



County of Albemarle, Virginia

— Local Information in Support of Chesapeake Bay TMDL Phase II WIP —

Albemarle County is pleased to have the opportunity to submit local data in support of the Virginia Phase II Watershed Implementation Plan (WIP) for the Chesapeake Bay TMDL. We hope that the included data is used to improve the underlying technical basis for the Bay TMDL and supports Virginia's demonstration of "reasonable assurance" of compliance. Albemarle County recognizes our role in the cleanup of the Bay and is committed to supporting the Bay TMDL planning process and wishes to see this process succeed.

Albemarle County Overview

Albemarle County encompasses 726 square miles in the Northern Blue Ridge and Northern Piedmont regions of Virginia and has an estimated (2010) population of 98,970. Ninety-eight percent of the County lies within the watershed of the Middle James River; the remaining two percent – lying in the northeast corner of the County – drains to the York River. Approximately 67% of the County land area is classified as forested and approximately 24% is classified as open land – including pasture and lawns.

A significant portion of the County – approximately 104,255 acres or 22 percent – is protected from future development either because it lies within a federal, state, or County park or through conservation easements. A total of over 85,000 acres have been placed in conservation easements under the County's Acquisition of Conservation Easements (ACE) Program or through the efforts of other local organizations, including the Virginia Outdoors Foundation, Piedmont Environmental Council, The Nature Conservancy, and the Virginia Department of Forestry. The northwest corner of the County – approximately 14,130 acres – is part of the Shenandoah National Park.

At the center of the County lies the independent city of Charlottesville. Approximately 80% of the University of Virginia is located within the County with the remainder located in the City. Piedmont Virginia Community College is located in the County southeast of the City.

Approximately 5% of the County is designated as development areas. These development areas generally surround Charlottesville and extend northward along the State Road 29 corridor and also include the Village of Rivanna and the Community of Crozet – located east and west of Charlottesville, respectively.

Albemarle County has been covered under a general permit for small (Phase II) MS4 communities since May 13, 2003 and has maintained ongoing compliance with permit requirements. Several neighboring organizations also hold MS4 permits; these include the City of Charlottesville, the University of Virginia, Piedmont Virginia Community College, and the Virginia Department of Transportation.

Past and Current County Water Protection Programs

Albemarle County has been – over the last several decades – early to adopt progressive water protection policies, programs, and practices. The table below includes some of the many programs implemented by the County that – while difficult to quantify and evaluate – have undoubtedly led to considerable reductions in the amount of pollutant discharged from County lands.

Comprehensive Plan	The County’s Comprehensive recognizes the important of natural resource protection. Approximately 30 different planning objectives are related to water resource protection. Growth management is anchored in the protection of drinking water supplies.
MS4 Program	The County has been implementing a MS4 program since 2003, partnering with adjacent MS4 organizations and other local partners on many of the minimum control measures. We began requiring privately-developed stormwater facilities and conveyance systems be placed within public easements to ultimately facilitate a more extensive County-managed stormwater management system.
Water Quality regulations for new development	In 1998, Albemarle County voluntarily adopted water quality regulations under the authority of the Chesapeake Bay Preservation Act.
Early water supply protection rules	Beginning in 1980, the zoning ordinance included stormwater management rules, beginning with basic detention requirements. In addition, western portions of the County was covered under a special runoff control ordinance.
Designated Development Areas	In 1980, five percent of the County was designated for growth. The remaining 95 percent was subjected to density down-zoning.
Stream Buffer protection rules	Albemarle County was the first and remains one of few local governments in Virginia outside of the tidewater areas to pass rules protecting riparian areas. Currently, the rules apply to perennial streams throughout the County and intermittent streams outside the development areas.
Capital Improvement Program	The County has voluntarily implemented a capital improvement program to provide additional stormwater management in urban areas and enhance stream corridors.
ACE Program and other conservation easements	In addition to the County-implemented Acquisition of Conservation Easements (ACE) program, there are a variety of land conservation programs active within the County. There were 81,202 acres under permanent conservation easements, as of January 1, 2010.

Post-Construction Stormwater BMP Inspection Program	A GIS and sophisticated database facilitates a robust post-construction stormwater BMP inspection program.
Critical Slopes restrictions	The County's critical slopes ordinance was originally applicable to lands surrounding the community's primary water supply reservoir and was later expanded to the entire County.
Community Involvement	Albemarle County and the Rivanna River basin have benefitted from the local involvement of a variety of not-for-profit public interest and advocacy organizations.
Other TMDL WIPs	In addition to the Chesapeake Bay TMDL WIP, the County is working with DEQ and other local partners in the development of WIPs for Meadow Creek, Schenks Branch, Moore's Creek and Lodge Creek (for benthic impairment) and Moore's Creek (for bacteria).
Floodplain Management	Albemarle County has developed a flood hazard overlay and is more restrictive than most communities regarding development within floodplains.
Ag-Forestal Districts	The County has facilitated the creation of agricultural and forestal districts that result in restrictions on future land development.
E&S Program	The County maintains a higher density of inspectors and enforces higher standards compared to most Virginia local governments.

WIP Development Process

Albemarle County has recognized the importance of participating in the WIP development process – and its moral obligation to work towards healthier local streams and a cleaner Bay – and has designated staff to actively participate in the process.

The Thomas Jefferson Planning District Commission (TJPDC) and the Rivanna River Basin Commission (RRBC) have collaborated to provide programmatic and technical support to the local governments in this region and much of the County engagement has been through these organizations. Staff have attended a variety of DCR coordination meetings hosted by the TJPCD – including a June 29, 2011 *data delivery* meeting and an August 1, 2011 *data workshop*. In addition, staff have coordinated with local partners, including adjacent MS4s – often through the RRBC – to share data, techniques, and strategies for addressing the information request. The County also participated in the Piedmont Regional Pilot Project, an effort coordinated by the RRBC which focused on identifying strategies for local engagement during the Phase II WIP process.

Internally, County staff from multiple departments, including the County Executive's Office, Community Development, and General Services, have met on many occasions to monitor and evaluate the Virginia process and to determine an appropriate approach and response. Activities carried out by County staff include:

- completing a County database of stormwater BMPs, including mapping BMPs and associated drainage areas within a GIS

- coordinating with UVA to incorporate their data into our database
- reviewing the Bay Model LU/LC data and comparing it to locally-developed data
- reviewing the Bay Model 2005 and 2009 BMP data and comparing it to locally-developed data
- assessing the Bay Model 2025 BMP scenarios

Albemarle County has not previously submitted to DCR information related to the WIP – for instance, for the October 1, 2011 deadline for inclusion in Virginia’s *draft* Phase II WIP.

BMP Inventory

Albemarle County appreciates the opportunity to share local BMP data so that the Chesapeake Bay model can be updated to better reflect the on-the-ground consequence of our decades of water resource protection programs. We have determined that there are significant inconsistencies in the level of stormwater management within the County between our best data and that currently reflected in the Chesapeake Bay Model (v5.3.2).

The information we are able to provide is limited to those BMPs over which the County has ownership or regulatory authority. Subsequently, we do not have data on BMPs related to the following:

- agricultural or forestry practices
- privately-owned septic systems
- VDOT-maintained roadways and stormwater infrastructure

We have compiled data pertaining to the considerable number of stormwater BMPs located within the County. The data includes BMPs that are both privately and publicly owned and maintained. Public BMPs are typically larger, regional facilities that were either constructed as part of a private development and then dedicated to the County or were constructed by the County as urban stormwater retrofits to address issues or provide additional downstream protection. Private BMPs include those that are owned and maintained by UVA (only those within the County portions), a separate MS4 entity having a comprehensive stormwater master plan.

The County stormwater BMP data includes the following attributes:

- ID#
- project name
- type of BMP
- activation date
- location (in GIS)
- area served by BMP

For the purposes of this submittal, the type of BMP was translated into one of the *combined BMP* types listed in the spreadsheet made available to us: 5.3.2LocalGoalData_Statewide_w2005.xls. The activation date is generally the date in which the County released the BMP construction bond to the contractor. It should be noted that, in some cases, a BMP could reasonably have been operating for years before the designated activation date. The location of each BMP is recorded in a GIS. This allows drainage areas to be created and associated with each BMPs.

In some cases, a single drainage area was created for multiple BMPs serving the same project. For instance, a site plan or subdivision may be served by several vegetated filter boxes for water quality treatment and an underground detention system for flow attenuation. This collection of BMPs is represented in this submittal as a single BMP system (filter) with the drainage area being the combined drainage area of the project.

Also, BMP drainage areas are occasionally nested within others. For instance, it is often the case that multiple, small, privately-owned BMPs lie with the drainage areas of regional BMPs. For this exercise, the drainage areas of smaller BMP were clipped out of regional BMP drainage areas so that no area is assigned to more than a single BMP. Although some runoff would actually pass through multiple BMPs (as in the concept of *treatment train*), it is not possible in this submittal – given the present resource and reporting constraints – to represent this level of complexity.

The County BMP data was combined with that provided by UVA. The current state of stormwater management within the County is summarized in the table below:

number of BMPs	801
number of BMP drainage areas in data set	552
total area served by BMPs (acres)	18,686
total impervious area served by BMPs (acres)	2,354
total impervious area within County (acres) (not including public roadways)	8,237
percentage of total County impervious area served by BMPs	29%

The oldest BMPs in the County were constructed in the late 1970's – driven by early ordinances to protect downstream properties from erosion and flooding. BMP drainage areas range in size from 0.02 acres for a cistern at the UVA Student Garden to 7,873 acres, the area draining to Lickinghole Basin (minus the many sub-areas draining into smaller BMPs), a regional wet pond completed in 1993 to enhance protection of the community's downstream principal water supply reservoir. We would be happy to provide DCR with the complete stormwater BMP data set, if requested.

Comparison of Data – 2005 and 2009 Progress BMPs

The table below is a summary of BMP data as reflected by the Bay Model versus the County's GIS for the following time periods:

- progress 2005 BMPs – those constructed through December 31, 2005
- progress 2009 BMPs – those constructed through June 30, 2006
- 2006 through June 2009 – those constructed between January 1, 2006 and June 30, 2009

	progress 2005 BMPs		progress 2009 BMPs		2006 - June 2009	
	Bay Model v5.3.2	Albemarle County	Bay Model v5.3.2	Albemarle County	Bay Model v5.3.2	Albemarle County
unregulated						
StreetSweep (Acres) (Annual)	0	0	1	0	1	0
UrbanNutMan (Acres) (Annual)	26	0	7	0	-20	0
Impervious Area Surface Reduction (Acres)	0	0	0	0	0	0
UrbStrmRest (linft)	0	0	0	0	0	0
ExtDryPonds (Acres Treated)	823	7	1150	8	327	1
DryPonds (Acres Treated)	308	155	313	198	5	43
WetPondWetland (Acres Treated)	543	5288	591	6039	48	751
Infiltration (Acres Treated)	4	0	5	0	1	0
Filter (Acres Treated)	17	761	30	2643	13	1882
regulated			June 2009	June 2009		
StreetSweep (Acres) (Annual)	0	20	0	25	0	5
UrbanNutMan (Acres) (Annual)	11	0	3	0	-8	0
Impervious Area Surface Reduction (Acres)	0	0	0	0	0	0
ExtDryPonds (Acres Treated)	309	140	409	249	99	108
DryPonds (Acres Treated)	116	1509	111	1631	-5	122
WetPondWetland (Acres Treated)	202	4480	210	4733	8	253
Infiltration (Acres Treated)	2	5	2	5	0	0
Filter (Acres Treated)	8	315	11	502	3	187
Total Treated Acres	2369	12680	2842	16033	473	3354

As indicated by the values in the first column group, the overall degree of stormwater management present in the County through the end of 2005 – the model calibration period – is significantly under-represented by the Bay Model. The obvious exception to the rule is the Bay Model’s over-representation of extended dry ponds in the unregulated areas. Since the model was calibrated at the regional scale – in which there was no differentiation between the varying levels of stormwater management of localities – it seems that Albemarle County may not be recognized for its early adoption of water resources protection policies and programs. The same could be said for the amount of treated areas present in mid-2009 (middle column group).

Perhaps more importantly, the Bay Model also significantly underestimates the amount of BMP-served areas that were created between January 2006 and June 2009 (last column group). While the Bay Model again over-represents the use of extended dry ponds in the unregulated areas, the use of other BMPs is generally under-represented.

Note: As of the date of this document, this data had not been entered into VAST. But the entire BMP data set has been provided to DRC as part of this process. It should be noted that this data is the best synthesis and representation of the large quantity of data the County holds – some of it very old – and that we reserve the right to re-interpret and re-analyze the data and revise any provided summary.

Land Use / Land Cover Evaluation

Albemarle County appreciates the opportunity to share local land use / land cover (LULC) data so that the Chesapeake Bay model can be refined with more accurate land cover. We recently collaborated with other local organizations, including the Rivanna River Basin Commission , StreamWatch, and the City of Charlottesville, to develop a LULC map based on high-resolution aerial photography recorded in 2009. The map incorporated existing impervious cover data which had been developed and maintained with high precision by the County’s internal GIS office. We would be happy to share this LULC map with DCR.

A cross-walk of the Bay Model data and the locally-derived data is summarized in the following table. With the exception of impervious cover and water, the subsorce categories of the two LULC data sets were disparate – this made evaluation somewhat challenging. To attempt any comparisons, it was necessary to group some subsources into general classes.

Albemarle County - 2009 Land Use

from Bay Model		from Rivanna LULC map		Notes
subsource	area (acres)	area (acres)	subsource	
Animal Operations	220			No overlap between specific LULC categories. However, when similar categories (agricultural, open space) are aggregated, the total areas are in good agreement (based on percent difference from Bay Model).
Crop	2211			
Hay	25289			
Pasture	50924			
Unmanaged Grass	7114			
Unregulated Urban Pervious	16991			
Regulated Urban Pervious	7064			
Nurseries	89			

		110134	Open Land
		938	Golf Course
		3202	Orchard/Vineyard
		<hr/>	
	109902	114274	
difference:	4372		4%

Unregulated Urban Impervious	6910		
Regulated Urban Impervious	1426		
		11365	Impervious
		<hr/>	
	8336	11365	
difference:	3029		36%

Significant difference. County data should be regarded as highly accurate.

Surface Mine	777		
Construction	441		
		1904	Bare Earth
		<hr/>	
	1218	1904	
difference:	686		56%

No overlap between specific LULC categories. Even when similar categories are aggregated, the total areas are very different.

Forest	341573		
		269310	Deciduous Forest
		41596	Evergreen Forest
		19338	Pine Plantation
		2186	Forest Harvest
		<hr/>	
	341573	332430	
difference:		9143	3%

Total areas are in good agreement (based on percent difference from Bay Model).

Atmospheric Deposition	3749		
		4765	Water
		<hr/>	
	3749	4765	
difference:	1016		27%

County data should be considered highly accurate; is likely larger due to inclusion of many small water bodies.

Grand Total (acres)	464777	464738	
overall difference:		39	

Two of the resulting LULC groups were in close agreement: the ag/open land group (purple) and the forest group (green). Although the total number of acres in the groups differed significantly across the two data sets – 4,372 acres and 9,143 acres, respectively – the differences as a percentage of the Bay Model totals were small: four and three percent, respectively. The third grouping – construction / bare earth (peach) – showed less agreement; the Bay Model appears to underestimate this amount, although the Albemarle mapping process could have included many small areas of bare earth not associated with surface mining, construction, or nurseries.

Despite the impervious and water subsources being clear and consistent across the two data sets, there was surprising disparity. The Bay Model seems to underestimate the amount of impervious surface within the County by 36 percent and the amount of water within the County by 27 percent.

Note: As of the date of this document, this data had not been entered into VAST.

Final Notes

While we appreciate DCR's offer to receive Albemarle County's preferred future BMP scenarios and associated strategies and resource needs, we are not prepared at this time to provide this information. As such, we understand that the default BMP scenarios developed as part of the Phase I WIP process in 2010 will be used in DCR's final Phase II WIP submission to EPA.

Some of the circumstances that led to the County's decision include:

- EPA's acknowledgement that the Bay Model data is not appropriate for determining local pollutant reduction targets
- current County budget and staff limitations
- lack of comprehensive cost data associated with various BMPs
- absence of County authority over many of the modeled BMPs
- unwillingness to submit to future BMP scenarios without a clear State guideline or directive

As a Phase II MS4 community, the County reserves the right to review and revise the Phase I WIP default scenario as part of any TMDL implementation planning that may be required or performed pursuant to the permit. In addition, we understand that our implementation of the water quality goals of the Bay TMDL and local TMDLs is currently governed by the "maximum extent practicable" standard.

Albemarle County remains committed to a high level of water resources protection and looks forward to continuing to support the State in refining how the Chesapeake Bay TMDL can be most effectively implemented.