I	02-13-10-01	STRE	375	0.01	3.75
AA020005	Severn Drive Stormdrain and Outfall Improvement	02-13-10-02	STRE	200	0.01	2.00
AA020007	Saefern Outfall Stabilization Phase I	02-13-10-02	STRE	200	0.01	2.00
AA020008	National Business Park Downstream Mitigation 324	02-13-11-05	STRE	1000	0.01	10.00
AA020036	Severnview Drive Outfall Restoration	02-13-10-02	STRE	185	0.01	1.85
AA020009	Leelyn Drive SWM Retrofit	02-13-10-01	STRE	1250	0.01	12.50
AA020012	Severn Run Stream Stabilization	02-13-10-02	STRE	639	0.01	6.39
AA020013	Picture Spring Branch Stream Stabilization	02-13-11-05	STRE	500	0.01	5.00
AA020010	Science Drive In-Stream Riffle	02-13-09-06	STRE	650	0.01	6.50
AA020028	Shady Cove Natural Area Wetland	02-13-10-04	STRE	1050	0.01	10.50
AA020016	Hammarlee Road SPSC	02-13-09-03	STRE	400	0.01	4.00
AA020017	602 Hammonds Lane SPSC	02-13-09-06	STRE	100	0.01	1.00
AA020018	Buena Vista Outfall	02-13-10-01	STRE	560	0.01	5.60
AA020019	Millersville Elementary SPSC	02-13-10-02	STRE	300	0.01	3.00
AA020053	Ben Oaks Shoreline Restoration	02-13-10-02	SHST	200	0.04	8.00
AA020020	Fairoaks Outfall Retrofit Phase II	02-13-10-01	STRE	300	0.01	3.00
AA020006	Carriage Hills Outfall Stabilization & Stream Res	02-13-10-02	STRE	600	0.01	6.00
	Total					**460.7**

[1] Based on published MDE Guidance *"Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated" August 2014*

[2] Equilivent Impervious Credit Reported = Length of Restoration x Impervious Acre Equilivent

Table 5- Water Quality projects Post February 2014 Impervious Credit Calculation

Structure ID	Structure Name	Watershed	Structure Type	Drainage Area (acres)	Impervious Area (acres)	Comment	Targeted WQ_v [1] (ac-ft)	WQ_v Provided by Retrofit (ac-ft) Reported by Design Consultant	R_v [2]	Impervious Credit Reported [3] (acres)
AA002478	BRITTINHAM/ SECTION 3	02-13-10-01	PWET	17.188	4.422	Longfellow Drive Pond Retrofit	0.403	0.170	0.282	1.86
AA000024	BRITTINGHAM II	02-13-10-01	PWET	7.254	2.636	Copperwood Ct Pond Retrofit	0.228	0.100	0.377	1.16
AA004022	EARLEIGH HEIGHTS ROAD	02-13-10-01	PWET	9.018	4.103	Sylvan Ave Pond Retrofit	0.345	0.170	0.460	2.02
AA000045	KILMARNOCK WOODS	02-13-10-01	PWET	33.780	7.549	Lahinch Ct SWM Pond Retrofit	0.707	0.210	0.251	2.24
AA000013	BERRYWOOD ACRES	02-13-10-01	PWET	25.019	5.187	Tarks Land Pond Retrofit	0.493	0.310	0.237	3.26
AA000652	COLLINGTON OFF JONES STATION	02-13-10-01	PWET	28.995	5.445	Collington Court Pond Retrofit	0.529	0.230	0.219	2.37
AA000819	MANSION HOUSE MANOR	02-13-10-01	PWET	6.199	2.614	Mayfield Rd and Gladnor Rd Pond Retrofit	0.222	0.270	0.429	3.18
AA000887	WOODBRIDGE FOREST	02-13-10-01	PWET	34.292	4.699	Amesbury Ct. Pond Retrofit	0.495	0.270	0.173	2.56
	Total									**18.7**

[1] $WQ_v = [(P)(R_v)(A)]/12$

P = rainfall depth in inches and is equal to 1.0"

R_v = volumentric runoff coefficient

A = drainage area in acres

[2] $R_v = 0.05 + 0.009 \times [(\text{Impervious Area}/\text{Drainage Area}) \times 100]$

[3] Impervious Credit Reported = (WQ_v Provided/Targeted WQ_v) x Impervious Area

Structure ID	Structure Name	Watershed	Structure Type	Length of Restoration (ft)	Impervious Acre Equilivent [1] (acres)	Equilivent Impervious Credit Reported [2] (acres)
AA020069	Forest Drive Stream Restoration	02-13-10-01	STRE	500	0.01	5.00
AA020068	Haskill Drive Stream Restoration	02-13-10-02	STRE	500	0.01	5.00
	Total					**10.0**

[1] Based on published MDE Guidance *"Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated" August 2014*

[2] Equilivent Impervious Credit Reported = Length of Restoration x Impervious Acre Equilivent

Table 7- Pre February 2014 Septic System Connections to Wastewater Treatment Plant

OBJECTID	ACCOUNT_NO	Imper_Acres	Imperv_Credit	WATERSHED_CODE
2	162201244601	0.773254103	0.39	02-13-10-03
3	174607934000	0.173881089	0.39	02-13-10-03
4	200002465991	0.778272056	0.39	02-13-10-03
5	200090044768	1.115781116	0.39	02-13-11-05
7	215890027774	0.382863343	0.39	02-13-10-02
8	216490222990	0.000593609	0.39	02-13-11-05
9	241107901620	0.134074307	0.39	02-13-10-02
10	266690085938	0.470750643	0.39	02-13-10-02
11	274904831500	0.081513514	0.39	02-13-10-03
12	274907385000	0.047225665	0.39	02-13-10-03
13	274910500155	0.060299535	0.39	02-13-10-03
14	274990012141	0.042695772	0.39	02-13-10-03
15	274990017792	0.063327366	0.39	02-13-10-03
16	288890009485	0.072691029	0.39	02-13-10-03
17	300001615575	0.323317953	0.39	02-13-10-02
18	300002021700	0.509965512	0.39	02-13-10-01
19	300002642200	0.108335944	0.39	02-13-09-03
20	300002911600	0.069255235	0.39	02-13-10-01
21	300003337608	0.089092259	0.39	02-13-10-01
22	300003515400	0.237104031	0.39	02-13-10-01
23	300007002100	0.356598819	0.39	02-13-10-01
24	300007646800	0.139765082	0.39	02-13-10-01
25	300008374105	0.105529609	0.39	02-13-09-03
26	300011699800	0.142270171	0.39	02-13-10-01
27	300011988910	0.454939442	0.39	02-13-10-01
28	300014530400	0.237104031	0.39	02-13-10-01
29	300014688909	0.09456735	0.39	02-13-10-01
30	300014897725	0.280206045	0.39	02-13-10-02
31	300014898400	0.097205689	0.39	02-13-10-01
32	300021079800	0.641597643	0.39	02-13-10-01
33	300021285670	0.065877101	0.39	02-13-10-01
34	300022506400	0.046612247	0.39	02-13-10-01
35	300023336600	0.02130207	0.39	02-13-10-01

Table 7- Pre February 2014 Septic System Connections to Wastewater Treatment Plant

OBJECTID	ACCOUNT_NO	Imper_Acres	Imperv_Credit	WATERSHED_CODE
36	300025923700	0.219633092	0.39	02-13-10-01
37	300028142910	0.994099264	0.39	02-13-10-01
38	300028824600	0.362944593	0.39	02-13-09-03
39	300029258700	0.077590286	0.39	02-13-10-01
40	300029950500	0.423201584	0.39	02-13-10-02
41	300031856400	0.10279132	0.39	02-13-09-02
42	300033099000	0.095115055	0.39	02-13-10-01
43	300033535800	0.093215354	0.39	02-13-10-01
44	300090008947	0.021367437	0.39	02-13-10-01
46	300090221084	0.166960116	0.39	02-13-10-01
47	311190229571	0.07641891	0.39	02-13-10-01
48	316509700000	0.093493528	0.39	02-13-10-01
49	318400604500	0.070364373	0.39	02-13-10-02
50	318422814200	0.079195234	0.39	02-13-10-02
51	318424857100	0.194125938	0.39	02-13-10-02
52	336018861900	0.040060646	0.39	02-13-09-03
53	336021529200	0.139397302	0.39	02-13-09-03
54	336290035634	0.054346948	0.39	02-13-09-03
55	338827458070	0.217009363	0.39	02-13-10-01
56	338890066038	0.051465834	0.39	02-13-09-03
58	345513127100	0.080364767	0.39	02-13-09-03
59	345520407800	0.256627715	0.39	02-13-09-03
60	345526234600	0.163455522	0.39	02-13-09-03
61	345528306805	0.110525415	0.39	02-13-09-03
62	345528632855	0.118648346	0.39	02-13-09-03
63	345533284200	0.109630753	0.39	02-13-09-03
64	346134276900	0.050860934	0.39	02-13-10-02
65	363410795810	0.043235488	0.39	02-13-10-01
66	363490004525	0.053100538	0.39	02-13-10-01
67	365833568605	0.05095019	0.39	02-13-09-03
69	366227590405	0.079254285	0.39	02-13-10-02
70	370290006199	0.074397112	0.39	02-13-10-01
71	374601789312	0.062902942	0.39	02-13-10-01

Table 7- Pre February 2014 Septic System Connections to Wastewater Treatment Plant

OBJECTID	ACCOUNT_NO	Imper_Acres	Imperv_Credit	WATERSHED_CODE
72	374623580190	0.110704956	0.39	02-13-10-01
73	387709702245	0.094768189	0.39	02-13-10-01
74	390033778500	0.165573017	0.39	02-13-10-02
78	390607691779	0.07448218	0.39	02-13-09-03
89	390614336249	0.053439338	0.39	02-13-09-03
90	390614336450	0.053976641	0.39	02-13-09-03
107	390631683165	0.066849554	0.39	02-13-09-03
113	400000388004	0.254360969	0.39	02-13-11-05
114	400001225000	0.131211172	0.39	02-13-11-05
115	400001420000	0.065002237	0.39	02-13-10-02
116	400002058000	0.04017994	0.39	02-13-11-05
117	400002095750	0.117341917	0.39	02-13-11-05
118	400002128600	0.062547709	0.39	02-13-10-02
119	400003271855	0.2323155	0.39	02-13-10-02
120	400003352525	0.561532182	0.39	02-13-11-05
121	400005670000	0.085379254	0.39	02-13-09-06
122	400006554500	0.078922141	0.39	02-13-09-06
123	400090034461	3.240503984	0.39	02-13-09-06
124	400090068132	0.872418168	0.39	02-13-11-05
125	400090085426	0.06857791	0.39	02-13-10-02
126	400090224251	0.089138819	0.39	02-13-10-02
127	413590228952	0.070740349	0.39	02-13-10-02
128	432290011829	0.02934963	0.39	02-13-10-02
129	444405524000	0.160446736	0.39	02-13-09-06
130	444406615000	0.077587068	0.39	02-13-09-06
131	467690213539	0.115820103	0.39	02-13-10-02
132	474690010529	0.086931088	0.39	02-13-09-06
133	478890035494	0.060301629	0.39	02-13-10-02
134	500000274600	0.292543866	0.39	02-13-09-06
135	500000424300	0.178369298	0.39	02-13-09-06
136	500001951400	0.049106371	0.39	02-13-09-03
137	500002473505	0.070265857	0.39	02-13-09-06
138	500006087200	0.187944549	0.39	02-13-09-03

Table 7- Pre February 2014 Septic System Connections to Wastewater Treatment Plant

OBJECTID	ACCOUNT_NO	Imper_Acres	Imperv_Credit	WATERSHED_CODE
139	500006542180	1.024297213	0.39	02-13-09-06
141	500008462600	0.100997579	0.39	02-13-09-06
142	500009058000	0.32269929	0.39	02-13-09-03
143	500009493100	0.557532269	0.39	02-13-09-06
144	500012894000	0.054448233	0.39	02-13-09-06
145	500013830801	1.167271288	0.39	02-13-09-06
146	500014555800	0.09963856	0.39	02-13-09-03
147	500017330000	0.593211511	0.39	02-13-09-06
148	500090043832	0.679500388	0.39	02-13-09-06
149	500090102163	0.16397526	0.39	02-13-09-03
150	500090231191	0.053833391	0.39	02-13-09-03
151	523006701947	0.206353881	0.39	02-13-09-03
152	531790232989	0.025917398	0.39	02-13-09-03
153	532307409200	0.043423428	0.39	02-13-09-03
154	532607540400	0.071136686	0.39	02-13-09-03
155	532613322400	0.063047159	0.39	02-13-09-03
156	532690041931	0.066618058	0.39	02-13-09-03
157	562514992620	0.128134228	0.39	02-13-09-03
158	562515497500	0.069235135	0.39	02-13-09-03
159	574803441235	0.052847527	0.39	02-13-09-03
160	700000072800	0.071764581	0.39	02-13-10-05
161	700000078800	0.634978967	0.39	02-13-10-05
162	700000150150	0.408199482	0.39	02-13-10-05
163	700000320600	0.258584242	0.39	02-13-10-05
164	700000611800	0.144325686	0.39	02-13-10-05
165	700000761185	0.107955077	0.39	02-13-10-05
166	700000898800	0.275652528	0.39	02-13-10-05
167	700000974800	0.017265263	0.39	02-13-10-05
168	700000985900	0.074774624	0.39	02-13-10-05
169	700001113000	0.075719808	0.39	02-13-10-05
170	700001239050	0.077858958	0.39	02-13-10-05
171	700001254400	0.300441425	0.39	02-13-10-05
172	700001385900	0.117440435	0.39	02-13-10-05

Table 7- Pre February 2014 Septic System Connections to Wastewater Treatment Plant

OBJECTID	ACCOUNT_NO	Imper_Acres	Imperv_Credit	WATERSHED_CODE
173	700001513400	0.171260796	0.39	02-13-10-04
174	700001561000	0.071439108	0.39	02-13-10-05
175	700001650615	0.056854218	0.39	02-13-10-05
176	700001709400	0.061627117	0.39	02-13-10-05
177	700001767005	0.560466997	0.39	02-13-10-05
178	700001803208	0.263304174	0.39	02-13-10-05
179	700002067100	0.153072456	0.39	02-13-10-05
180	700002182000	1.866776762	0.39	02-13-10-05
181	700002659000	0.077741942	0.39	02-13-10-05
182	700002664230	0.206389255	0.39	02-13-10-05
183	700002935800	0.055171205	0.39	02-13-10-05
184	700002941400	0.350148545	0.39	02-13-10-05
185	700002942800	0.218707687	0.39	02-13-10-05
186	700002997400	0.034263068	0.39	02-13-10-05
187	700002999275	0.116952346	0.39	02-13-10-05
188	700003010000	0.194613054	0.39	02-13-10-05
189	700003105755	0.13381301	0.39	02-13-10-04
190	700003109450	0.074115683	0.39	02-13-10-05
191	700003170300	0.147362084	0.39	02-13-10-05
192	700003259600	0.138867406	0.39	02-13-10-05
193	700003510500	0.048106598	0.39	02-13-10-05
194	700003546300	0.11078484	0.39	02-13-10-05
195	700003675200	0.053649527	0.39	02-13-10-05
196	700003676400	0.024663869	0.39	02-13-10-05
197	700003885700	0.177242288	0.39	02-13-10-04
198	700003916500	0.102617371	0.39	02-13-10-05
199	700004147450	0.17645017	0.39	02-13-10-05
200	700004433115	0.174402689	0.39	02-13-10-05
201	700004707400	0.175139645	0.39	02-13-10-05
202	700004744860	0.085101615	0.39	02-13-10-05
203	700004767210	0.113590054	0.39	02-13-10-05
204	700004768708	1.65263622	0.39	02-13-10-05
205	700005075000	0.025804386	0.39	02-13-10-05

Table 7- Pre February 2014 Septic System Connections to Wastewater Treatment Plant

OBJECTID	ACCOUNT_NO	Imper_Acres	Imperv_Credit	WATERSHED_CODE
206	700005080600	0.074091778	0.39	02-13-10-05
207	700005082000	0.081541647	0.39	02-13-10-05
208	700005255013	0.032926942	0.39	02-13-10-05
209	700005398000	0.355971761	0.39	02-13-10-05
210	700090006233	0.042143255	0.39	02-13-10-05
211	700090021029	0.061917168	0.39	02-13-10-05
212	700090028117	0.414417431	0.39	02-13-10-05
213	700090220625	0.112697492	0.39	02-13-10-05
214	700100054600	0.076188326	0.39	02-13-10-04
215	700102651605	0.044032767	0.39	02-13-10-04
216	700102811200	0.026516551	0.39	02-13-10-04
217	700190235682	0.001104547	0.39	02-13-10-04
218	704601689800	0.001608889	0.39	02-13-10-04
219	800090100548	36.59327117	0.39	02-13-10-05
220	857900891800	0.09253685	0.39	02-13-10-05
		Total	**70.2**	

Table 8- Post Feb 2014 Septic System Connections to Wasterwater Treatment Plant

OBJECTID	ACCOUNT_NO	Imper_Acres	Imperv_Credit	WATERSHED_CODE
1	100090060685	1.780129192	0.39	02-13-10-03
6	204707114100	0.182615541	0.39	02-13-10-02
45	300090030173	0.149042706	0.39	02-13-10-01
57	345509726800	0.071890789	0.39	02-13-09-03
68	366223678522	0.14040324	0.39	02-13-10-02
75	390600030100	0.060858447	0.39	02-13-09-03
76	390600034987	0.087329846	0.39	02-13-09-03
77	390600865125	0.099001676	0.39	02-13-09-03
79	390608517999	0.082584864	0.39	02-13-09-03
80	390608550210	0.058881399	0.39	02-13-09-03
81	390609312776	0.092548543	0.39	02-13-09-03
82	390611110600	0.074566125	0.39	02-13-09-03
83	390611754547	0.070230864	0.39	02-13-09-03
84	390612285300	0.036017055	0.39	02-13-09-03
85	390612879920	0.053793805	0.39	02-13-09-03
86	390613221805	0.079864661	0.39	02-13-09-03
87	390613702505	0.052890125	0.39	02-13-09-03
88	390613977000	0.067399866	0.39	02-13-09-03
91	390615486297	0.043516643	0.39	02-13-09-03
92	390615607240	0.070393067	0.39	02-13-09-03
93	390615910600	0.100471603	0.39	02-13-09-03
94	390617326433	0.098228183	0.39	02-13-09-03
95	390618810500	0.06589814	0.39	02-13-09-03
96	390619202300	0.087948933	0.39	02-13-09-03
97	390619522300	0.107432654	0.39	02-13-09-03
98	390621575060	0.093857665	0.39	02-13-09-03
99	390621651608	0.06072404	0.39	02-13-09-03
100	390622293900	0.063919911	0.39	02-13-09-03
101	390625192050	0.093968186	0.39	02-13-09-03
102	390625200150	0.060890109	0.39	02-13-09-03
103	390626494300	0.063471121	0.39	02-13-09-03
104	390628077580	0.042435783	0.39	02-13-09-03
105	390629339800	0.073892453	0.39	02-13-09-03
106	390630050950	0.093124683	0.39	02-13-09-03
108	390632555200	0.070112635	0.39	02-13-09-03
109	390633684600	0.067063464	0.39	02-13-09-03
110	390633809400	0.052179037	0.39	02-13-09-03
111	390633968575	0.071510404	0.39	02-13-09-03
112	390634395200	0.058547384	0.39	02-13-09-03
140	500007714000	0.387559912	0.39	02-13-09-03
		Total	**15.6**	

Table 9- Pre February 2014 Septic Systems Upgraded to ENR System

OBJECTID	ACCOUNT_NO	IMP_ACREAGE	IMP_CONTROLLED	WATERSHED_CODE
1	100000301600	0.388719146	0.26	02-13-10-04
2	100000938000	0.179899239	0.26	02-13-10-04
3	100001286600	0.270480147	0.26	02-13-10-05
4	100001485400	0.207788498	0.26	02-13-10-03
5	100003834600	0.072269145	0.26	02-13-10-04
6	100004042200	0.193957955	0.26	02-13-10-04
7	100004673200	8.930060751	0.26	02-13-10-03
8	100005796100	0.238374472	0.26	02-13-10-04
9	100005796453	1.789668704	0.26	02-13-10-04
10	100005901800	0.120376613	0.26	02-13-10-04
11	100006067800	0.535152224	0.26	02-13-11-04
12	100006524000	1.078362333	0.26	02-13-11-04
13	100006729100	0.065304549	0.26	02-13-10-05
14	100007259500	0.113350647	0.26	02-13-10-04
15	100007691600	0.416202267	0.26	02-13-10-04
16	100008304510	0.627643262	0.26	02-13-10-04
17	100008443420	0.102067624	0.26	02-13-10-04
18	100009056500	0.195725184	0.26	02-13-10-04
19	100009171550	0.169226545	0.26	02-13-10-03
20	100090033083	0.019848561	0.26	02-13-10-03
21	100090049483	0.073496173	0.26	02-13-11-04
22	100090064784	0.431790248	0.26	02-13-11-04
24	100090220785	0.223177045	0.26	02-13-10-04
25	102890061305	0.121505044	0.26	02-13-11-04
26	102990085254	0.231429883	0.26	02-13-10-03
27	102990085255	0.24902135	0.26	02-13-10-03
28	104790073284	0.150538835	0.26	02-13-10-04
30	124000372800	0.066036597	0.26	02-13-10-03
31	124000812000	0.100959024	0.26	02-13-10-03
32	124000882100	0.047567945	0.26	02-13-10-03
34	124006956875	0.209128232	0.26	02-13-10-03
35	124007639820	0.059674003	0.26	02-13-10-03
36	124090017424	0.128574818	0.26	02-13-10-03
37	124090046535	0.117402978	0.26	02-13-10-03
38	124090089156	0.114430502	0.26	02-13-10-03
39	126890030301	0.120850286	0.26	02-13-11-04
40	126890030302	0.144291472	0.26	02-13-11-04
41	126890085639	0.168101336	0.26	02-13-11-04
42	138690215968	0.567727381	0.26	02-13-10-03
43	150705258032	0.166462436	0.26	02-13-11-04
44	159890035518	0.33569433	0.26	02-13-10-03
45	175002344600	0.061970289	0.26	02-13-10-03
46	175006097055	0.047154639	0.26	02-13-10-03
47	175006999800	0.082547704	0.26	02-13-10-03
48	192290089071	0.123152328	0.26	02-13-11-04
49	200001999000	0.037688954	0.26	02-13-10-03

Table 9- Pre February 2014 Septic Systems Upgraded to ENR System

OBJECTID	ACCOUNT_NO	IMP_ACREAGE	IMP_CONTROLLED	WATERSHED_CODE
50	200004158455	0.115560912	0.26	02-13-11-05
51	200004335000	0.225262662	0.26	02-13-10-03
52	200007604059	0.209034108	0.26	02-13-10-03
53	200008626500	0.294788071	0.26	02-13-10-03
54	200008922477	0.059611146	0.26	02-13-10-02
55	200010381000	0.200469988	0.26	02-13-10-03
56	200012083400	0.172438217	0.26	02-13-10-02
57	200012279400	0.053269281	0.26	02-13-10-03
58	200012728510	0.009122663	0.26	02-13-10-03
59	200090004204	0.687267634	0.26	02-13-10-03
60	200090039780	0.210749652	0.26	02-13-10-03
61	200090048646	0.255485536	0.26	02-13-10-03
63	200090065102	0.207662788	0.26	02-13-10-02
64	200090066620	0.203649348	0.26	02-13-10-02
65	200090071452	0.247460263	0.26	02-13-10-03
66	200090086959	0.036274286	0.26	02-13-10-02
67	200090086963	0.099959769	0.26	02-13-10-02
68	200090086971	0.134827535	0.26	02-13-10-02
69	200090088073	0.16344606	0.26	02-13-10-03
70	200090093875	0.126344653	0.26	02-13-10-02
71	200090232304	0.110435713	0.26	02-13-10-02
72	200090232909	2.84717E-05	0.26	02-13-10-02
73	200390014828	0.317674035	0.26	02-13-10-03
74	203907173518	0.121633704	0.26	02-13-10-03
75	216090045557	0.117278989	0.26	02-13-10-02
76	219690067764	0.145040017	0.26	02-13-10-02
77	219690067767	0.227611408	0.26	02-13-10-02
78	224002487200	0.031708212	0.26	02-13-10-02
79	224002763600	0.076032314	0.26	02-13-10-02
80	224003420205	0.061418892	0.26	02-13-10-02
81	224004242813	0.02383947	0.26	02-13-10-02
82	224005186005	0.034743768	0.26	02-13-10-02
83	224005296000	0.050611869	0.26	02-13-10-02
84	224007991430	0.074801651	0.26	02-13-10-02
85	224009319430	0.077217912	0.26	02-13-10-02
86	224010108000	0.022573909	0.26	02-13-10-02
87	224090017394	0.232749465	0.26	02-13-10-02
88	224090038921	0.031894681	0.26	02-13-10-02
89	224090071058	0.029625252	0.26	02-13-10-02
90	224090226068	0.203531191	0.26	02-13-10-02
91	225890217720	0.151500157	0.26	02-13-10-03
92	228001835825	0.060121531	0.26	02-13-10-03
93	232100385500	0.105423115	0.26	02-13-10-03
94	232102219000	0.084335931	0.26	02-13-10-03
95	232109465400	0.048722592	0.26	02-13-10-03
96	232109760805	0.059001932	0.26	02-13-10-03

Table 9- Pre February 2014 Septic Systems Upgraded to ENR System

OBJECTID	ACCOUNT_NO	IMP_ACREAGE	IMP_CONTROLLED	WATERSHED_CODE
97	238500204700	0.043857376	0.26	02-13-10-03
98	238501388200	0.13307757	0.26	02-13-10-03
99	239490009727	0.16402529	0.26	02-13-10-02
100	239690062360	0.187882572	0.26	02-13-10-03
101	241300282515	0.029849318	0.26	02-13-10-02
102	241301542825	0.052204646	0.26	02-13-10-02
103	241301664150	0.022167579	0.26	02-13-10-02
104	241301713700	0.023660517	0.26	02-13-10-02
105	241302469527	0.044533424	0.26	02-13-10-02
106	241302786504	0.008009322	0.26	02-13-10-02
107	241302899400	0.053742008	0.26	02-13-10-02
108	241302969400	0.063559883	0.26	02-13-10-02
109	241303171615	0.075319694	0.26	02-13-10-02
110	241303368700	0.042115025	0.26	02-13-10-02
111	241303368750	0.001114485	0.26	02-13-10-02
112	241303368950	0.056375169	0.26	02-13-10-02
113	241303368986	0.027488796	0.26	02-13-10-02
114	241303368987	0.037654352	0.26	02-13-10-02
115	241303939600	0.037633915	0.26	02-13-10-02
116	241303993900	0.027393528	0.26	02-13-10-02
117	241304219300	0.079300247	0.26	02-13-10-02
118	241304291585	0.049487325	0.26	02-13-10-02
119	241304851000	0.034350488	0.26	02-13-10-02
120	241305110915	0.039103901	0.26	02-13-10-02
121	241305338273	0.077900697	0.26	02-13-10-02
122	241306205929	0.044361166	0.26	02-13-10-02
123	241307659400	0.049729335	0.26	02-13-10-02
124	241307676900	0.050269661	0.26	02-13-10-02
125	241307948700	0.043562012	0.26	02-13-10-02
126	241308061100	0.003226169	0.26	02-13-10-02
127	241308079400	0.043819625	0.26	02-13-10-02
128	241308181601	0.063495301	0.26	02-13-10-02
129	241308402900	0.091310441	0.26	02-13-10-02
130	241308682100	0.06296608	0.26	02-13-10-02
131	241308782000	0.048190596	0.26	02-13-10-02
132	241309383003	0.040849035	0.26	02-13-10-02
133	241309549900	0.012608647	0.26	02-13-10-02
134	241310183600	0.031403821	0.26	02-13-10-02
135	241310705406	0.060894339	0.26	02-13-10-02
136	241311068400	0.017742592	0.26	02-13-10-02
137	241311069900	0.018212525	0.26	02-13-10-02
138	241311072600	0.044811288	0.26	02-13-10-02
139	241311193760	0.067944697	0.26	02-13-10-02
140	241312087000	0.038413447	0.26	02-13-10-02
142	241312521603	0.090197471	0.26	02-13-10-02
143	241312570450	0.033865923	0.26	02-13-10-02

Table 9- Pre February 2014 Septic Systems Upgraded to ENR System

OBJECTID	ACCOUNT_NO	IMP_ACREAGE	IMP_CONTROLLED	WATERSHED_CODE
144	241312608400	0.155604002	0.26	02-13-10-02
145	241312747000	0.035847017	0.26	02-13-10-02
146	241390001609	0.081454929	0.26	02-13-10-02
147	241390010582	0.021762924	0.26	02-13-10-02
148	241390017795	0.045098983	0.26	02-13-10-02
149	241390018112	0.050798829	0.26	02-13-10-02
150	241390029190	0.021372088	0.26	02-13-10-02
151	241390029768	0.043637353	0.26	02-13-10-02
152	241390035439	0.075352471	0.26	02-13-10-02
153	241390040172	0.089428291	0.26	02-13-10-02
154	241390078567	0.087943494	0.26	02-13-10-02
155	241390081246	0.103722465	0.26	02-13-10-02
156	241390093690	0.070940248	0.26	02-13-10-02
157	241390097134	0.030929746	0.26	02-13-10-02
158	241390217352	0.075861744	0.26	02-13-10-02
159	241390217354	0.078576075	0.26	02-13-10-02
160	241390217937	0.002836542	0.26	02-13-10-02
161	241390224748	0.044247595	0.26	02-13-10-02
162	241390232570	0.077946544	0.26	02-13-10-02
163	241490217983	0.168479589	0.26	02-13-10-03
164	241490217984	0.148252184	0.26	02-13-10-03
165	241490217987	0.126944603	0.26	02-13-10-03
166	241490217989	0.230673001	0.26	02-13-10-03
167	241490217990	0.158765677	0.26	02-13-10-03
168	241490217992	0.000959264	0.26	02-13-10-03
169	241490217993	0.00375834	0.26	02-13-10-03
170	241490217994	0.11097041	0.26	02-13-10-03
171	241490217996	0.306895961	0.26	02-13-10-03
172	247004450600	0.063983484	0.26	02-13-11-05
173	253004259300	0.022790492	0.26	02-13-10-02
174	253006907600	0.037166524	0.26	02-13-10-02
175	253009251600	0.000572567	0.26	02-13-10-02
176	253090017785	0.13041981	0.26	02-13-10-02
177	253090231079	0.044791587	0.26	02-13-10-02
178	253990228941	0.155956793	0.26	02-13-10-02
179	254506276200	4.33768E-05	0.26	02-13-10-02
180	256390037307	0.219677829	0.26	02-13-10-02
181	256390037308	0.313793211	0.26	02-13-10-02
182	256390037311	0.280642785	0.26	02-13-10-02
183	260506614000	0.129651461	0.26	02-13-10-02
185	260801723825	0.113400327	0.26	02-13-10-02
186	260803171506	0.040445448	0.26	02-13-10-02
187	260807235425	0.075182574	0.26	02-13-10-02
188	260807837200	0.046657834	0.26	02-13-10-02
189	260810699600	0.272861852	0.26	02-13-10-02
190	260811042000	0.087225595	0.26	02-13-10-02

Table 9- Pre February 2014 Septic Systems Upgraded to ENR System

OBJECTID	ACCOUNT_NO	IMP_ACREAGE	IMP_CONTROLLED	WATERSHED_CODE
191	260812221700	0.054975411	0.26	02-13-10-02
192	260890073880	0.106882905	0.26	02-13-10-02
193	263590050758	0.064901464	0.26	02-13-11-04
194	266490078327	0.107835078	0.26	02-13-10-02
195	267102850494	0.124568154	0.26	02-13-10-03
196	270507954810	0.131101648	0.26	02-13-10-02
197	271390009597	0.210069938	0.26	02-13-10-02
198	271990053802	0.300073673	0.26	02-13-10-03
199	271990053807	0.140892849	0.26	02-13-10-03
200	272004304910	0.055209965	0.26	02-13-10-02
201	272006256927	0.053680589	0.26	02-13-10-02
202	272007508400	0.068025641	0.26	02-13-10-02
203	272008013500	0.068704839	0.26	02-13-10-02
204	272008910330	0.061994357	0.26	02-13-10-02
205	272010206350	0.080085207	0.26	02-13-10-02
206	274706596200	0.048156228	0.26	02-13-10-03
207	274712468406	0.043633777	0.26	02-13-10-03
208	274801468600	0.070433647	0.26	02-13-10-02
209	274801928930	3.42083E-05	0.26	02-13-10-02
210	274803108375	0.066493315	0.26	02-13-10-02
211	274803196825	0.063394822	0.26	02-13-10-02
212	274803197300	0.129742273	0.26	02-13-10-02
213	274803229350	0.083525868	0.26	02-13-10-02
214	274803319600	0.096523065	0.26	02-13-10-02
215	274804269800	0.069084829	0.26	02-13-10-02
216	274805129600	0.071421416	0.26	02-13-10-02
217	274807241600	0.077103154	0.26	02-13-10-02
218	274807816200	0.077544294	0.26	02-13-10-02
219	274807972353	0.157975912	0.26	02-13-10-02
220	274808238420	0.111897165	0.26	02-13-10-02
221	274810774290	0.050298699	0.26	02-13-10-02
222	274810943800	0.100279008	0.26	02-13-10-02
223	274811909900	0.061944803	0.26	02-13-10-02
224	274812197100	0.080483406	0.26	02-13-10-02
225	274890025660	0.056560967	0.26	02-13-10-02
226	275790030089	0.121586097	0.26	02-13-10-03
227	275790030092	0.140792505	0.26	02-13-10-03
228	275790030118	0.152108928	0.26	02-13-10-03
229	287590036834	0.090091097	0.26	02-13-10-02
230	294602766200	0.12558671	0.26	02-13-10-03
231	294607248485	0.141628338	0.26	02-13-10-03
232	294608600600	0.409269651	0.26	02-13-10-03
233	294690016434	0.262207325	0.26	02-13-10-03
234	296090038785	0.269519839	0.26	02-13-10-03
235	296090038792	0.268586871	0.26	02-13-10-03
236	296090038803	0.168649017	0.26	02-13-10-03

Table 9- Pre February 2014 Septic Systems Upgraded to ENR System

OBJECTID	ACCOUNT_NO	IMP_ACREAGE	IMP_CONTROLLED	WATERSHED_CODE
237	296090042345	0.362611167	0.26	02-13-10-03
238	297690067687	0.167199197	0.26	02-13-10-02
239	297690067691	0.208491333	0.26	02-13-10-02
240	300000215620	0.23993501	0.26	02-13-10-01
241	300000389200	0.074399827	0.26	02-13-10-02
242	300000918500	0.109858484	0.26	02-13-10-02
243	300001234800	0.04805132	0.26	02-13-09-02
244	300001899800	0.173772215	0.26	02-13-10-01
245	300001901560	0.126988044	0.26	02-13-09-03
246	300006171200	0.098589666	0.26	02-13-10-02
247	300007596800	0.352390873	0.26	02-13-10-02
248	300012053010	0.152677531	0.26	02-13-10-01
249	300012607000	0.123678264	0.26	02-13-10-02
250	300013002316	0.222079658	0.26	02-13-10-01
251	300013121000	0.112585826	0.26	02-13-10-01
252	300013149900	0.115461042	0.26	02-13-10-02
253	300013552020	0.077349921	0.26	02-13-09-03
254	300013682005	0.11188328	0.26	02-13-09-03
255	300013739600	0.078722545	0.26	02-13-10-02
256	300014660500	0.074297433	0.26	02-13-10-02
257	300015402800	0.001413665	0.26	02-13-10-01
258	300015559600	0.057542494	0.26	02-13-10-02
259	300017176600	0.068037267	0.26	02-13-10-01
260	300017726800	0.219056723	0.26	02-13-10-01
261	300018427500	0.067389498	0.26	02-13-10-01
262	300018955080	1.852539033	0.26	02-13-10-02
263	300019581000	0.225051603	0.26	02-13-10-02
264	300019700400	0.158605385	0.26	02-13-09-03
266	300021012580	1.213793289	0.26	02-13-10-02
267	300026037200	0.176997666	0.26	02-13-10-01
268	300028243000	0.301565521	0.26	02-13-10-01
269	300028387600	0.111487009	0.26	02-13-10-01
270	300029141000	0.353353893	0.26	02-13-10-02
271	300030236316	0.058743921	0.26	02-13-09-02
272	300032092700	0.057553567	0.26	02-13-09-03
273	300090004809	0.074755792	0.26	02-13-10-01
274	300090026376	0.355431121	0.26	02-13-10-02
275	300090029749	0.152729678	0.26	02-13-10-01
276	300090030170	0.001745224	0.26	02-13-10-02
277	300090031197	0.042651403	0.26	02-13-09-03
278	300090035230	0.054686467	0.26	02-13-10-02
279	300090037162	0.156507502	0.26	02-13-10-01
280	300090043740	0.151262782	0.26	02-13-10-01
281	300090045125	0.055075272	0.26	02-13-10-01
282	300090046079	0.091304339	0.26	02-13-09-03
283	300090061771	0.239842241	0.26	02-13-10-01

Table 9- Pre February 2014 Septic Systems Upgraded to ENR System

OBJECTID	ACCOUNT_NO	IMP_ACREAGE	IMP_CONTROLLED	WATERSHED_CODE
284	300090066918	0.090728056	0.26	02-13-10-01
285	300090074437	0.714505324	0.26	02-13-10-02
286	300090079950	0.130374869	0.26	02-13-10-01
287	300090094937	0.138449789	0.26	02-13-10-02
288	300090100003	0.181767851	0.26	02-13-10-01
289	300090212016	0.077302493	0.26	02-13-10-01
290	300090221080	0.443410202	0.26	02-13-10-01
291	300090221610	0.122937607	0.26	02-13-10-01
292	300090221611	0.092548341	0.26	02-13-10-01
293	300090221612	0.178702544	0.26	02-13-10-01
294	300090227167	0.09716123	0.26	02-13-10-02
295	300090227168	0.107795533	0.26	02-13-10-02
296	300090227169	0.097234168	0.26	02-13-10-02
299	301418783440	0.050633616	0.26	02-13-09-02
300	302006553400	0.167046501	0.26	02-13-09-03
301	302013838675	0.035299454	0.26	02-13-09-03
302	302501790550	0.22156806	0.26	02-13-10-02
303	302509513608	0.189422175	0.26	02-13-10-02
304	302514485800	0.244184082	0.26	02-13-10-02
305	302518378079	0.121187054	0.26	02-13-10-02
306	302529930100	0.262575443	0.26	02-13-10-02
307	302532851910	0.094725668	0.26	02-13-10-02
308	303210056875	0.082146006	0.26	02-13-09-02
309	303290082903	0.141657749	0.26	02-13-09-02
310	303714089600	0.141270858	0.26	02-13-10-01
311	305714809900	0.071840738	0.26	02-13-09-02
312	305721578230	0.065651577	0.26	02-13-09-02
313	305733069951	0.091995742	0.26	02-13-09-02
314	305790004992	0.069816975	0.26	02-13-09-02
315	305790215306	0.191579793	0.26	02-13-09-02
316	306333968325	0.000538021	0.26	02-13-09-02
317	307518867400	0.096375682	0.26	02-13-10-01
318	307534344300	0.187516157	0.26	02-13-10-01
319	307590019195	0.323487507	0.26	02-13-10-01
320	308000766708	0.080457107	0.26	02-13-09-03
321	308002515673	0.016424609	0.26	02-13-09-03
322	308003321900	0.067807462	0.26	02-13-09-02
323	308004978390	0.030767741	0.26	02-13-09-02
324	308015615079	0.073454448	0.26	02-13-09-03
325	308015908300	0.13140511	0.26	02-13-09-03
326	308024797990	0.116931691	0.26	02-13-09-02
327	308025049600	0.116972257	0.26	02-13-09-02
328	308027004600	0.047299579	0.26	02-13-09-03
329	308027230350	0.118946713	0.26	02-13-09-03
330	308027428800	0.512974229	0.26	02-13-09-02
331	308030176200	0.190655376	0.26	02-13-09-02

Table 9- Pre February 2014 Septic Systems Upgraded to ENR System

OBJECTID	ACCOUNT_NO	IMP_ACREAGE	IMP_CONTROLLED	WATERSHED_CODE
332	308031835100	0.085971607	0.26	02-13-09-03
333	308033195200	0.12695585	0.26	02-13-09-02
334	308090093638	0.09263204	0.26	02-13-09-03
335	308590060601	0.18081576	0.26	02-13-10-01
336	309011806900	0.094163592	0.26	02-13-09-03
337	309309704117	0.107043834	0.26	02-13-10-02
338	309390033507	0.044404754	0.26	02-13-10-02
339	309390082511	0.108200193	0.26	02-13-10-02
340	309390221400	0.015586983	0.26	02-13-10-02
341	309509874200	0.121339263	0.26	02-13-10-01
342	309512063810	0.104348104	0.26	02-13-10-01
343	309513880700	0.037057576	0.26	02-13-10-01
344	309514816500	0.059851875	0.26	02-13-10-01
345	311000848524	0.076950163	0.26	02-13-09-02
346	311000848555	0.094674296	0.26	02-13-09-02
347	311000848561	0.073775141	0.26	02-13-09-02
348	311002229410	0.151353823	0.26	02-13-09-02
349	311025849600	0.169615024	0.26	02-13-09-02
350	311027897800	0.046029999	0.26	02-13-09-02
351	311034311500	0.111458087	0.26	02-13-09-02
352	312090060274	0.102787817	0.26	02-13-10-01
353	313019947108	0.162314419	0.26	02-13-09-02
354	313026017300	0.193171141	0.26	02-13-09-02
355	313090222032	0.027123591	0.26	02-13-09-02
356	313090222033	0.000595493	0.26	02-13-09-02
357	313090229229	0.09249152	0.26	02-13-09-02
358	313090235123	0.048762506	0.26	02-13-09-02
359	313801605835	0.00734751	0.26	02-13-10-01
360	313808457430	0.058333682	0.26	02-13-10-01
361	313809143005	0.064395739	0.26	02-13-10-01
362	313817543820	0.004250231	0.26	02-13-10-01
363	313819107265	0.078962416	0.26	02-13-10-01
364	313821116603	0.096668441	0.26	02-13-10-01
365	313822083385	0.048353697	0.26	02-13-10-01
366	313827304200	0.059680337	0.26	02-13-10-01
367	313827307712	0.041371258	0.26	02-13-10-01
368	313828147222	0.066187035	0.26	02-13-10-01
369	313828263005	0.053384602	0.26	02-13-10-01
370	313890008343	0.050036848	0.26	02-13-10-01
371	313890023912	0.040415079	0.26	02-13-10-01
372	313890025628	0.06348179	0.26	02-13-10-01
373	313890025714	0.051678986	0.26	02-13-10-01
374	313890029389	0.058389593	0.26	02-13-10-01
375	313890029494	0.134428652	0.26	02-13-10-01
376	313890048983	0.065241156	0.26	02-13-10-01
377	313890050262	0.044504657	0.26	02-13-10-01

Table 9- Pre February 2014 Septic Systems Upgraded to ENR System

OBJECTID	ACCOUNT_NO	IMP_ACREAGE	IMP_CONTROLLED	WATERSHED_CODE
378	313890083961	0.055085937	0.26	02-13-10-01
379	313890220810	0.049286079	0.26	02-13-10-01
380	313890226184	0.049299085	0.26	02-13-10-01
381	314611405262	0.06527632	0.26	02-13-09-03
382	314690002371	0.051117595	0.26	02-13-09-03
383	314790222735	0.324940228	0.26	02-13-10-02
384	314790222736	0.324940228	0.26	02-13-10-02
385	315302103560	0.088285189	0.26	02-13-10-01
386	315390216473	0.096699835	0.26	02-13-10-01
387	317804861025	0.246415098	0.26	02-13-10-01
388	318001884036	0.122943281	0.26	02-13-10-02
389	318501003250	0.057978747	0.26	02-13-10-01
390	318501602905	0.104768717	0.26	02-13-10-01
391	318502282825	0.01844227	0.26	02-13-10-01
392	318504705409	0.089554621	0.26	02-13-10-01
393	318511793610	0.045247548	0.26	02-13-10-01
394	318512092700	0.052059299	0.26	02-13-10-01
395	318514749700	0.0448687	0.26	02-13-10-01
396	318527270650	0.0639239	0.26	02-13-10-01
397	318527866325	0.088284359	0.26	02-13-10-01
398	318528109000	0.071620565	0.26	02-13-10-01
399	318531895100	0.065203538	0.26	02-13-10-01
400	318534200800	0.019403355	0.26	02-13-10-01
401	318590002263	0.060286779	0.26	02-13-10-01
402	318590092783	0.084255553	0.26	02-13-10-01
403	318890064806	0.232656253	0.26	02-13-10-01
404	320018378050	0.032097536	0.26	02-13-10-01
405	320028863150	0.056138595	0.26	02-13-10-01
406	321728165200	0.075851921	0.26	02-13-10-01
407	325001619800	0.041006595	0.26	02-13-10-01
408	325012898500	0.090277665	0.26	02-13-10-01
409	326928991895	0.072764485	0.26	02-13-10-01
410	329502266600	0.122305589	0.26	02-13-09-02
411	329508005900	0.02186701	0.26	02-13-09-02
412	329522201305	0.164696306	0.26	02-13-09-02
413	329525542000	0.091258801	0.26	02-13-09-02
414	329532010000	0.080079874	0.26	02-13-09-02
415	335012476800	0.22834924	0.26	02-13-10-01
416	335019971700	0.131918154	0.26	02-13-10-01
417	335025794450	0.147324246	0.26	02-13-10-01
418	335027829400	0.188119373	0.26	02-13-10-01
419	335028076015	0.124110983	0.26	02-13-10-01
420	336233231603	0.047228382	0.26	02-13-09-03
421	336403146100	0.231227314	0.26	02-13-10-02
422	338503466510	0.034334322	0.26	02-13-09-02
423	338518261300	0.075837071	0.26	02-13-09-02

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OBJECTID	ACCOUNT_NO	IMP_ACREAGE	IMP_CONTROLLED	WATERSHED_CODE
424	338520630350	0.128636987	0.26	02-13-09-02
425	338524449780	0.072611938	0.26	02-13-09-02
426	338524707200	0.017739322	0.26	02-13-09-02
427	338526557705	0.090961903	0.26	02-13-09-02
428	338526558150	0.080811133	0.26	02-13-09-02
429	339090080012	0.103434727	0.26	02-13-10-01
430	342819854300	0.084929114	0.26	02-13-10-02
431	343314723800	0.15524351	0.26	02-13-10-02
432	343326693005	0.102460551	0.26	02-13-10-02
433	344423364260	0.0518497	0.26	02-13-10-02
434	344802732801	0.090927493	0.26	02-13-10-01
435	344821639800	0.089988287	0.26	02-13-10-01
436	344825946800	0.070026007	0.26	02-13-10-01
437	346000396500	0.051756226	0.26	02-13-10-01
438	346008493252	0.051282559	0.26	02-13-10-01
439	346009029930	0.051990829	0.26	02-13-10-01
440	346013521900	0.219752011	0.26	02-13-10-01
441	346019674925	0.07352705	0.26	02-13-10-01
442	346022631150	0.054651945	0.26	02-13-10-01
443	346026074352	0.051102537	0.26	02-13-10-01
444	346027957900	0.042835638	0.26	02-13-10-01
445	346090085420	0.067710667	0.26	02-13-10-01
447	349708866200	0.075790568	0.26	02-13-09-03
448	349721323400	0.043497804	0.26	02-13-09-03
449	349732962900	0.074216961	0.26	02-13-09-03
450	350300848400	0.064925754	0.26	02-13-10-01
451	350301835275	0.094278588	0.26	02-13-10-01
452	350306128353	0.070228264	0.26	02-13-10-01
453	350309021600	0.036763188	0.26	02-13-10-01
454	350310529050	0.06930354	0.26	02-13-10-01
455	350311622803	0.112734608	0.26	02-13-10-01
456	350314639815	0.050659339	0.26	02-13-10-01
457	350315925025	0.086934575	0.26	02-13-10-01
458	350317698800	0.075471765	0.26	02-13-10-01
459	350319998150	0.098287462	0.26	02-13-10-01
460	350323472700	0.099021201	0.26	02-13-10-01
461	350328009300	0.101566899	0.26	02-13-10-01
462	350328355400	0.092028144	0.26	02-13-10-01
463	350328737800	0.08741795	0.26	02-13-10-01
464	350329597250	0.053424908	0.26	02-13-10-01
465	350331831900	0.075694236	0.26	02-13-10-01
466	350332732508	0.08091317	0.26	02-13-10-01
467	350333359475	0.056426393	0.26	02-13-10-01
468	350390226516	0.048773613	0.26	02-13-10-01
469	350890061733	0.120284263	0.26	02-13-10-01
470	351690071778	0.109413469	0.26	02-13-10-01

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OBJECTID	ACCOUNT_NO	IMP_ACREAGE	IMP_CONTROLLED	WATERSHED_CODE
471	352132093055	0.078253796	0.26	02-13-10-01
472	352190093683	0.104189027	0.26	02-13-10-01
473	352302408650	0.112248299	0.26	02-13-10-01
474	352302831005	0.106801092	0.26	02-13-10-01
475	352303447030	0.111480676	0.26	02-13-10-01
476	352308223425	0.079245989	0.26	02-13-10-01
477	352308233800	0.090022744	0.26	02-13-10-01
478	352308234300	0.078916841	0.26	02-13-10-01
479	352308438000	0.009579073	0.26	02-13-10-01
480	352313738200	0.040904951	0.26	02-13-10-01
481	352314204850	0.147921523	0.26	02-13-10-01
482	352317823900	0.035835341	0.26	02-13-10-01
483	352328754820	0.055340988	0.26	02-13-10-01
484	352332734200	0.152391285	0.26	02-13-10-01
485	352390221095	0.05675133	0.26	02-13-10-01
486	352990094952	0.099139525	0.26	02-13-10-01
487	354706143200	0.066486072	0.26	02-13-09-03
488	354719563500	0.000153593	0.26	02-13-09-03
489	354733320000	0.052320915	0.26	02-13-09-03
490	354734391200	0.103546394	0.26	02-13-09-03
491	355013717900	0.077409846	0.26	02-13-10-02
492	355226177200	0.097823176	0.26	02-13-10-02
493	359003081163	0.051071157	0.26	02-13-10-01
494	359006136250	0.142179846	0.26	02-13-10-01
495	359011894400	0.173161929	0.26	02-13-10-01
496	359690229175	0.110804244	0.26	02-13-10-01
497	359690229178	0.09654323	0.26	02-13-10-01
499	362014333200	0.068908514	0.26	02-13-10-01
500	363011165700	0.076409534	0.26	02-13-09-03
501	363017353700	0.206261321	0.26	02-13-09-03
502	363090002771	0.062100545	0.26	02-13-09-03
503	363090004598	0.164308221	0.26	02-13-09-03
504	363090020034	0.069652697	0.26	02-13-09-03
505	363090085232	0.055067818	0.26	02-13-09-03
506	363490011938	0.10092436	0.26	02-13-10-01
507	363490039956	0.070174725	0.26	02-13-10-01
508	363490040095	0.039388487	0.26	02-13-10-01
509	363490079760	0.112877533	0.26	02-13-10-01
510	365305002250	0.094918605	0.26	02-13-09-02
511	365312266258	0.138319425	0.26	02-13-09-02
512	365320781600	0.043111161	0.26	02-13-09-02
513	365321115027	0.078115037	0.26	02-13-09-02
514	365323550960	0.107213428	0.26	02-13-09-02
515	365324486650	0.058383938	0.26	02-13-09-02
516	365327869200	0.11849837	0.26	02-13-09-02
517	365328382600	0.064658725	0.26	02-13-09-02

Table 9- Pre February 2014 Septic Systems Upgraded to ENR System

OBJECTID	ACCOUNT_NO	IMP_ACREAGE	IMP_CONTROLLED	WATERSHED_CODE
518	365331706600	0.109848985	0.26	02-13-09-02
519	365390004432	0.151220348	0.26	02-13-09-02
520	365390102312	0.164900774	0.26	02-13-09-02
521	365611432080	0.020820666	0.26	02-13-10-02
522	365623609300	0.073321863	0.26	02-13-10-02
523	365628037900	0.007512819	0.26	02-13-10-02
524	365690052327	0.006399262	0.26	02-13-10-02
525	365710029900	0.055777374	0.26	02-13-10-01
526	365715583300	0.077954121	0.26	02-13-10-01
527	365731665400	0.066151481	0.26	02-13-10-01
528	365901265700	0.082995273	0.26	02-13-09-02
529	365901742300	0.085373569	0.26	02-13-09-02
530	365901818950	0.238513041	0.26	02-13-09-02
531	365902941000	0.065270165	0.26	02-13-09-02
532	365907981400	0.057529292	0.26	02-13-09-02
533	365908464400	0.096321661	0.26	02-13-09-02
534	365915112200	0.144300668	0.26	02-13-09-02
535	365915537262	0.111614383	0.26	02-13-09-02
536	365919364025	0.154044493	0.26	02-13-09-02
537	365927427400	0.177193254	0.26	02-13-09-02
538	365928008400	0.106813571	0.26	02-13-09-02
539	365990036529	0.046756163	0.26	02-13-09-02
540	365990222928	0.08251374	0.26	02-13-09-02
541	366000616500	0.120755885	0.26	02-13-09-03
542	366026483550	0.162658236	0.26	02-13-09-03
543	366114443150	0.079334386	0.26	02-13-10-02
544	366124663500	0.084923275	0.26	02-13-10-02
545	366190019170	0.221778691	0.26	02-13-10-02
546	366190052692	0.074633534	0.26	02-13-10-02
547	366190052693	0.063720415	0.26	02-13-10-02
548	366190052694	0.069418852	0.26	02-13-10-02
549	366190052696	0.074015528	0.26	02-13-10-02
550	366190052699	0.113157672	0.26	02-13-10-02
551	366190052702	0.1352882	0.26	02-13-10-02
552	366190052707	0.076815582	0.26	02-13-10-02
553	366190052711	0.094219927	0.26	02-13-10-02
554	366190052712	0.064039279	0.26	02-13-10-02
555	366190052713	0.073835997	0.26	02-13-10-02
556	366190052714	0.08039145	0.26	02-13-10-02
557	366190052720	0.067476014	0.26	02-13-10-02
558	366190052728	0.076575183	0.26	02-13-10-02
559	366190052731	0.069301424	0.26	02-13-10-02
560	366190052733	0.161379003	0.26	02-13-10-02
561	366190052737	0.077121234	0.26	02-13-10-02
562	367005914404	0.127668037	0.26	02-13-10-02
563	367522532230	0.063363268	0.26	02-13-10-01

Table 9- Pre February 2014 Septic Systems Upgraded to ENR System

OBJECTID	ACCOUNT_NO	IMP_ACREAGE	IMP_CONTROLLED	WATERSHED_CODE
564	367590010081	0.149953374	0.26	02-13-10-01
565	369209195300	0.156682863	0.26	02-13-10-01
566	369216615000	0.208119442	0.26	02-13-10-01
567	369290047645	0.138479077	0.26	02-13-10-01
568	369290060481	0.09873087	0.26	02-13-10-01
569	369403611000	0.039913582	0.26	02-13-09-03
570	369490009410	0.119269476	0.26	02-13-09-03
571	369614303810	0.056070393	0.26	02-13-09-03
572	369620898500	0.049308646	0.26	02-13-09-03
573	369622510600	0.054742309	0.26	02-13-09-03
574	369910758910	0.012138982	0.26	02-13-10-01
575	369925021030	0.105225605	0.26	02-13-10-01
576	369933685100	0.061147701	0.26	02-13-10-01
577	370128912810	0.05723103	0.26	02-13-09-03
578	370190029012	0.052642471	0.26	02-13-09-03
579	371711254600	0.157662857	0.26	02-13-10-02
580	373829062600	0.060107949	0.26	02-13-10-01
581	374090234991	0.001543014	0.26	02-13-09-02
582	374308141500	0.123220644	0.26	02-13-10-01
583	374326101300	0.149706338	0.26	02-13-10-01
584	374690087689	0.085061932	0.26	02-13-10-01
585	374706952600	0.070503339	0.26	02-13-10-02
586	374713591815	0.033591602	0.26	02-13-10-02
587	374713860502	0.055797215	0.26	02-13-10-02
588	374730212920	0.024720308	0.26	02-13-10-02
589	374903182800	0.254359412	0.26	02-13-10-01
590	374903587310	0.096106732	0.26	02-13-10-01
591	374907019900	0.278754447	0.26	02-13-10-01
592	374908881600	0.054301079	0.26	02-13-10-01
593	374912664100	0.0626467	0.26	02-13-10-01
594	374915154800	0.02523452	0.26	02-13-10-01
595	374915766800	0.037458459	0.26	02-13-10-01
596	374916536805	0.091032262	0.26	02-13-10-01
597	374918044900	0.206813097	0.26	02-13-10-01
598	374918120200	0.127422135	0.26	02-13-10-01
599	374918148200	0.120731344	0.26	02-13-10-01
600	374918610178	0.138701183	0.26	02-13-10-01
601	374927099510	0.120684246	0.26	02-13-10-01
602	374934123905	0.195444017	0.26	02-13-10-01
603	375319543100	0.111860754	0.26	02-13-10-01
604	375390011272	0.105713822	0.26	02-13-10-01
605	375390221949	0.048715472	0.26	02-13-10-01
606	375700843900	0.105272146	0.26	02-13-10-01
607	375727262900	0.062408671	0.26	02-13-10-01
608	377390053588	0.097905661	0.26	02-13-10-01
609	377490073685	0.178078576	0.26	02-13-10-01

Table 9- Pre February 2014 Septic Systems Upgraded to ENR System

OBJECTID	ACCOUNT_NO	IMP_ACREAGE	IMP_CONTROLLED	WATERSHED_CODE
610	377690068198	0.158045616	0.26	02-13-09-02
611	386310958100	0.085713347	0.26	02-13-10-01
612	386313708810	0.200339172	0.26	02-13-10-01
613	386390085778	0.075629053	0.26	02-13-10-01
614	388101566600	0.133491721	0.26	02-13-10-01
615	388102683775	0.034360497	0.26	02-13-10-01
616	388105873000	0.053197689	0.26	02-13-10-01
617	388106513505	0.076224745	0.26	02-13-10-01
618	388108320500	0.020532779	0.26	02-13-10-01
619	388114693000	0.129586005	0.26	02-13-10-01
620	388123452350	0.221062632	0.26	02-13-10-01
621	388125431100	0.075729037	0.26	02-13-10-01
622	388126426400	0.053736314	0.26	02-13-10-01
623	388129580500	0.113487154	0.26	02-13-10-01
624	388129898500	0.082275589	0.26	02-13-10-01
625	388132421722	0.033815762	0.26	02-13-10-01
626	388190034580	0.187364825	0.26	02-13-10-01
627	388190040240	0.062087969	0.26	02-13-10-01
628	388190221687	0.089793215	0.26	02-13-10-01
629	388602941401	0.101723582	0.26	02-13-09-03
630	388606931300	0.085333786	0.26	02-13-09-03
631	388608908500	0.091443835	0.26	02-13-09-03
632	388609709252	0.061301133	0.26	02-13-09-03
633	388618425000	0.05069508	0.26	02-13-09-03
634	388619629095	0.086067166	0.26	02-13-09-03
635	388619922051	0.028616069	0.26	02-13-09-03
636	388626456700	0.035184163	0.26	02-13-09-03
637	388631923000	0.069387157	0.26	02-13-09-03
638	388700296800	0.091831284	0.26	02-13-09-02
639	388707076400	0.073897482	0.26	02-13-09-02
640	388716253600	0.092117593	0.26	02-13-09-02
641	388790017382	0.142570435	0.26	02-13-09-02
642	388790036134	0.062220657	0.26	02-13-09-02
643	388790215093	0.171730575	0.26	02-13-09-02
644	388927820120	0.118715852	0.26	02-13-10-01
645	389625047406	0.068721723	0.26	02-13-09-03
646	390414428400	3.33821E-05	0.26	02-13-10-02
647	390415111908	0.097031416	0.26	02-13-10-02
648	390417784208	0.118342671	0.26	02-13-10-02
649	390423648100	0.069788445	0.26	02-13-10-02
650	390425242000	0.080087632	0.26	02-13-10-02
651	390431589800	0.061031594	0.26	02-13-10-02
652	390606934125	0.034730323	0.26	02-13-09-03
653	390690093849	0.063586419	0.26	02-13-09-03
654	390924369400	0.078359341	0.26	02-13-10-02
655	390924639857	0.129990681	0.26	02-13-10-02

Table 9- Pre February 2014 Septic Systems Upgraded to ENR System

OBJECTID	ACCOUNT_NO	IMP_ACREAGE	IMP_CONTROLLED	WATERSHED_CODE
656	390928367500	0.086202772	0.26	02-13-10-02
657	390932394460	0.013154047	0.26	02-13-10-02
658	391690027256	0.163022262	0.26	02-13-10-01
659	396190039494	0.163390354	0.26	02-13-10-02
661	400000538510	0.025891967	0.26	02-13-10-02
662	400000733616	0.076795059	0.26	02-13-10-02
664	400002427605	0.090720343	0.26	02-13-11-05
665	400003717100	0.109181476	0.26	02-13-10-02
666	400005683103	0.170943246	0.26	02-13-10-02
667	400006460301	0.066335637	0.26	02-13-09-03
670	405103523800	0.108853911	0.26	02-13-09-03
671	405700818600	0.072191271	0.26	02-13-10-02
672	405706042300	0.056530478	0.26	02-13-10-02
673	405790214430	0.062484191	0.26	02-13-10-02
674	416690065147	0.244972608	0.26	02-13-11-05
675	416690065148	0.234892449	0.26	02-13-11-05
676	425004496842	0.045991661	0.26	02-13-10-02
677	425090018777	0.079478892	0.26	02-13-10-02
678	425090049302	0.058225605	0.26	02-13-09-03
679	425090086331	0.061463529	0.26	02-13-10-02
680	432090081572	0.081490472	0.26	02-13-10-02
681	432101025000	0.07044601	0.26	02-13-10-02
682	432102072110	0.150147536	0.26	02-13-10-02
683	432102588600	0.066360991	0.26	02-13-10-02
684	432104446400	0.094251731	0.26	02-13-10-02
685	432104510400	0.11034849	0.26	02-13-10-02
686	432104922180	0.083606737	0.26	02-13-10-02
687	432106328100	0.120242468	0.26	02-13-11-05
688	432190217432	0.141428359	0.26	02-13-10-02
689	432204127205	0.044444331	0.26	02-13-10-02
690	441190224471	0.003130642	0.26	02-13-10-02
691	444403570000	0.1547305	0.26	02-13-09-06
692	457003723000	0.05810336	0.26	02-13-10-02
693	457090230518	0.077635762	0.26	02-13-10-02
694	474602587700	0.087595421	0.26	02-13-10-02
695	480203052612	0.099629016	0.26	02-13-10-03
696	480204537910	0.091479793	0.26	02-13-10-03
697	481490054585	0.189858406	0.26	02-13-10-02
698	500090059134	0.501417174	0.26	02-13-09-03
699	532309031175	0.03496957	0.26	02-13-09-03
700	700000478800	0.116752464	0.26	02-13-10-05
701	700001748100	0.293606191	0.26	02-13-10-04
702	700002414200	0.104140801	0.26	02-13-10-05
703	700002503200	0.587339131	0.26	02-13-10-04
704	700003136015	0.389580772	0.26	02-13-10-04
705	700003248800	0.218295602	0.26	02-13-10-05

Table 9- Pre February 2014 Septic Systems Upgraded to ENR System

OBJECTID	ACCOUNT_NO	IMP_ACREAGE	IMP_CONTROLLED	WATERSHED_CODE
706	700004583600	0.272224804	0.26	02-13-10-05
707	700004707723	0.12981955	0.26	02-13-10-05
708	700090001227	0.551644637	0.26	02-13-10-05
709	715801873200	0.130436978	0.26	02-13-10-05
710	773800837607	0.0924876	0.26	02-13-10-04
711	773801947400	0.137658308	0.26	02-13-10-04
712	800000408820	0.181604072	0.26	02-13-11-02
713	800000492800	0.40100963	0.26	02-13-11-02
714	800001792225	0.266562248	0.26	02-13-10-05
715	800090044713	0.278584265	0.26	02-13-11-01
716	800690023442	0.107221367	0.26	02-13-11-02
717	804190036445	0.323121313	0.26	02-13-11-02
718	826701870800	0.085475058	0.26	02-13-10-05
719	828100152622	0.238710861	0.26	02-13-11-02
720	841100992500	0.131768997	0.26	02-13-10-05
721	841100992600	0.228160418	0.26	02-13-10-05
722	841190022257	0.104933065	0.26	02-13-10-05
723	848290058357	0.360164684	0.26	02-13-11-02
724	873590036305	0.319506207	0.26	02-13-11-01
725	874190100760	0.129833106	0.26	02-13-10-05
		Total	**184.6**	

Table 10- Post February 2014 Septic Systems Upgraded to ENR System

OBJECTID	ACCOUNT_NO	IMP_ACREAGE	IMP_CONTROLLED	WATERSHED_CODE
23	100090217465	0.074606753	0.26	02-13-10-05
29	116500231213	0.002771775	0.26	02-13-10-03
33	124004665000	0.01272428	0.26	02-13-10-03
62	200090054474	0.011189923	0.26	02-13-10-03
141	241312242963	0.042978863	0.26	02-13-10-02
184	260801169000	0.036533596	0.26	02-13-10-02
265	300019847260	0.009509335	0.26	02-13-10-02
297	300090234941	0.004571516	0.26	02-13-10-01
298	300090239177	0.042610929	0.26	02-13-09-02
446	347590229192	0.027542274	0.26	02-13-09-02
498	359690229179	0.008380667	0.26	02-13-10-01
660	400000092300	0.066191977	0.26	02-13-11-05
663	400001986815	0.310214131	0.26	02-13-10-02
668	400090238012	0.310214131	0.26	02-13-10-02
669	400090238014	0.310214131	0.26	02-13-10-02
		Total	**3.9**	

Appendix A

GIS Layers (Geodatabase)

Appendix B

Field Survey of Rural Zones in Anne Arundel County Documenting Type and Extent of Environmental Site Design (ESD) Practices

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BACKGROUND

Anne Arundel County's Annual Municipal Separate Storm Sewer System (MS4) report, submitted in February 2015, included a detailed GIS analysis to support the case for removing a significant portion of the County's rurally zoned areas from its impervious surface baseline, asserting that those areas were treated according to acceptable, non-structural practices outlined in the 2000 Maryland Stormwater Design Manual (Manual). In correspondence received from MDE in March 2015, there was a request to conduct a representative field survey of the area being claimed as having nonstructural or micro-scale environmental site design (ESD) practices.

PURPOSE

This purpose of this report is to document and verify the portion of impervious surfaces within the rural areas of County's MS4 jurisdiction that is treated to the MEP and submit this impervious area assessment for MDE's review. After MDE approval, this area will be counted as managed impervious area, and will be subtracted from the baseline that is used to calculate 20% restoration required.

To document the above, Anne Arundel County (County) has conducted a systematic review (e.g., tiered analysis), including field survey of the representative areas, to show that the impervious areas are considered to be treated per the criteria in Table 1 below.

Table 1 - Rural Impervious Area and Water Quality Treatment

Criteria	Impervious Surface Treated to the MEP
I	Areas that are zoned rural residential with 1 house or less per 3 acres and meets the disconnection or sheetflow to conservation criteria in the Manual
II	Open section roads that meet the disconnection or sheetflow to conservation area criteria in the Manual
III	Open section roads with swales that meet the grass swale criteria in the Manual

Source: Maryland Department of the Environment. (August 2014). Accounting for Stormwater Wasteload Allocations And Impervious Acres Treated, Guidance for National Pollutant Discharge Elimination System Stormwater Permits.

IMPERVIOUS SURFACE AREA ASSESSMENT – RURAL AREAS

Many rural roads and residential subdivisions have open vegetated drainage systems, impervious area disconnections, and sheet flow to conservation areas that filter and infiltrate stormwater runoff.

Runoff may be directed to undisturbed natural areas (e.g., vegetated buffers) or landscaped areas (e.g., lawns, grass channels). Typically, areas that are less than fifteen percent impervious can meet ESD requirements according to the criteria for nonstructural practices in the Manual. These practices include rooftop disconnect, non-rooftop disconnect, and sheet flow to conservation areas.

Below is description of two of the rural zoning categories in the County:

RA - Rural Agricultural -This district is generally intended to preserve agricultural lands and provide for very low-density rural single-family detached residential development at a subdivision density of approximately 1 dwelling unit per 20 acres.

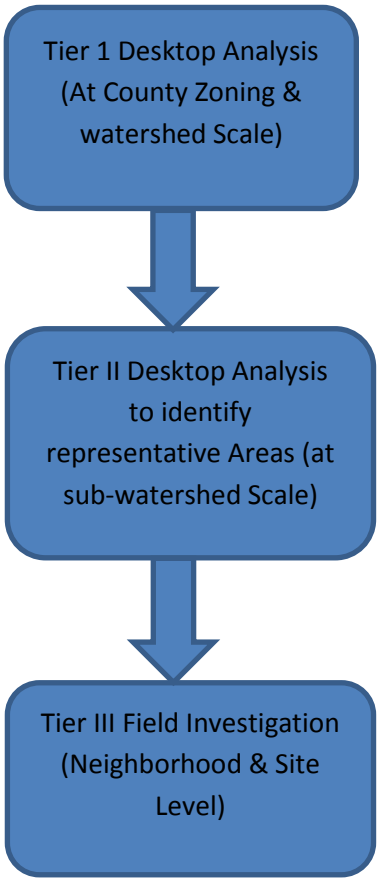
RLD - Residential Low Density - This District is generally intended for low-density rural single-family detached residential development at a subdivision density of 1 dwelling unit per 5 acres.

Based on a Desktop GIS review, RA is approximately 5% impervious and RLD is at approximately 7% impervious overall. See Table 2 below for additional detail:

Table 2- Impervious area Summary (based on Zoning)

Zoning	Impervious Area (in acres)	Total Acreage	Impervious %
RA	3,647	80,099	5%
RLD	1,141	15,821	7%
Total	4,788	95,920	5%

Further analysis is required to document areas that are treated to the MEP within these Zoning areas. To identify and verify the impervious areas that are considered treated to the MEP, the County utilized a tiered analysis. This is further described in Section III of this report.



ASSESSMENT METHODOLGY

TIER 1 DESKTOP ANALYSIS:

As a first step, the County utilized a desktop GIS analysis to identify areas that meet any of the three criteria in Table 1. This required a review of zoning, imperviousness, disconnection, sheetflow, grass swales, and slopes within RA and RLD zoned lands.

Next, the County reviewed for areas that have impervious area disconnection, the practice of directing stormwater runoff (as sheet flow) from built-upon areas to properly-sloped vegetated pervious areas. This analysis was further broken in to two broad categories: Rooftop Disconnections and non-rooftop disconnections (e.g., open section roads). Note that driveway disconnection analysis was not done, as the MDE August 2014 Guidance does not specifically allow impervious area credit for this type of disconnection, even though Manual allows Non-rooftop disconnection to driveways. (Reference: Chapter 5.4.2 N-2- Disconnection of Non-Rooftop Runoff Environmental Site Design, Maryland Stormwater Design Manual, Volumes I and II (October 2000, Revised May 2009).

Rooftop Disconnection:

Rooftop disconnection involves directing flow from downspouts onto vegetated areas where it can soak into or filter over the ground. Disconnection Flow Path Length (ft.) should be a minimum of 75-ft (Manual). This disconnects the rooftop from the storm drain system and reduces both runoff volume and pollutants delivered to receiving waters.

A GIS desktop analysis was done to identify residential subdivisions and agricultural areas that have open vegetated drainage systems, impervious area disconnections, and sheet flow to conservation areas that filter and infiltrate stormwater runoff.

In this analysis, zoning designation was used to help select areas that have impervious area disconnects, by comparing the County's building rooftop GIS layer against its RA and RLD zoning areas. Eligible rooftops within these zoning classifications were then further refined by selecting rooftops on residential parcels greater than 3 acres.

As a result of this analysis, 14,070 rooftops with a disconnected area of **499 acres** were identified. A breakdown of these areas by watershed can be found in Table 3 below.

Non-Rooftop Disconnection:

Non-rooftop disconnection involves directing flow from impervious surfaces onto vegetated areas where it can soak into or filter over the ground. Disconnection Flow Path Length (ft.) should be a minimum of 75-ft. This disconnects these surfaces from the storm drain system, reducing both

runoff volume and pollutants delivered to receiving waters. Non-rooftop disconnection is commonly applied to smaller or narrower impervious areas like open section roads, parking lots, and driveways.

Open section roads are characterized as roads that do not have curb and gutters. These areas have been identified by cross referencing the County's functional road classification GIS layer against areas zoned as RA and RLD. Open section roads within these zoning classifications were further refined by removing from the selection roadways drained by the County's closed storm drain system. As a result of this analysis, 393 individual roadway segments with a disconnected area of **211 acres** were identified. A breakdown of these areas by watershed can be found in Table 3 below.

Summary:

In total, 710 acres of potentially disconnected impervious cover were identified as part of the Tier 1 analysis. These areas serve as the starting point for the Tier 2 analysis.

Table 3 – Summary of Impervious area (Tier 1 Analysis)

Watershed	Zoning	Rooftop Acres	Number of Rooftops	Open Section Road Acres
Bodkin Creek	RLD	6	173	0
Herring Bay	RA	38	1188	17
Herring Bay	RLD	0	6	0
Little Patuxent	RA	4	162	4
Little Patuxent	RLD	2	70	1
Lower Patuxent	RA	15	521	6
Magothy River	RLD	3	79	5
Middle Patuxent	RA	120	3854	47
Patapsco Non-Tidal	RLD	1	39	0
Patapsco Tidal	RLD	5	224	5
Rhode River	RA	22	713	10
Severn River	RA	9	297	4
Severn River	RLD	61	1638	32
South River	RA	86	2060	27
South River	RLD	13	275	4
Upper Patuxent	RA	93	2186	36
West River	RA	16	458	10
West River	RLD	4	126	3
		499	**14069**	**211**

TIER 2 DESKTOP ANALYSIS:

The areas identified through the Tier 1 analysis were further investigated using a variety of remote sensing tools (e.g., GIS analysis, high resolution LIDAR , aerial photography, and Google street maps).

The purpose of this analysis was to identify representative areas for field survey visits. The below criteria were used for this analysis:

- Review and group areas that generally have the same basic lot size, road widths, setbacks, and house types.
- Review all lots greater than 3-acres, with 15% or less impervious.
- Review and eliminate cluster development (e.g., mobile homes were removed from further analysis because even though these were often located on parcels of 3-acres or more, the actual impervious area was dense and not conducive to disconnection and sheet flow to vegetated areas).
- Eliminate homes & roadway sections connected to the storm drain system.
- Review the vegetated cover areas.
- Review NRCS HSG Soil group, including only sites within A, B, and C groups. Remove HSG D areas from further analysis.

For open section road analysis, road sections identified were reviewed against the type of vegetated area (e.g., grassed swales, sheet to conservation areas, wooded areas and vegetated filter strips). To help with the field visits, these areas generally are selected to be within the same neighborhood or general vicinity, of the representative rooftop disconnects areas.

At the end of the Tier 2 analysis, 43 acres of rooftops and 7 acres of open section roads were removed from the assessment, as these did not meet the ESD to MEP criteria. The summary of these revised acreage numbers by watershed can be found in Table 4 below.

Table 4 – Summary of Impervious area (Tier 2 Analysis)

Watershed	Zoning	Rooftop Acres	Number of Rooftops	Open Section Road Acres
Bodkin Creek	RLD	6	170	0
Herring Bay	RA	38	1187	10
Herring Bay	RLD	0	6	0
Little Patuxent	RA	4	161	4
Little Patuxent	RLD	2	70	1
Lower Patuxent	RA	15	521	6
Magothy River	RLD	3	76	5
Middle Patuxent	RA	102	3057	47
Patapsco Non-Tidal	RLD	1	39	0
Patapsco Tidal	RLD	5	205	5
Rhode River	RA	22	713	10

Severn River	RA	9	296	4
Severn River	RLD	58	1633	32
South River	RA	81	1894	27
South River	RLD	13	275	4
Upper Patuxent	RA	77	2051	36
West River	RA	16	458	10
West River	RLD	4	126	3
		456	**12938**	**204**

As a result of the Tier 2 analysis, ten representative areas, spread throughout the County were identified for field investigations, the Tier 3 analysis.

REPRESENTATIVE FIELD INVESTIGATIONS (TIER 3):

The Tier 2 analysis identified ten representative areas for field investigation surveys. Three site teams, with 2 members per team, investigated these areas over 2 days.

Table 05: Field Survey Areas by Watershed

Watershed	Rooftop Acres	Open Section Road Acres	Field Survey Sites
Middle Patuxent	102	47	3
South River	94	31	2
Upper Patuxent	77	36	2
Severn River	67	36	2
Herring Bay	38	10	
Rhode River	22	10	1
West River	20	13	1
Lower Patuxent	15	6	
Bodkin Creek	6	0	
Little Patuxent	6	5	
Patapsco Tidal	5	5	
Magothy River	3	5	
Patapsco Non-Tidal	1	0	
Total	**456**	**204**	**10**

These areas are shown on Map 19. Cumberstone Road (Area J) area is not shown on this map; this area was selected by crews in the field for Non-Rooftop Assessment.

Herring Bay, Middle Patuxent watersheds, and Lower Patuxent watersheds are in the southern part of the County and are homogenous, in terms of farm areas, development, lot density, and open section roads. The 3 sites surveyed in the Middle Patuxent watershed are representative e of Herring Bay and Lower Patuxent watersheds.

Based on the above the representative site areas are generally representative of the watershed areas.

Field assessment notes, help document for field crews, completed field assessment forms, and associated maps can be found in “Appendix C –Representative Field Survey” section of this report. Field assessment forms have comment/notes & site sketch sections, and these further support & document the representative field surveys.

Terms Defined:

Representative Areas: These areas were identified from the Tier 2 analysis for field investigations and are representative of the watershed & sub-watersheds as a whole.

Site Areas: The site areas were identified by the field crews as a part of the field investigations based on the overall visual inspection of the representative area. These areas were generally representative of the average conditions for the neighborhood as a whole. There were 16 sites in total.

Field forms were filled out for the site areas, as these capture the average representative site area condition. The term neighborhood was used on the form and this is synonymous with representative site areas; For example Area F had 3 sites reviewed, as additional sites were needed to document representative conditions of the area; However, Area M only needed one site to document the whole area.

Field Forms and Assessment Criteria:

Field forms for both rooftop and non-rooftop disconnection were developed (see Appendix C) and completed for each site. These forms were filled to capture general neighborhood characteristics and disconnection on representative lots selected from within the site area.

A field assessment form for each representative site was completed for the following:

1. General site and field investigation information
2. General neighborhood characteristics - basic lot size, road widths, setbacks, and house types.
3. General rooftop conditions in the neighborhood (e.g., pitch, gutters, overhead tree canopy)
4. Visual estimation of the contributing roof area to each roof leader.
5. Sheet flow runoff conveyance in a safe and non-erosive manner through vegetated areas.
6. Estimated length of the flow path from the roof across pervious areas.
7. Site diagram/schematic of the representative site.
8. Comments and notes from the field teams.

After review of the neighborhood, representative lots and open section road sections were selected for survey. These samples represent the average conditions for the neighborhood as a whole. As additional open section roadways were observed near the representative areas, visual and detailed inspections for these roadways were also performed

FIELD ASSESSMENT

County staff reviewed 10 representative areas to assess impervious area disconnection. Within each area, from 1 to 3 discrete sites areas were evaluated and field forms filled out, for a total of sixteen representative sites.

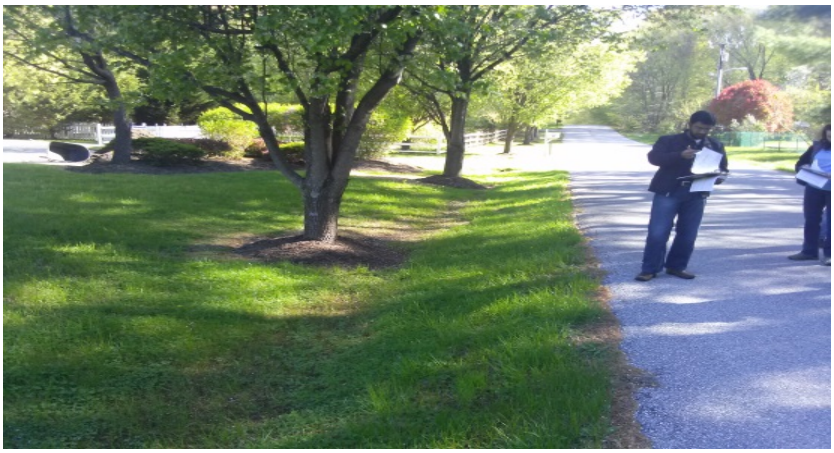
REPRESENTATIVE SITE AREAS

Bell Branch Road (Area A):

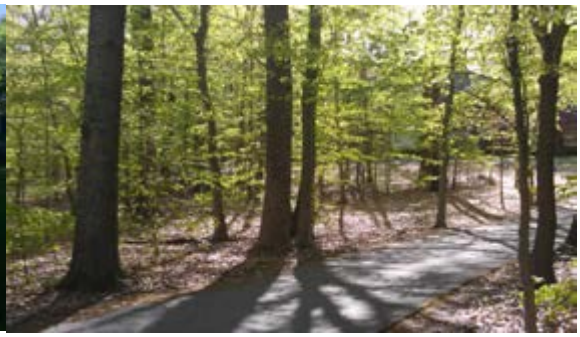
Bell Branch Road (Area A) was assessed for rooftop and nonrooftop disconnects, sheet flow to vegetated areas and open section road swales.

Field assessment forms for both rooftop and Non-rooftop disconnects were completed for this area. The percentage impervious for the parcels ranges from 0.37% to 5.67%, which is representative of the watershed.

ID	Parcel Area	Imp Area	% Imp
0	17.98	0.24	1.34
1	5.92	0.34	5.67
2	11.72	0.04	0.37
3	9.26	0.11	1.18
4	13.79	0.08	0.55



Representative swale section. Note that even though gravel verge was not noticed at the edge of the pavement, no erosion, or sediment deposit, was noted from the road pavement to the swale. The edge was covered with thick grass with some pine needles.

Representative vegetated area (for sheet flow from impervious disconnects); Even though some of the downspouts discharge on driveways, these sheet flow into the wooded area on the parcels. The neighborhood has 75% wooded areas and 25% turf lawn as vegetated areas**.**

This house did not have any downspouts. As evidenced from the photo, the driveway area sheet flows into the adjacent wooded area.

Overall neighborhood, showing the road and the vegetated areas.

Summary of Area A:

The entire neighborhood is about 2% impervious, and has impervious disconnection and runoff conveyance via vegetated areas occurring to the MEP.

Based on the visual inspection of the area, field visits, and walk through of the neighborhood, this area meets the impervious disconnection to the MEP. Note that some areas of the road section are not served by a swale conveyance, and in these cases, the road runoff sheet flows to grassed filter strip and wooded areas.

St. Stephens Church Road (Area B)

St. Stephens Church Road (Area B) was assessed for rooftop and nonrooftop disconnects, sheet flow to vegetated areas and open section road swales.

Field assessment forms were completed for this area. The percentage of impervious for the parcels ranged from 2.8% to 8.5%, which is representative of the watershed.

ID	Parcel Area	Imp Area	% Imp
0	7.69	0.21	2.79
1	6.51	0.29	4.39
2	4.79	0.41	8.46
3	3.83	0.30	7.88
4	3.03	0.18	5.96
5	4.94	0.22	4.39
6	6.91	0.20	2.88

Overview of a representative home with rooftop impervious disconnection and vegetated area.

Vegetated swale along the open section road (North to Creek Farm Road)

Vegetated swale along the open section road (South along St. Stephens Road). See field notes and sketch for ridge line and flow in the swales. Note that the swale slope is less than 4%.

Overview of a representative home with rooftop impervious disconnection and vegetated area.

Summary of Area B:

The entire neighborhood is about 5% impervious, and has impervious disconnection and runoff conveyance via vegetated areas occurring to the MEP.

Based on the visual inspection of the area, field visits, and walk through of the neighborhood, this area meets the impervious disconnection to the MEP. Note that some areas of the road section are not served by a swale conveyance, and in these cases, the road runoff sheet flows to grassed filter strip and wooded areas.

Old Herald Harbor Road (Area D)[1]

Old Herald Harbor Road (Area D) was assessed for rooftop and nonrooftop disconnects, sheet flow to vegetated areas, and open section road swales.

Field assessment forms were completed for this area. As confirmed by the field visit, this area can be considered treated to MEP. The percentage impervious for the parcels ranged from 3.0% to 9.4%, which is representative of the watershed.

ID	Parcel Area	Imp Area	% Imp
0	3.19	0.10	2.99
1	4.28	0.06	1.39
2	2.60	0.24	9.39
3	8.37	0.64	7.64
4	5.50	0.27	4.85
5	4.87	0.46	9.41
6	5.58	0.46	8.20
7	5.52	0.28	5.04

Representative Swale – Sheridan Road. Overall the swale slope is mild and is less than 4%.

[1] Site areas are not alphabetically continuous as additional sites found in the field did not meet the zoning, lot size, or impervious area threshold criteria. These did not affect total acreage because these did not meet Tier 1 or Tier criteria either.

Swale Section – flat slopes (milder than 3:1/H:V)

Typical neighborhood home with rooftop disconnection and vegetated area. Sheet flow mostly to lawn areas. The neighborhood has both wooded and turf grass vegetated areas.

Summary of Area D:

The entire neighborhood is about 6% impervious, and has impervious disconnection and runoff conveyance via vegetated areas occurring to the MEP.

Based on the visual inspection of the area, field visits, and walk through of the neighborhood, this area meets the impervious disconnection to the MEP. Note that some areas of the road section are not served by a swale conveyance, and in these cases, the road runoff sheet flows to grassed filter strip and wooded areas.

Bayfields Road (Area F)

Bayfields Road (Area F) was assessed for rooftop and nonrooftop disconnects, sheet flow to vegetated areas and open section road swales.

Field assessment forms were completed for this area. The percentage impervious for the parcels ranged from 2 % to 13.7%, which is representative of the watershed.

ID	Parcel Area	Imp Area	% Imp
0	11.80	0.24	2.02
1	9.39	0.82	8.69
2	6.09	0.39	6.39
3	9.94	0.44	4.38
4	7.96	0.24	3.00
5	7.98	0.47	5.94
6	18.18	0.68	3.72
7	11.37	0.31	2.68
8	8.40	0.41	4.94
9	5.58	0.42	7.46
10	5.68	0.16	2.85
11	6.83	0.59	8.66
12	7.87	0.20	2.50
13	12.89	0.59	4.59
14	10.65	0.70	6.53
16	5.57	0.76	13.70

Flat, wide bottom representative roadside swale- This discharges into a wooded conservation area

Representative roof area and vegetated area conditions. Note that crews could not enter private property due to access and privacy concerns. Aerial photography was utilized to support the overall neighborhood conditions, impervious area, disconnect and vegetated flow conveyance.

Overall condition- showing road area disconnection through swales, and vegetated areas on lots.

Overall road and vegetated area condition

South River Clubhouse Road (Area F3)

South River Clubhouse Road (Area F3) was assessed for non-rooftop disconnects, sheet flow to vegetated areas and open section road swales. This site was identified by crews directly as a part of the neighborhood field assessment.

Road impervious disconnection and sheet flow to vegetated/grassed areas

Road runoff further discharges on to grassed areas and finally to wooded areas

Summary of Area F:

The entire neighborhood is about 6% impervious, and has impervious disconnection and runoff conveyance via vegetated areas occurring to the MEP. Site F3 was selected by crews directly in the field for Non-rooftop assessment.

Based on the visual inspection of the area, field visits, and walk through of the neighborhood, this area meets the impervious disconnection to the MEP. Note that some areas of the road section are not served by a swale conveyance, and in these cases, the road runoff sheet flows to grassed filter strip and wooded areas.

Double Gate Road (Area G)

Double Gate Road (Area G) was assessed for rooftop and nonrooftop disconnects and sheet flow to vegetated areas.

Field assessment forms were completed for this area. The percentage of impervious for the parcels ranged from 3.0 % to 12%, which is representative of the watershed.

ID	Parcel Area	Imp Area	% Imp
0	4.49	0.42	9.27
1	4.49	0.39	8.59
2	4.49	0.53	11.85
3	4.48	0.13	2.98

Representative lawn/vegetated area conditions.

Roadway sheet flow to vegetated filter strip area

Vegetated areas – Sheet flow to turf lawn and wooded areas

Summary of Area:

The entire neighborhood is about 7% impervious, and has impervious disconnection and runoff conveyance via vegetated areas occurring to the MEP.

Based on the visual inspection of the area, field visits, and walk through of the neighborhood, this area meets the impervious disconnection to the MEP. For this, there were no defined swale sections to convey disconnected road runoff; however, as seen from the pictures above and noted on the filed forms, the road runoff sheets flows in to the vegetated areas nest to the roadway.

Dodon Road (Area H)

Double Road (Area H) was assessed for rooftop disconnection sheet flow to vegetated areas.

Field assessment forms were completed for this area. The percentage of impervious for the parcels ranged from 4 % to 8.0%, which is representative of the watershed.

ID	Parcel Area	Imp Area	% Imp
0	11.84	0.49	4.10
1	3.72	0.30	7.95
2	3.83	0.24	6.24
3	8.53	0.40	4.69

Representative lawn/vegetated area conditions.

Overview of a representative home with rooftop impervious disconnection and vegetated area.

Summary of Area:

The entire neighborhood is about 7% impervious, and has impervious disconnection and runoff conveyance via vegetated areas occurring to the MEP.

Based on the visual inspection of the area, field visits, and walk through of the neighborhood, this area meets the impervious disconnection to the MEP.

Cumberstone Road (Area J)

Cumberstone Road (Area J) was assessed for nonrooftop disconnects, sheet flow to vegetated areas and open section road swales. Field assessment forms were completed for this area.

Road discharges in to wooded areas through vegetated filter strip

Summary of Area:

The entire neighborhood impervious disconnection and runoff conveyance via vegetated areas occurring to the MEP.

Based on the visual inspection of the area, field visits, and walk through of the neighborhood, this area meets the impervious disconnection to the MEP. For this, there were no defined swale sections to convey disconnected road runoff; however, as seen from the pictures above and noted on the filed forms, the road runoff sheets flows in to the vegetated areas nest to the roadway.

South Polling House Road (Area K)

South Polling House Road (Area K) was assessed for rooftop and nonrooftop disconnects, sheet flow to vegetated areas, and open section road swales.

Field assessment forms were completed for this area. The percentage impervious for the parcels ranges from 1.3% to 6.5% which is representative of the watershed.

ID	Parcel Area	Imp Area	% Imp
0	4.12	0.19	4.67
1	4.07	0.33	8.19
2	5.17	0.32	6.27
3	7.76	0.14	1.87
4	19.63	0.61	3.13
5	54.68	0.70	1.28
6	5.04	0.14	2.84
7	36.99	1.48	3.99
8	4.86	0.16	3.38

Rooftop disconnection onto vegetated area.

Close-up of the downspout. Note that runoff flows onto vegetated area and then to wooded areas.

Overall conditions of the neighborhood showing the road disconnection to vegetated swales

Rooftop disconnection to lawn areas and to vegetated swales in the roadway

Close-up of the swale

Overall road conditions showing sheet flow to vegetated swale conveyance

Open section road disconnection to vegetated area

Summary of Area K :

The entire neighborhood is about 6% impervious, and has impervious disconnection and runoff conveyance via vegetated areas occurring to the MEP.

Based on the visual inspection of the area, field visits, and walk through of the neighborhood, this area meets the impervious disconnection to the MEP. For some sections of the roadway, there were no defined swale sections to convey disconnected road runoff; however, as seen from the pictures above and noted on the filed forms, the road runoff sheets flows in to the vegetated areas nest to the roadway.

Crandell Road (Area L)

Crandell Road was assessed for rooftop and nonrooftop disconnects, sheet flow to vegetated areas.

Field assessment forms were completed for this area. The percentage impervious for the parcels ranges from 1% to 4% which is representative of the watershed.

ID	Parcel Area	Imp Area	% Imp
0	3.11	0.12	3.76
1	18.43	0.22	1.18
2	9.16	0.44	4.79
3	43.19	0.77	1.78
4	17.81	0.55	3.09
5	25.90	0.69	2.68
6	47.46	1.86	3.93

Rooftop disconnection onto vegetated area

Roadway disconnection onto vegetated areas; the road discharges onto wooded areas downstream

Summary of Area:

The entire neighborhood is about 4% impervious, and has impervious disconnection and runoff conveyance via vegetated areas occurring to the MEP.

Based on the visual inspection of the area, field visits, and walk through of the neighborhood, this area meets the impervious disconnection to the MEP. Note that some areas of the road section may not be served by swale conveyance, and in these cases, the road runoff sheet flows to grassed filter strip and wooded areas. Nonrooftop**33** | Page field form was not filled out for this site, as there were defined swales, and the disconnection for roadway was captured as a part of section 1 of the Rooftop disconnection form.

Greenock Road (Area M)

Greenock Road (Area M) was assessed for rooftop and nonrooftop disconnects, sheet flow to vegetated areas.

Field assessment forms were completed for this area. The percentage impervious for the parcels ranges from 0.4 % to 6.6%, which is representative of the watershed.

ID	Parcel Area	Imp Area	% Imp
0	14.68	0.67	4.55
1	10.19	0.68	6.63
2	13.46	0.46	3.44
3	2.47	0.03	1.04
4	4.27	0.06	1.49
5	27.60	0.23	0.85
6	20.74	0.14	0.67
7	12.69	0.07	0.58
8	10.36	0.09	0.88
9	20.22	0.34	1.68
10	31.52	1.45	4.59
11	44.46	0.18	0.42
12	91.62	2.38	2.59

Field Crews could not take pictures due to traffic and safety conditions. However, field forms have been filled out to capture the neighborhood conditions and the impervious area disconnection and sheet flow to vegetated areas. Please refer to the sketch on the field forms for neighborhood.

Summary of Area:

The entire neighborhood is about 3% impervious, and has impervious disconnection and runoff conveyance via vegetated areas occurring to the MEP.

Based on the visual inspection of the area, field visits, and walk through of the neighborhood, this area meets the impervious disconnection to the MEP. For some sections of the roadway, there were no defined swale sections to convey disconnected road runoff; however, as seen from the pictures above and noted on the filed forms, the road runoff sheets flows in to the vegetated areas next to the roadway.

CONCLUSION

The Tier 3 field analysis, which involved assessing a representative sample of sites narrowed down through desktop analysis, confirmed that 660 acres of existing impervious cover within the rural RA and RLD zones of Anne Arundel County should be counted as treated to the MEP for the purposes of the County's MS4 baseline. Table 6 below, summarizes the refinement process that the County conducted.

Table 6- Summary of Impervious area (Representative Field Survey)

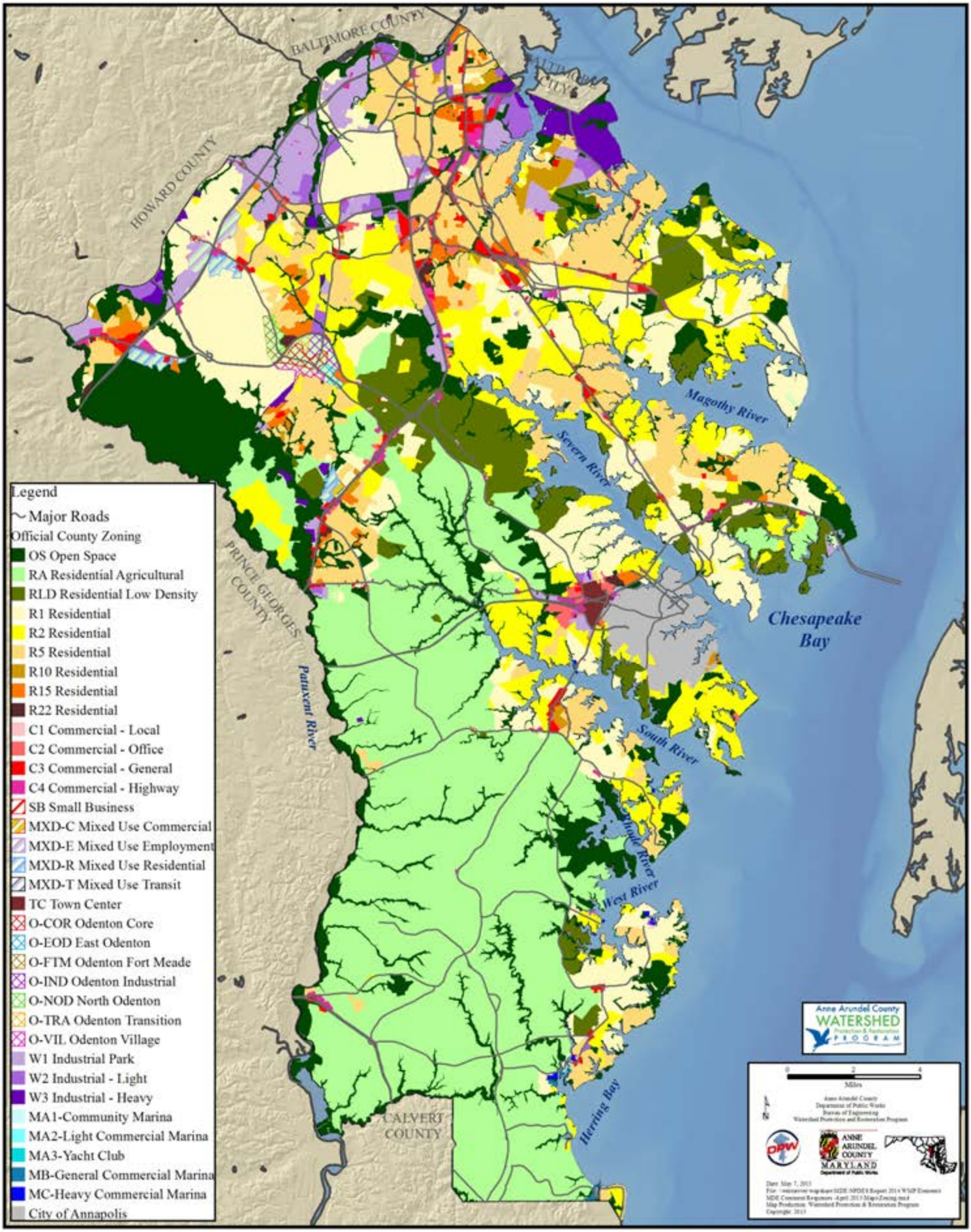
Analysis	Impervious area (in acres)	Notes
RA/RLD Zoning Countywide	4,788	5% impervious overall
Tier 1 Desktop Analysis	710	499 acres for rooftop; 211 non-rooftop/open section roadway
Tier 2 Desktop Analysis	660	456 acres from rooftop; 204 non-rooftop/open section roadway
Representative field Survey	660	Validated acreage from field surveys

REFERENCES

1. Chapter 5. Environmental Site Design, Maryland Stormwater Design Manual, Volumes I and II (October 2000, Revised May 2009.
2. Unified Sub watershed and Site Reconnaissance: A User's Manual Version 2.0, February 2005- Center for Watershed Protection Manual 11.
3. Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated Guidance for National Pollutant Discharge Elimination System Stormwater Permits."- Guidance for NPDES Stormwater Permits, August 2014.

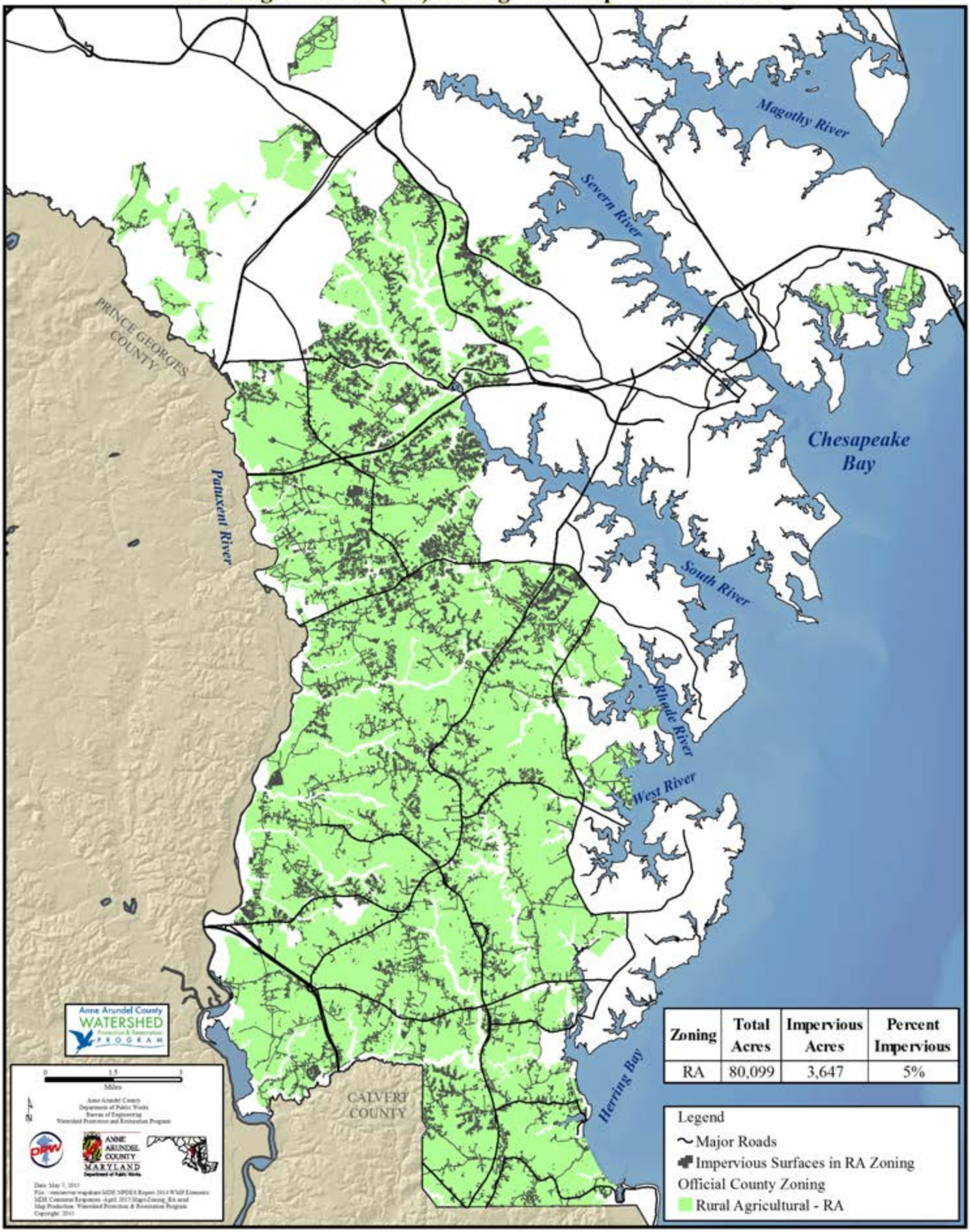
Anne Arundel County - Official Zoning

MAP 3



Anne Arundel County
Rural Agricultural (RA) Zoning with Impervious Surfaces

MAP 4



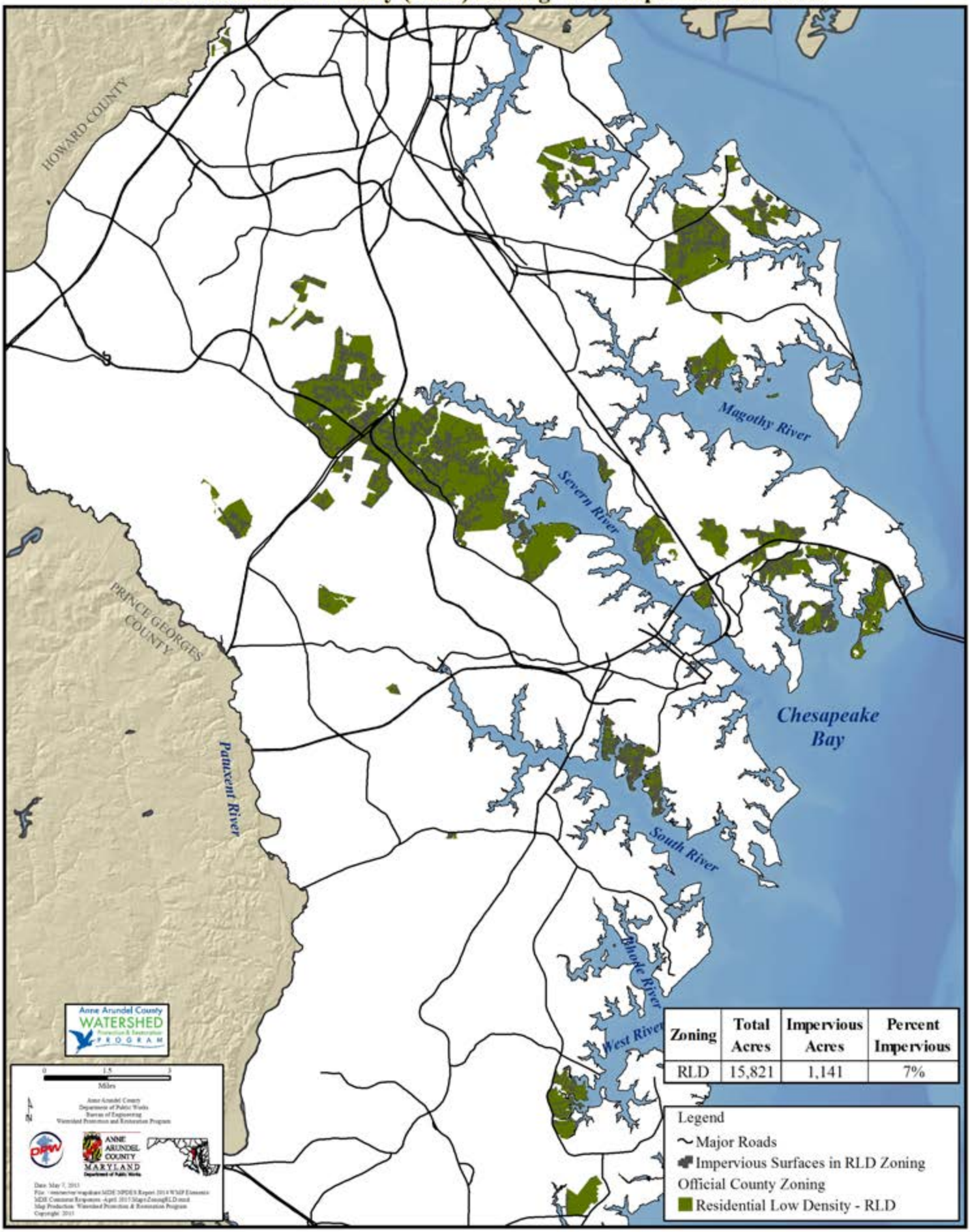
Zoning	Total Acres	Impervious Acres	Percent Impervious
RA	80,099	3,647	5%

Legend
- Major Roads
- Impervious Surfaces in RA Zoning

Official County Zoning
- Rural Agricultural - RA

Anne Arundel County
Residential Low Density (RLD) Zoning with Impervious Surfaces

MAP 5

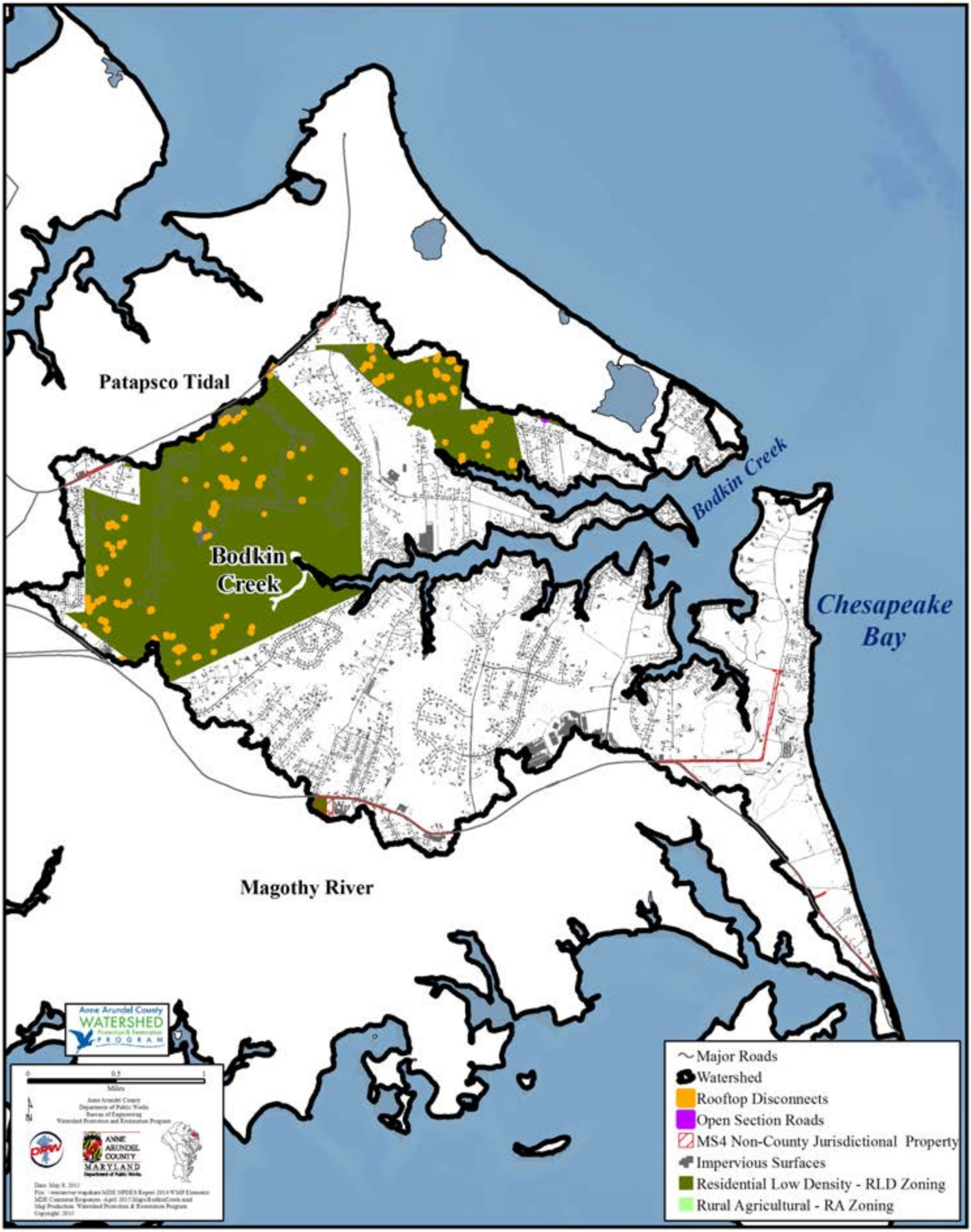


Zoning	Total Acres	Impervious Acres	Percent Impervious
RLD	15,821	1,141	7%

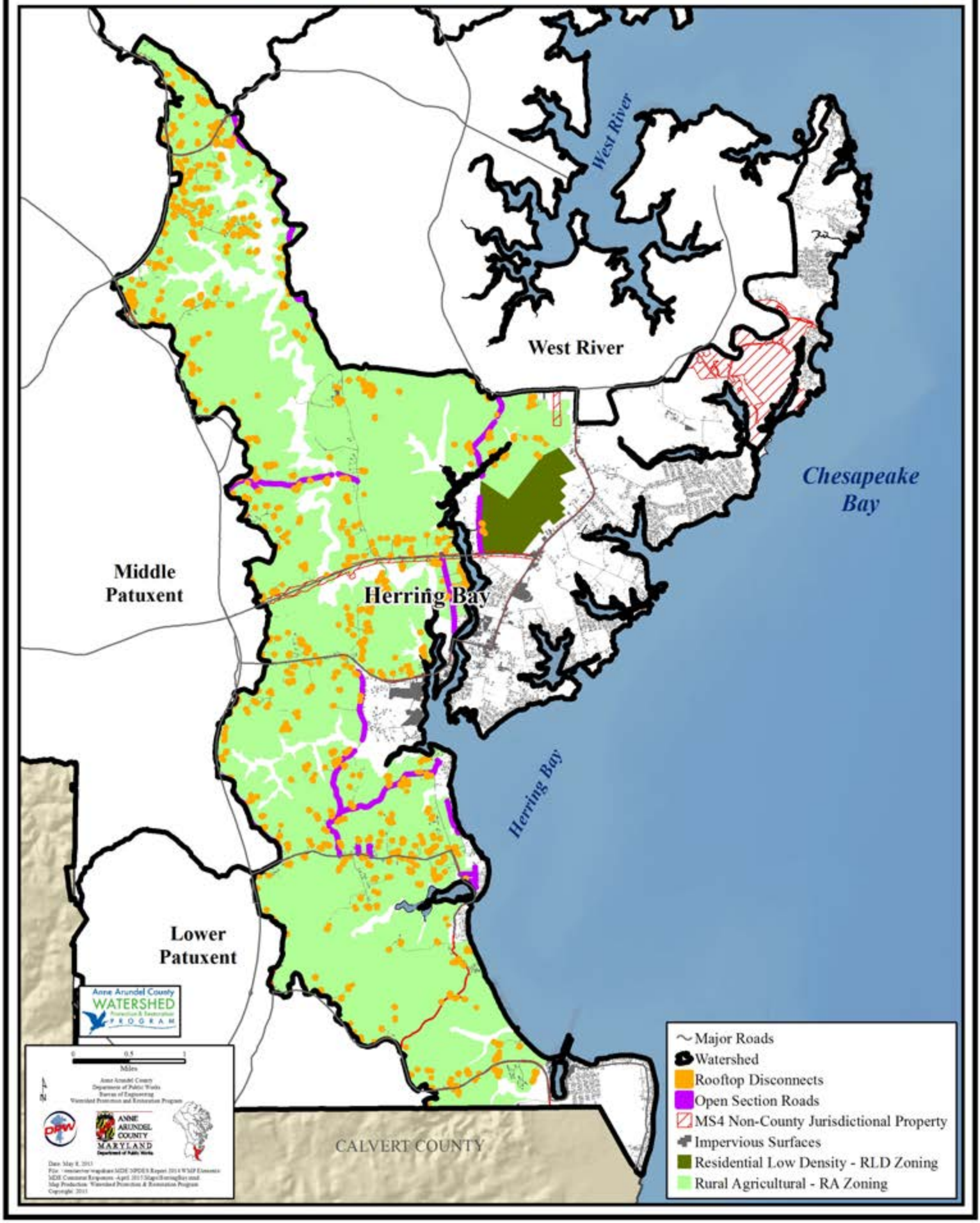
Legend
- Major Roads
- Impervious Surfaces in RLD Zoning

Official County Zoning
- Residential Low Density - RLD

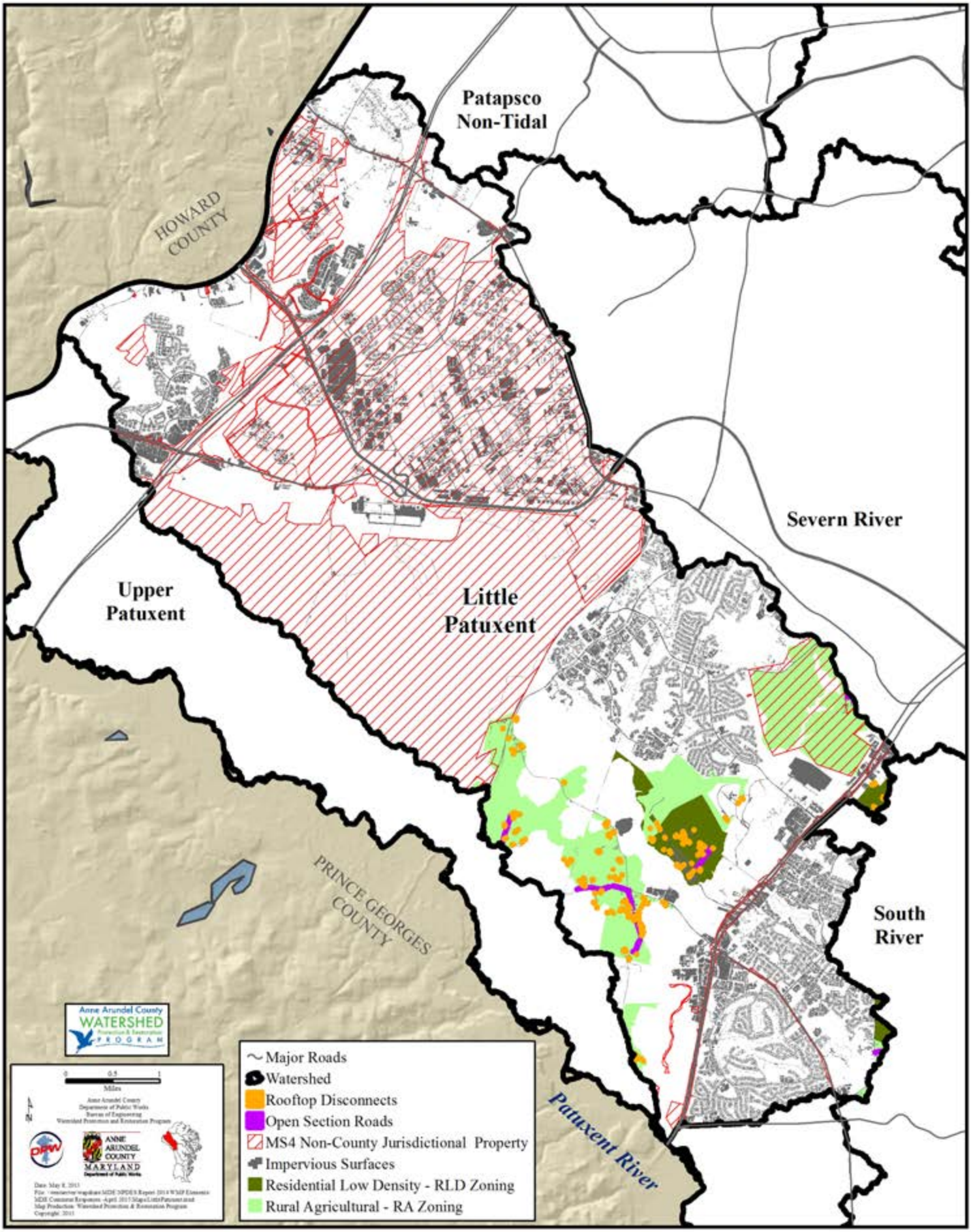
Anne Arundel County - Bodkin Creek Watershed MAP 6



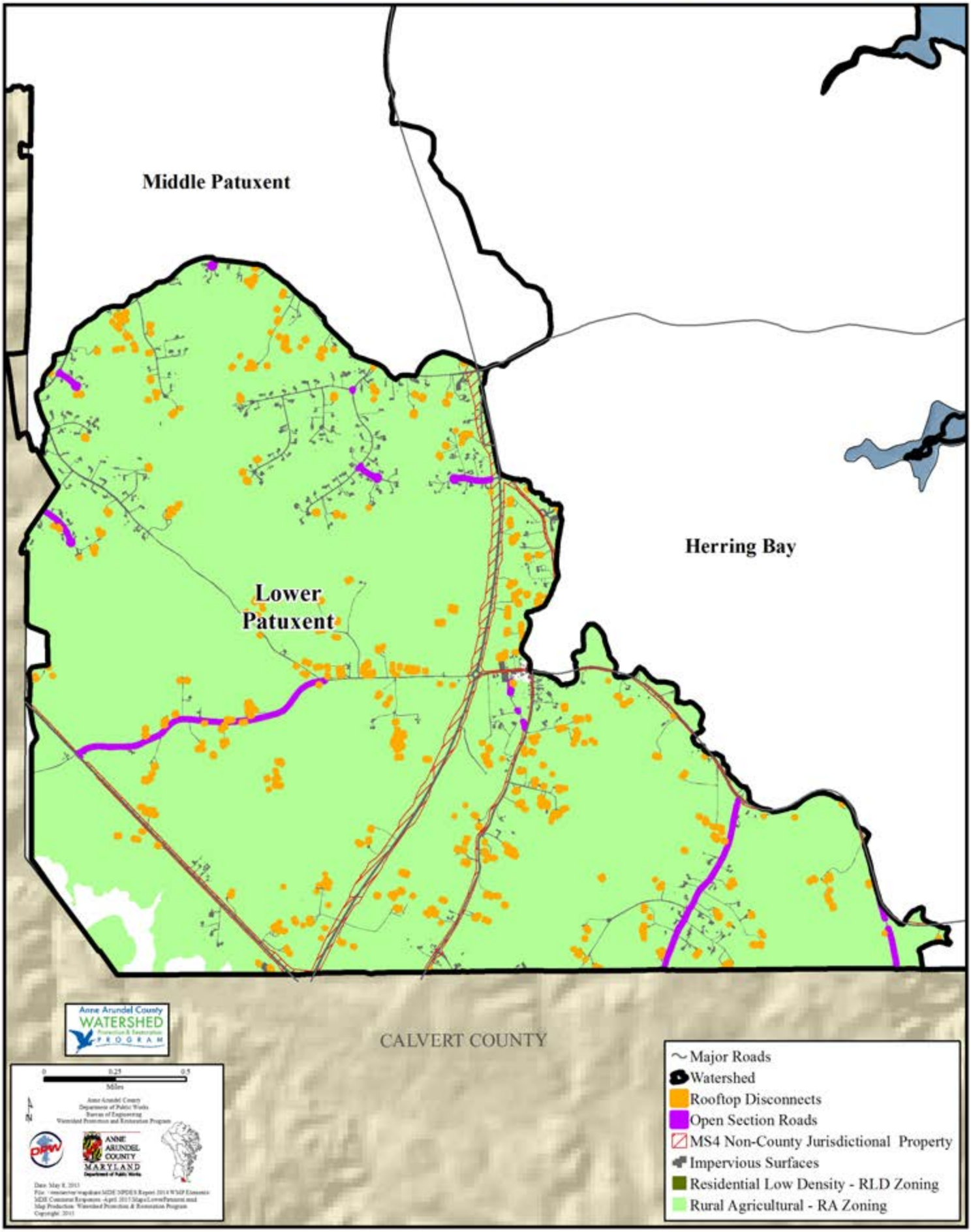
Anne Arundel County - Herring Bay Watershed MAP 7



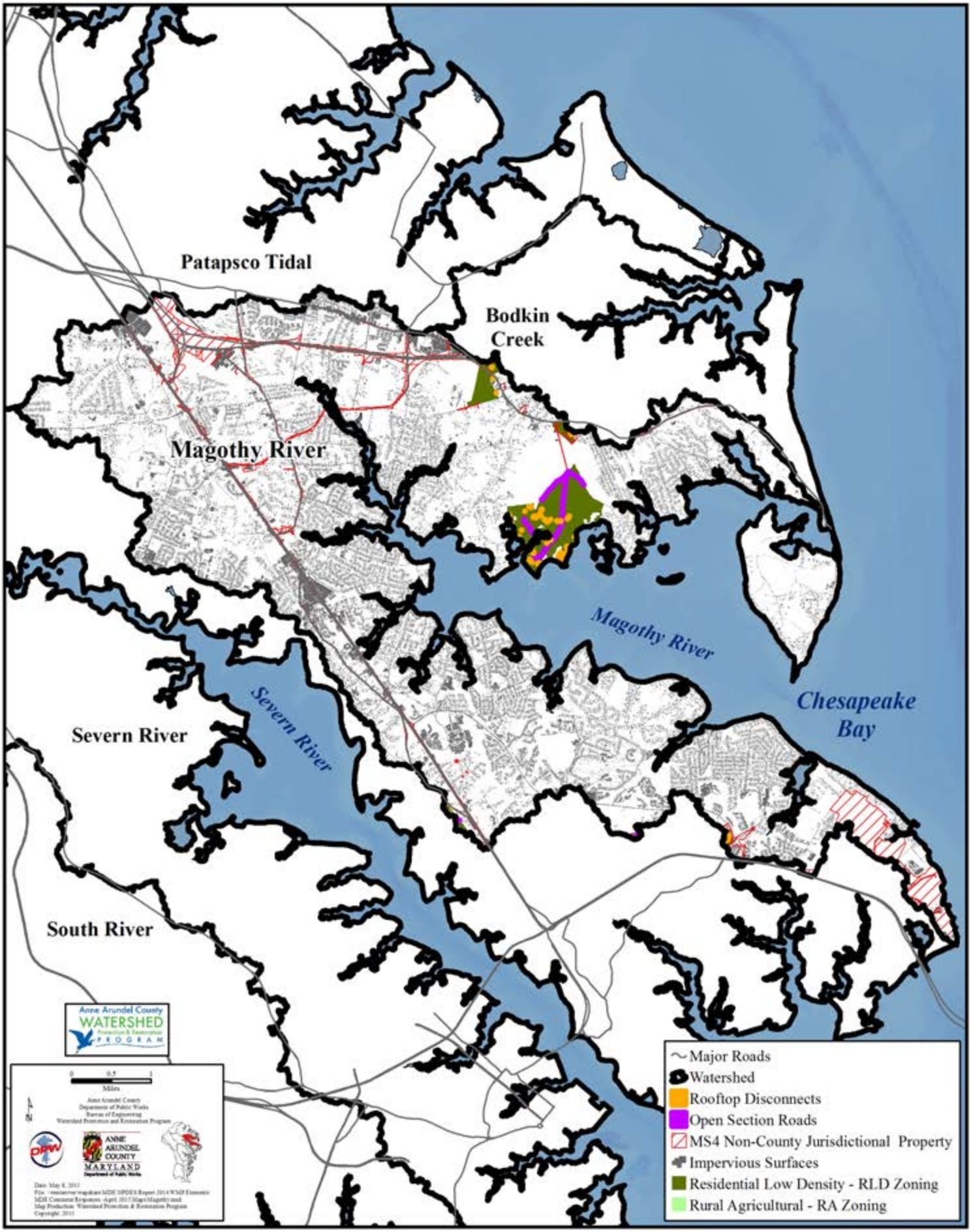
Anne Arundel County - Little Patuxent Watershed MAP 8



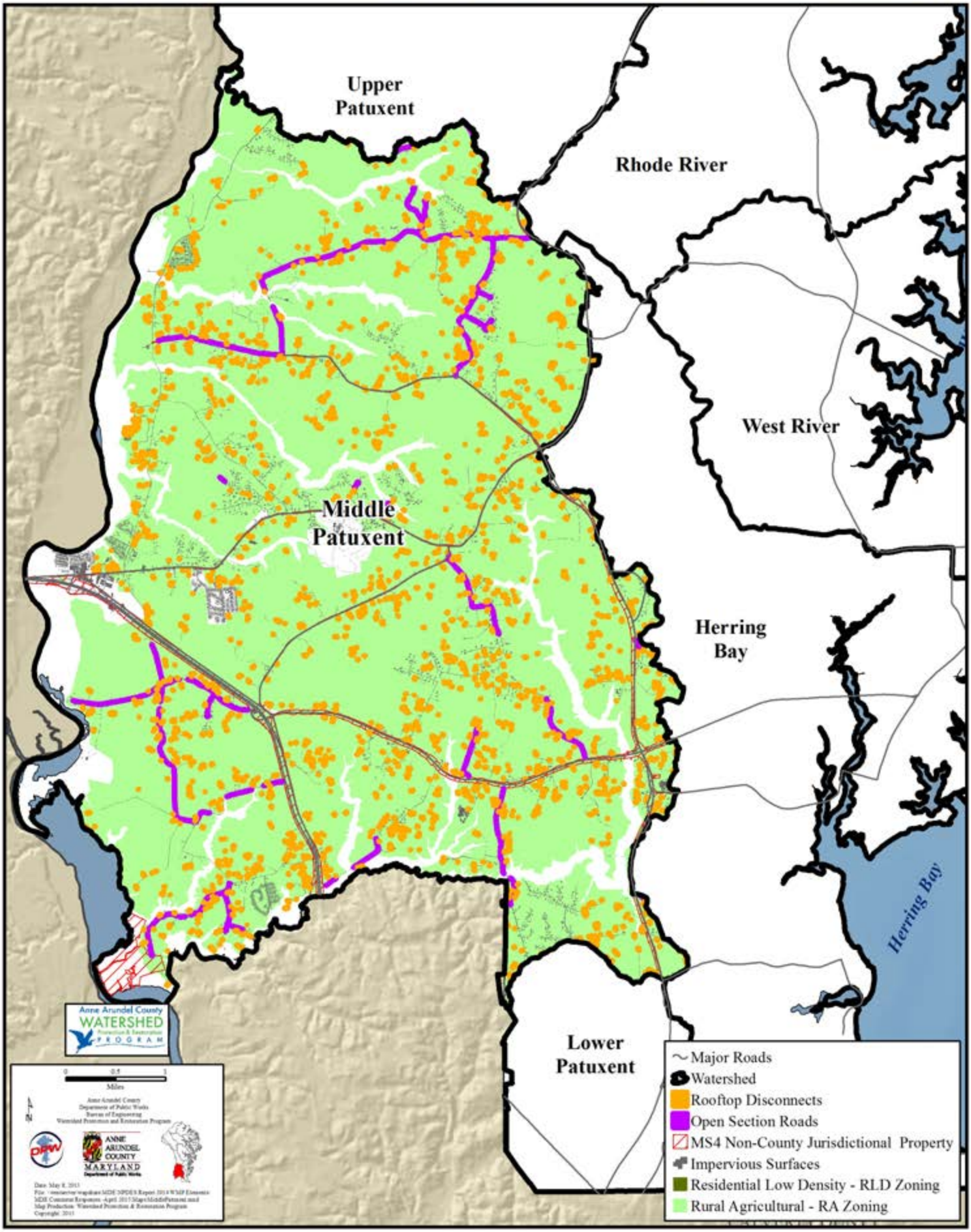
Anne Arundel County - Lower Patuxent Watershed MAP 9



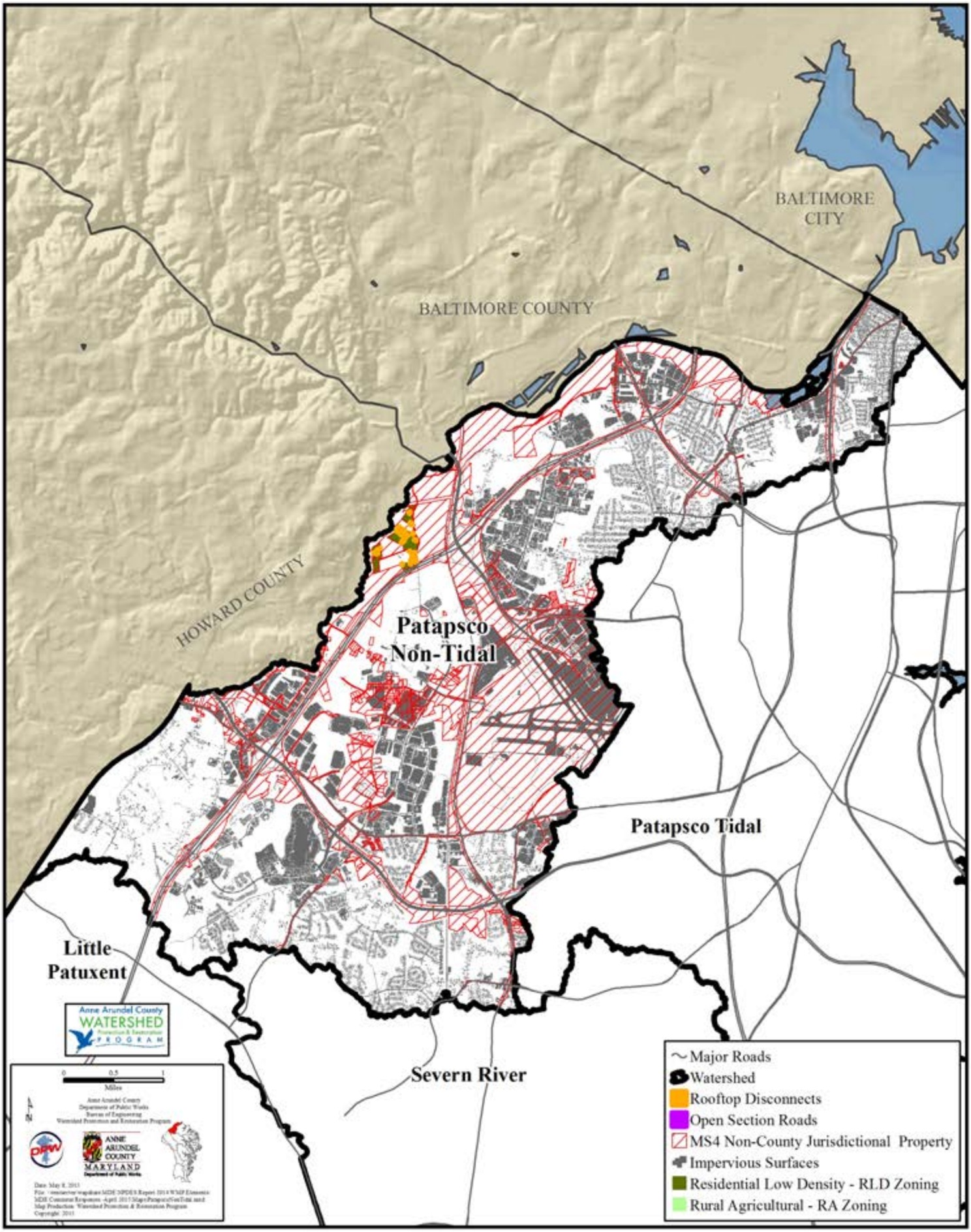
Anne Arundel County - Magothy River Watershed MAP 10



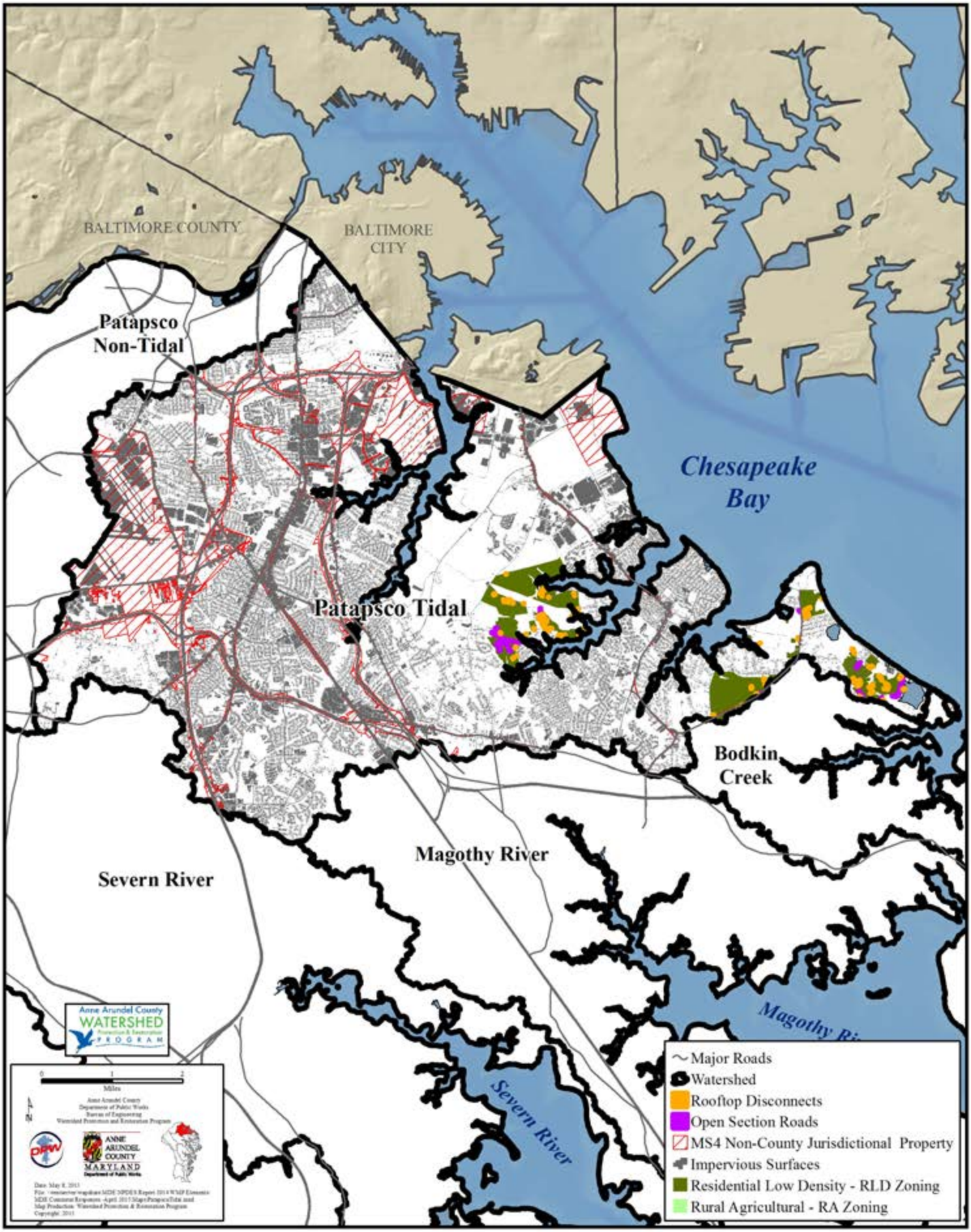
Anne Arundel County - Middle Patuxent Watershed MAP 11



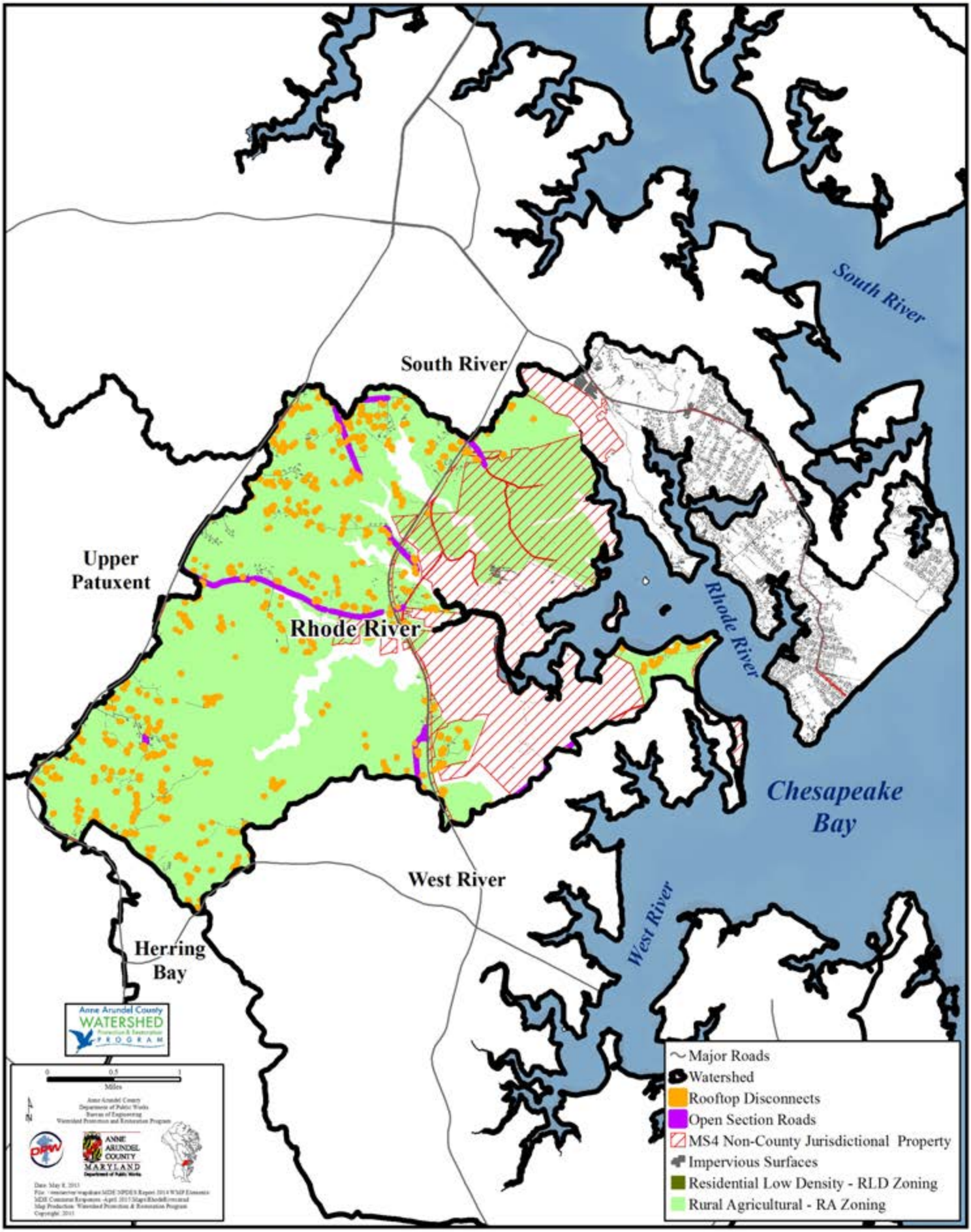
Anne Arundel County - Patapsco Non-Tidal Watershed MAP 12



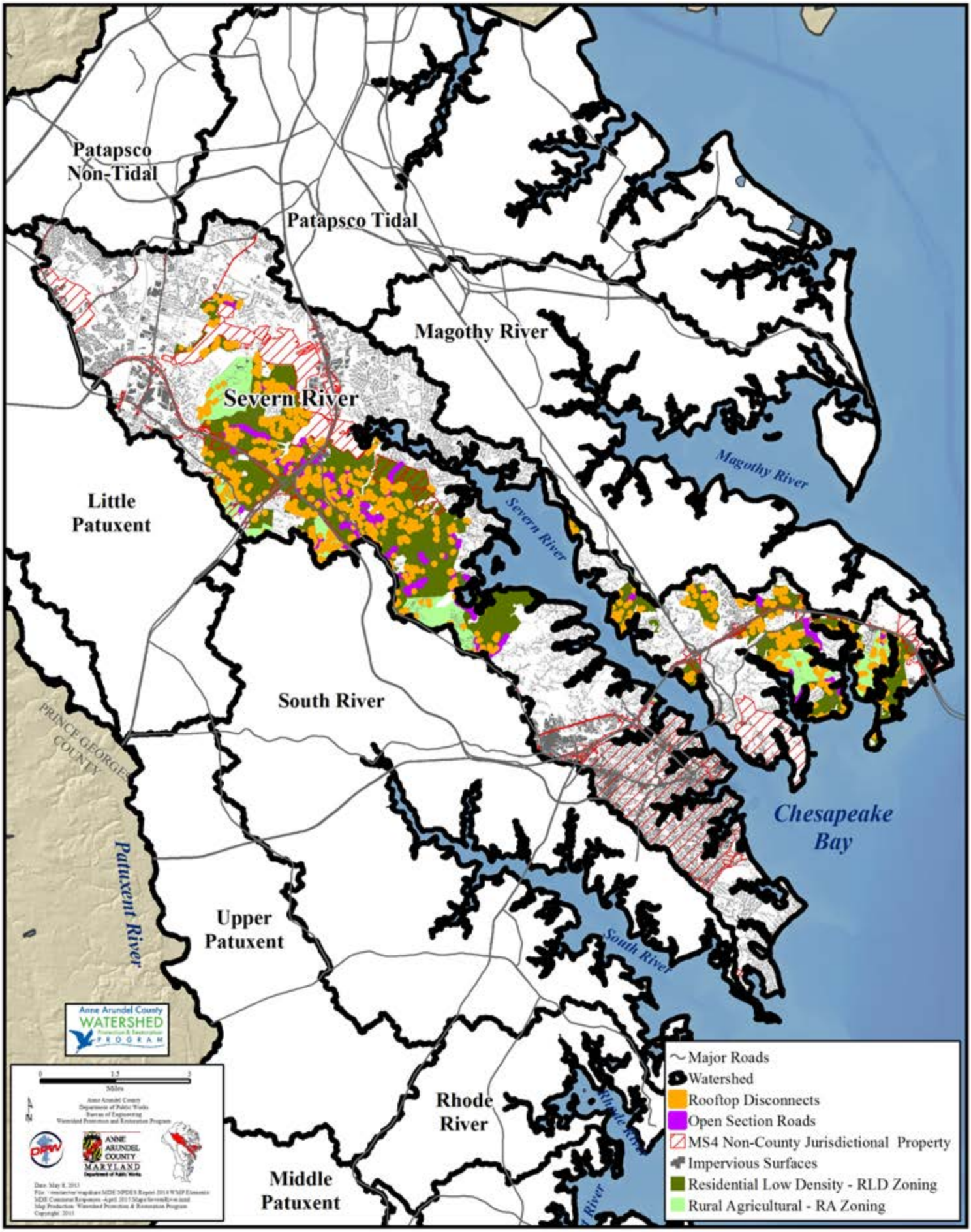
Anne Arundel County - Patapsco Tidal Watershed MAP 13



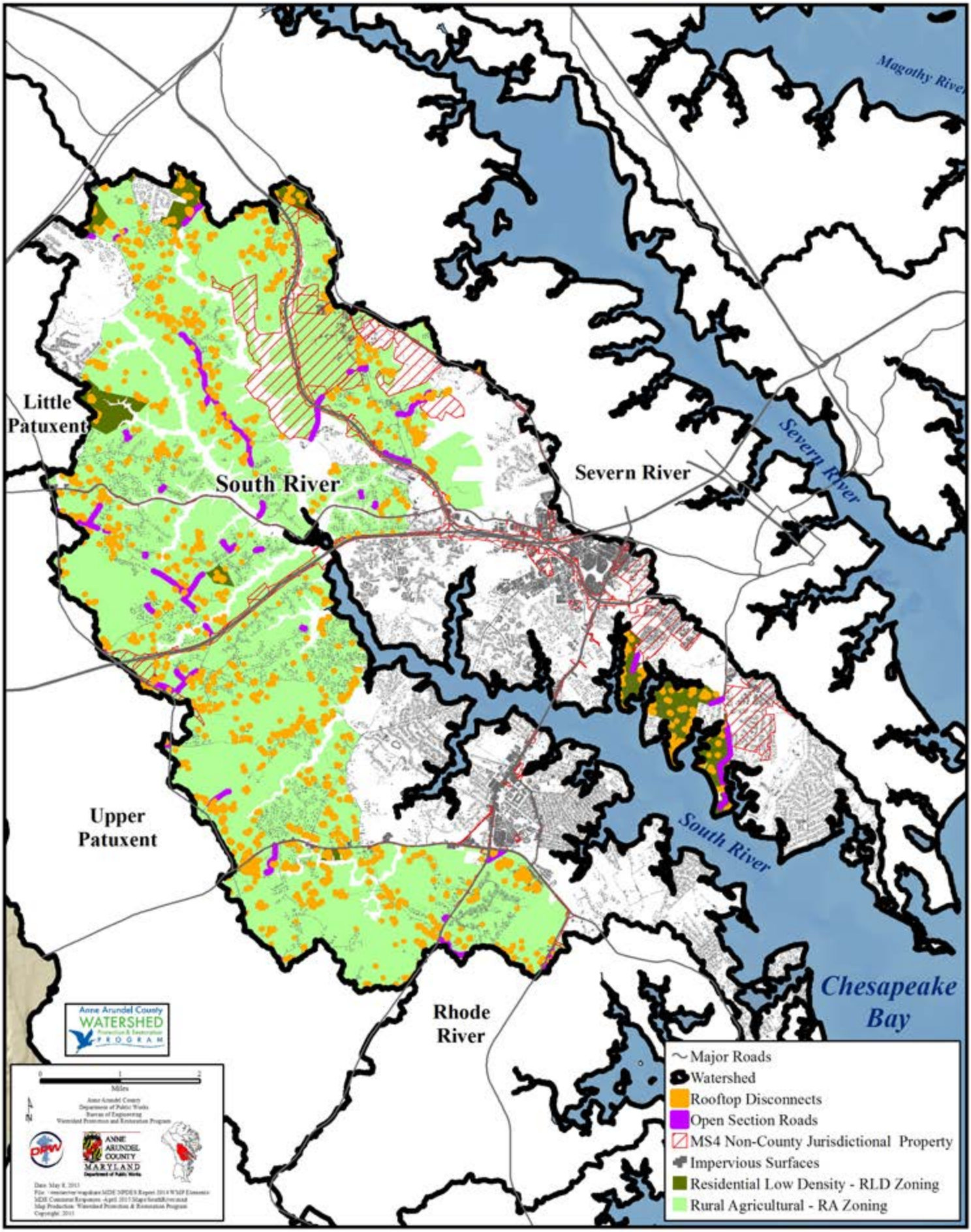
Anne Arundel County - Rhode River Watershed MAP 14



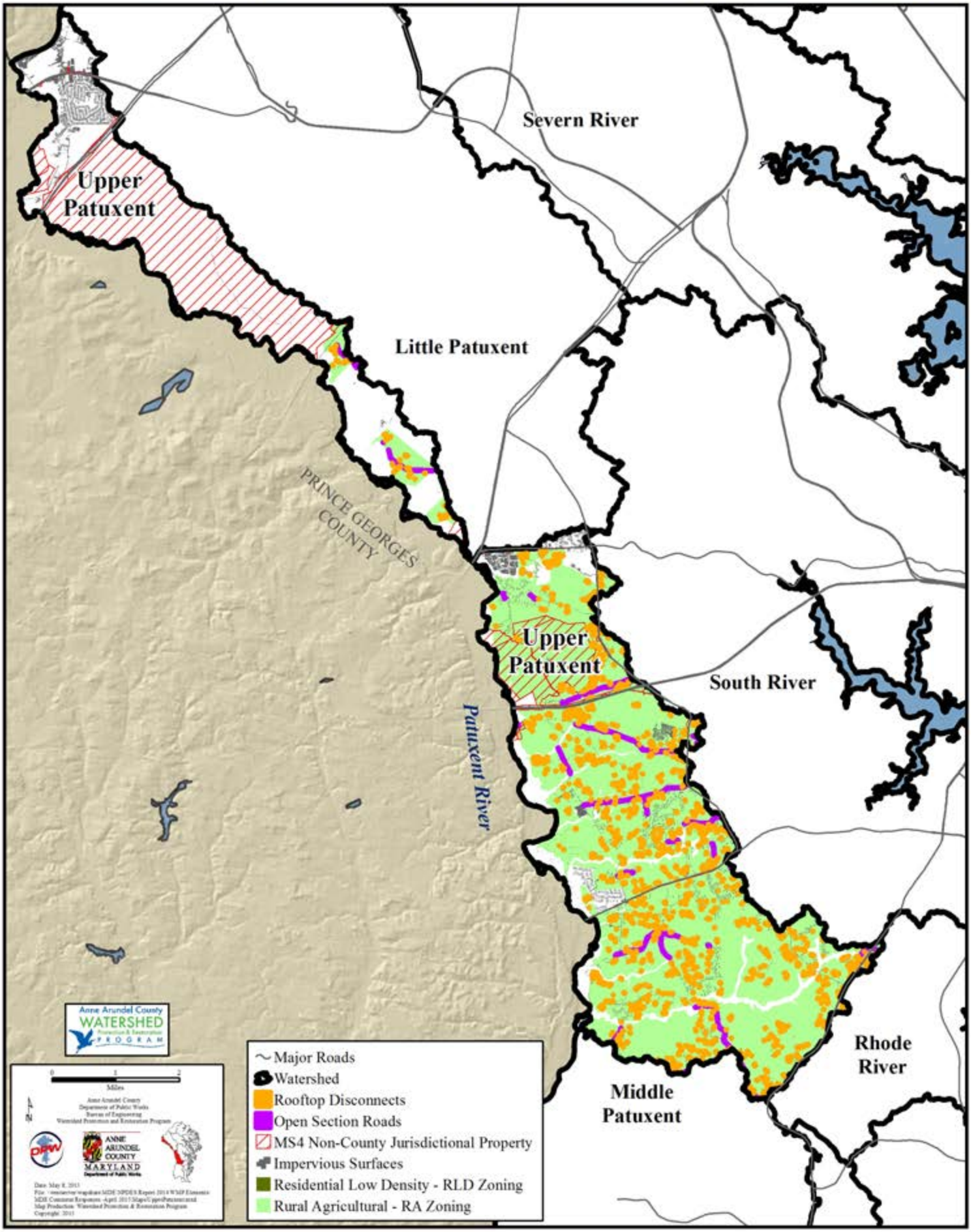
Anne Arundel County - Severn River Watershed MAP 15



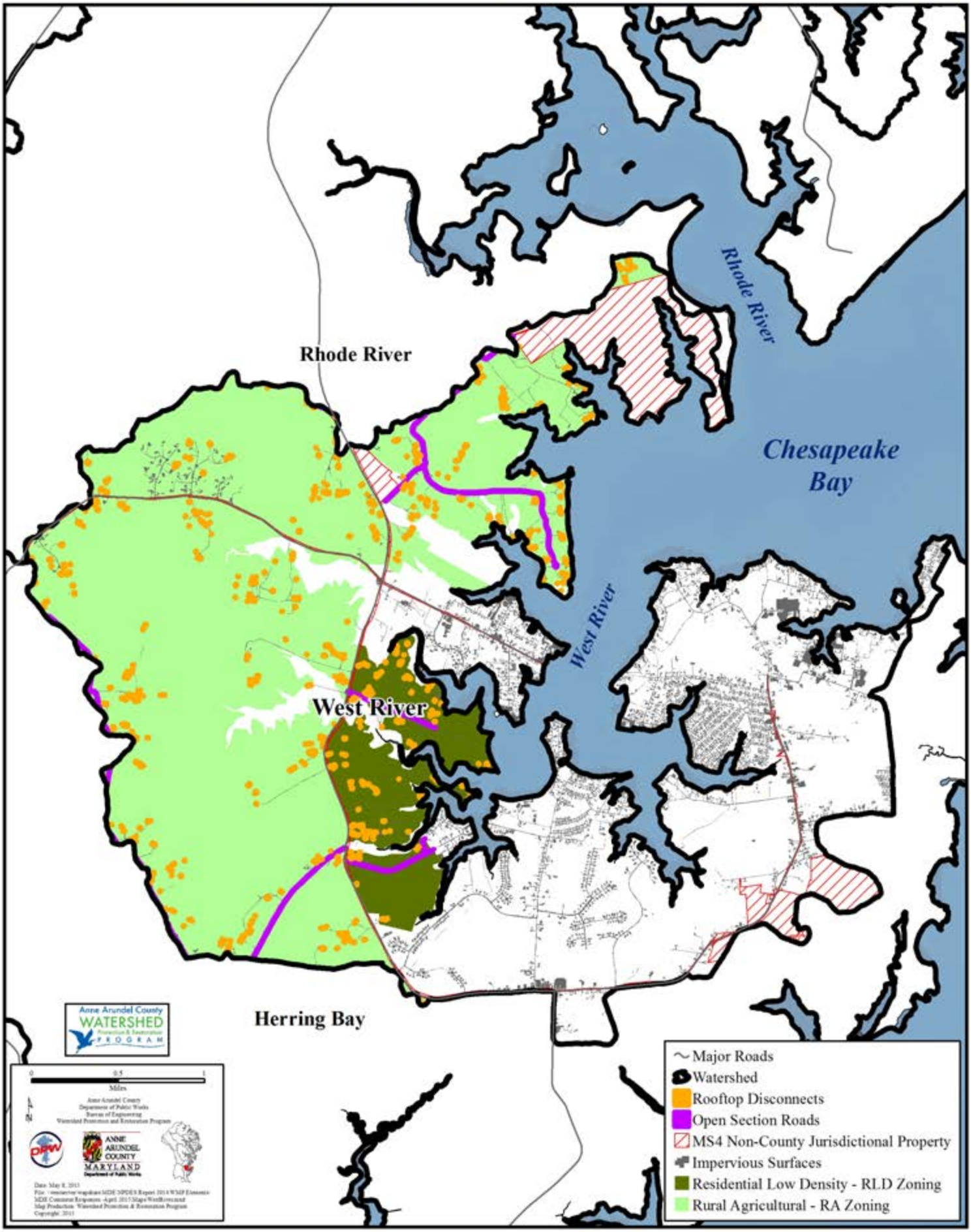
Anne Arundel County - South River Watershed MAP 16



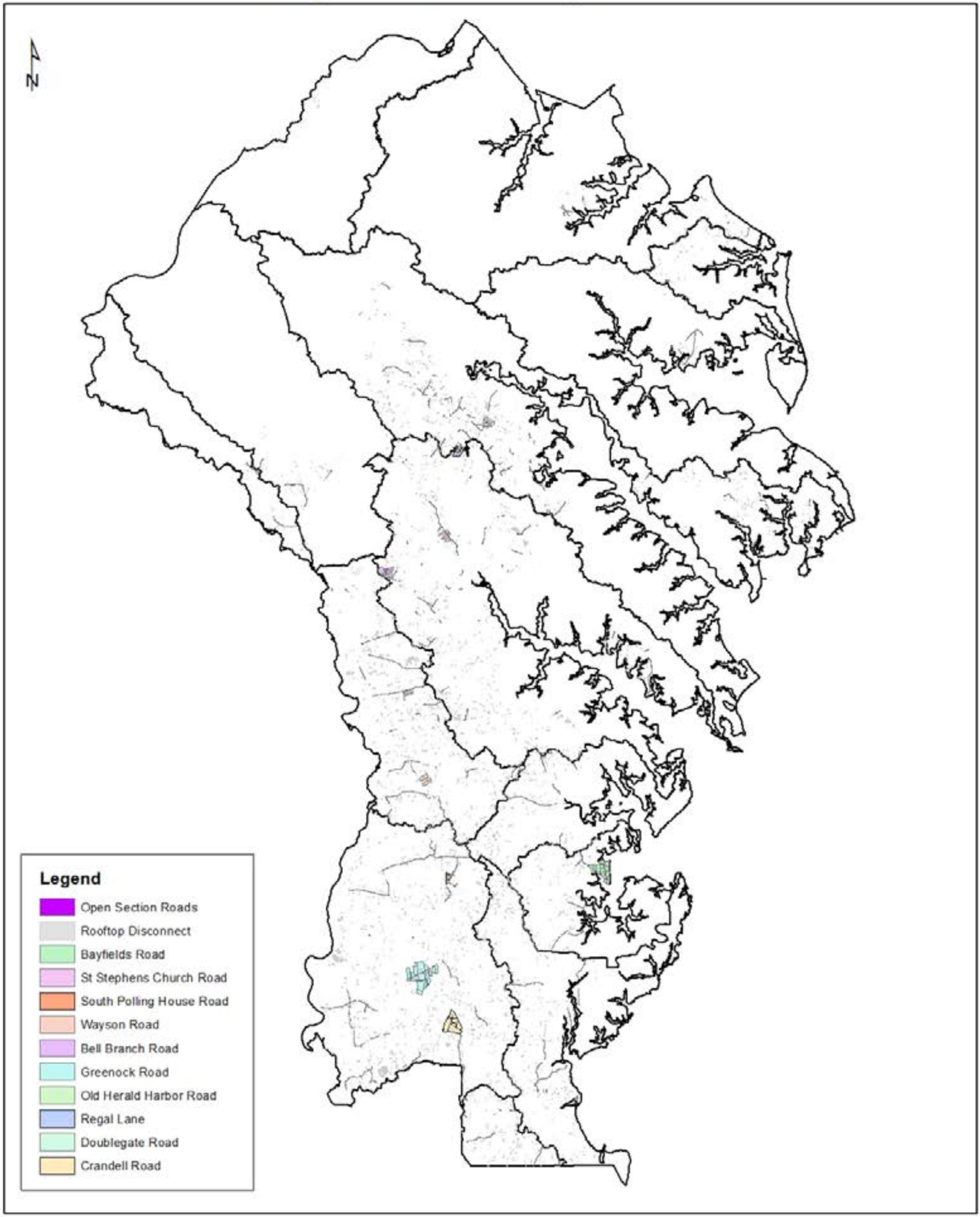
Anne Arundel County - Upper Patuxent Watershed MAP 17



Anne Arundel County - West River Watershed MAP 18



Representative Field Survey Area Map
Rooftop Disconnects and Open Section Roads



APPENDIX C –REPRESENTATIVE FIELD SURVEY

Field Survey Notes:

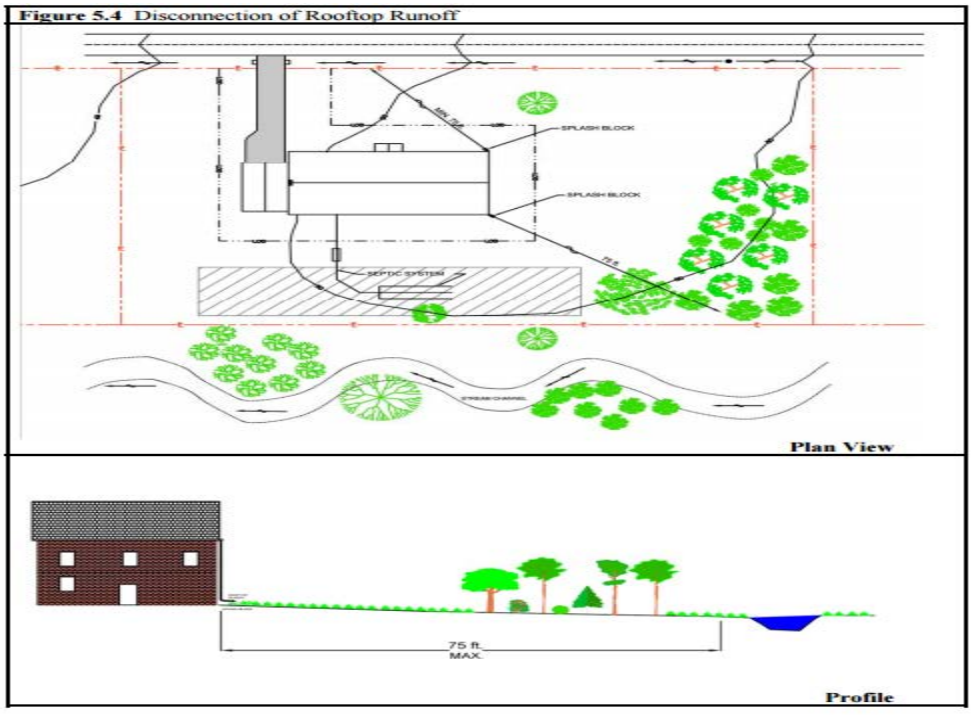
- As representative areas were surveyed, crews reviewed areas by walk through and windshield inspections. The neighborhood area and vicinity were reviewed to assess the impervious area disconnection, including areas leading into and out of the neighborhood.
- Some degree of professional judgment was used in the assessment, and staff were briefed prior to field visits to ensure consistency and thorough review of the areas.
- The rooftop disconnection assessment was generally homogeneous across different areas, in the sense that impervious area (e.g., rooftops) had downspouts and these sheet flow across vegetated areas. However, the nonrooftop disconnect varied, in the sense that some roadway sections had vegetated swale conveyances, and some had sheet flow to wooded areas and vegetated filter strips.
- To ensure a level of consistency and uniformity, a Help Document (provided below) was put together to assist field teams. The first area was surveyed as a group exercise with all 3 teams.
- Due to privacy and safety concerns, staff was advised not to enter private property without the property owners' explicit permission. As owners were available on site at the time of site visits and permission was sought and given, staff entered property; otherwise, the impervious area to each disconnect was determined using best professional judgement in the field and by assessing general rooftop conditions in the neighborhood (e.g., pitch, gutters, and overhead tree canopy) as seen from the street. Some site areas required further office review using Pictometry and LIDAR data, to determine the rooftop conditions.
- It should be noted that not all open road sections had vegetated swale conveyances; there were some areas that had a combination of vegetated swale conveyances and sheet flow to vegetated filter strips, forest, and woods
- All the sites and neighborhood areas generally met the Manual criteria, and as such were included in the assessment area. Please see individual site area section below.

FIELD ASSESSMENT HELP DOCUMENT

This document is to provide background, general guidance, to help field teams assess the areas for impervious area disconnection and fill out the field representative forms for rooftop & nonrooftop impervious area disconnects.

- The purpose of the field investigations is to validate the desktop analysis and to document the types and extent of environmental site design (ESD) practices.
- Impervious area disconnection is the practice of directing stormwater runoff (as sheet flow) from built-upon areas (e.g., roof, open section roads, parking areas, etc.) to properly sloped vegetated pervious areas.
- Sheet flow or overland flow is flow over plane surfaces. Runoff begins as sheet flow, transitioning to shallow concentrated flow, and finally to channelized flow

- Vegetated areas for sheet flow could be comprised of a variety of surfaces: Grassed lawn/turf grasses, riparian buffer, wooded area, and conservation areas.
- Vegetated conveyances: Grassed swale, wooded area, and landscaped area.
- General Neighborhood characterization & rooftop assessments section should be completed based on visual inspection of the entire neighborhood.
- Runoff conveyance (e.g., grassed swale) assessment should be completed based on the representative section selected.
- Vegetated conveyance assessment (e.g., turf lawn) assessment should be completed based on the representative lot(s) selected.
- Disconnected downspouts should be located on gradual slopes (≤ 5%)
- Roof area to each downspout disconnect is based on visual inspection
- A vegetated swale is a broad, shallow channel with a dense stand of vegetation covering the side slopes and bottom. Swales should have relatively flat slopes of less than 4 percent slope; 1 to 2 percent slope is recommended.
- Please use the below criteria for assessing the vegetated area condition at a neighborhood level:
    1. Presence of clumping species 2. Grass should be dense 3.Invasive & weed presence 4. Drying out or localized dry spots 5.scalping 6. Grass height (should be no lower than 2”-3”) 7. Irrigation 8.Overall neighborhood condition 8.Insects 9. Evidence of parking, heavy foot traffic, etc.
- Neighborhood ID: Area#
- Site ID: Area#_Site#



Source: Chapter 5. Environmental Site Design, Maryland Stormwater Design Manual, Volumes I and II (October 2000, Revised May 2009.

REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (NONROOFTOP)

NEIGHBORHOOD ID: Area A	DATE: 4/29/15
SITE ID: Area A Site 1	ASSESSED BY: Teams 1, 2 & 3

(GENERAL) NEIGHBORHOOD CHARACTERIZATION

Neighborhood/Subdivision Name: Bell Branch Road

Address (or streets) surveyed: St. Heather Lane

Neighborhood generally homogenous, in terms of basic lot size, road widths, setback and house types (Y)/N

Neighborhood has Disconnected Impervious Area: (Y)/N

Vegetated Cover Type (Circle all that apply): (Turf Lawn) Riparian Buffer (Wooded Area) Other _____

Vegetated Area Condition (Circle one): Excellent (Good+) Poor

Average slope of the vegetated area <5%: Y/N – see comments

Road Section (Circle one): (Non-Curb & Gutter) Curb & Gutter Other: _____

Runoff conveyed in a safe and non-erosive manner? (YES) / NO

OPEN ROAD SECTION RUNOFF CONVEYANCE

Erosion observed in the conveyance YES / (NO)

Runoff conveyance through (Circle all that apply):
(Grassed Swale) (Landscaping) Wooded Area Roadside Bioretention area Other _____

Width of the Gravel Verge at the edge of the road (prior to vegetated area): Ø -ft

Slope of the vegetated area <4% (Y)/N

Swale Dimensions: Length ___ ft Bottom Width 3.9 ft Top Width 15 ft Side Slopes: 3:1 (H:V)
Swale depth = 0.9 ft.

Length of Swale: 100 -ft – measure in optic

COMMENTS/NOTES

Neighborhood vegetative cover = 75% Woods; 25% Turf
Average slope of vegetative area to be determined by GIS
No gravel verge. Vegetated to pavement.

Slope of Swale DA = 0.018
Swale length = 259 ft.

note: neighborhood has good vegetative cover; mature tree canopy. well kept turf.
2107 St. Heather Lane = no downspouts on house

SITE SKETCH

SITE ID: A-1

REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (NONROOFTOP)

PHOTO INVENTORY	
PHOTO #	DESCRIPTION
1	cell phone photo# Camp1275 Parallel to St Heather Lane
2	Camp1276 Parallel to St Heather Lane
3	01277 Adjacent House of Lawn to swale.
4	01278 House @ + Bell Branch + St. Heather : Downspouts. (2100 St. Heather Lane)
5	01279 Parallel to St. Heather Lane - East side of Road. - swale
6	01280 Swale @ 2100 St. Heather Lane.
7	01281 House @ 2105 St. Heather Lane : Wooded Lot.
8	01282 2107 St. Heather Lane = no downspouts.
9	01283 General View of St. Heather Lane

SITE ID: A-1

REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (ROOFTOP)

NEIGHBORHOOD ID: Area A	DATE: 4/29/15
SITE ID: A Site 2	ASSESSED BY: Teams 1, 2 & 3

(GENERAL) NEIGHBORHOOD CHARACTERIZATION

Neighborhood/Subdivision Name: Bell Branch Road

Address (or streets) surveyed: Bell Branch Road

Neighborhood generally homogenous, in terms of basic lot size, road widths, setback and house types: (Y)/N

Neighborhood has Disconnected Impervious Area: (Y)/N

Vegetated Cover Type (Circle all that apply): (Turf Lawn) Riparian Buffer (Wooded Area) Other _____

Vegetated Area Condition (Circle one): Excellent (Good) Poor

Average slope of the vegetated area <5%: Y/N check on GIS.

Road Section (Circle one): (Non-Curb & Gutter) Curb & Gutter Other: _____

Runoff conveyed in a safe and non-erosive manner? (YES) / NO

ROOFTOP CONDITIONS ASSESMENT (AT A NEIGHBOURHOOD LEVEL)

% Downspouts directly connected to storm sewer	0 %
% Downspouts directed to impervious surface	10 % - driveways
% Downspouts discharge to Vegetated pervious areas	90 %
% Downspouts discharge to a cistern, rain barrel, Rain garden, etc.	_____ %

**Note: The above four should total 100%*

Contributing roof area to each downspout 500 sq ft or less? YES / NO See comments

RUNOFF CONVEYANCE (REPRENSTATIVE SITE/LOT LEVEL)

Erosion observed in the vegetated area YES / (NO)

Sheet flow Runoff conveyance through (Circle all that apply):

(Turf) Landscaping (Wooded Area) Rain Barrel/Cistern Rain Garden

Slope of the vegetated area <5%: (Y)/N

Distance from roof leader to the nearest impervious surface: ≈ 5 ft.
Length of sheet flow path from roof across vegetated areas: 125 ft. ft. } See comments

COMMENTS/NOTES

Neighborhood vegetative cover: 75% wooded, 25% Turf.
Use GIS to confirm ave. Slope of vegetated area <5% - slope 0.032
Use GIS to measure # of roofs to ea. downspout
Use GIS to measure distance from roof leader to imp. area; length sheet flow path.
- Roof divided into 6 segments with an average of 654 sq ft

SITE ID: A-2

REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (ROOFTOP)

SITE SKETCH

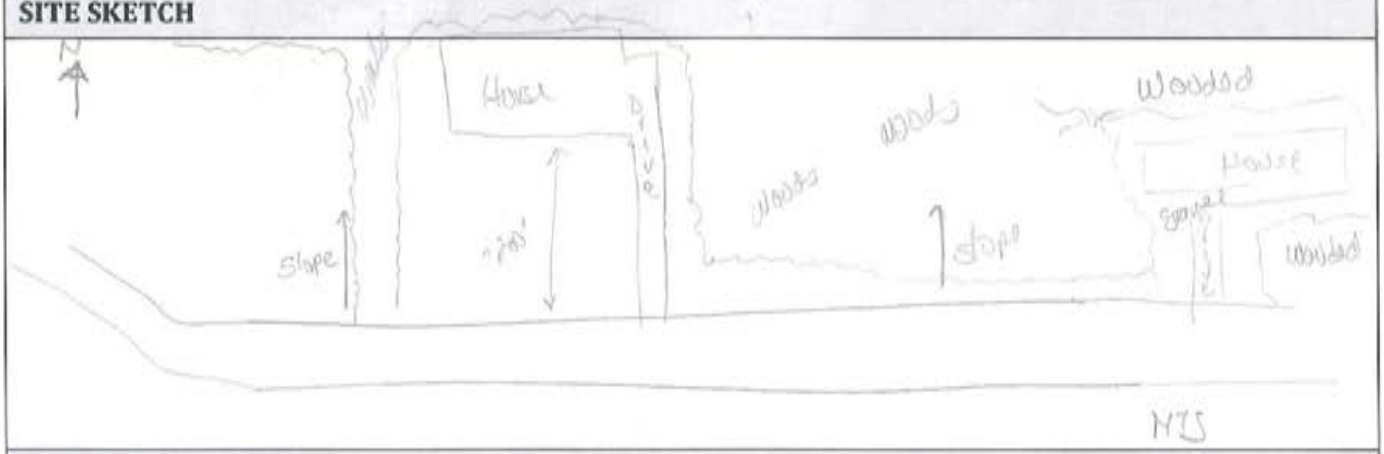


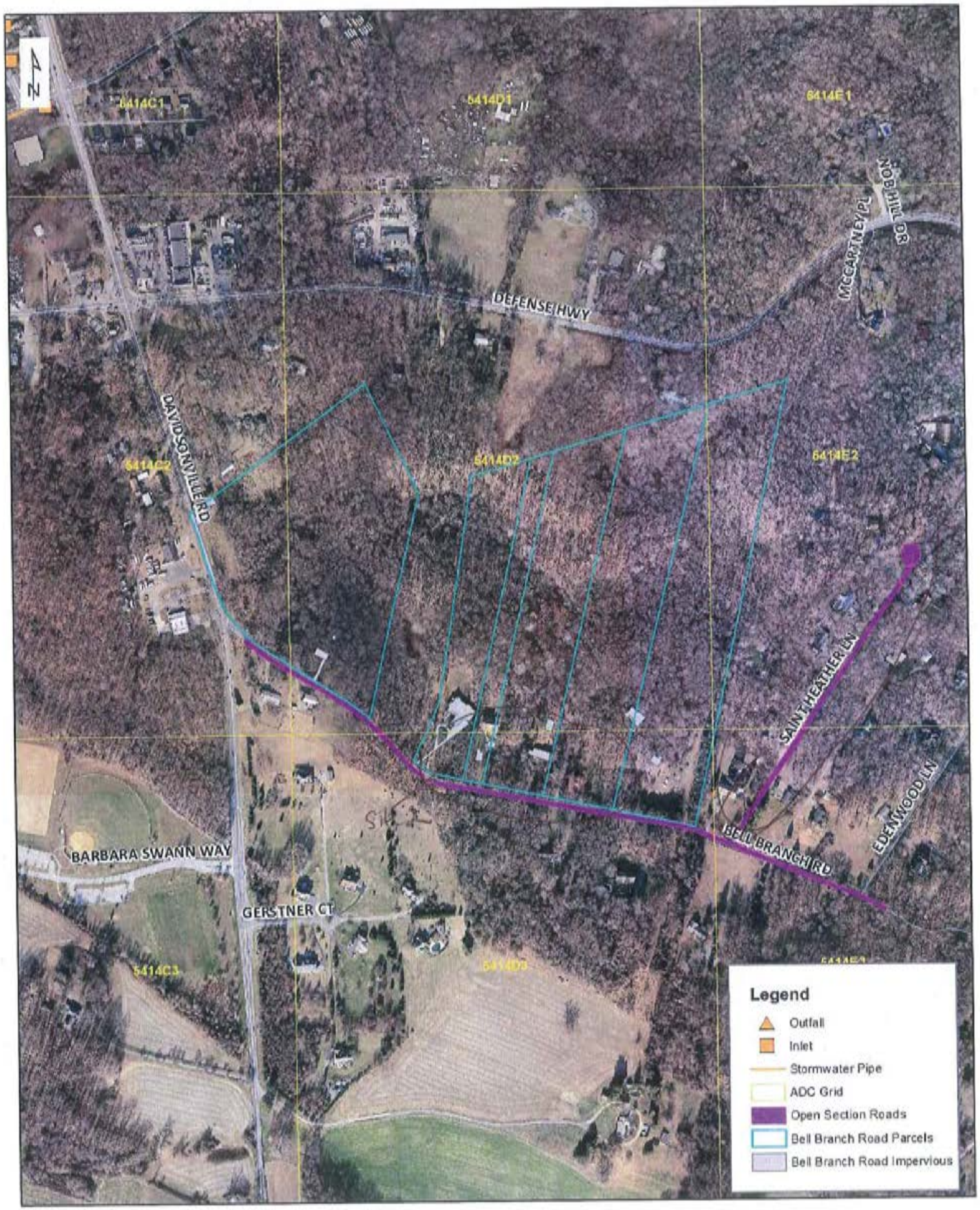
PHOTO INVENTORY

PHOTO #	DESCRIPTION
~~#~~ 1	01284 Bell Branch Road typical Area of Disconnected Downspouts
# 2	0285 Bell Branch Rd typical Vegetative Area - disconnected.

SITE ID: A-2

AREA A

Bell Branch Road



REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (ROOFTOP)

NEIGHBORHOOD ID: Area B	DATE: 4/29/15
SITE ID: B-2	ASSESSED BY: Tam I

(GENERAL) NEIGHBORHOOD CHARACTERIZATION

Neighborhood/Subdivision Name: St. Stephens Church Rd

Address (or streets) surveyed: St Stephens Church Road - elevated parcels

Neighborhood generally homogenous, in terms of basic lot size, road widths, setback and house types (Y)/N

Neighborhood has Disconnected Impervious Area: (Y)/N

Vegetated Cover Type (Circle all that apply): (Turf Lawn) Riparian Buffer (Wooded Area) Other _____

Vegetated Area Condition (Circle one): Excellent (Good) Poor

Average slope of the vegetated area <5% (Y)/N

Road Section (Circle one): (Non-Curb & Gutter) Curb & Gutter Other: _____

Runoff conveyed in a safe and non-erosive manner? (YES) / NO

ROOFTOP CONDITIONS ASSESMENT (AT A NEIGHBOURHOOD LEVEL)

% Downspouts directly connected to storm sewer	0 %
% Downspouts directed to impervious surface	5 %
% Downspouts discharge to Vegetated pervious areas	95 %
% Downspouts discharge to a cistern, rain barrel, Rain garden, etc.	_____ %

**Note: The above four should total 100%*

Contributing roof area to each downspout 500 sq ft or less? YES / NO 6 roof section avg 437 sq ft

RUNOFF CONVEYANCE (REPRENSTATIVE SITE/LOT LEVEL)

Erosion observed in the vegetated area YES / (NO)

Sheet flow Runoff conveyance through (Circle all that apply):

(Turf) Landscaping Wooded Area Rain Barrel/Cistern Rain Garden

Slope of the vegetated area <5% (Y)/N

Distance from roof leader to the nearest impervious surface: ? ft. > 75 ft. unable to determine

Length of sheet flow path from roof across vegetated areas: ? ft. 775 ft 165 ft front lawn

COMMENTS/NOTES

Vegetation = 80% Wooded, 20% Turf.
Use GIS to confirm Slope of area 0.02 Slope 3.28 elev change 165.0 run
Saw one Rain Barrel only; appeared connected to downspout

SITE ID: B-2

REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (ROOFTOP)

SITE SKETCH

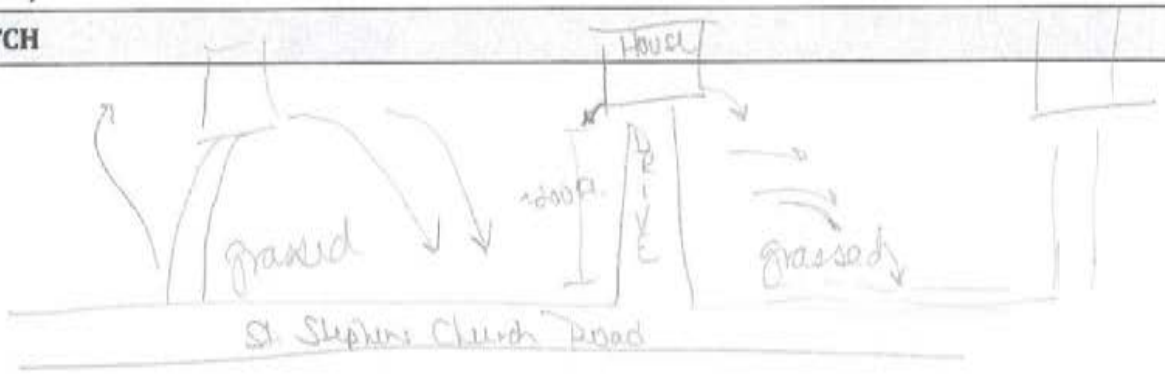


PHOTO INVENTORY

PHOTO #	DESCRIPTION
1	0288 Typical disconnected house
2	0289

SITE ID: A-2

REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (NONROOFTOP)

NEIGHBORHOOD ID: Area B	DATE: 4/29/15
SITE ID: B-1	ASSESSED BY: Team 1

(GENERAL) NEIGHBORHOOD CHARACTERIZATION

Neighborhood/Subdivision Name: St. Stephens Church Road

Address (or streets) surveyed: St. Stephens Church Rd. from Creek Farm Rd to ~300 south.

Neighborhood generally homogenous, in terms of basic lot size, road widths, setback and house types (Y)/N

Neighborhood has Disconnected Impervious Area: (Y)/N

Vegetated Cover Type (Circle all that apply): (Turf Lawn) Riparian Buffer Wooded Area Other _____

Vegetated Area Condition (Circle one): Excellent (Good) Poor

Average slope of the vegetated area <5%: Y/N -See comments.

Road Section (Circle one): (Non-Curb & Gutter) Curb & Gutter Other: _____

Runoff conveyed in a safe and non-erosive manner? (YES) / NO

OPEN ROAD SECTION RUNOFF CONVEYANCE

Erosion observed in the conveyance YES / (NO)

Runoff conveyance through (Circle all that apply):

(Grassed Swale) Landscaping Wooded Area Roadside Bioretention area Other _____

Width of the Gravel Verge at the edge of the road (prior to vegetated area): 1.5 -ft

Slope of the vegetated area <4% (Y)/N

Swale Dimensions: Length ~350 ft Bottom Width 2 ft Top Width 11 ft Side Slopes: <3:1 (H:V)

Max Depth: 0.33 ~~feet~~ feet

Length of Swale: _____-ft

COMMENTS/NOTES

Use GIS to confirm Slope of Vegetated area within this site.

Use GIS to confirm Swale length; note that Swale crosses the ridgeline so water flows in both directions (see sketch).

Swale measured was on S side of Road. 6.7 ft elevation change 263 ft run = 0.025

No houses draining to this site.

SITE SKETCH

SITE ID: B-1

REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (NONROOFTOP)

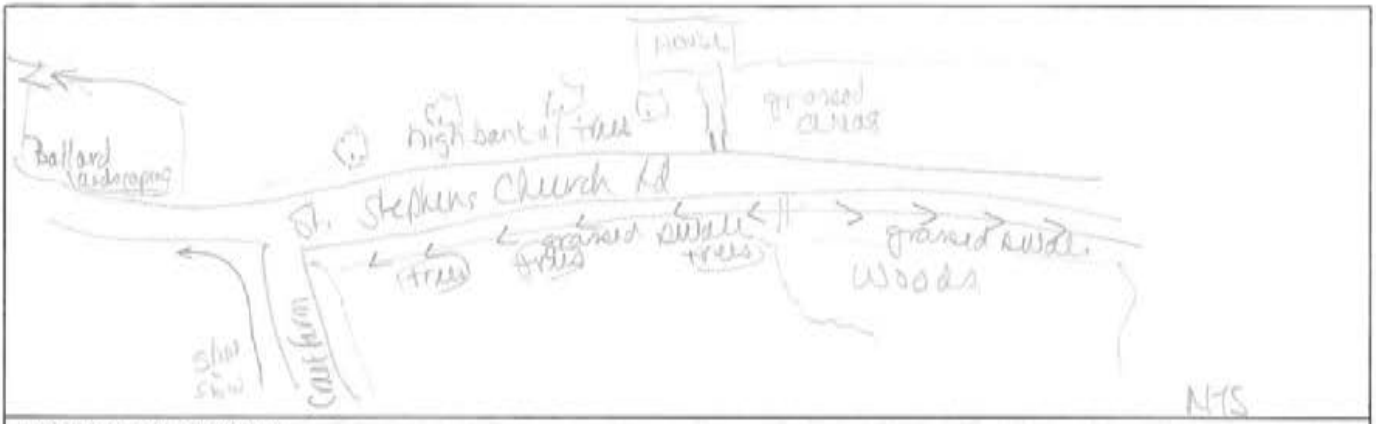


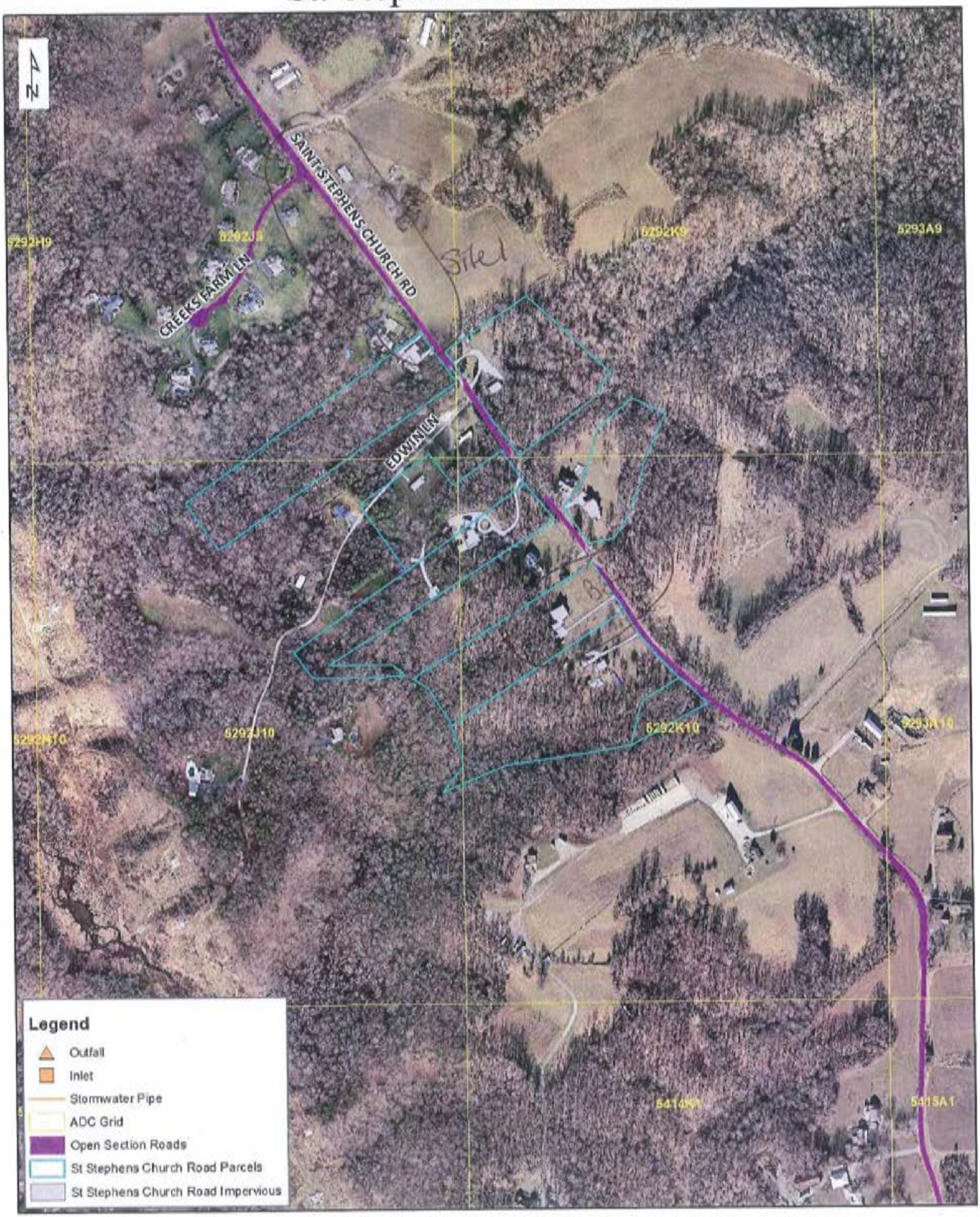
PHOTO INVENTORY

PHOTO #	DESCRIPTION
1	01286 View of Swale along Rd. looking North to Creek Farm Rd.
2	01287 View of Swale looking South along St. Stephens Church Rd

SITE ID: B-1

Area B.

St. Stephens Church Road



REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (NONROOFTOP)

NEIGHBORHOOD ID: D	DATE: 4/29/15
SITE ID: D-1	ASSESSED BY: Team 1

(GENERAL) NEIGHBORHOOD CHARACTERIZATION

Neighborhood/Subdivision Name: Old Herald Harbor Road

Address (or streets) surveyed: Sheridan Rd / Wadebury Heights.

Neighborhood generally homogenous, in terms of basic lot size, road widths, setback and house types (Y)/N

Neighborhood has Disconnected Impervious Area: (Y)/N

Vegetated Cover Type (Circle all that apply): (Turf Lawn) Riparian Buffer (Wooded Area) Other _____

Vegetated Area Condition (Circle one): Excellent (Good) Poor

Average slope of the vegetated area <5%: (Y)/N

Road Section (Circle one): (Non-Curb & Gutter) Curb & Gutter Other: _____

Runoff conveyed in a safe and non-erosive manner? (YES) / NO

OPEN ROAD SECTION RUNOFF CONVEYANCE

Erosion observed in the conveyance YES / (NO)

Runoff conveyance through (Circle all that apply):

(Grassed Swale) Landscaping Wooded Area Roadside Bioretention area Other _____

Width of the Gravel Verge at the edge of the road (prior to vegetated area): 1.5 -ft

Slope of the vegetated area <4%: (Y)/N ?

Swale Dimensions: Length ~250 ft Bottom Width 1.25 ft Top Width 9 ft Side Slopes: 3:1 (H:V)

Swale depth: 0.5 ft

Length of Swale: 311 -ft

COMMENTS/NOTES

50% Wooded 50% Turf lawns

Check topo/GIS to determine slope of the grassed swales. May be >5%.

Measured swale on N. side of Sheridan Road. Some eroded areas of swale on steeper sections of Sheridan. 21.6 ft change in elevation 311 ft run = 0.069 slope

SITE SKETCH

REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (NONROOFTOP)

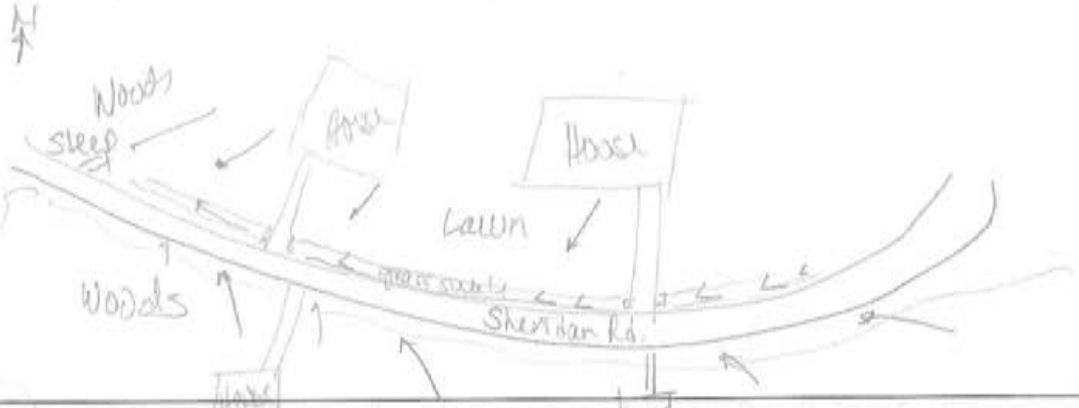


PHOTO INVENTORY

PHOTO #	DESCRIPTION
1	01295 Swale - representative - Sheridan Rd
2	01296 Swale - representative - Sheridan Rd
3	01297 House - typical of community

SITE ID: D-1

REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (ROOFTOP)

NEIGHBORHOOD ID: D	DATE: 4/21/15
SITE ID: D-2	ASSESSED BY: Team

(GENERAL) NEIGHBORHOOD CHARACTERIZATION

Neighborhood/Subdivision Name: Old Herald Harbour Rd

Address (or streets) surveyed: Old Herald Harbour Rd.

Neighborhood generally homogenous, in terms of basic lot size, road widths, setback and house types: (Y)/N

Neighborhood has Disconnected Impervious Area: (Y)/N

Vegetated Cover Type (Circle all that apply) : (Turf Lawn) Riparian Buffer (Wooded Area) Other _____

Vegetated Area Condition (Circle one): Excellent (Good) Poor

Average slope of the vegetated area <5%: (Y)/N

Road Section (Circle one): (Non-Curb & Gutter) Curb & Gutter Other: _____

Runoff conveyed in a safe and non-erosive manner? (YES) / NO

ROOFTOP CONDITIONS ASSESMENT (AT A NEIGHBOURHOOD LEVEL)

% Downspouts directly connected to storm sewer	_____ %
% Downspouts directed to impervious surface	3 %
% Downspouts discharge to Vegetated pervious areas	97 %
% Downspouts discharge to a cistern, rain barrel, Rain garden, etc.	_____ %

**Note: The above four should total 100%*

Contributing roof area to each downspout 500 sq ft or less? YES / NO ? 5 roof segments Average 425 sq ft

RUNOFF CONVEYANCE (REPRENSTATIVE SITE/LOT LEVEL)

Erosion observed in the vegetated area YES / (NO)

Sheet flow Runoff conveyance through (Circle all that apply):

(Turf) (Landscaping) Wooded Area Rain Barrel/Cistern Rain Garden mostly lawn.

Slope of the vegetated area <5%: (Y)/N change in elevation 6ft over 130 ft = 0.047 slope

Distance from roof leader to the nearest impervious surface: ? ft. Unknown - rear of property

Length of sheet flow path from roof across vegetated areas: 130 ft.

COMMENTS/NOTES

Woods = ~~80%~~ Turf = 20%

Sheet flow to mostly lawn areas.

When observed, all downspouts directed to lawn area; maybe a few that are not.

SITE ID: D-2

REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (ROOFTOP)

SITE SKETCH

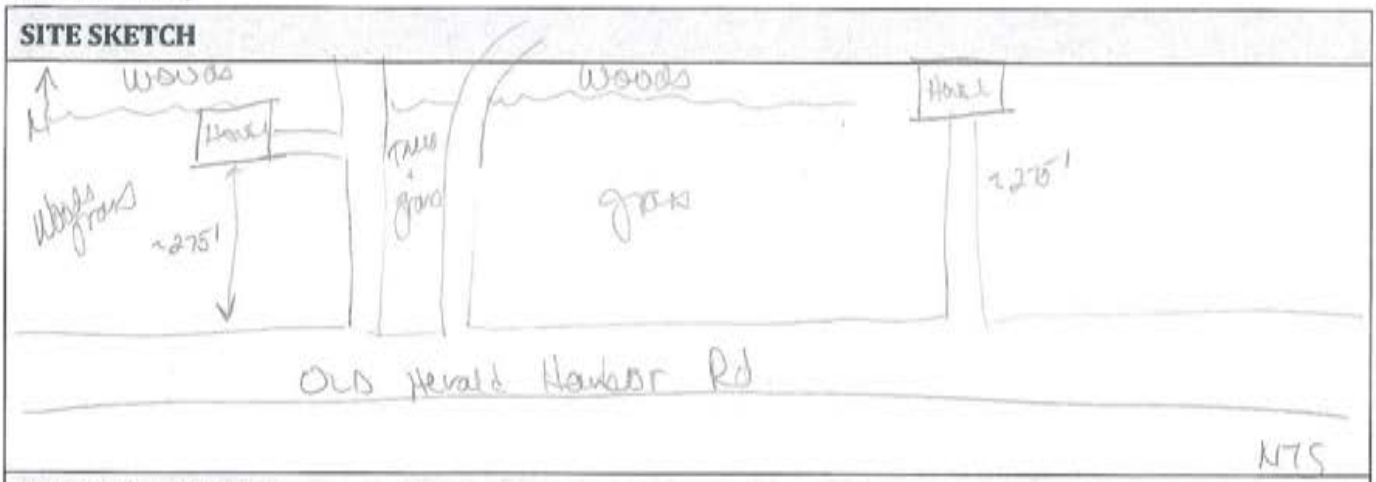


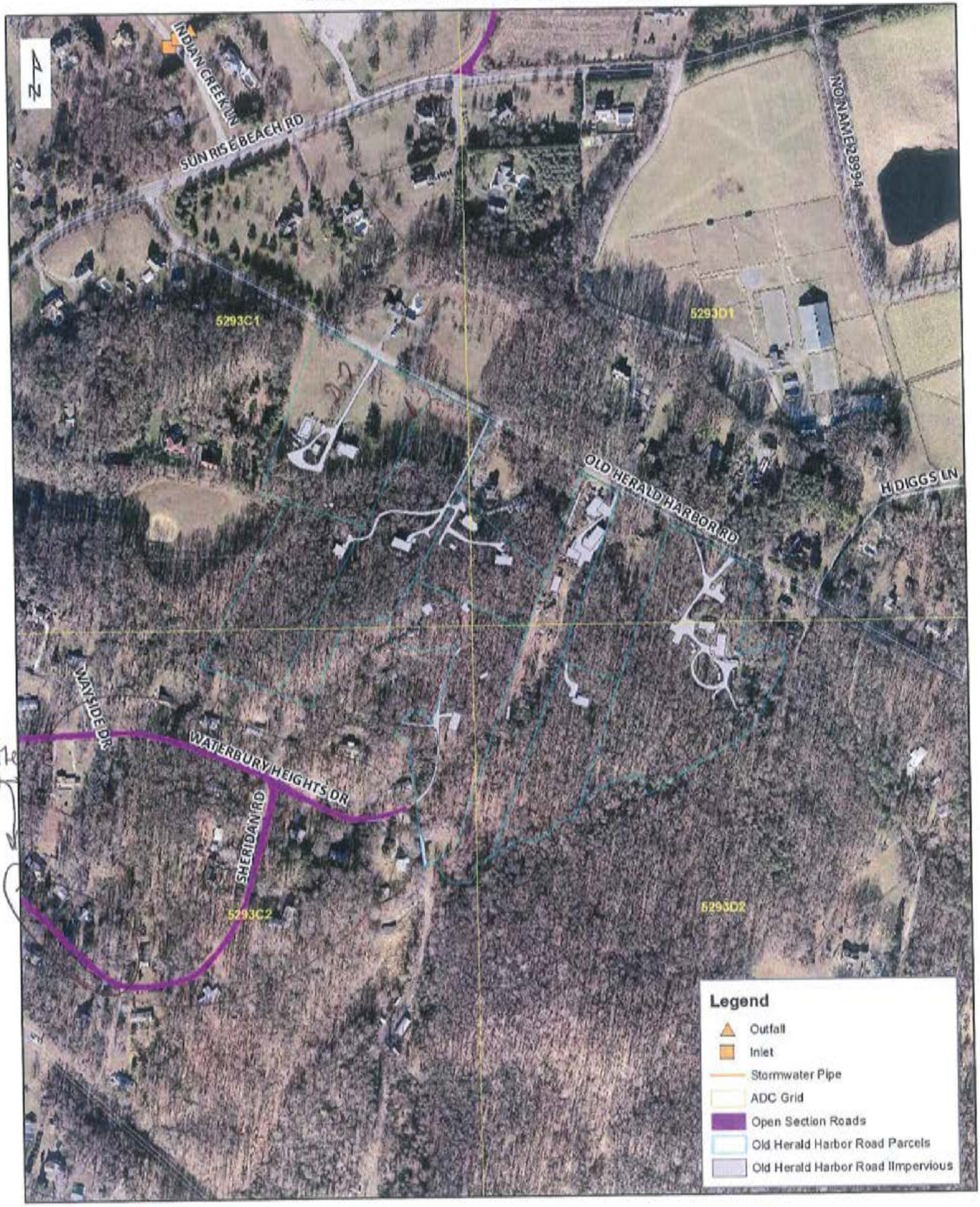
PHOTO INVENTORY

PHOTO #	DESCRIPTION
1	0298 Disconnected Homes on Herald Harbor Rd.
2	0299 " " " " "

SITE ID: D-2

Area D

Old Herald Harbor Road



REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (ROOFTOP)

NEIGHBORHOOD ID: Bayfields Road	DATE: 4/30/2015
SITE ID: F-1	ASSESSED BY: RF/JC

(GENERAL) NEIGHBORHOOD CHARACTERIZATION

Neighborhood/Subdivision Name: Bayfields Road

Address (or streets) surveyed: 4728 Bayfields Road

Neighborhood generally homogenous, in terms of basic lot size, road widths, setback and house types (Y)/N

Neighborhood has Disconnected Impervious Area: (Y)/N

Vegetated Cover Type (Circle all that apply) : (Turf Lawn) (Riparian Buffer Wooded Area) Other _____
10% 90% Neighborhood Boundaries

Vegetated Area Condition (Circle one): Excellent (Good) Poor

Average slope of the vegetated area <5%: (Y)/N

Road Section (Circle one): (Non-Curb & Gutter) Curb & Gutter Other: _____

Runoff conveyed in a safe and non-erosive manner? (YES) / NO

ROOFTOP CONDITIONS ASSESMENT (AT A NEIGHBOURHOOD LEVEL)

% Downspouts directly connected to storm sewer	0%	%
% Downspouts directed to impervious surface	unknown	% How to be from street
% Downspouts discharge to Vegetated pervious areas	unknown	% visual confirmation
% Downspouts discharge to a cistern, rain barrel, Rain garden, etc.	unknown	%

**Note: The above four should total 100%*

Contributing roof area to each downspout 500 sq ft or less? YES / NO

RUNOFF CONVEYANCE (REPRENSTATIVE SITE/LOT LEVEL)

Erosion observed in the vegetated area YES / (NO)

Sheet flow Runoff conveyance through (Circle all that apply):

(Turf) Landscaping (Wooded Area) Rain Barrel/Cistern Rain Garden

Slope of the vegetated area <5%: (Y)/N

Distance from roof leader to the nearest impervious surface: 0-2 ft.

Length of sheet flow path from roof across vegetated areas: approx 149 ft. - based on Lidar flow path distance

Slope = 0.0516

COMMENTS/NOTES

* See attached aerial photographs.

SITE ID: _____

REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (ROOFTOP)

SITE SKETCH

PHOTO INVENTORY	
PHOTO #	DESCRIPTION

SITE ID:_____

REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (NONROOFTOP)

NEIGHBORHOOD ID: Bayfields Road	DATE: 4/30/2015
SITE ID: F-2	ASSESSED BY: RF/JC

(GENERAL) NEIGHBORHOOD CHARACTERIZATION

Neighborhood/Subdivision Name: Bayfields Road

Address (or streets) surveyed: 4540 Bayfields Road

Neighborhood generally homogenous, in terms of basic lot size, road widths, setback and house types: (Y)/N

Neighborhood has Disconnected Impervious Area: (Y)/N

Vegetated Cover Type (Circle all that apply): (Turf Lawn) Riparian Buffer Wooded Area Other _____

Vegetated Area Condition (Circle one): Excellent (Good) Poor

Average slope of the vegetated area <5%: (Y)/N

Road Section (Circle one): (Non-Curb & Gutter) Curb & Gutter Other: _____

Runoff conveyed in a safe and non-erosive manner? (YES) / NO

OPEN ROAD SECTION RUNOFF CONVEYANCE

Erosion observed in the conveyance YES / (NO)

Runoff conveyance through (Circle all that apply):

(Grassed Swale) Landscaping Wooded Area Roadside Bioretention area Other _____

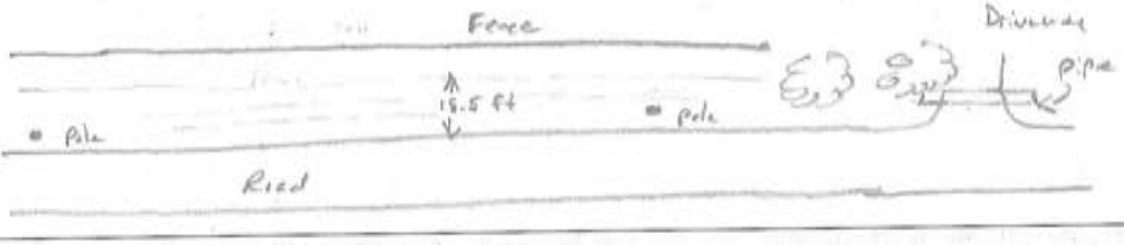
Width of the Gravel Verge at the edge of the road (prior to vegetated area): 1.0 -ft

Slope of the vegetated area <4%: (Y)/N

Swale Dimensions: ~~Length~~ Depth .6 ft Bottom Width 5.5 ft Top Width 18.5 ft Side Slopes: 3:1 (H:V)

Length of Swale: 365 -ft Slope = 0.042 Change in elevation 15.2 ft run: 365 ft

COMMENTS/NOTES



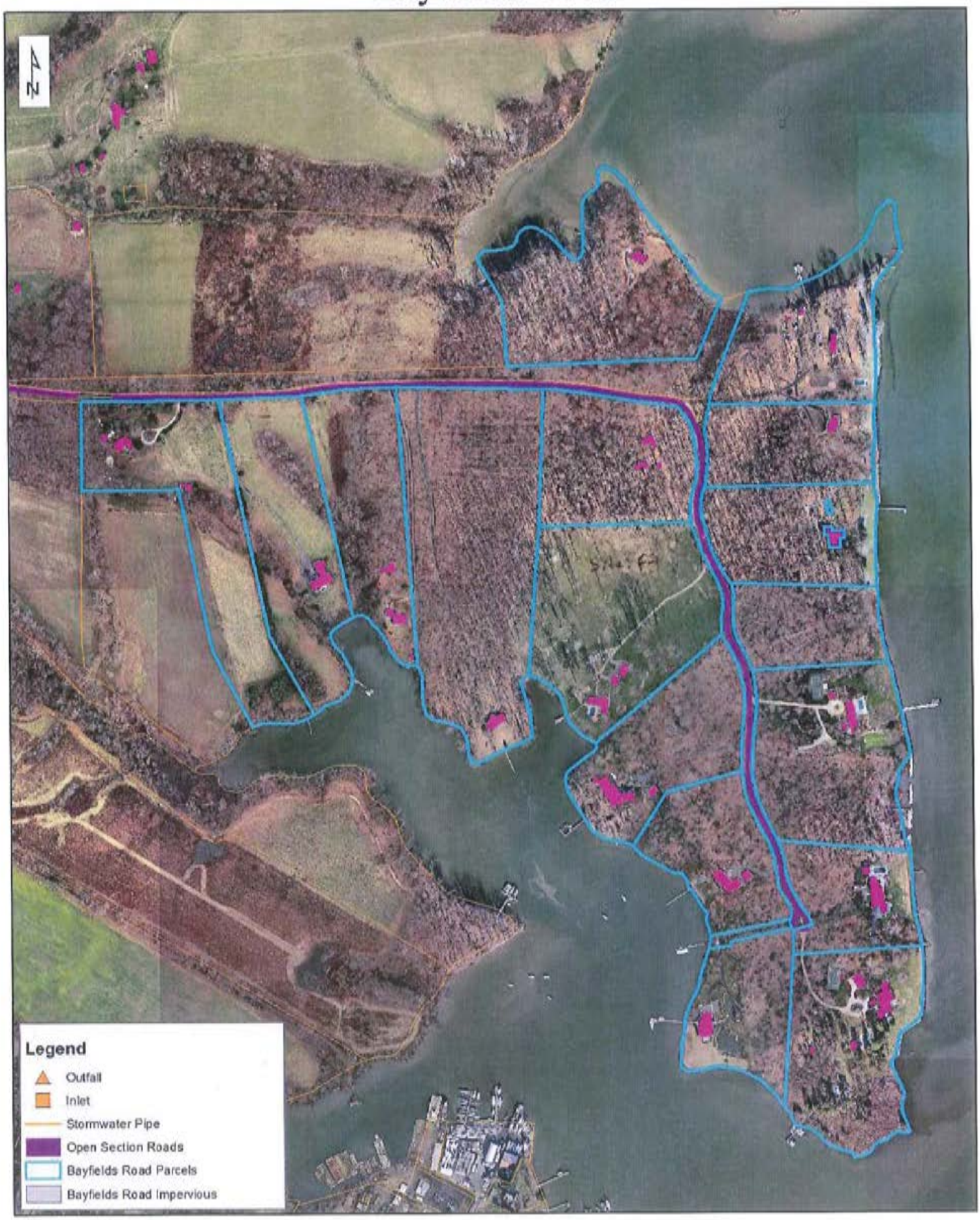
SITE SKETCH

REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (NONROOFTOP)

PHOTO INVENTORY	
PHOTO #	DESCRIPTION
IMG_1709	Roadside swale looking down stream
IMG_1710	Road side swale visible confluence
IMG-1711	View of swale from road.
IMG_1712	Roadside swale looking up stream

SITE ID:_____

Bayfields Road



REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (NONROOFTOP)

NEIGHBORHOOD ID: South River Clubhouse Road	DATE: 4/30/2015
SITE ID: F-3	ASSESSED BY: RF/JC

(GENERAL) NEIGHBORHOOD CHARACTERIZATION

Neighborhood/Subdivision Name: South River Clubhouse Road

Address (or streets) surveyed: South River Clubhouse Road

Neighborhood generally homogenous, in terms of basic lot size, road widths, setback and house types (Y)/N

Neighborhood has Disconnected Impervious Area: (Y)/N

Vegetated Cover Type (Circle all that apply) (Turf Lawn 95%) (Riparian Buffer Wooded Area 5%) Other _____

Vegetated Area Condition (Circle one): Excellent (Good) Poor

Average slope of the vegetated area <5%: (Y)/N

Road Section (Circle one): (Non-Curb & Gutter) Curb & Gutter Other: _____

Runoff conveyed in a safe and non-erosive manner? (YES) / NO

OPEN ROAD SECTION RUNOFF CONVEYANCE

Erosion observed in the conveyance YES / (NO)

Runoff conveyance through (Circle all that apply):

(Grassed Swale) Landscaping Wooded Area Roadside Bioretention area Other _____

Width of the Gravel Verge at the edge of the road (prior to vegetated area): N/A -ft

Slope of the vegetated area <4%: (Y)/N 0.037

Swale Dimensions: ~~Length~~ Depth 0.8 ft Bottom Width 2 ft Top Width 9.5 ft Side Slopes: 3:1 (H:V)

Length of Swale: 665 -ft Change in elevation = 25.1 ft Run = 665 ft Slope = 0.037

COMMENTS/NOTES

SITE SKETCH

Hardrock Road

SITE ID: _____

REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (NONROOFTOP)

PHOTO INVENTORY	
PHOTO #	DESCRIPTION
IMG-1698	Roadside swale looking up stream
IMG-1699	Roadside swale looking down stream
IMG-1701	View of Adjacent lawn near swale
IMG. 1702	View of swale from roadway

SITE ID:_____

South River Clubhouse Road/Hardesty Road

REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (ROOFTOP)

NEIGHBORHOOD ID: Doubletgate Road	DATE: 4/29/2015
SITE ID: G-1	ASSESSED BY: RF/JC

(GENERAL) NEIGHBORHOOD CHARACTERIZATION

Neighborhood/Subdivision Name: Doubletgate Road

Address (or streets) surveyed: 1101 Doubletgate Road

Neighborhood generally homogenous, in terms of basic lot size, road widths, setback and house types : (Y)/N

Neighborhood has Disconnected Impervious Area: (Y)/N

Vegetated Cover Type (Circle all that apply): (Turf Lawn 80%) (Riparian Buffer Wooded Area 20%) Other _____

Vegetated Area Condition (Circle one): (Excellent) Good Poor

Average slope of the vegetated area <5%: (Y)/N

Road Section (Circle one): (Non-Curb & Gutter) Curb & Gutter Other: _____

Runoff conveyed in a safe and non-erosive manner? (YES) / NO

ROOFTOP CONDITIONS ASSESMENT (AT A NEIGHBOURHOOD LEVEL)

% Downspouts directly connected to storm sewer	0 %
% Downspouts directed to impervious surface	25 %
% Downspouts discharge to Vegetated pervious areas	75 %
% Downspouts discharge to a cistern, rain barrel, Rain garden, etc.	N/A %

**Note: The above four should total 100%*

Contributing roof area to each downspout 500 sq ft or less? (YES) / NO 13 Sections Average 308.7 sq ft

RUNOFF CONVEYANCE (REPRENSTATIVE SITE/LOT LEVEL)

Erosion observed in the vegetated area YES / NO

Sheet flow Runoff conveyance through (Circle all that apply):

Turf ~~Landscaping~~ Wooded Area Rain Barrel/Cistern Rain Garden

Slope of the vegetated area <5%: Y/N Slope 0.014 change in elevation = 4.7 ft run = 330 ft

Distance from roof leader to the nearest impervious surface: < 5 Ft ft.

Length of sheet flow path from roof across vegetated areas: 330 ft.

COMMENTS/NOTES

SITE ID: _____

REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (ROOFTOP)

SITE SKETCH

PHOTO INVENTORY	
PHOTO #	DESCRIPTION
IMG-1677	Front of property taken from Road

SITE ID:_____

REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (NONROOFTOP)

NEIGHBORHOOD ID: Doubleyoke Ct.	DATE: 4/29/2015
SITE ID: G1-Z	ASSESSED BY: RF/JC

(GENERAL) NEIGHBORHOOD CHARACTERIZATION

Neighborhood/Subdivision Name: Doubleyoke Ct.

Address (or streets) surveyed: _____

Neighborhood generally homogenous, in terms of basic lot size, road widths, setback and house types (Y)/N

Neighborhood has Disconnected Impervious Area: (Y)/N

Vegetated Cover Type (Circle all that apply): Turf Lawn Riparian Buffer Wooded Area Other _____

Vegetated Area Condition (Circle one): Excellent (Good) Poor

Average slope of the vegetated area <5%: (Y)/N

Road Section (Circle one): (Non-Curb & Gutter) Curb & Gutter Other: _____

Runoff conveyed in a safe and non-erosive manner? (YES) / NO

OPEN ROAD SECTION RUNOFF CONVEYANCE

Erosion observed in the conveyance YES / (NO)

Runoff conveyance through (Circle all that apply):

(Grassed Swale) Landscaping Wooded Area Roadside Bioretention area Other _____

Width of the Gravel Verge at the edge of the road (prior to vegetated area): N/A -ft

Slope of the vegetated area <4%: (Y)/N

Swale Dimensions: Length ___ ft Bottom Width ___ ft Top Width ___ ft Side Slopes: ___ (H:V)

Length of Swale: _____-ft - lawn can dwell up to Road No visible Swale

COMMENTS/NOTES

- Did not appear to have a swale along roadway took two representative photos of roadway.

SITE SKETCH

SITE ID: _____

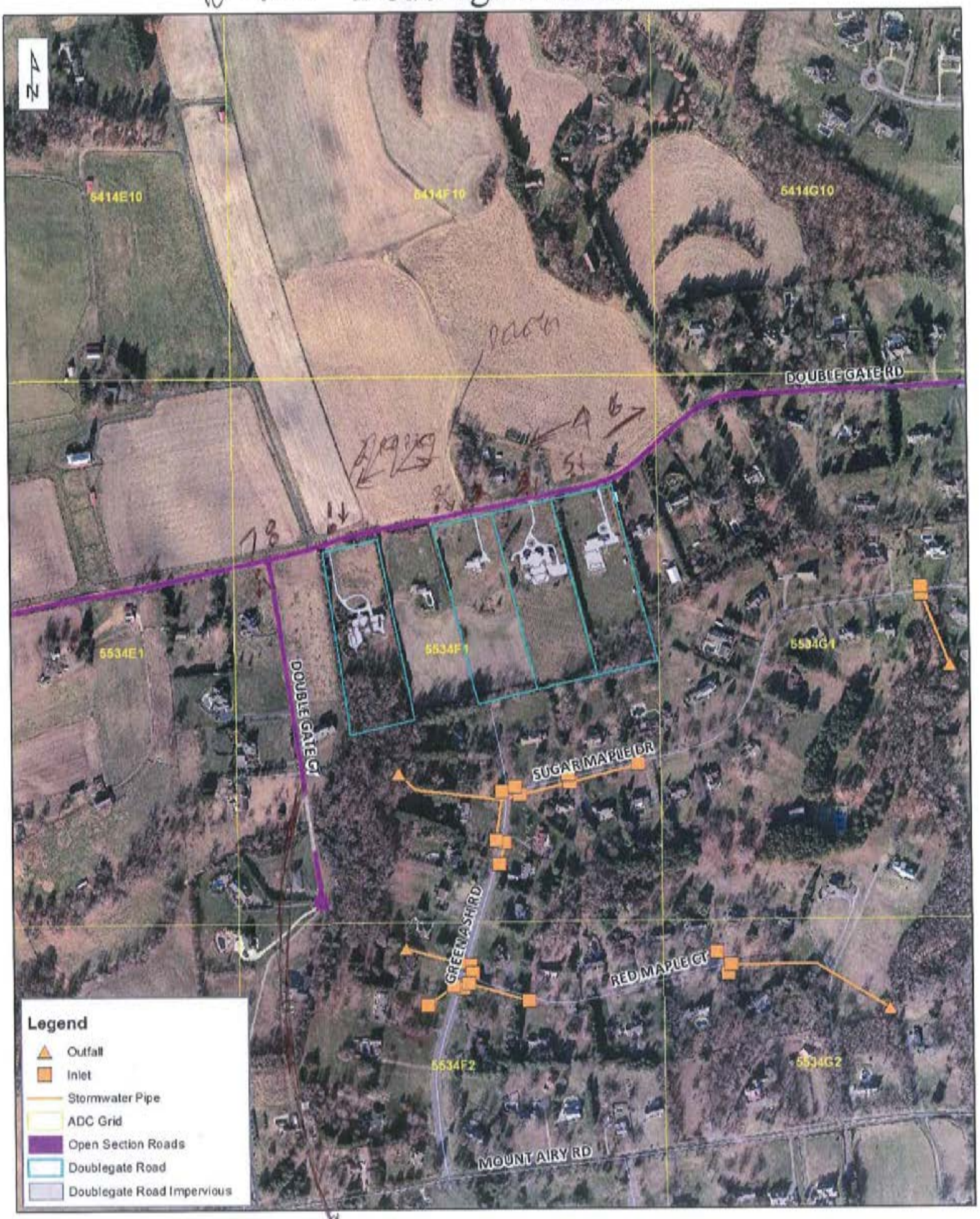
REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (NONROOFTOP)

PHOTO INVENTORY	
PHOTO #	DESCRIPTION
IMG-1680	Viewing looking South down Doubleset Ct.
IMG-1679	View of edge of pavement South along Doubleset Ct.
IMG-1678	looking east along Doubleset road. Farm field slope toward roadway
IMG-1676	looking west along Doubleset Road no visible swale along road way.
IMG-1675	representative parcel
IMG-1674	representative parcel
IMG-1672	representative parcel

SITE ID:_____

10-11am

Doublegate Road



REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (ROOFTOP)

NEIGHBORHOOD ID: Dodon Road	DATE: 4/25/2015
SITE ID: H-1	ASSESSED BY: TC RF

(GENERAL) NEIGHBORHOOD CHARACTERIZATION

Neighborhood/Subdivision Name: Dodon Road

Address (or streets) surveyed: 319 Dodon Road

Neighborhood generally homogenous, in terms of basic lot size, road widths, setback and house types : (Y)/N

Neighborhood has Disconnected Impervious Area: (Y)/N

Vegetated Cover Type (Circle all that apply) : (Turf Lawn) (Riparian Buffer Wooded Area) Other _____

Vegetated Area Condition (Circle one): Excellent (Good) Poor

Average slope of the vegetated area <5%: (Y)/N

Road Section (Circle one): (Non-Curb & Gutter) Curb & Gutter Other: _____

Runoff conveyed in a safe and non-erosive manner? (YES) / NO

ROOFTOP CONDITIONS ASSESMENT (AT A NEIGHBOURHOOD LEVEL)

% Downspouts directly connected to storm sewer	0 %
% Downspouts directed to impervious surface	25 %
% Downspouts discharge to Vegetated pervious areas	75 %
% Downspouts discharge to a cistern, rain barrel, Rain garden, etc.	Unknown %

**Note: The above four should total 100%*

Contributing roof area to each downspout 500 sq ft or less? (YES) / NO 14 roof segments Avg. 464.5 sq ft

RUNOFF CONVEYANCE (REPRENSTATIVE SITE/LOT LEVEL)

Erosion observed in the vegetated area (YES) / NO

Sheet flow Runoff conveyance through (Circle all that apply):

(Turf) (Landscaping) (Wooded Area) Rain Barrel/Cistern Rain Garden

Slope of the vegetated area <5%: (Y)/N change in elevation 4.4 ft slope = 0.021

Distance from roof leader to the nearest impervious surface: ~16 ft. ft.

Length of sheet flow path from roof across vegetated areas: 210 ft.

COMMENTS/NOTES

SITE ID: _____

REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (ROOFTOP)

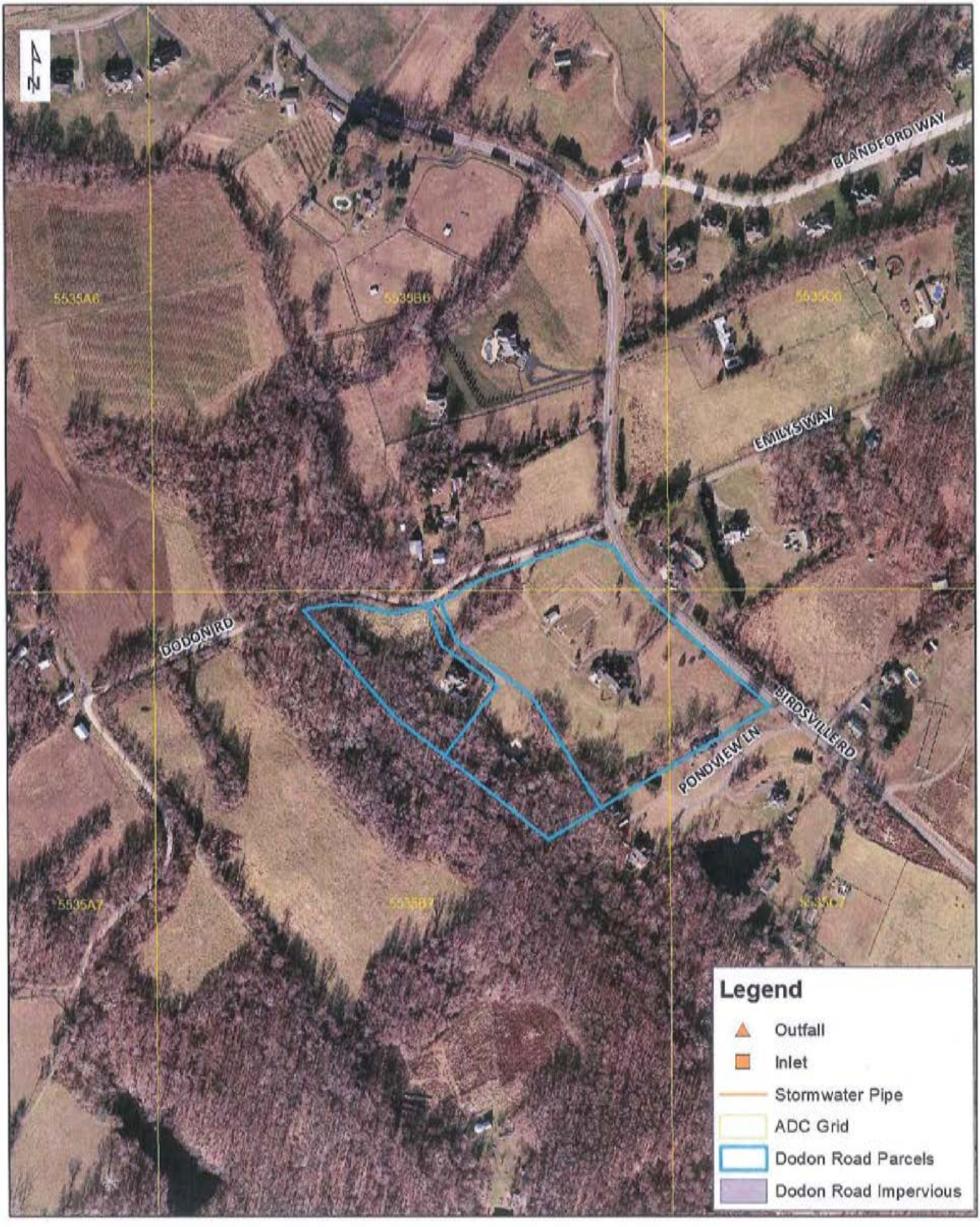
SITE SKETCH

PHOTO INVENTORY

PHOTO #	DESCRIPTION
IMG_1681	Street view in front 319 Dodon Road facing west
IMG_1682	Street view in front 319 Dodon Road facing property facing South
IMG_1683	Street view in front 319 Dodon Road facing East
IMG_1684	Street view in Front 315 Dodon Road facing South
IMG_1685	Street view from Dodon facing South towards 3800 Birdsville Rd.
IMG_1686	Street view from Dodon facing North towards 3808 Birdsville Rd
IMG_1687	Street view from Birdsville Rd Facing southwest in front 3850 Birdsville
IMG_1688	Street view Corner Birdsville & Dodon facing Southwest.

SITE ID:_____

Dodon Road


N
BLANDFORD WAY
EMILY'S WAY
DODON RD
BIRDSVILLE RD
POND VIEW LN
5535A6
5535B6
5535C6
5535A7
5535B7
5535C7
Legend
Outfall
Inlet
Stormwater Pipe
ADC Grid
Dodon Road Parcels
Dodon Road Impervious

REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (NONROOFTOP)

NEIGHBORHOOD ID: Cumberstone Road	DATE: 4/30/2015
SITE ID: J-1	ASSESSED BY: RF/JL

(GENERAL) NEIGHBORHOOD CHARACTERIZATION

Neighborhood/Subdivision Name: Cumberstone Road

Address (or streets) surveyed: _____

Neighborhood generally homogenous, in terms of basic lot size, road widths, setback and house types : (Y)/N

Neighborhood has Disconnected Impervious Area: (Y)/N

Vegetated Cover Type (Circle all that apply) : Turf Lawn (Riparian Buffer Wooded Area) Other farm land

Vegetated Area Condition (Circle one): Excellent (Good) Poor

Average slope of the vegetated area <5%: (Y)/N

Road Section (Circle one): (Non-Curb & Gutter) Curb & Gutter Other: _____

Runoff conveyed in a safe and non-erosive manner? (YES) / NO

OPEN ROAD SECTION RUNOFF CONVEYANCE

Erosion observed in the conveyance YES / (NO)

Runoff conveyance through (Circle all that apply):

Grassed Swale Landscaping (Wooded Area) Roadside Bioretention area Other _____

Width of the Gravel Verge at the edge of the road (prior to vegetated area): N/A -ft

Slope of the vegetated area <4%: (Y)/N Slope = 0.012

Swale Dimensions: Length _____ ft Bottom Width 2.0 ft Top Width 6.5 ft Side Slopes: 3:1 (H:V)

Length of Swale: 350 -ft Depth = 9" change in elevation 4.4 ft

COMMENTS/NOTES

SITE SKETCH

SITE ID: _____

REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (NONROOFTOP)

PHOTO INVENTORY	
PHOTO #	DESCRIPTION
IMG_1705	Street view facing west up stream of the roadside swale
IMG_1706	Street view facing south into the wooded section
IMG_1707	Street view facing East down stream of the swale.

SITE ID:_____

Cumberstone Road

REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (NONROOFTOP)

NEIGHBORHOOD ID: Area K	DATE: 04 / 29 / 15
SITE ID: Area K – Site 1	ASSESSED BY: LFM, RB

(GENERAL) NEIGHBORHOOD CHARACTERIZATION

Neighborhood/Subdivision Name: S. Polling House Rd

Address (or streets) surveyed: Sigma Dr.

Neighborhood generally homogenous, in terms of basic lot size, road widths, setback and house types: (Y)/N

Neighborhood has Disconnected Impervious Area: (Y)/N

Vegetated Cover Type (Circle all that apply): (Turf Lawn) Riparian Buffer (Wooded Area) Other _____

Vegetated Area Condition (Circle one): (Excellent) Good Poor

Average slope of the vegetated area <5%: (Y)/N

Road Section (Circle one): (Non-Curb & Gutter) Curb & Gutter Other: _____

Runoff conveyed in a safe and non-erosive manner? (YES) / NO

OPEN ROAD SECTION RUNOFF CONVEYANCE

Erosion observed in the conveyance YES / (NO) – Good condition.

Runoff conveyance through (Circle all that apply):

(Grassed Swale) Landscaping Wooded Area Roadside Bioretention area Other _____

Width of the Gravel Verge at the edge of the road (prior to vegetated area): 0 -ft ; No trees marked at the edge

Slope of the vegetated area <4%: (Y)/N

Swale Dimensions: Length 109 ft Bottom Width 7 ft Top Width 24 ft Side Slopes: 5:1 (H:V)

Length of Swale: 150 -ft ; Depth 1.2-ft

COMMENTS/NOTES

Vegetated Cover – 50% Turf Lawn; 50% Wooded Area/Trees

Neighborhood has good Conveyance in a Grassed vegetated Area.

SITE SKETCH

SITE ID: _____

REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (NONROOFTOP)

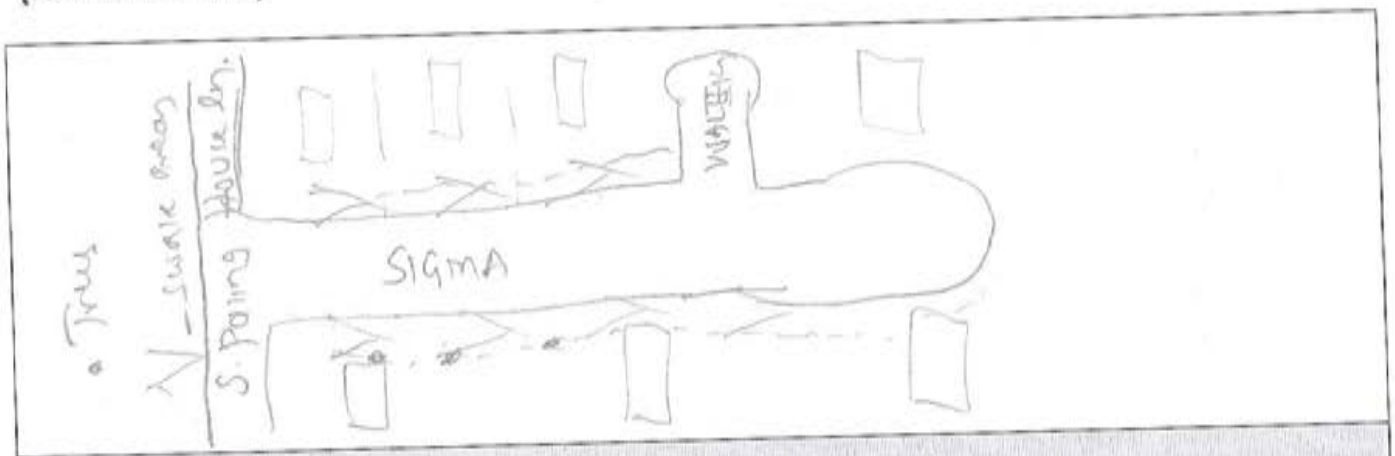


PHOTO INVENTORY

PHOTO #	DESCRIPTION
1	View of Road & House's, overall Conditions
2	View of Typical House & vegetated Areas
3	Closed up of the vegetated Area, Lawn, (Stone Trees)
4	Photo of swale Cross-section
(RB) 5	Typical Lawn & Roadway Swale

SITE ID:_____

REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (ROOFTOP)

NEIGHBORHOOD ID: Area K	DATE: 4 / 29 / 2015
SITE ID: 2	ASSESSED BY: Raghu / Lisa

(GENERAL) NEIGHBORHOOD CHARACTERIZATION

Neighborhood/Subdivision Name: South Polling House

Address (or streets) surveyed: South Polling House

Neighborhood generally homogenous, in terms of basic lot size, road widths, setback and house types : Y/N

Neighborhood has Disconnected Impervious Area: (Y)/N

Vegetated Cover Type (Circle all that apply) : (Turf Lawn) Riparian Buffer (Wooded Area) Other _____

Vegetated Area Condition (Circle one): Excellent (Good) Poor

Average slope of the vegetated area <5%: (Y)/N

Road Section (Circle one): (Non-Curb & Gutter) Curb & Gutter Other: _____

Runoff conveyed in a safe and non-erosive manner? (YES) / NO

ROOFTOP CONDITIONS ASSESMENT (AT A NEIGHBOURHOOD LEVEL)

% Downspouts directly connected to storm sewer	_____ %
% Downspouts directed to impervious surface	_____ %
% Downspouts discharge to Vegetated pervious areas	100 %
% Downspouts discharge to a cistern, rain barrel, Rain garden, etc.	_____ %

**Note: The above four should total 100%*

Contributing roof area to each downspout 500 sq ft or less? YES / NO

RUNOFF CONVEYANCE (REPRENSTATIVE SITE/LOT LEVEL)

Erosion observed in the vegetated area YES / (NO)

Sheet flow Runoff conveyance through (Circle all that apply):

(Turf) Landscaping (Wooded Area) Rain Barrel/Cistern Rain Garden

Slope of the vegetated area <5%: (Y)/N

Distance from roof leader to the nearest impervious surface: 20 ft.

Length of sheet flow path from roof across vegetated areas: _____ ft. Measure from GIS

COMMENTS/NOTES

60% Turf, 40% wooded

REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (ROOFTOP)

SITE SKETCH

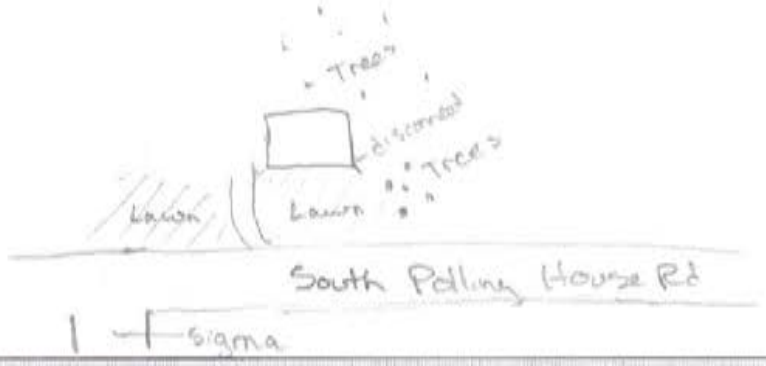


PHOTO INVENTORY

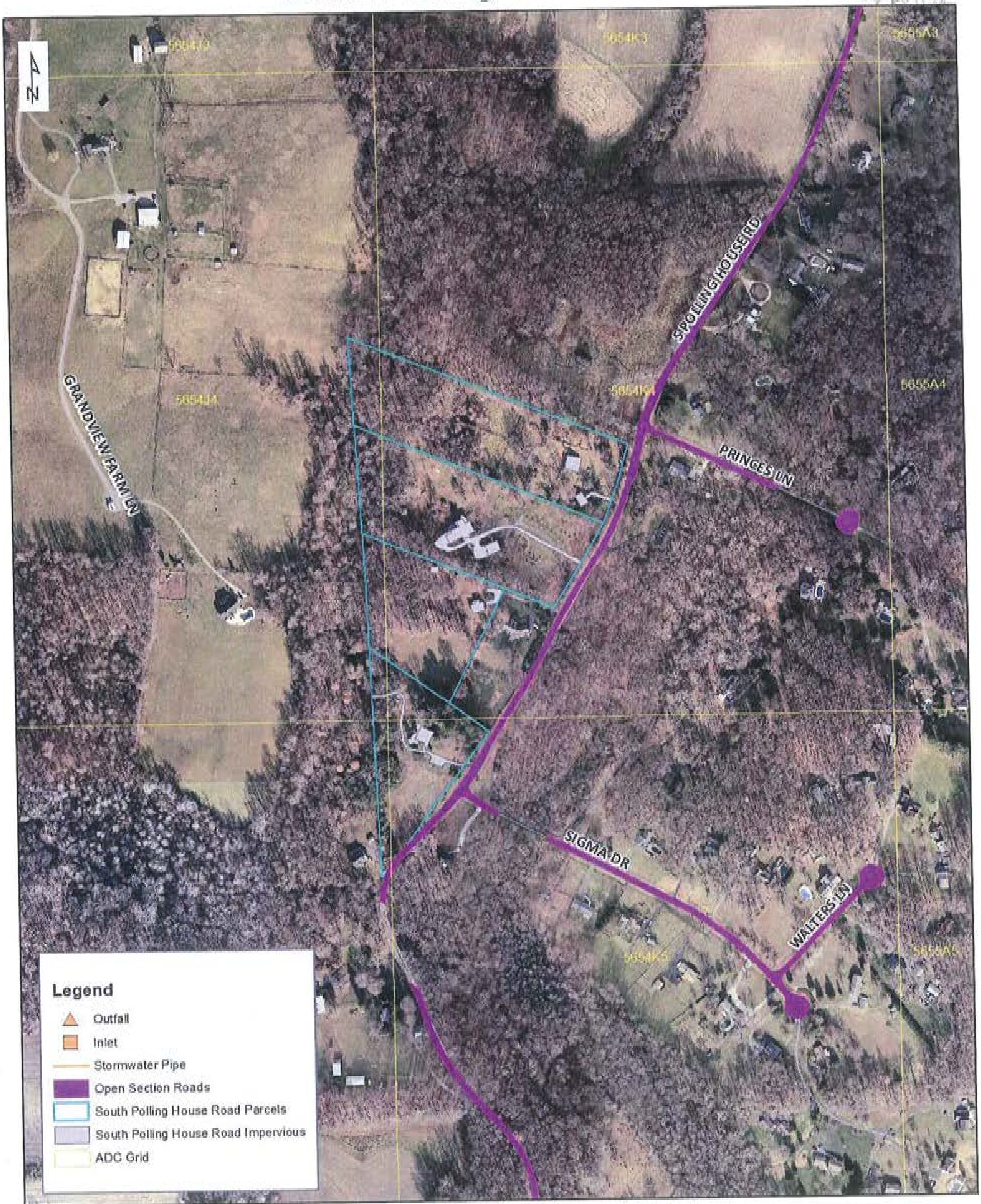
PHOTO #	DESCRIPTION
RB 1	Home and lawn conditions of representative site
RB 2	Close up of downspout disconnect and vegetated area
RB 3	Street view of vegetated area and lawn areas

SITE ID: Area K Site 2

Site (1) Road section – Sigma Dr.   Area (K)

South Polling House Road

Site (2)



REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (ROOFTOP)

NEIGHBORHOOD ID: Area 14	DATE: 04/29/15
SITE ID: Area 14 – Site 1	ASSESSED BY: LFM, RB

(GENERAL) NEIGHBORHOOD CHARACTERIZATION

Neighborhood/Subdivision Name: Greenock Road

Address (or streets) surveyed: Greenock Road

Neighborhood generally homogenous, in terms of basic lot size, road widths, setback and house types (Y)/N

Neighborhood has Disconnected Impervious Area: (Y)/N

Vegetated Cover Type (Circle all that apply) : (Turf Lawn) Riparian Buffer (Wooded Area) Other _____

Vegetated Area Condition (Circle one): (Excellent) Good Poor

Average slope of the vegetated area <5%: (Y)/N

Road Section (Circle one): (Non-Curb & Gutter) Curb & Gutter Other: _____

Runoff conveyed in a safe and non-erosive manner? (YES) / NO

ROOFTOP CONDITIONS ASSESMENT (AT A NEIGHBOURHOOD LEVEL)

% Downspouts directly connected to storm sewer	_____ %
% Downspouts directed to impervious surface	100 %
% Downspouts discharge to Vegetated pervious areas	_____ %
% Downspouts discharge to a cistern, rain barrel, Rain garden, etc.	_____ %

**Note: The above four should total 100%*

Contributing roof area to each downspout 500 sq ft or less? YES / NO

RUNOFF CONVEYANCE (REPRENSTATIVE SITE/LOT LEVEL)

Erosion observed in the vegetated area YES / (NO)

Sheet flow Runoff conveyance through (Circle all that apply):

(Turf) Landscaping Wooded Area Rain Barrel/Cistern Rain Garden

Slope of the vegetated area <5%: (Y)/N

Distance from roof leader to the nearest impervious surface: 710 - ft ft.

Length of sheet flow path from roof across vegetated areas: ~~375~~ 300 ft.

COMMENTS/NOTES

75% lawn; 25% wooded Area

DID not enter Private Property due to safety concerns/Property Condition.

SITE ID: _____

REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (ROOFTOP)

SITE SKETCH

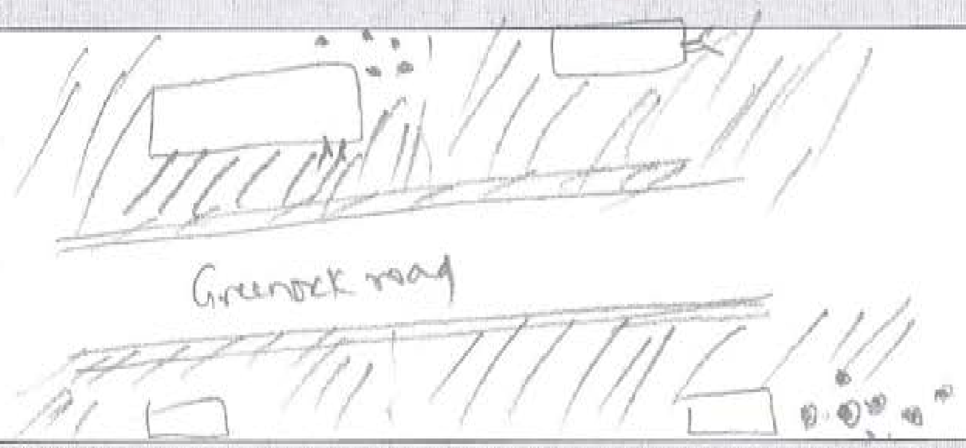


PHOTO INVENTORY

PHOTO #	DESCRIPTION

▨ – Grass/turf area

▦ – Trees/wooded

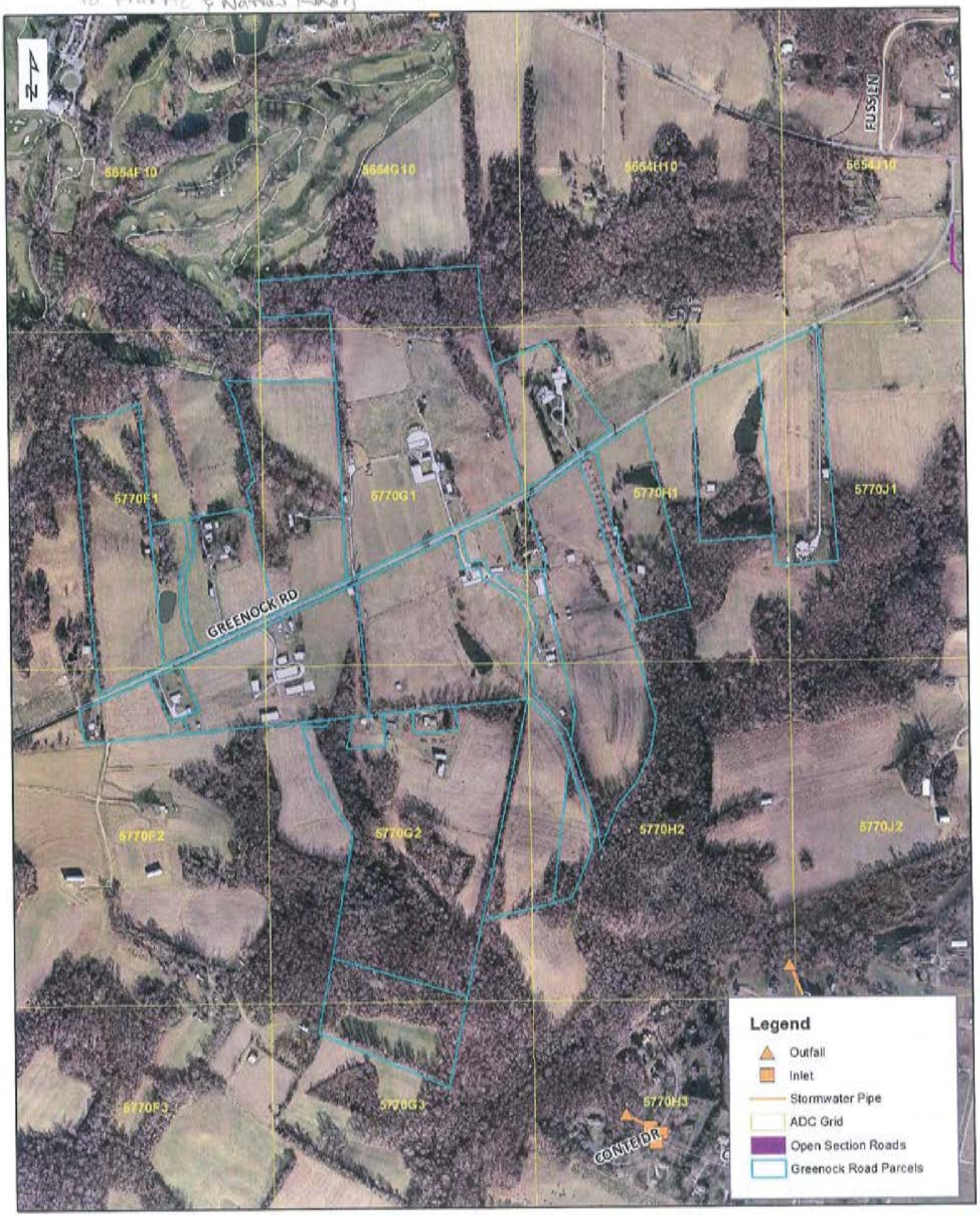
Sheet flow from Road occurs; on to filter strip area

SITE ID: ______________________

F.I.C form out in the office - unable to get a photo due to traffic & Narrow Road

Area M

Greenock Road



REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (ROOFTOP)

NEIGHBORHOOD ID: Area 1	DATE: 4/29/2015
SITE ID: 1 (Area 1 - Site 1)	ASSESSED BY: Raghu / Lisa

(GENERAL) NEIGHBORHOOD CHARACTERIZATION

Neighborhood/Subdivision Name: Crandall Rd

Address (or streets) surveyed: Crandall Rd

Neighborhood generally homogenous, in terms of basic lot size, road widths, setback and house types: (Y)/N

Neighborhood has Disconnected Impervious Area: (Y)/N

Vegetated Cover Type (Circle all that apply) : (Turf Lawn) Riparian Buffer Wooded Area Other _____

Vegetated Area Condition (Circle one): (Excellent) Good Poor

Average slope of the vegetated area <5%: (Y)/N

Road Section (Circle one): (Non-Curb & Gutter) Curb & Gutter Other: _____

Runoff conveyed in a safe and non-erosive manner? (YES) / NO

ROOFTOP CONDITIONS ASSESMENT (AT A NEIGHBOURHOOD LEVEL)

% Downspouts directly connected to storm sewer	_____ %
% Downspouts directed to impervious surface	_____ %
% Downspouts discharge to Vegetated pervious areas	100 %
% Downspouts discharge to a cistern, rain barrel, Rain garden, etc.	_____ %

**Note: The above four should total 100%*

Contributing roof area to each downspout 500 sq ft or less? YES / NO (need GIS verification)

RUNOFF CONVEYANCE (REPRENSTATIVE SITE/LOT LEVEL)

Erosion observed in the vegetated area YES / (NO)

Sheet flow Runoff conveyance through (Circle all that apply):

(Turf) Landscaping Wooded Area Rain Barrel/Cistern Rain Garden

Slope of the vegetated area <5%: Y/N

Distance from roof leader to the nearest impervious surface: 710-ft ft.

Length of sheet flow path from roof across vegetated areas: ~100 ft.

COMMENTS/NOTES

Could not enter Parcel Registry to verify Imp. area to each downspout.

Overall neighborhood is large lots with treed areas with Homes / Imp areas disconnected, with plenty of opportunities for sheet flow to open vegetated areas.

SITE ID: _____

REPRENSENTATIVE FIELD SURVEY-IMPERVIOUS AREA DISCONNECTION (ROOFTOP)

SITE SKETCH

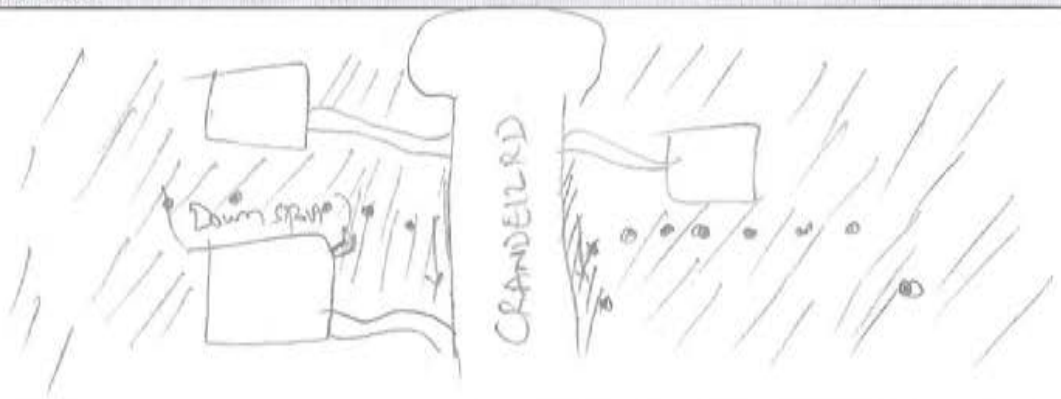


PHOTO INVENTORY

PHOTO #	DESCRIPTION
1	Parallel to Road Showing Road & House Condition
2	Photo facing the House & yard/front Lawn
3	Close-up of the vegetated Area/Lawn
4	Photo of the vegetated Conveyance in the Street

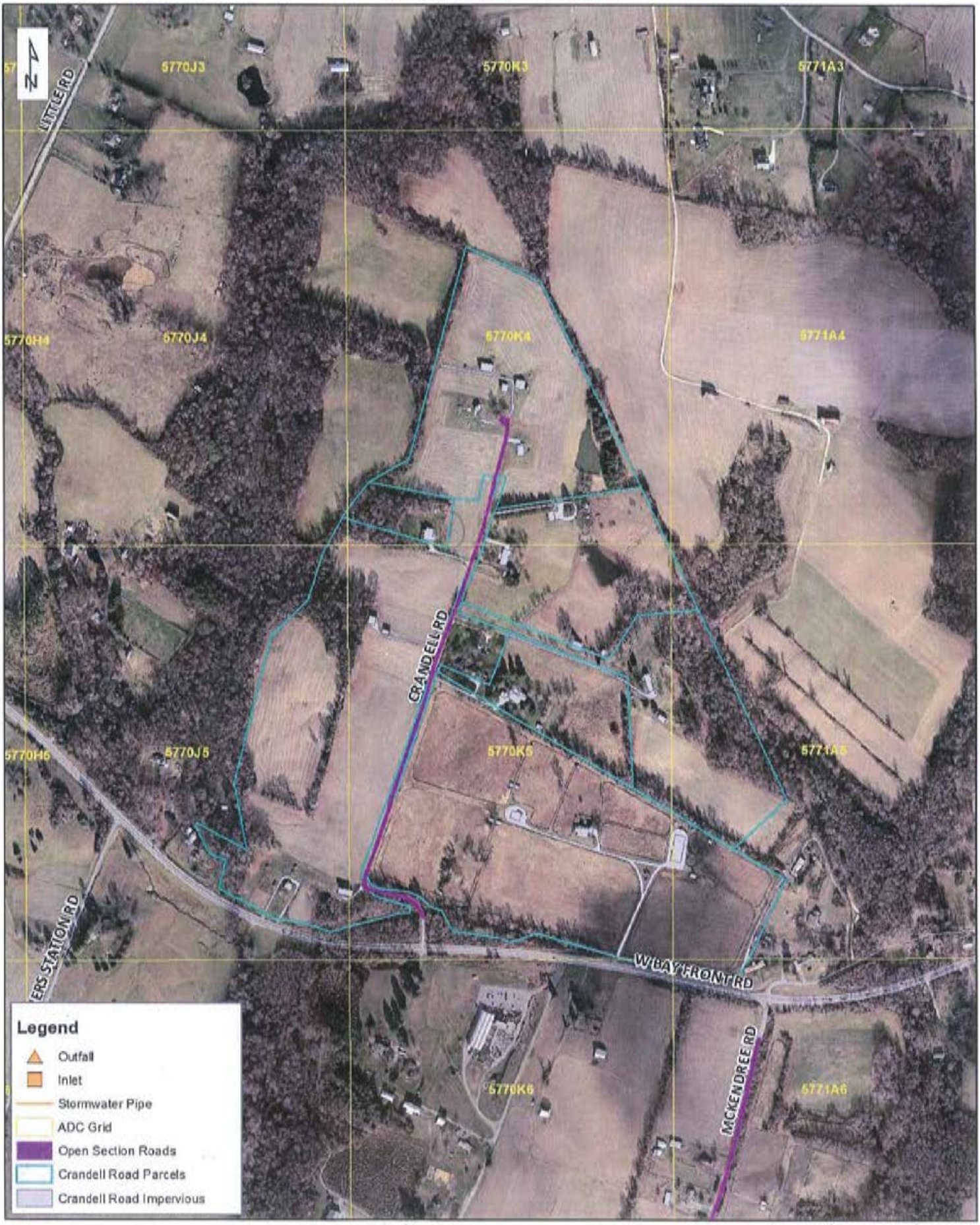
▨ – Grassed Area.

• – Trees

SITE ID:_____

[Rooftop disconnect] Site (5)

Crandell Road



Appendix D –Representative Swale Calculations

Representative Swale sections have been evaluated to meet the below Manual Criteria:

- Swales shall have a bottom width between two and eight feet.
- The channel slope shall be less than or equal to 4.0%.
- The maximum flow velocity for the ESDv shall be less than or equal to 1.0 fps.
- Channel side slopes shall be 3:1 or flatter.
- A thick vegetative cover shall be provided for proper function.

Peak flows to the representative field swale sections was calculated for ESDv. After the Q was calculated, the velocity was calculated to verify the above criteria was met.

It should be noted that field teams were required to review the vegetated area condition for signs of erosion. Swale Depth was calculated in the field.

The Swale calculations are based on Manning's equation.
Q = A*V (Q Known and A known Solve for V); Q = Peak discharge to the channel (cfs) calculated using TR-20

V –= Flow velocity, ft/s ; S = Longitudinal slope of the invert of the channel (ft fall/ft run).
Area $A = By + My^2$

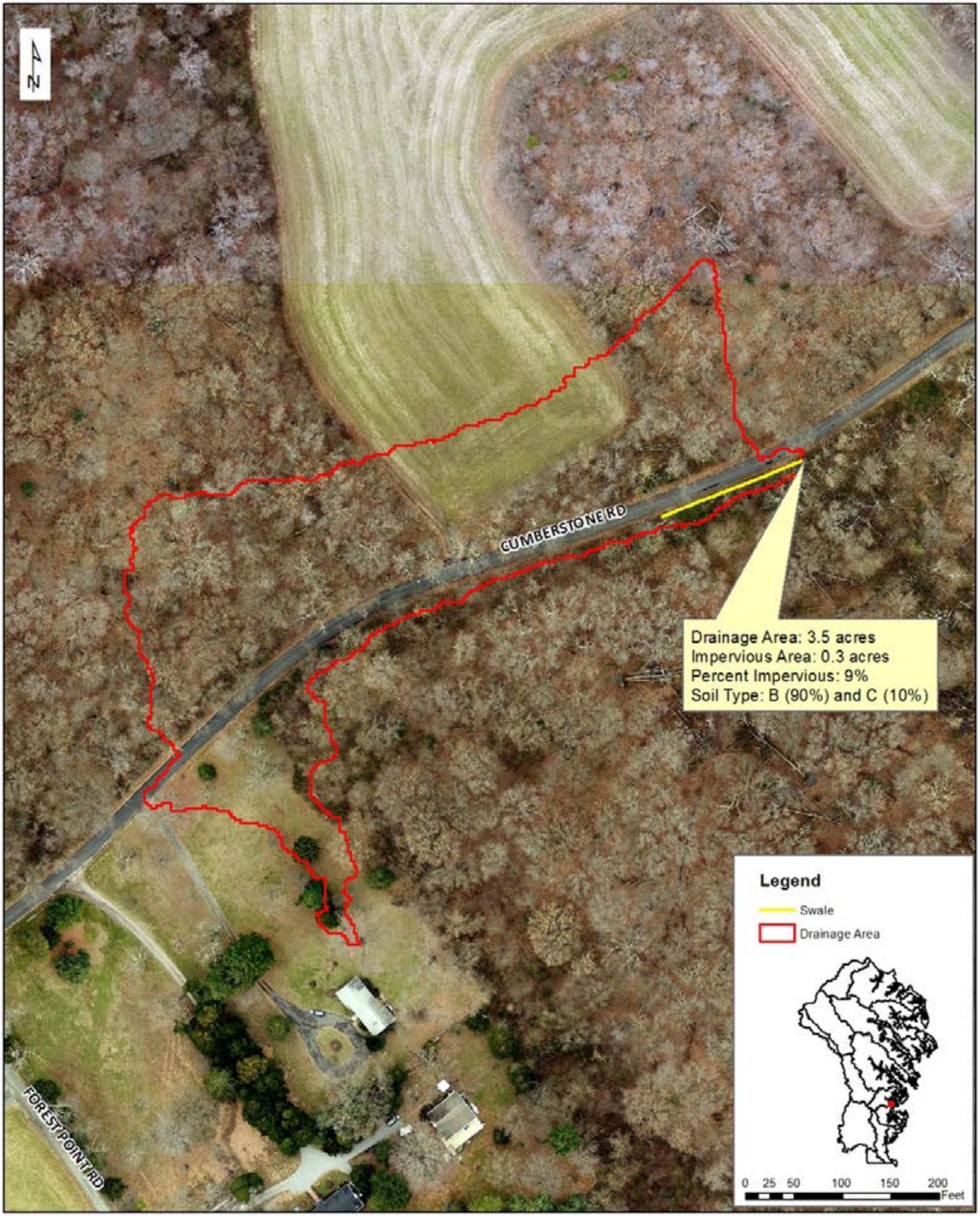
M is governed by channel side slope, which was measured in the field. It was captured as M:1 in the field (e.g., 3:1 ; 3H:1V)

Site Area	Peak flow cfs(ESDv)	Bottom Width (ft)	Top Width	Slope " M"(H:V) (M:1)	Depth (ft)	Area (of Swale)	Velocity	Notes -Check for nonerosive velocity
Cumberstone	0.528	2	6.5	3	0.25	0.6875	0.768	OK
Sigma	1.62	7	24	5	0.8	8.8	0.184090909	OK
St. Stephens Church Rd	1.1	2	11	5	0.33	1.2045	0.913242009	OK
Sheridian Rd	0.12	1.25	9	3	0.5	1.375	0.087272727	OK
St. Heather Ln	0.7	3.9	15	3	0.9	5.94	0.117845118	OK
South River Clubhouse Rd	0.8	2	9.5	3	0.8	3.52	0.227272727	OK

Notes:
1. Bottom width, side slope, top width, and depth are from field surveys

Cumberstone Road Swale

Map 20

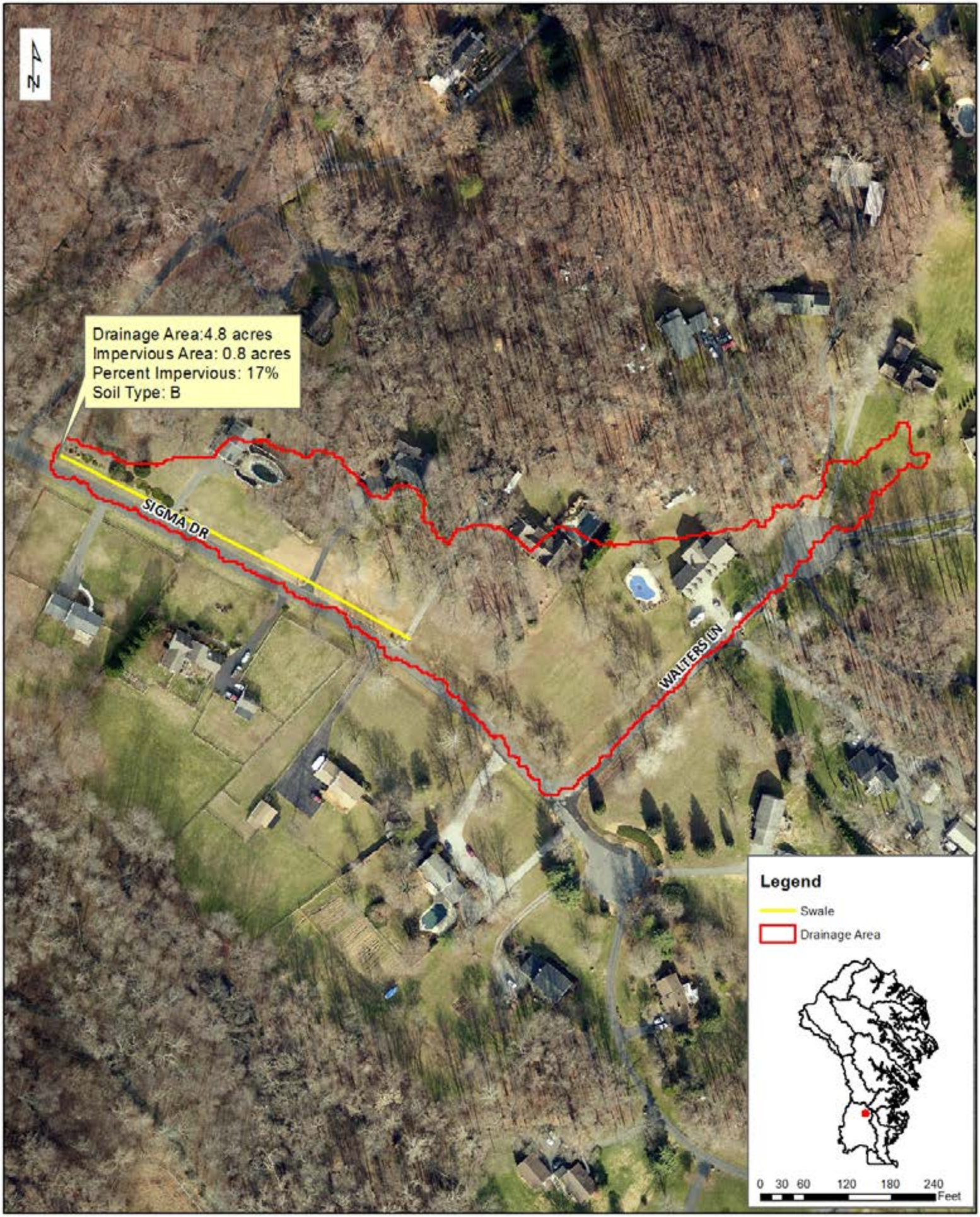


St. Heather Lane Swale

Map 21

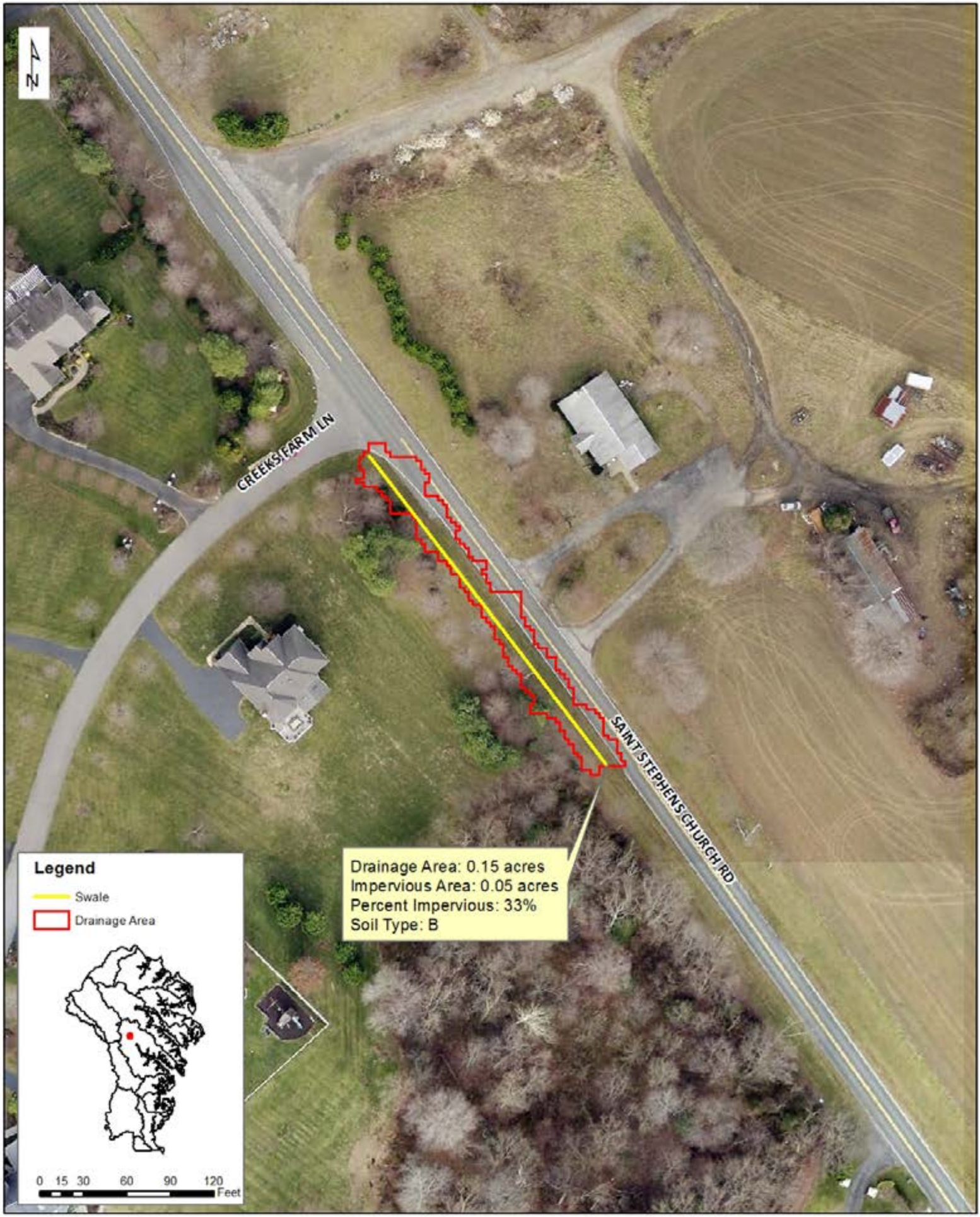
Sigma Road Swale

Map 22



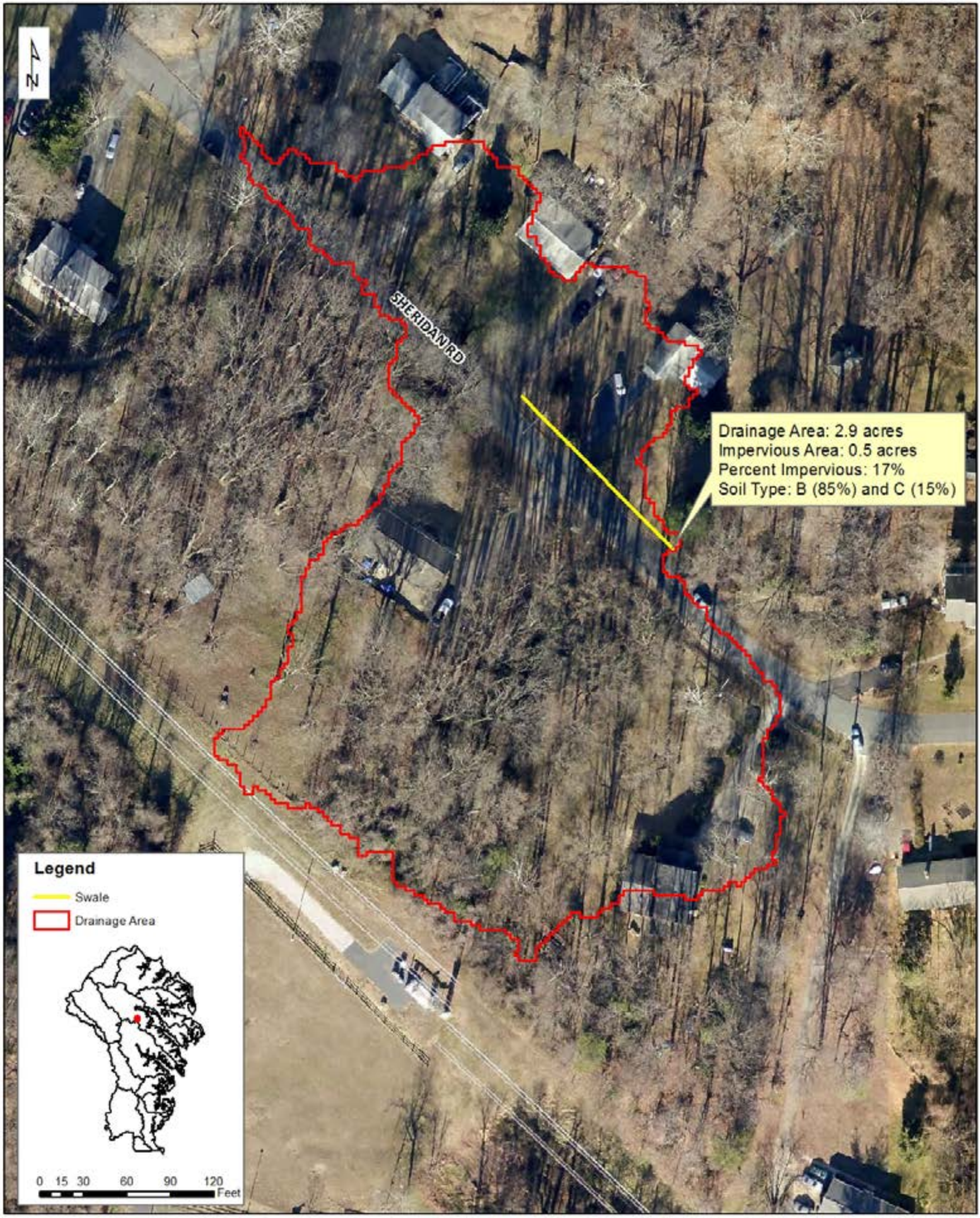
St. Stephens Church Road Swale

Map 23



Sheridan Road Swale

Map 24



South River Clubhouse Road Swale

Map 25