

RICHMOND REGIONAL PDC TECHNICAL ASSISTANCE --FINAL REPORT--

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NA10NOS4190205
Task Number: 48**

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Planning District
Commission**

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Richmond Regional Planning District Commission

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Executive Summary

The Richmond Regional Planning District Commission receives Technical Assistance grant funds from the Virginia Coastal Zone Management Program for the provision of technical assistance to member localities located within the Coastal Plain of Virginia. In addition, these funds also support the creation of special projects each year. This grant year, the RRPDC special project was a public access guide displaying information for all the rivers in the Richmond Region. Brief descriptions of each project funded by this grant can be found below; full descriptions and product information can be found in the various sections and appendices of this document.

Report on Coordination Initiatives – RRPDC staff summarized comments supplied by local staff at a September 2010 Environmental TAC meeting to include in the RRDC 2011 Legislative Agenda. The Legislative Agenda was used by RRPDC staff to inform the Capital Region Delegation at the Virginia General Assembly about environmental concerns and consensus for localities in the Richmond Region. RRPDC staff processed 72 environmental and intergovernmental reviews during this portion of the grant year. Throughout the year, RRPDC staff also attended meeting and participated in the development of local Total Maximum Daily Load (TMDL) implementation efforts relevant to the Region. RRPDC staff has also attended several meetings of Virginia’s Stakeholder Advisory Group for the Chesapeake Bay TMDL Phase II Watershed Implementation Plan (WIP II); RRPDC staff summarized these meetings and reported to local planners.

Report on Training Initiatives – RRPDC staff organized four Environmental Technical Advisory Committee meetings that provided opportunities for locality staffs to learn about various water quality programs and issues within the Richmond Region and beyond. On February 8, 2011, the Environmental TAC met at the Henrico County Water Treatment Facility for a tour and discussion about water treatment and distribution. On May 10, 2011, staff from the Virginia Department of Conservation and Recreation (DCR) provided a presentation on the Healthy Waters Initiative. Staff from the Virginia Department of Environmental Quality also presented information on newly developed Environmental Education programs including the Coastal GEMS website, Water Stewardship Campaigns and a Climate Science program. In June and September of 2011, the RRPDC hosted 2 meetings for locality staff and other stakeholders on Virginia’s creation of the WIP II for the Chesapeake Bay TMDL. Locality staff in the Richmond region met with staff of DCR, Soil and Water Conservation Districts in the Richmond Region, and non-profit organizations relevant to water quality.

Impervious Cover Forecast Report – RRPDC staff completed digitization of all 2009 structures for the region; PDC staff updated with local data where available. RRPDC staff also completed a transportation layer to include interchanges, median strips, turn lanes and actual road pavement

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widths as well as parking lots using the 2009 aerial photography available from VGIN. RRPDC staff produced a report analyzing impervious cover in 2009 and change between 2002 and 2009, the two years for which regional impervious surface GIS data is most complete and comparable.

Rivers of the Richmond Region Public Access Guide – The Access Guide includes an inventory of features and locations of public access points to the Pamunkey, Appomattox, Chickahominy and James Rivers. RRPDC staff began by researching and reviewing prior plans and maps and Virginia Department of Game and Inland Fisheries (VDGIF) resources. RRPDC staff coordinated stakeholders, including state agencies and advocacy groups to ensure the accuracy of data gathering efforts. RRPDC staff coordinated with Crater PDC on their inventory of the Appomattox River. RRPDC staff completed the field reconnaissance work and prepared a draft map of public water access points for review and comment by river stakeholders and local planning staffs. The map was professionally printed and copies have been distributed to stakeholders across the Richmond Region. Copies are also available from the RRPDC office and for download from www.richmondregional.org.

Initiation of Regional Stormwater Management (SWM) Discussion - Given proposed changes in the State and Federal regulatory environment the importance of understanding alternative SWM approaches and Best Management Practices (BMP) for SWM in the region is becoming evident. Toward this end, PDC staff has begun the discussion with localities and with representatives of the local development community. RRPDC staff met with locality staff around the region to discuss the status of stormwater management facilities and BMPs in each locality.

Product #1: Coordination Initiatives

The Richmond Regional PDC Technical Assistance Program Grant funds the Environmental Coordination Program among member localities in the RRPDC. RRPDC staff continuously work with locality staff to share information about current and future issues and policies, as well as provide technical assistance on these matters when able.

As part of the Environmental Coordination Program, the RRPDC maintains an Environmental Technical Advisory Committee (TAC). The Environmental TAC consists of locality staff as appointed by Directors of local Planning, Environmental Engineering, Public Utilities and other relevant departments. The goal of the committee is to provide a forum for information sharing on environmental and water quality issues, as well as provide opportunities for training and education. In addition, RRPDC staff solicit comments from Environmental TAC members for inclusion in environmental and relevant intergovernmental reviews.

Highlights of the RRPDC Coordination Program from Federal Fiscal Year 2010:

- RRPDC staff worked with the Environmental TAC and other locality staff to create and refine the RRPDC legislative agenda. This agenda is used to inform the Capital Region Caucus to the Virginia General Assembly about matters of concern and consensus for localities in the Richmond Region, including environmental matters. More information about the RRPDC legislative program and copies of the 2011 legislative agenda are available from the RRPDC website: http://www.richmondregional.org/Legislative_Program/legislative.htm. The 2012 Legislative Agenda is currently in draft form; once finalized, the agenda will be posted on the website listed above.
- RRPDC staff participated in the development of the James River Bacteria TMDL Implementation Plan; RRPDC staff sat on both the Plan's Steering Committee and the Urban & Governmental Workgroup. RRPDC staff communicated with locality staff about the development of the plan document throughout the process. In addition, RRPDC staff have helped facilitate the potential beginning of a region pet waste pick up campaign that grew out of Implementation Plan discussions. This campaign is still in the early stages, but shows promise with the involvement of numerous stakeholders across the region. RRPDC staff are also involved in the ongoing development of the James River PCB TMDL and the Chickahominy River Bacteria TMDL. RRPDC staff has also attended several meetings of Virginia's Stakeholder Advisory Group for the Chesapeake Bay TMDL Phase II Watershed Implementation Plan (WIP II); RRPDC staff summarized these meetings and reported to local planners.
- RRPDC staff processed 72 environmental and intergovernmental reviews during this grant year. A summary list of these reviews follows below. Copies of comment letters submitted are available upon request.

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October 2010	None	April 2011	4 Reviews
November 2010	3 Reviews	May 2011	9 Reviews
December 2010	7 Reviews	June 2011	8 Reviews
January 2011	4 Reviews	July 2011	7 Reviews
February 2011	4 Reviews	August 2011	8 Reviews
March 2011	13 Reviews	September 2011	7 Reviews

- ❖ Department of Environmental Quality; Modification of VPDES Permit No. VA0020699 For DOC Powhatan Correctional Center Wastewater Treatment Plant
- ❖ Department of Environmental Quality; General Permit Regulation: Biomass Energy Generator General Permit
- ❖ Department of Environmental Quality; The Federal Club Water Protection Permit
- ❖ Department of Environmental Quality; Ground Water Withdrawal Permit: High Point Farms Water System
- ❖ Department of Environmental Quality; Ground Water Withdrawal Permit: Walnut Grove Water System
- ❖ Department of Environmental Quality; Ground Water Withdrawal Permit: Colonial Forest Water System
- ❖ Department of Environmental Quality; Environmental Regulation: Fast Tract Rulemaking
- ❖ Department of Environmental Quality; Pole Green Road Scoping
- ❖ Department of Environmental Quality; Ground Water Withdrawal Permit: United States Air Force Joint Base Langley Eustis
- ❖ Department of Environmental Quality; Ground Water Withdrawal Permit: Golden Horseshoe Green Golf Course
- ❖ Department of Environmental Quality; Ground Water Withdrawal Permit: BASF Corporation-Williamsburg Plant
- ❖ Capital Area Partnership Uplifting People Inc. request to purchase bus
- ❖ Department of Environmental Quality; Nationwide Use of High Frequency and Ultra High Frequency SONOR Technology
- ❖ Department of Environmental Quality; Virginia Clean Water Revolving Loan Fund (VCWRLD) Draft Stormwater Loan Program Guidelines
- ❖ Department of Environmental Quality; VCU Institute for Contemporary Art
- ❖ Chesterfield Community Services Board FTA Section 5310 Purchase Request
- ❖ Department of Environmental Quality; Parham Landing/Route 33 Corridor Water system Application to withdraw ground water
- ❖ Department of Environmental Quality; VADEQ Total Maximum Daily Load (TMDL) study for the James River
- ❖ Department of Environmental Quality; VADEQ Intergovernmental Review for [11-05] Database and Reporting Process for Tracking Wetlands in Virginia

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- ❖ Department of Environmental Quality; Adoption of two general purpose regulations: Electric Generator Voluntary Demand Response/Emergency Generator General Permit
- ❖ A Grace Place Adult Care Center ; FTA Section 5310 Purchase Request
- ❖ Department of Environmental Quality; Ground Water Withdrawal Permit: Elizabeth Manor Golf and Country Club
- ❖ Department of Environmental Quality; Ground Water Withdrawal Permit: Hanover Farms Cold Harbor & Gains Mill Roads
- ❖ Department of Environmental Quality; Ground Water Withdrawal Permit: Cherrydale Water System
- ❖ Department of Environmental Quality; Ground Water Withdrawal Permit: Richmond Cold Storage
- ❖ Department of Environmental Quality; VWP: Vulcan Richmond Quarry
- ❖ Department of Environmental Quality; Virginia Department of Corrections Steam Plant Improvements
- ❖ Hanover Department of Public Utilities; State and Tribal Assistance, Special Appropriations
- ❖ Department of Environmental Quality; Titan Virginia Ready Mix Ground Water Withdrawal Permit
- ❖ Department of Environmental Quality; Rip Rap Road Ready-Mix Concrete-Ground Water Withdrawal Permit
- ❖ Department of Environmental Quality; Children's Hospital of Richmond Pavilion
- ❖ Department of Environmental Quality; Campostella Ready Mix Concrete Ground Water Withdrawal Permit
- ❖ Department of Environmental Quality; Reissuance of VPDES Permit No. VA0090344--Matoaca High School
- ❖ Department of Environmental Quality; James River Country Club Waste Water Withdrawal
- ❖ Department of Environmental Quality; VADEQ fy12-13 Pollution Prevention Initiatives
- ❖ Department of Environmental Quality; New Kent County For Colonial Downs Water System Ground Water Withdrawal Permit
- ❖ Department of Environmental Quality; Charles City County School Board for Charles City County School Complex Ground Water Withdrawal Permit
- ❖ Department of Environmental Quality; Aqua Virginia For Spring Meadows Water System Ground Water Withdrawal Permit
- ❖ Department of Environmental Quality; VCU_West Grace Street Housing -- North Acquisition & Construction
- ❖ Department of Environmental Quality; 11-07 VADEQ Monitoring Technical and Scientific Support Services (117d)
- ❖ Department of Environmental Quality; 11-08 VADEQ FY12 Chesapeake Bay Monitoring Program (CWA117(e)(1)(B))

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- ❖ Department of Environmental Quality; Prince George County for Cedarwood Water System Ground Water Withdrawal Permit
- ❖ Department of Environmental Quality; Prince George County for Rt. 301 Water System Ground Water Withdrawal Permit
- ❖ Department of Environmental Quality; Chippokes Plantation State Park Ground Water Withdrawal Permit
- ❖ Department of Environmental Quality; VPDES Permit No VA0020702 Modification, Virginia Correctional Center for Women
- ❖ Department of Environmental Quality; Virginia State University Gateway II Residence Hall
- ❖ Department of Environmental Quality; Ground Water Withdrawal Permit: Wildwood Farms Subdivision Water System
- ❖ Department of Environmental Quality; [11-10] FY2012 CELCP VA Lynhaven Oyster
- ❖ Department of Environmental Quality; [11-11] FY11 CELCP King William Proposal
- ❖ Department of Environmental Quality; [11-09] FY12 CELCP VA EA Shore Land Protection
- ❖ Department of Environmental Quality; [11-13] FY2011 State Revolving Loan Fund Capitalization Grant
- ❖ Virginia Tech; Chesapeake Bay Program Wastewater, Onsite Treatment Systems
- ❖ Department of Environmental Quality; [11-12] SEC 103 for NATT Air Monitoring Site Program
- ❖ Department of Environmental Quality; [11-14] 26th Year VA CZM Implementation Application
- ❖ Department of Environmental Quality; Isle of Wight County for Rushmere Water System Ground Water Withdrawal Permit
- ❖ Department of Environmental Quality; Edgehill Subdivision Ground Water Withdrawal Permit
- ❖ Department of Environmental Quality; VADEQ Superfund Core Prog Coop Agreement
- ❖ Department of Environmental Quality; Virginia Beach National Golf Club Ground Water Withdrawal Permit
- ❖ Department of Environmental Quality; Ware Creek Manor Ground Water Withdrawal Permit
- ❖ Department of Environmental Quality; King William County for Manquin Water Company Ground Water Withdrawal Permit
- ❖ Department of Environmental Quality; Aqua Virginia For Mayfield Farms Ground Water Withdrawal Permit
- ❖ Department of Environmental Quality; VADEQ Water Quality Management Planning
- ❖ Virginia Department of Health; FY11 Drinking water State Revolving Fund Program-safe Drinking water Act Project Review Notification
- ❖ Department of Environmental Quality; Major Unit Modification of the Hopewell Power Station, PUE 2011-00074

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- ❖ Department of Environmental Quality; New Kent County for Whitehouse Farms Subdivision Ground Water Withdrawal Permit
- ❖ Department of Environmental Quality; 2010 Master Plan for the Defense Supply Center Richmond
- ❖ Department of Environmental Quality; VADEQ Wetland Development Proposal
- ❖ Department of Environmental Quality; Northwest-Lakeside 230 kV Transmission Line, Dominion, PUE 2011-00082 Ground Water Withdrawal Permit
- ❖ Department of Environmental Quality; Five Lakes #1 Subdivision Water System Ground Water Withdrawal Permit
- ❖ Department of Environmental Quality; Town of Stony Creek, Department of Environmental Quality; Western Water System Ground Water Withdrawal Permit
- ❖ Department of Environmental Quality; Rock Springs Water System Ground Water Withdrawal Permit
- ❖ Department of Environmental Quality; National Environmental Policy Act Scoping: Federal Transit Administration Grant Request: GRTC, Bus Parking Expansion Project
- ❖ Department of Environmental Quality; VA Electric and Power Company: Prevention of Significant Deterioration Air Permit Application
- ❖ Department of Environmental Quality; Aqua Virginia for Indian River Water Company application to withdraw ground water

Product #2: Training Initiatives

The Richmond Regional PDC Technical Assistance Program Grant funds the Environmental Training Program for member localities in the RRPDC. The program is geared towards offering relevant training and education opportunities for the Environmental TAC; however, most meetings are open to all interested local staff. Overall, a total of 89 people attended these educational meetings throughout the year, with an average of 22 people attending each meeting. A list of Environmental TAC meetings follows below. Agendas and presentation materials for these meetings can be found in Appendix A.

February 8, 2011

The Environmental TAC met at the Henrico County Water Treatment Facility for a tour and discussion about water treatment and distribution.

May 10, 2011

The Environmental TAC met in the RRPDC Board Room. Staff from the Virginia Department of Conservation and Recreation (DCR) provided a presentation about the Healthy Waters Initiative. Staff from the Virginia Department of Environmental Quality provided a presentation on environmental education programs, including the Coastal GEMS website, Water Stewardship Campaigns, and a newly developed Climate Science program.

June 7, 2011

The Environmental TAC met in the RRPDC Board Room. Staff from DCR reviewed the process for the development of the Commonwealth of Virginia's Chesapeake Bay TMDL Phase II Watershed Implementation Plan. In conjunction with this review, DCR staff supplied locality staffs with preliminary nutrient goals. DCR staff also provided guidance to locality staff about submission of updated BMP counts, comments on land use data, and potential future strategies. Such information will be included in the Phase II Watershed Implementation Plan document.

September 23, 2011

The Environmental TAC met in the RRPDC Board Room. RRPDC staff facilitated a roundtable discussion among locality staff about Phase II Watershed Implementation Plan development process so far. New information from DCR was shared and coordination decisions about each locality moving forward were discussed.

Product #3: Impervious Surface Forecast

Over the past several years, the Richmond Regional Planning District Commission (RRPDC) has been digitizing and cataloging impervious surfaces in the Richmond Region based on aerial imagery provided by the Commonwealth of Virginia. A portion of the Richmond Regional PDC Technical Assistance Grant has been used to carry forward this project.

The Phase IV Report includes the findings and analysis of Phase IV of this work effort. Specifically, impervious surfaces existing in 2009 are analyzed and impervious surfaces due to buildings and other like structures are compared between the years 2002 and 2009.

Of particular interest, in 2009, there was more than 70,500 acres of impervious surface in the Richmond Region. Almost 90% of these impervious surfaces are located in the more urban localities: City of Richmond, Henrico County, Chesterfield County, and Hanover County, including the Town of Ashland. Looking beyond simple numerical values to proportions of imperviousness, the City of Richmond is nearly one third impervious. The remaining localities in the Region fall far short of that proportion; Henrico County, the second most impervious locality, is less than 15% impervious. On average in the Richmond Region, roadways constitute 45% of the impervious area in a locality. Buildings/Structures constitute 31% of the impervious area. Across localities in the Richmond region, parking lots constitute an average of 21% of the impervious area. There is a wide range of per capita impervious surface area in the Richmond Region. In the City of Richmond there was 2,596 square feet of impervious surface per person while in Charles City County there was 6,553 square feet of impervious surface per person.

Between 2002 and 2009, localities in the Richmond region saw an increase in building impervious surface of about 18%. However, the populations of localities in the Richmond region grew by an average of 13%. There is a notable difference in these growth rates, especially while looking at individual localities. This document merely establishes the difference in growth rates and compares that difference across the region. A more complete analysis is necessary to determine what elements of government policies, market demands, and development programs attributed to these rate differences.

A copy of the Report can be found in Appendix B.

Product #4: Rivers of the Richmond Region Public Access Guide

Each year the Richmond Regional PDC Technical Assistance grant funds a special project. For Federal Fiscal Year 2010, the RRPDC special project was the *Rivers of the Richmond Region Public Access Guide*. In past years, RRPDC staff have worked on projects involving public access to individual rivers in the Richmond Region. While the products of these projects have been useful for their respective audiences, RRPDC staff had not comprehensively compiled all the access point information in one dataset and product map. The *Rivers of the Richmond Region Public Access Guide* is the first effort at compiling such information in one dataset and publicly distributable document; the *Public Access Guide* also effectively establishes a baseline from which changes in public access can be monitored in the future.

RRPDC staff utilized Virginia Department of Game and Inland Fisheries public access point data as well as outreach to local planners and interested stakeholder groups to gather information about all public access points to the rivers in the Richmond Region: the James River, the Pamunkey River and the Chickahominy River. RRPDC staff coordinated with Crater PDC staff to gather information about access points along the Appomattox River. RRPDC staff concluded the information gathering process with a site visit to each public access point. Verification of information already gathered was important to ensure accuracy of the final product. Access point amenities, such as restrooms, picnic areas, playgrounds, were noted and have been summarized in the printed copies of the *Public Access Guide*.

The *Public Access Guide* has been distributed to interested groups and institutions across the Richmond Region, including: the James River Advisory Council, the Friends of the James River Park, the Partnership for Smarter Growth. Copies of the *Public Access Guide* are available from the RRPDC office upon request and are available for download from the RRPDC website: www.richmondregional.org.

Product #5: Regional Stormwater Management

Given the interest developed from last year's Richmond Regional Water and Sewer Inventory, RRPDC staff decided to concentrate on understanding local approaches to stormwater management within the Richmond region. Such a focus is especially timely given EPA's issuance of the Chesapeake Bay Total Maximum Daily Load (TMDL) and the creation of Virginia's Phase I and Phase II Watershed Implementation Plans (WIPs) as part of the TMDL process. The Chesapeake Bay TMDL identifies a nutrient pollutant load specific to stormwater; accordingly, Virginia's Phase I and Phase II WIPs are tasked with identifying strategies for nutrient pollutant reductions in stormwater runoff. Therefore, RRPDC staff dedicated a portion of the Richmond Regional Technical Assistance Grant to fund the initiation of regional stormwater management discussion. This discussion occurred over time through forums relevant to several projects underway at the RRPDC.

RRPDC staff decided that while the over-arching goal of these discussions would be to learn as much as possible about stormwater treatment in the Richmond Region, RRPDC staff should concentrate most on non-point source stormwater best management practice (BMP) facilities. While knowledge of locality Municipal Separate Storm Sewer System (MS4) and Combined Sewer Overflow (CSO) programs is relevant, at this point, there is only a very limited role for the RRPDC concerning MS4 or CSO permits given the role of the US EPA in administering them. On the other hand, non-point source stormwater management is likely where much attention will need to be paid by localities in the next several years; similarly, there is much more potential for the RRPDC to provide assistance to localities in this arena.

As part of a methodological review of the RRPDC impervious surface GIS dataset (see Product #3), RRPDC staff met with locality staff in each jurisdiction within the region. In these meetings, RRPDC staff guided the discussion to be sure to include local tracking of impervious surfaces and any relationship that might exist to the land development process and planning for urban stormwater facilities.

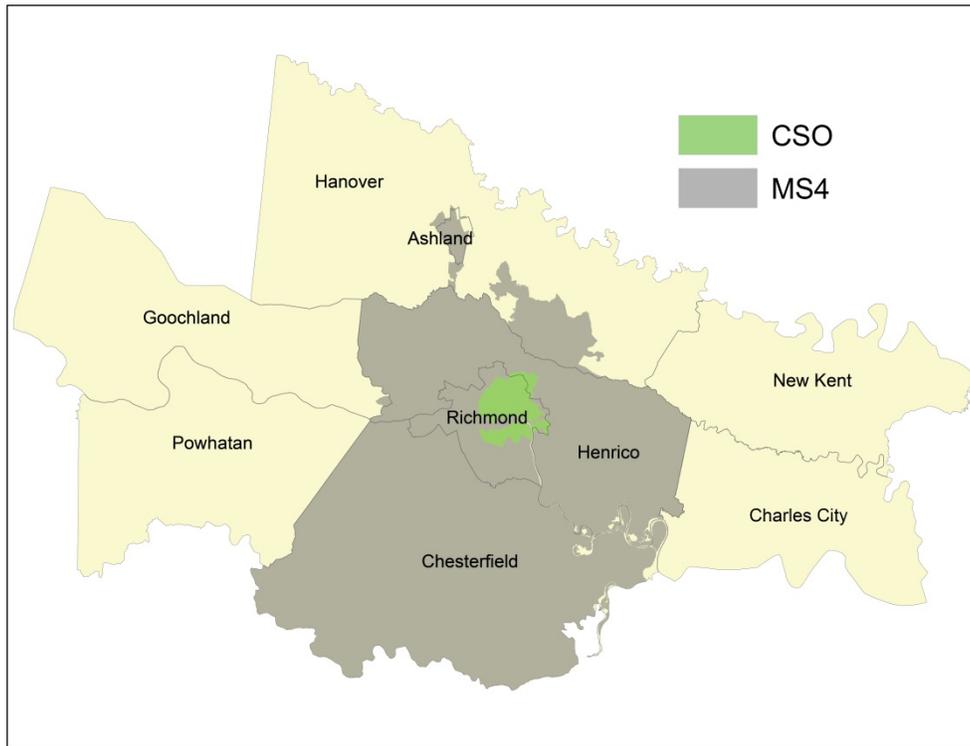
In response to the initiation of development of Virginia's Phase II WIP by the Department of Conservation and Recreation, RRPDC staff created a survey that was distributed to all localities in the region. The survey sought to ascertain how localities in the region intended to participate in the Phase II WIP process. Additionally, the survey aimed to establish the status of various data and processes within each jurisdiction likely to be relevant to the Phase II WIP and broader Chesapeake Bay TMDL planning processes.

RRPDC staff have facilitated regional roundtable discussions centered around the development of Virginia's Phase II WIP over the past few months. Given the nutrient pollutant loads tied to urban stormwater, some of the conversation at the meetings has centered around the status of stormwater planning and treatment facilities. In addition, RRPDC staff are in continuous contacts through email and telephone conversations with local planners on this subject.

Finally, it is worth noting that work related to other RRPDC projects have also contributed to the body of knowledge about stormwater across the Richmond Region. Such other projects include: Jefferson Davis Highway Revitalization Study, the 2008 – 2035 Socioeconomic Data Report, and the Phase III Regional Green Infrastructure Project.

Summary highlights gathered from these discussions:

- The larger localities in the Richmond Region regularly update an impervious surface dataset for planning needs. Much of this work is performed by an outside consultant. In the City of Richmond, such a dataset is essential for the calculation of stormwater utility fees. [The City is the only locality in the Region which imposes a stormwater utility fee.]
- The larger, more intensely developed localities are more likely to have at least a partial dataset of existing urban stormwater Best Management Practice (BMP) facilities. There is wide variation as to the time span for which the data set is complete and the completeness of feature attribute information. The smaller, less developed localities have largely incomplete datasets for urban BMPs, if any at all in an organized, accessible fashion. These localities often lack the documentation or staff time necessary to create and maintain a comprehensive dataset.
- The rural localities in the Richmond Region are aware of a variety of agricultural BMPs within their jurisdiction. In general, tracking of agricultural BMPs by local jurisdictions is complicated by the fact that DCR and the Soil and Water Conservation Districts administer the Virginia agricultural cost-share program outside of locality control. Cost-share is a program through which agricultural land owners can receive financial assistance for BMP installation. DCR and the Soil and Water Conservation Districts are responsible for tracking BMP installations as part of the program; however, privacy concerns restrict much of the information about the location of BMP installations from being shared with local governments. Cooperation with DCR and the Soil and Water Conservation Districts varies throughout the Richmond Region by locality and is highly dependent on the existing relationship between localities and Soil and Water Conservation Districts.
- Henrico County currently uses modeling software to perform GIS analysis for water quality analysis. The outputs of this analysis are used in planning and prioritization of land development and stormwater facility projects.
- The Richmond Region has localities with Phase I and Phase II MS4 permits as well as a CSO system in the City of Richmond.



For more information concerning stormwater management in the Richmond Region, contact RRPDC staff at (804) 323-2033.

Appendix A

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From: Sarah Stewart
Sent: Tuesday, January 25, 2011 5:37 PM
To: Allyson Finchum; Amy Walker; Brandon Stidham; Brooke Hardin; Carl Schlaudt; Chris Landgraf; George Homewood; Heather Barrar; Janie Kaplan; Jeff Perry; John Bragg; Jonet Prevost-White; Keith White; Lee Garman; Leigh Dunn; Michelle Virts; Mike Flagg; Natalie Spillman; Nora Amos; Platt, Stewart D. - DCD; Roy Props; Scott Flanigan; Shaun Reynolds; Steven Herzog; Tyler Potterfield; Weedon Cloe
Cc: Jacqueline Stewart; Quillia Brooks; 'Doss, Melissa (DCR)'; Barbara Jacocks; Anne Darby
Subject: February 8 Environmental TAC Meeting

On Tuesday, February 8 at 2pm, we have been offered the chance to tour the Henrico County Water Treatment Facility. Of course, Environmental TAC members are invited. As well, the tour is open to all interested locality staff. I would greatly appreciate those interested to RSVP so I have an approximate head count. I will send out more details soon.

A few interesting facts:

The Henrico Facility is a state of the art Water Treatment Facility permitted to treat a total of 55 million gallons per day. It is a conventional treatment plant with one major exception; they use ozone as a primary disinfectant in the treatment process. Most plants use a form of chlorine as a primary disinfectant. The raw water source is over 5 miles from the plant, so the raw water is pumped up to the plant.

Cheers,

Sarah Stewart

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February 8, 2011 Environmental TAC Meeting RSVP

Name	Organization	
Sarah Stewart	RRPDC	
Jackie Stewart	RRPDC	
Barbara Jacocks	RRPDC	
Roy Props	Henrico	
Henrico Planner	Henrico	*unsure of name at this point, just head count
Henrico Planner	Henrico	*unsure of name at this point, just head count
Amy Doss	CBLAD	
Megan Sommers	DCR	TMDL Coordinator, requested notice of our meetings, interested in attending
Allyson Finchum	Charles City	

* spoke to Rosemary Deemer, she suggested more Henrico employees were interested in attending but do not have a final head count at this time.

2/8/11 Tour of Henrico Water Treatment Plant—Russ Navratil and Chip England

- Fall 1994-agreement with City on water sharing
- Purchased the site from one land owner whose house remains on the property; plan to construct new entrance when Three Chopt widened and plant upgraded so chemical trucks have better access
- Apr 2004-plant opened with reserve capacity of 55 MGD; plans to upgrade to 80 MGD
- \$180 million capital investment to build (\$90 million in building) Camp Dresser McGee out of Boston engineer
- Operating at max of 43 MGD or 27 MGD annual average; summer peak days approaching 52 MGD
- \$8 million annual budget (Enterprise Fund fully supported by fees) of which \$2.5 million in chemicals
- Operate 24/7-10 certified operators and 7 adm; 2 back-up generators for up to 2/3 of capacity if power is down
- 5-1/2 mile from intake point in James just above Boshers dam-gravity for the first 1/2 mile then pumped through two 44" water mains in Gaskins Road
- One of only 3 plants in VA which uses Ozone in treatment (others are Newport News and Fairfax)—Ozone or O³ is very unstable, lethal with a short life but reacts well with chlorine
- Majority of treatment is underground—4.5 million gallons in clear wells under building
- Quality lab checks for turbidity et al every 2 hours throughout the process
- Supply from this plant pretty much goes to portion of the County west of I-95; east of I-95 by reserve agreement of 35 MGD (of which 12 MGD is used) with City until 2040
- 4 inactive wells on the East End due to water quality commitments for White Oak (Quimondo was largest customer at 5.0 MGD)

- Sludge from plant is treated daily at the County’s wastewater treatment plant

AGENDA

Environmental TAC Meeting

May 10, 2011

Richmond Regional Planning District Commission
Large Conference Room
9211 Forest Hill Ave, Ste. 200
Richmond, VA 23235

CALL TO ORDER10:30 A.M.

10:30 Rick Hill (DCR) – Healthy Waters Initiative (30 minutes)

11:00 David Ruble (DEQ) – Environmental Education – Climate Science (1 hour)

12:00 Lunch

12:45 David Ruble (DEQ) & Nick Meade (VCZMP) – Environmental Education: Coastal GEMS & Water Stewardship Campaign (1 hour)

1:45 Anne Darby (RRPDC) – Rivers of the Richmond Region (RRPDC) - (30 minutes)

2:15 RRPDC Staff - Chesapeake Bay TMDL Discussion/Additional Items (45 minutes)

3:00 Adjourn

RICHMOND REGIONAL PDC Technical Assistance | **FFY10**
--FINAL REPORT

From: Sarah Stewart
Sent: Friday, April 15, 2011 11:55 AM
To: Allyson Finchum; Amy Walker; Brandon Stidham; Carl Schlaudt; Chris Landgraf; George Homewood; Heather Barrar; Janie Kaplan; Jeff Perry; John Bragg; Jonet Prevost-White; Keith White; Lee Garman; Leigh Dunn; Michelle Virts; Mike Flagg; Natalie Spillman; Neville Simon; Nora Amos; Platt, Stewart D. - DCD; Roy Props; Scott Flanigan; Shaun Reynolds; Steven Herzog; Tyler Potterfield; Weedon Cloe
Cc: Barbara Jacocks; Anne Darby; Jacqueline Stewart; Quillia Brooks; Hill, Rick (DCR); david.ruble@deq.virginia.gov; Doss, Melissa (DCR)
Subject: May 10 Environmental TAC meeting

Good afternoon,

We are planning an Environmental TAC meeting for **Tuesday May 10**. The meeting will likely take a few hours, but to help with everyone's schedule, we are planning a lunch meeting. Please hold the early afternoon of Tuesday May 10 for this meeting. Quillia and I will follow up with details about exact meeting time and lunch orders.

Currently there are three topics on the Agenda:

DCR Healthy Waters Program
DEQ Environmental Education Programs
Review of RRPDC River of the Region map/brochure

We will include time for open discussion of other items of interest among the group.

Thanks & look forward to seeing everyone! This should be a great meeting!

Sarah Stewart

Senior Planner
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Please consider the environment before printing this e-mail

RICHMOND REGIONAL PDC Technical Assistance **FFY10**
--FINAL REPORT

May 10, 2011 Environmental TAC Meeting Lunch Consideration

Name	Organization	Lunch
Bryant Phillips	Ashland	1
Sarah Stewart	RRPDC	1
Anne Darby	RRPDC	1
Jackie Stewart	RRPDC	1
Quillia Brooks	RRPDC	1
Leigh Dunn	Goochland	1
Nick Meade	VCZMP	1
David Ruble	DEQ	1
Barbara Jacocks	RRPDC	0
Rick Hill	DCR	1
Heather Barrar	Chesterfield	1
Roy Props	Henrico	1
Amy Walker	New Kent	1
Michelle Virts	Richmond	1
Daniel or Shawn	CBLAD	1

AGENDA

**Chesapeake Bay TMDL
Virginia Watershed Implementation Plan Phase II
Data Delivery Meeting**

June 7, 2011

Richmond Regional Planning District Commission
Large Conference Room
9211 Forest Hill Ave, Ste. 200
Richmond, VA 23235

1. Welcome/Introductions and Purpose of MeetingBob Crum (5 minutes)
2. Review EPA requirements for Bay TMDL and
Watershed Implementation Plan (WIP)Joan Salvati (7 minutes)
3. Phase II Timeline and FlowchartJoan Salvati (3 minutes)
4. Chesapeake Bay Program Watershed Model
DataJames Davis Martin (30 minutes)
 - a. Goal Spreadsheet (worksheets)
 - b. Changes expected to current spreadsheet from model adjustments
 - c. Priority data gathering tasks for locality and PDC staff
5. Virginia Assessment Scenario ToolJames Davis Martin (5 minutes)
6. Questions/CommentsNissa Dean (45 minutes)
7. Wrap-Up Going Forward—
Next Steps, Process, Roles, Key ContactsBob Crum (10 minutes)

RICHMOND REGIONAL PDC Technical Assistance | **FFY10**
--FINAL REPORT

Attendees of June 7, 2011

Chesapeake Bay TMDL WIP Phase II Meeting

Name	Locality		
Bryant Phillips	Ashland	Bob Pinkerton	Henrico
Ingrid Stenbjorn	Ashland	Greg Garrison	Henrico
John Bragg	Charles City	Jeff Perry	Henrico
Heather Barrar	Chesterfield	Keith White	Henrico
Julie Seyfarth	Chesterfield	Roy Props	Henrico
Lorne Field	Chesterfield	Amy Walker	New Kent
Richard McElfish	Chesterfield	Rodney Hathaway	New Kent
Scott Flanigan	Chesterfield	Paul Cuomo	New Kent
Debbie Byrd	Goochland	Brandon Stidham	Powhatan
Leigh Dunn	Goochland	Kate Anderson	Powhatan
Mike Flagg	Hanover	Bob Steidel	Richmond
Shaun Reynolds	Hanover	Grace LeRose	Richmond
Stu Wilson	Hanover	Michelle Virts	Richmond

Name	Organization		
Brian Wagner	Balzer	Nissa Dean	DCR
Chris Tabor	CDM	Sharon Conner	Hanover SWCD
Brian Noyes	Colonial SWCD	Barbara McGarry	Henricopolis SWCD
Jim Wallace	Colonial SWCD	Kenper Marable	Henricopolis SWCD
Mark Bitner	Crater PDC	Daniel Lee	James River SWCD
Amy Doss	DCR	Adrienne Kotula	JRA
Carrie Hagin	DCR	Keith Burgess	Monacan SWCD
Joan Salvati	DCR	Betty McCracken	Monacan SWCD
Megan Sommers	DCR		

AGENDA

**Chesapeake Bay TMDL
Virginia Watershed Implementation Plan Phase II
Regional Roundtable/Environmental TAC Meeting**

September 23, 2011

Richmond Regional Planning District Commission
Large Conference Room
9211 Forest Hill Ave, Ste. 200
Richmond, VA 23235

CALL TO ORDER10:00 A.M.

10:00 Introductions & Purpose

10:05 Roundtable Progress Updates

11:00 DCR Funding Opportunities

11:15 Consensus on Next Steps

12:00 Adjourn

Appendix B

2011

Impervious Surface in the Richmond Region

Phase IV Report

Grant Number: NA10NOS4190205
Task Number: 48

This project was funded by the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant # NA10NOS4190205 of the U. S. Department of Commerce, National Oceanic and Atmospheric Administration under the Coastal Zone Management Act of 1972, as amended.

Disclaimer: *The contents of this document reflect the views of the Richmond Regional Planning District Commission. The Commission is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Virginia Coastal Zone Management Program, Virginia Department of Environmental Quality (DEQ), the U.S Department of Commerce, the National Oceanographic and Atmospheric Administration (NOAA), or any of its subagencies. This report does not constitute a standard, specification, or regulation*

**Richmond Regional
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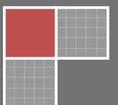


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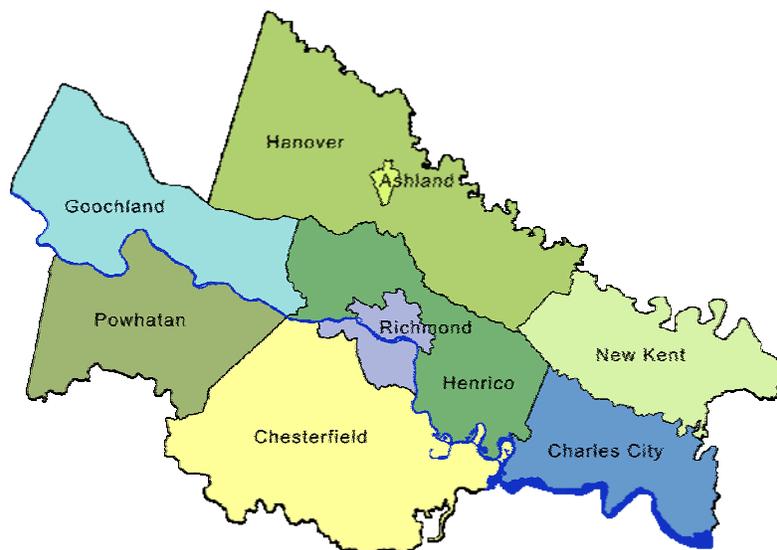
Executive Summary

Over the past several years, the Richmond Regional Planning District Commission (RRPDC) has been digitizing and cataloging impervious surfaces in the Richmond Region based on aerial imagery provided by the Commonwealth of Virginia. A portion of the Richmond Regional PDC Technical Assistance Grant has been used to carry forward this project. This Report includes the findings and analysis of Phase IV of this work effort. Specifically, impervious surfaces existing in 2009 are analyzed and impervious surfaces due to buildings and other like structures are compared between the years 2002 and 2009.

Of particular interest, in 2009, there were more than 70,500 acres of impervious surface in the Richmond Region. Almost 90% of these impervious surfaces were located in the more urban localities: City of Richmond, Henrico County, Chesterfield County, and Hanover County, including the Town of Ashland. Looking beyond simple numerical values to proportions of imperviousness, the City of Richmond was nearly one third impervious. The remaining localities in the Region fall far short of that proportion; Henrico County, the second most impervious locality, was less than 15% impervious. On average in the Richmond Region, roadways constitute 45% of the impervious area in a locality. Buildings/Structures constitute 31% of the impervious area. Across localities in the Richmond region, parking lots constituted an average of 21% of the impervious area. There was a wide range of per capita impervious surface area in the Richmond Region. In the City of Richmond there was 2,596 square feet of impervious surface per person while in Charles City County there was 6,553 square feet of impervious surface per person.

Between 2002 and 2009, localities in the Richmond region saw an increase in building impervious surface of about 18%. However, the populations of localities in the Richmond region grew by an average of 13%. There is a notable difference in these growth rates, especially while looking at individual localities. This document merely establishes the difference in growth rates and compares that difference across the region. A more complete analysis is necessary to determine what elements of local land use policy, market demands, and development programs might collectively contribute to these differences.

Figure 1



Introduction

Large amounts of impervious area such as building roof tops and paved surfaces are to be expected in existing developed areas. The relatively larger and denser populations in these areas demand services that require impervious surface construction: buildings for housing and economic activity; roads, rail lines, airport runways, etc. to transport people, ideas, and items of economic import, hardened surfaces for use by the population during recreational activities; and so on. The City of Richmond historically is the central city and economic hub for this region. According to the RRPDC Socioeconomic Analysis Report (November 2011), the Region's population almost doubled from 1970 to 2008, increasing by 83%. In absolute terms, the counties of Chesterfield and Henrico have experienced the largest increases in population during this period. In percentage terms, six of the jurisdictions experienced a population increase of almost 100%; only Charles City County and the City of Richmond have not experienced the same degree of population growth. Population growth from the year 2000 to 2008 has leveled off to an overall increase of 16% within the Region with New Kent and Powhatan experiencing the highest percentage increases in population.

How does this population growth translate into quantifiable measures of change that can affect the environment? Since 2005, the Richmond Regional Planning District Commission has studied the extent of impervious surface in the Richmond metropolitan region as one way to depict the parallel impact of population growth. This is the fourth report in a series of mapping and analysis efforts that have spanned multiple years of diligent interpretation of aerial imagery available from the Commonwealth of Virginia. The funding for this phase of the project was made available through a FY10 technical assistance grant from the National Oceanic and Atmospheric Administration (NOAA) through the Virginia Coastal Zone Management Program (VACZM). This document details Phase IV of the project.

Impervious Surfaces: What & Why

For the purposes of this study, impervious surfaces include roads, parking lots, building footprints, and other impermeable transportation surfaces usually associated with urban and suburban development. An increase in impervious area affects, among other things, the hydrologic cycle and as a result, water resources. Such effects may include: increased flooding and stream bank erosion, degraded aquatic habitat, reduced groundwater recharge, additional pollutants entering a river or other body of water from stormwater runoff, and reduction in healthy water streams and water supply.



Project Background

Phase I: 2005

Phase I began with the intent to measure change in impervious surfaces in the Richmond Region between 1994 and 2002. The imagery used for the 1994 baseline came from the United States Geological Survey color infrared Digital Orthophotography Quarter Quads (DOQQs). The 2002 imagery was a higher resolution orthophotography product developed by the Virginia Geographic Information Network under the Virginia Base Mapping Program (VBMP). The comparison of the digitized data from these two years was the basis for measuring change.

The digitization of impervious surface polygons on the 1994 and 2002 VBMP orthophotography was conducted using Geographic Information Systems (GIS) software. When available, staff started with locality-generated information such as building permits, and existing GIS data layers. A database was established for the impervious surface features. For localities with a building footprint layer, existing data was used as a starting point. In some cases, localities had not prepared an existing building footprint layer, so a layer was created by digitizing structures visible in the orthophotography. Information about newly digitized polygons was placed in the database attribute table. The polygons were classified as either having existed in 1994 orthophotography or having been constructed between 1994 and 2002.

There were degrees of inaccuracy between the 1994 and 2002 polygon delineations due to resolution quality of the two orthophotographic sources and differences in the data projections. The color aerial photography used to capture the 2002 data provided the user more details and accurate imagery than was possible when using the 1994 color infrared DOQQs. Using the road and structure polygons, the impervious area was calculated for both 1994 and 2002. Maps were prepared as a visual tool illustrating the change in regional impervious surface.

For a more detailed methodology of Phase I, please refer to Mapping Impervious Surface in the Richmond Region with Ortho Imagery section in the *Impervious Surface in the Richmond Region* report that is available upon request from RRPDC staff.

Phase II: 2006

Phase II of the project was conducted between January and September 2006 using the 2002 VBMP orthophotography. The goal of Phase II was to improve the accuracy of the existing building polygons, delineate driveways, improve classification of polygons by using a standard classification system in the four rural jurisdictions, and improve the road layer, region-wide, to reflect the difference in road widths between rural and urban/suburban jurisdictions. It was decided that a similar analysis using 1994 orthophotography would be less valuable due to the lower resolution and quality of the DOQQs.

A final step was to identify inconsistencies due to varying techniques of individual technicians compiling the project. Separate technicians analyzed and coded impervious areas differently in Phase I which resulted in polygons having different configurations and impervious use codes. Methodology was reassessed and use codes were corrected to reflect a comparable category and a more generalized use code. Use codes included, but were not limited to, buildings (residential, commercial and industrial), airports, driveways, parking lots, pools, and tennis courts.

The refinement of the Phase I methodology resulted in very similar calculations at the regional level, but greatly differing calculations at the county/city level. Discussions of the results for each jurisdiction were also included. The Phase II report, *Refining Impervious Surface in the Richmond Region*, is available upon request from RRPDC staff.

Phase III: 2009

Phase III of the project was conducted between November 2008 and September 2009. The goal of Phase III was to digitize impervious surface for an additional year in order to expand the data catalogue of Richmond Region impervious surface data for analysis. During Phase III, technicians digitized footprints of buildings erected between 2002 and 2007. The base for this project was leaf-off imagery, gathered in 2007, as high resolution orthophotography and developed by VGIN as part of the VBMP.

Data tables were standardized for all attributes and all years of photography. 1994 and 2002 digitized structures were spatially joined to scanned footprints from 2006, 2007, and 2008 photography to take advantage of higher photography accuracy while maintaining data attributes of original impervious surface files. New structures were digitized for all counties from 2009 photography and attributes added to data.

More details of the Phase III methodology can be found in the report *Richmond Regional Impervious Surface Inventory; Phase III* available upon request from RRPDC staff.

Phase IV Methodology

The improving resolution of aerial photography over time and the abilities of RRPDC staff and GIS software have resulted in methodological evolution throughout the project. The result has been that throughout the phases of this project, focus has shifted among the various elements of impervious surface. The Phase IV work effort focused on reviewing impervious surface structure data gathered using aerial imagery from 2002 and correcting any noticed errors. Also, during Phase IV, RRPDC staff used aerial imagery from 2009 to review structure data created during Phase III of the project. Having reliable and comparable structure data for the entire Richmond Region for 2002 and 2009, allows RRPDC staff and others across the region to analyze changes in impervious surface between the two subject years.

Additionally in Phase IV, RRPDC staff completed a transportation impervious surface GIS layer for the region based on this 2009 aerial imagery. The transportation layer was recalculated with the VBMP road centerline files. This data developed with VDOT and all localities to provide accurate and consistent roads data for Virginia. The interstate and highway road widths were measurements from the 2009 photography providing accurate road widths for the road buffering to generate accurate impervious acreage for this layer. The rural road measurements were sampled from the 2009 photography and based on the road classification from VDOT/VBMP (collector road, major road, minor road etc.) and buffered to generate accurate impervious acreage. Additional information from localities with impervious data was used when available.

The creation of these “base layers” will enable RRPDC staff to analyze changes in the region over time in the future. Such analysis will be of particular use when developing plans for water quality improvement associated with Total Maximum Daily Loads (TMDL) for small watersheds of local streams up to larger watersheds such as the Chesapeake Bay.

For a visual representation of the impervious surface elements mapped in different situations, please see Figures 2 through 5 depicting residential and commercial areas. In addition, the following maps depict an overview of impervious surface expansion in the Richmond Region through 2009.

Figure 2



Figure 3



Figure 4

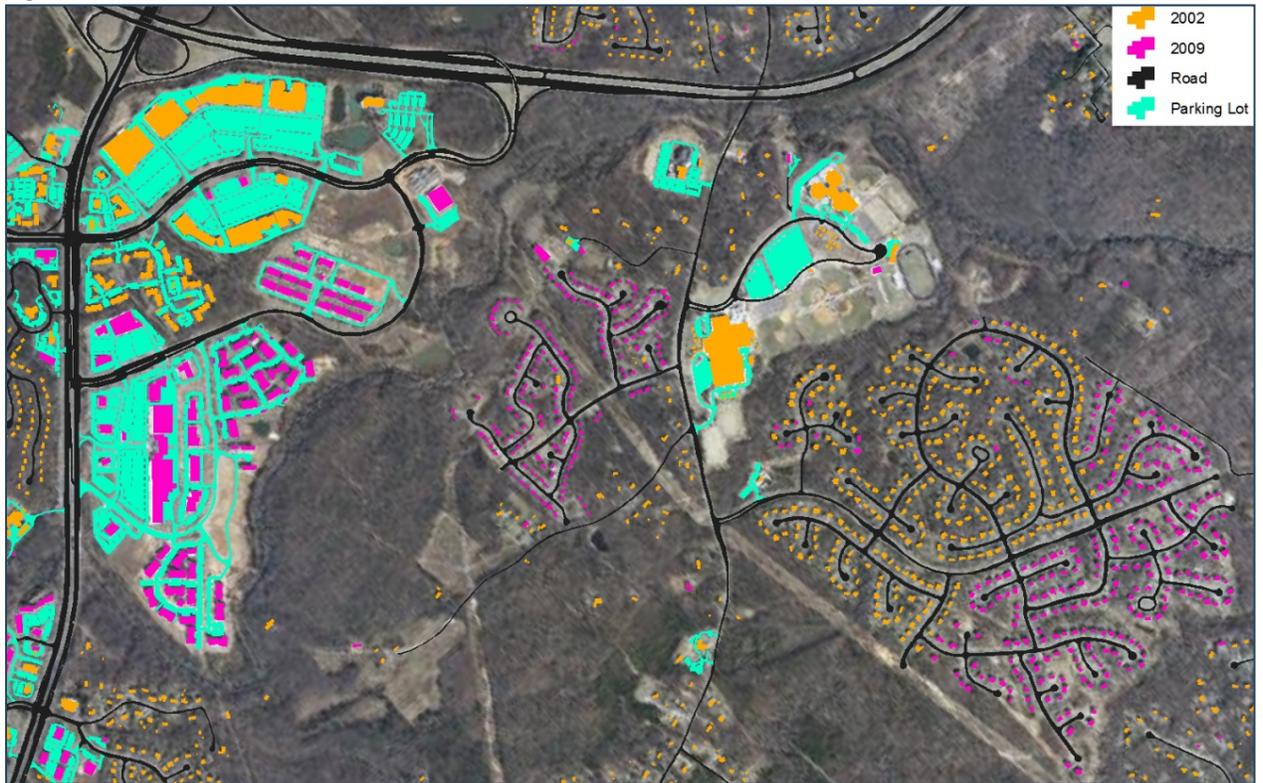
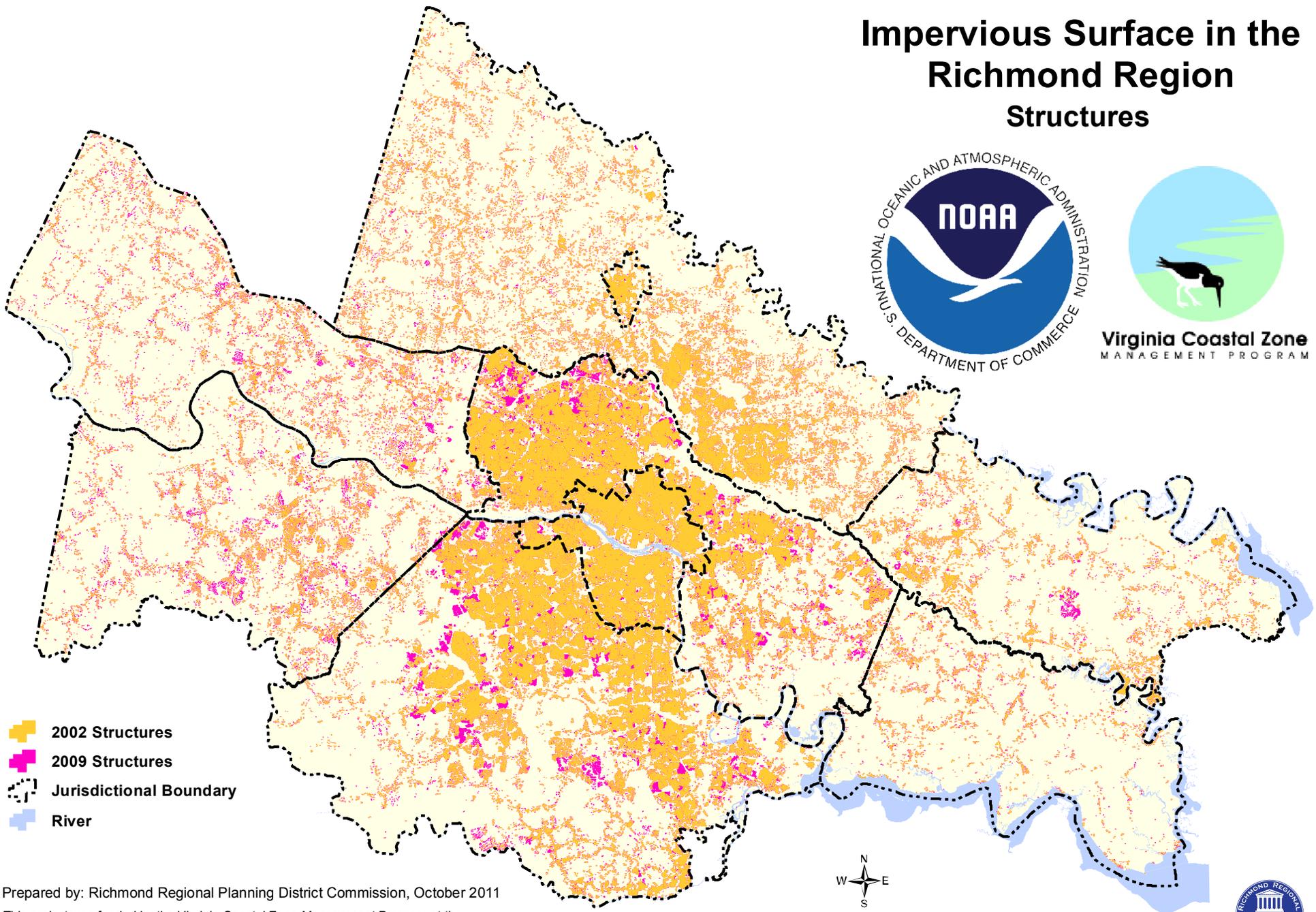
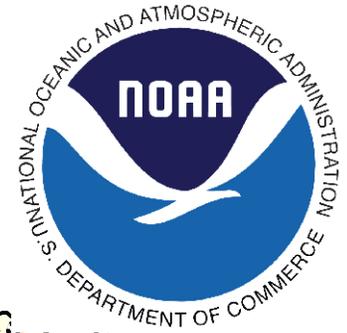


Figure 5



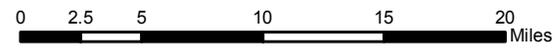
Impervious Surface in the Richmond Region Structures



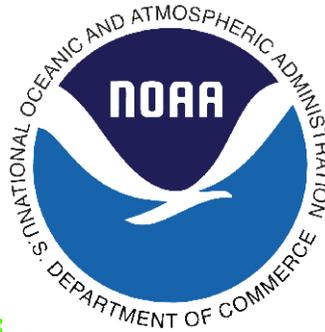
- 2002 Structures
- 2009 Structures
- Jurisdictional Boundary
- River

Prepared by: Richmond Regional Planning District Commission, October 2011

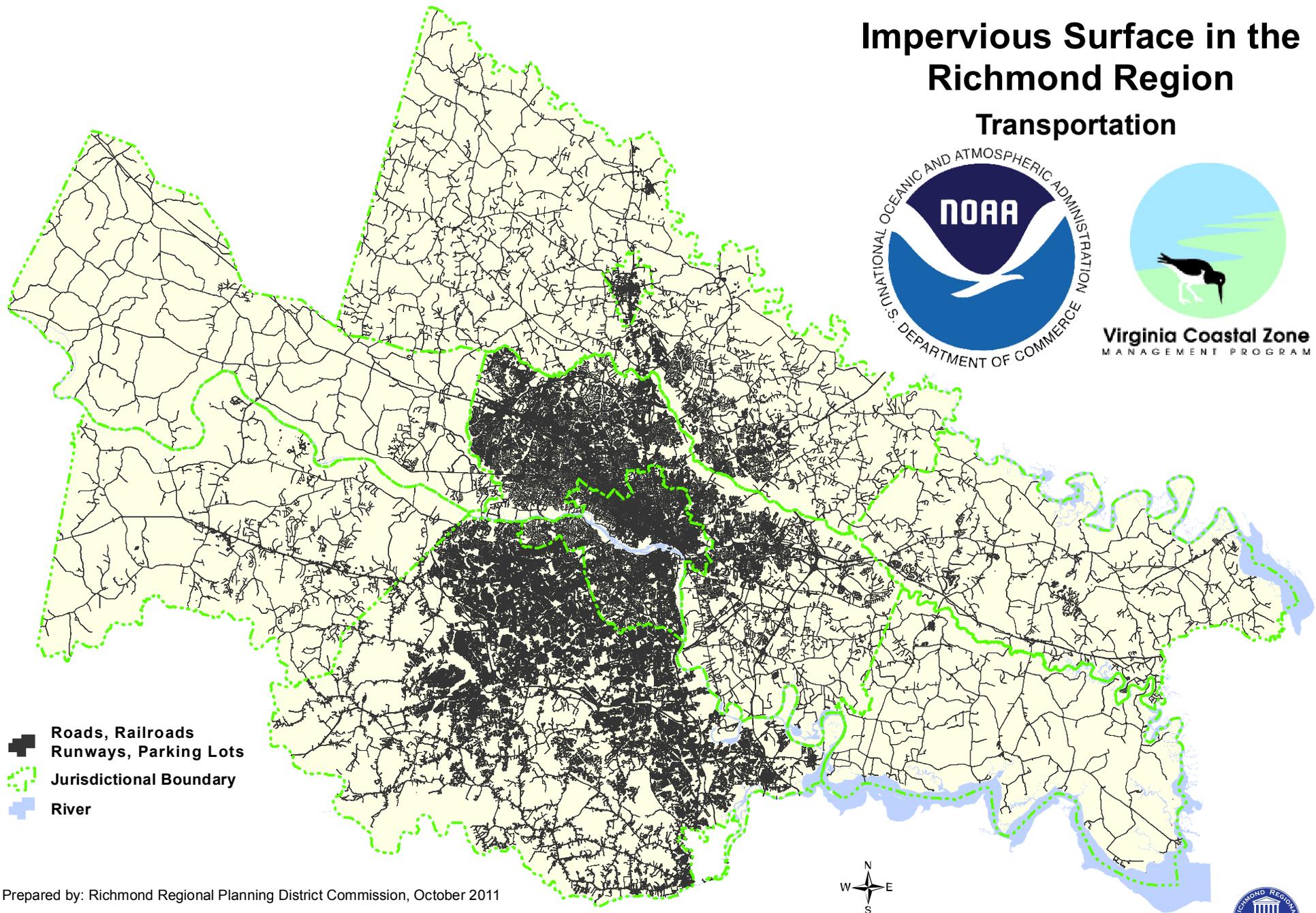
This project was funded by the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant #NA10NOS4190205 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.



Impervious Surface in the Richmond Region Transportation



Virginia Coastal Zone
MANAGEMENT PROGRAM



-  Roads, Railroads
Runways, Parking Lots
-  Jurisdictional Boundary
-  River

Prepared by: Richmond Regional Planning District Commission, October 2011

This project was funded by the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant #NA10NOS4190205 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

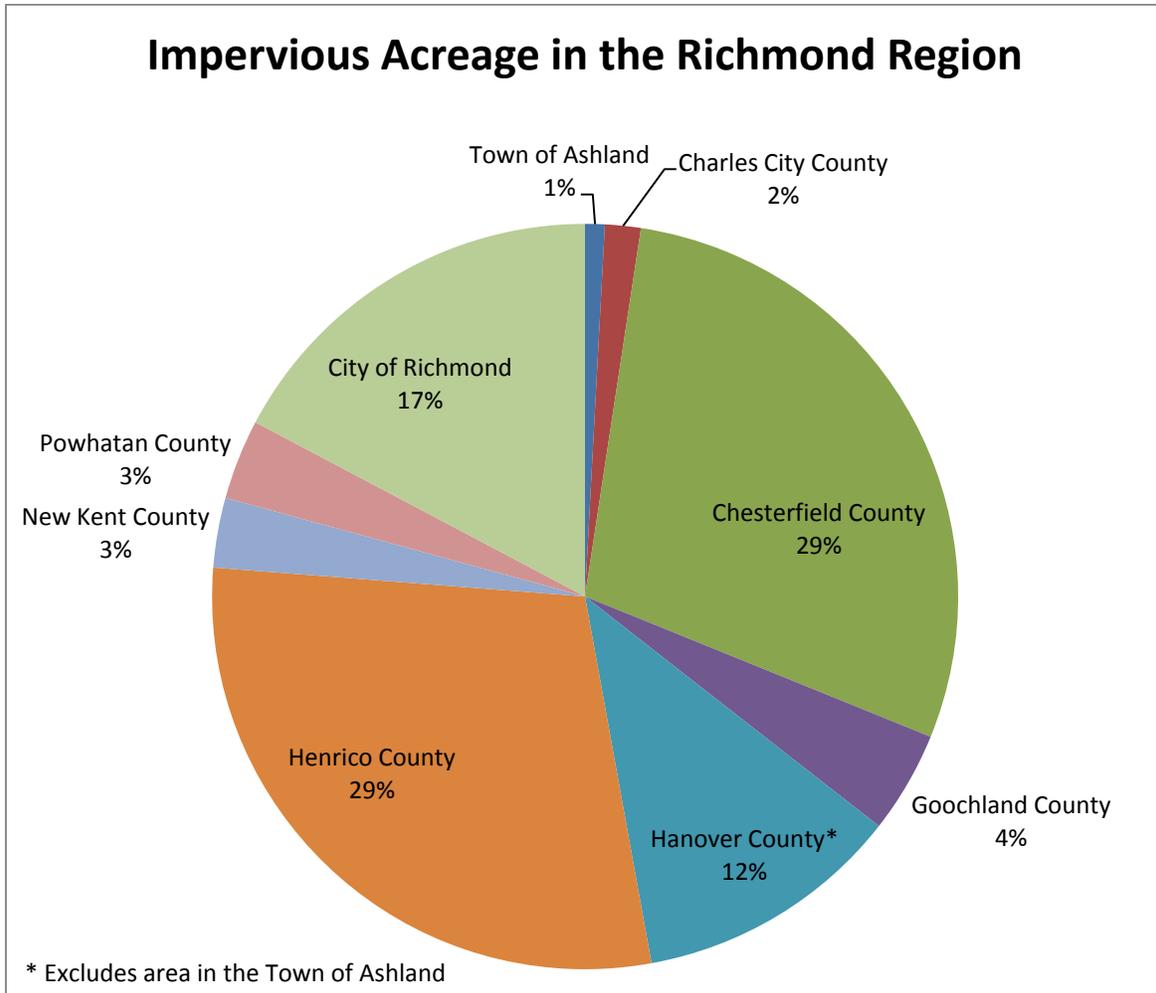


Findings

2009 Impervious Area

Henrico and Chesterfield Counties have the greatest acreage of impervious area in the Richmond Region. Both localities have more than 20,000 acres of impervious area; each has an equal proportion of the Region's acreage that is impervious within their jurisdictional boundaries. The City of Richmond also has a large amount of impervious area, as is to be expected; about 17% of the impervious area in the Richmond Region lies within the City of Richmond.

Figure 6



In this comparison, it is important to remember that the land area of the City of Richmond is 14% the land area of Chesterfield County and 26% the land area of Henrico County. For this reason, a simple comparison of total impervious surface area can be misleading as it does not accurately illustrate what proportion of a locality is impervious. Accordingly, a better comparison of local imperviousness would be a ratio of impervious area to total land area. As seen in Table 1 below, the City of Richmond has the greatest percentage of its area covered with impervious surfaces, 32%. Comparatively, Charles City County and Powhatan County are the localities least covered by impervious surfaces; both are approximately 1% impervious.

Table 1

	Total Acreage	Water Acreage	Land Acreage	Impervious Acreage	Percentage Impervious
Town of Ashland	4,610	34	4,576	598	13%
Charles City County	131,183	21,760	109,423	1,092	1%
Chesterfield County	279,724	13,856	265,868	20,272	8%
Goochland County	185,207	4,843	180,364	3,113	2%
Hanover County*	302,386	5,678	296,708	8,173	3%
Henrico County	155,433	7,769	147,664	20,522	14%
New Kent County	134,051	20,799	113,252	2,133	2%
Powhatan County	167,755	1,251	166,504	2,452	1%
City of Richmond	40,011	2,178	37,833	12,168	32%
RRPDC	1,400,360	78,167	1,322,194	70,523	5%

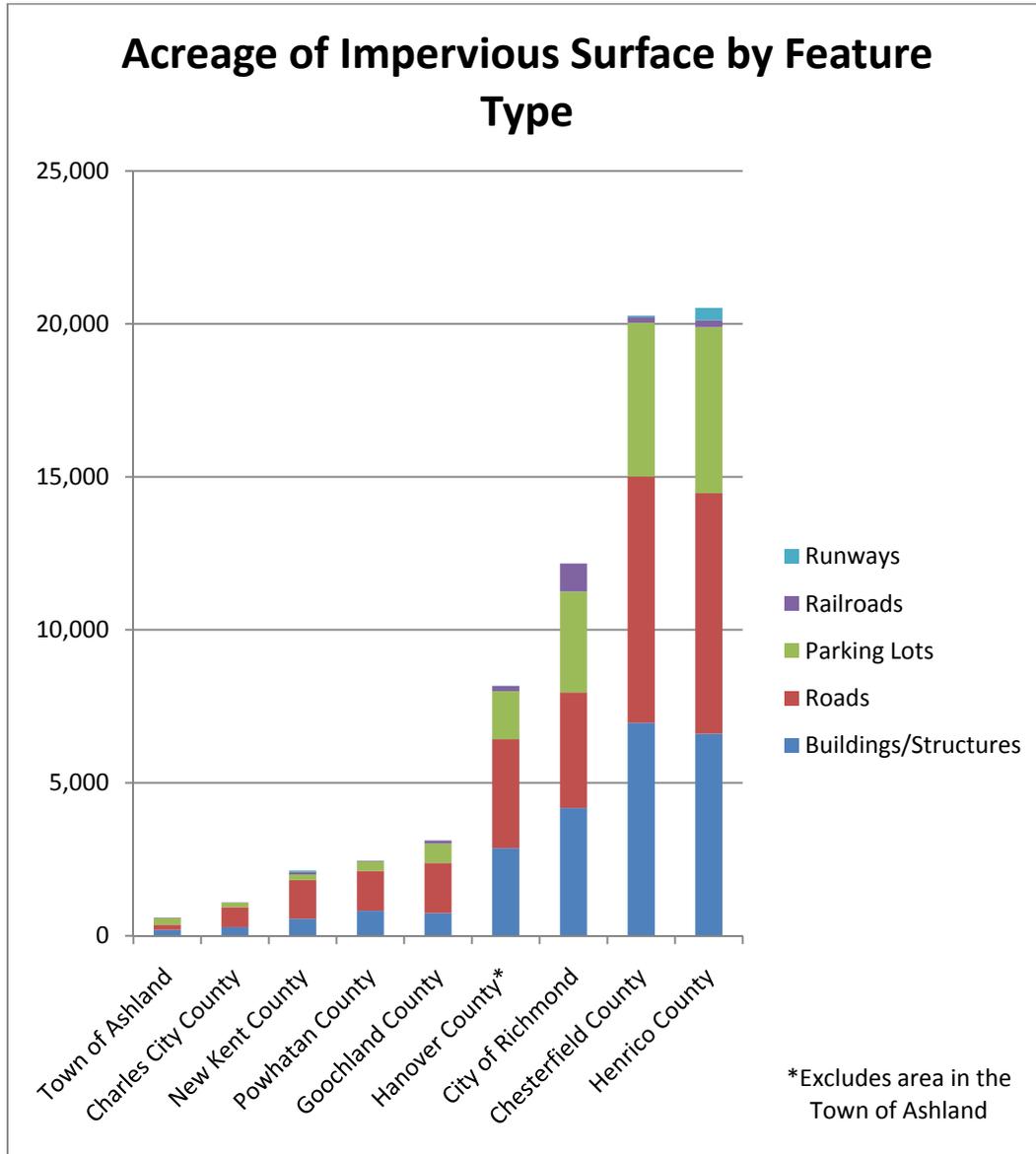
* Excludes area in the Town of Ashland

Water acreage referenced from the USGS National Hydrography Dataset.



Figures about total impervious area are useful, but only in a limited manner. Information about the composition of the total impervious area can be very informative about land use patterns and potential effects on water quality. Different impervious surfaces are likely to contribute different types of pollution to stormwater runoff. For instance, impervious surfaces such as roadways and parking lots are likely to contribute toxic fluids, such as motor oil or antifreeze, and heavy metal dust from vehicle exhaust to nearby streams and waterways. Meanwhile, runoff from impervious surfaces associated with buildings and development is likely to encounter, among other things, bacteria associated with pet waste; chemicals in fertilizer; and sediment associated with cleared, undeveloped land. For the distribution of each locality’s impervious surfaces by feature type, refer to Figure 7 and Tables 2 and 3 below.

Figure 7



In both Chesterfield and Henrico Counties, there are more than 6,500 acres of impervious surface accounted for by building footprints. The locality with the least impervious area from buildings is the Town of Ashland with less than 200 acres committed to building impervious surface. Chesterfield and Henrico Counties also have the greatest amount of impervious surface attributed to roadways; Chesterfield has more than 8,000 acres of impervious surface in roadways while Henrico has more than 7,800 acres.

On average in the Richmond Region, roadways constitute the largest percentage (45%) of impervious area in a locality. Buildings/Structures constitute the second largest percentage of impervious area. Across localities in the Richmond region, parking lots constitute an average of 21% of impervious area.

Table 2

Locality	Buildings/Structures	Roads	Parking Lots	Railroads	Runways	Total
Town of Ashland	191	172	218	17		598
Charles City County	280	657	143	12		1,092
Chesterfield County	6,963	8,048	5,033	181	47	20,272
Goochland County	739	1,641	630	104		3,113
Hanover County*	2,866	3,559	1,569	167	12	8,173
Henrico County	6,606	7,861	5,426	230	399	20,522
New Kent County	556	1,261	191	80	44	2,133
Powhatan County	817	1,304	311	19		2,452
City of Richmond	4,179	3,777	3,298	915		12,168
RRPDC	23,198	28,280	16,819	1,724	502	70,523

*Excludes area in the Town of Ashland

Table 3

Locality	Buildings/Structures	Roads	Parking Lots	Railroads	Runways	Total
Town of Ashland	32%	29%	36%	3%	0%	100%
Charles City County	26%	60%	13%	1%	0%	100%
Chesterfield County	34%	40%	25%	1%	0%	100%
Goochland County	24%	53%	20%	3%	0%	100%
Hanover County*	35%	44%	19%	2%	0%	100%
Henrico County	32%	38%	26%	1%	2%	100%
New Kent County	26%	59%	9%	4%	2%	100%
Powhatan County	33%	53%	13%	1%	0%	100%
City of Richmond	34%	31%	27%	8%	0%	100%
RRPDC Average	31%	45%	21%	3%	0%	100%

*Excludes area in the Town of Ashland

above regional average

below regional average

Another useful comparison is to study impervious area based on a per capita basis. Such an investigation can allow one to better understand how the relationship between population and impervious cover are reflected in land use patterns and the density of development. As shown in Figure 8 and Table 4 below, the rural counties in the Richmond region have a greater per capita area of impervious cover than do the more urban localities. Charles City County has the greatest area of impervious surface per capita: 6,553 square feet per person. At the other end of the spectrum, the City of Richmond has the lowest area of impervious surface per capita: 2,596 square feet per person.



Density, or the proximity of people and structures to each other, helps explain this wide range of per capita impervious surface area. The closer two places are together, the shorter the roadway connecting them needs to be. The proximity of two stores to each other increases that chances that parking can be shared, thereby reducing overall parking area needed. Similarly, the closer an origin is to a destination, the greater the chance that multiple transportation modes including

walking and biking can provide adequate access and that automobile demand for large roadway surfaces can be limited.

Figure 8

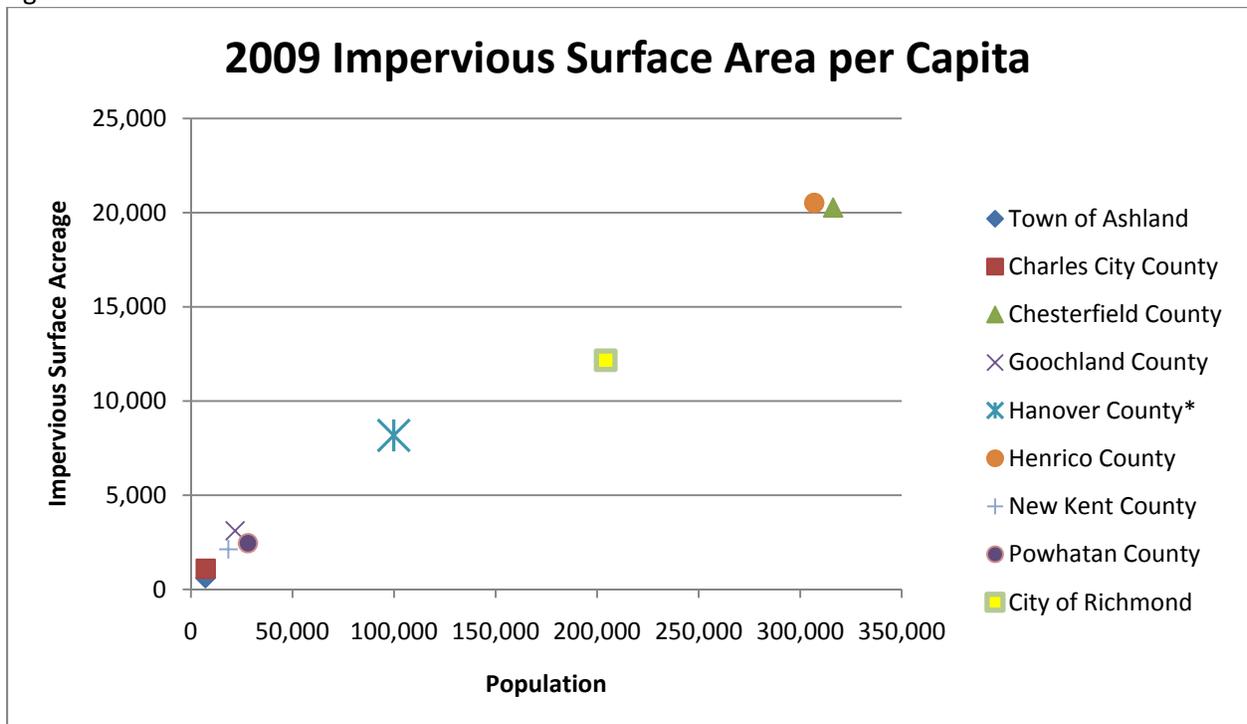


Table 4

Locality	2009 Population Estimate	2009 Impervious Surface Area	2009 Per Capita Impervious Surface Square Footage
Town of Ashland	7,114	598	3,663
Charles City County	7,256	1,092	6,553
Chesterfield County	316,236	20,272	2,792
Goochland County	21,717	3,113	6,245
Hanover County*	92,749	8,173	3,839
Henrico County	306,935	20,522	2,912
New Kent County	18,429	2,133	5,042
Powhatan County	28,046	2,452	3,809
City of Richmond	204,214	12,168	2,596
RRPDC	1,002,696	70,523	3,064

*Excludes area in the Town of Ashland

Population estimates from Weldon Cooper Center

Figure 9 and Table 5 display information about the per capita square footage of impervious surface features, such as roads and parking lots. Goochland County and Hanover County have the most per capita impervious surface in building footprints in the Richmond Region; both have more than 1,350 square feet of building impervious surface per person. Charles City County and Goochland County have the most per capita impervious surface associated with roadways; both counties have more than 3,200 square feet of roadway impervious surface per person. Charles City County has nearly 4,000 square feet of roadway per person. The Town of Ashland and Goochland County have the highest per capita impervious surface associated with parking lots; both have more than 1,200 square feet of parking lot area per person.

While rail lines and airport runways are interesting features to study, data about the extent of these features reveals less about daily life and development patterns in the United States across jurisdictions within a region. Airports with large runway surfaces are typically designed to service a region, not one locality. Therefore, comparing all runway area to one locality's population is likely to skew the conclusion. Somewhat similarly, while passenger rail service is a valid and useful form of transportation in today's economy, the transport of freight and historic placement and ownership of rail lines, factors heavily into the location of present rail lines. It is more difficult to tease out broad statements about impervious surface and land use development patterns from this data.

Figure 9

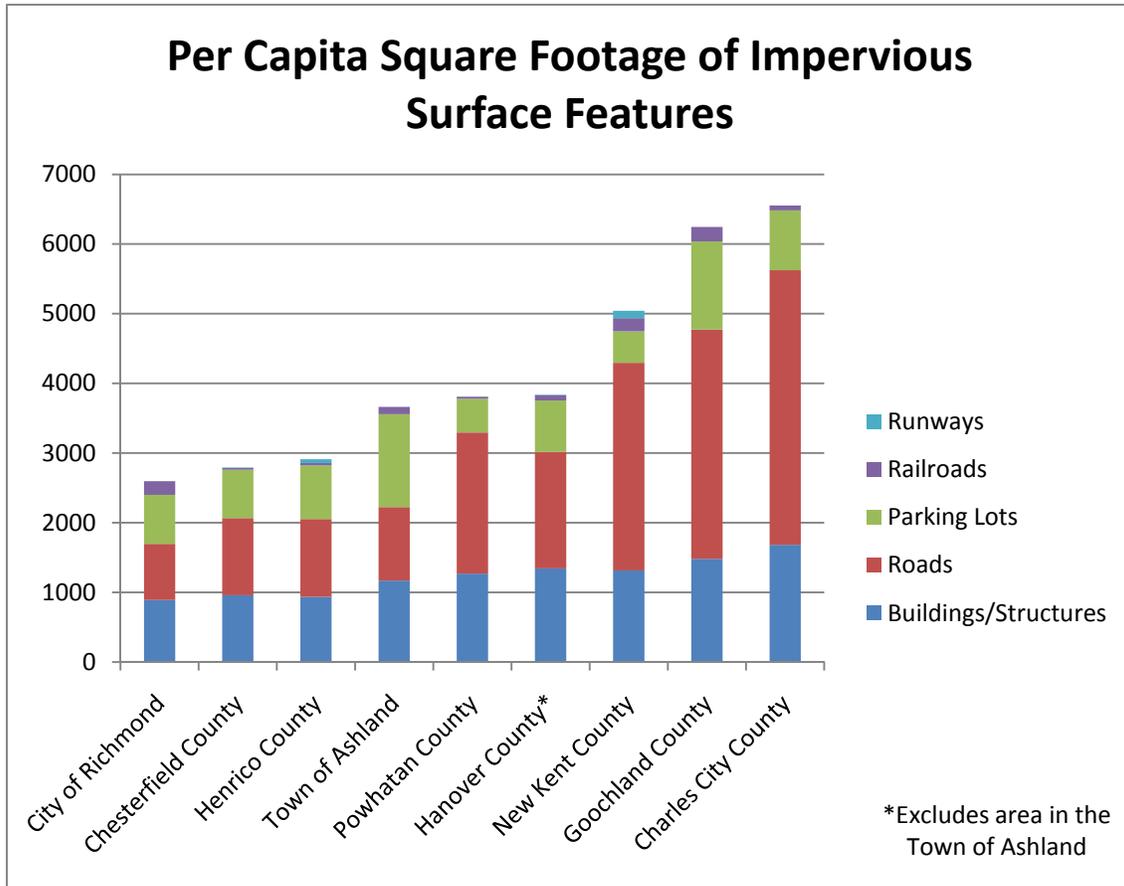


Table 5

Locality	Buildings/Structures	Roads	Parking Lots	Railroads	Runways	Total
Town of Ashland	1,169	1,056	1,333	105	0	3,663
Charles City County	1,683	3,942	858	69	0	6,553
Chesterfield County	959	1,109	693	25	6	2,792
Goochland County	1,482	3,291	1,264	208	0	6,245
Hanover County*	1,346	1,672	737	78	6	3,839
Henrico County	937	1,116	770	33	57	2,912
New Kent County	1,315	2,981	452	190	105	5,042
Powhatan County	1,269	2,026	483	30	0	3,809
City of Richmond	891	806	703	195	0	2,596
RRPDC	1,008	1,229	731	75	22	3,064

Values represent impervious surface square footage per capita.

Change over Time, 2002 – 2009

One of the aims of the Impervious Surface project has been the ability to compare similar datasets across time. Such a comparison enables planners to see change over time; inferences about the effects of practices or policies can be more accurately drawn. Ideas or notions about land use patterns over time can be tested. A useful point of analysis is the rate of change of impervious surface compared to that of population. In general, continuing the status quo of the manner in which land is developed would result in approximately the same rate of change in population to that of impervious surface. Variances between these two rates can generally be assumed to reflect a combination of changes to government policies concerning development, land development practices, and/or real estate and land development market demands. Of course, further study than is provided in this document would be necessary to isolate specific causes and their extents for any trend deviations seen. The analysis in this section compares population growth to changes in impervious surface associated with building footprints, not including impervious surfaces associated with transportation features like roadways or parking lots. Limitations of available and comparable data restricted this comparison to these two elements.

On average, localities in the Richmond region saw a little over 300 acres of building impervious surface created between 2002 and 2009. This represented an average increase in building impervious surface of 18% over 2002 levels. As seen in Figure # and Table 6 below, there is wide variety of deviance from this regional average. Indeed, even the RRPDC region itself as a whole saw less of an increase less than the regional average, increasing by only 14%. Powhatan and Goochland Counties saw the greatest rate of building impervious surface growth; both at or above a 35% increase. The Town of Ashland, Hanover County, and Goochland County saw the lowest rates of increase, all below 5%.

Meanwhile, between 2002 and 2009, the populations of localities in the Richmond region grew by an average of 13%. Again, as with impervious surfaces, there was much variance from this regional average. The RRPDC region itself grew by slightly less; population increased by 109,013 people, or 12%, between 2002 and 2009. New Kent County saw the largest percentage increase in population: 4,219 people or 30%. On the other hand, Charles City County saw the least population growth: 159 people or 2%.

In some localities, large differences between the rates of growth of building impervious surface compared to that of population are evident. Some localities saw much larger growth rates of building impervious surface than of population, for example, Powhatan County and Goochland County. Other localities saw population growth outpace building impervious surface growth, for example, the Town of Ashland and Hanover County. However, one constant across the region existed; if a locality experienced above or below average growth for one element, the locality saw the same relationship to the average for the other element, albeit, not necessarily by the same amount.

Figure 10

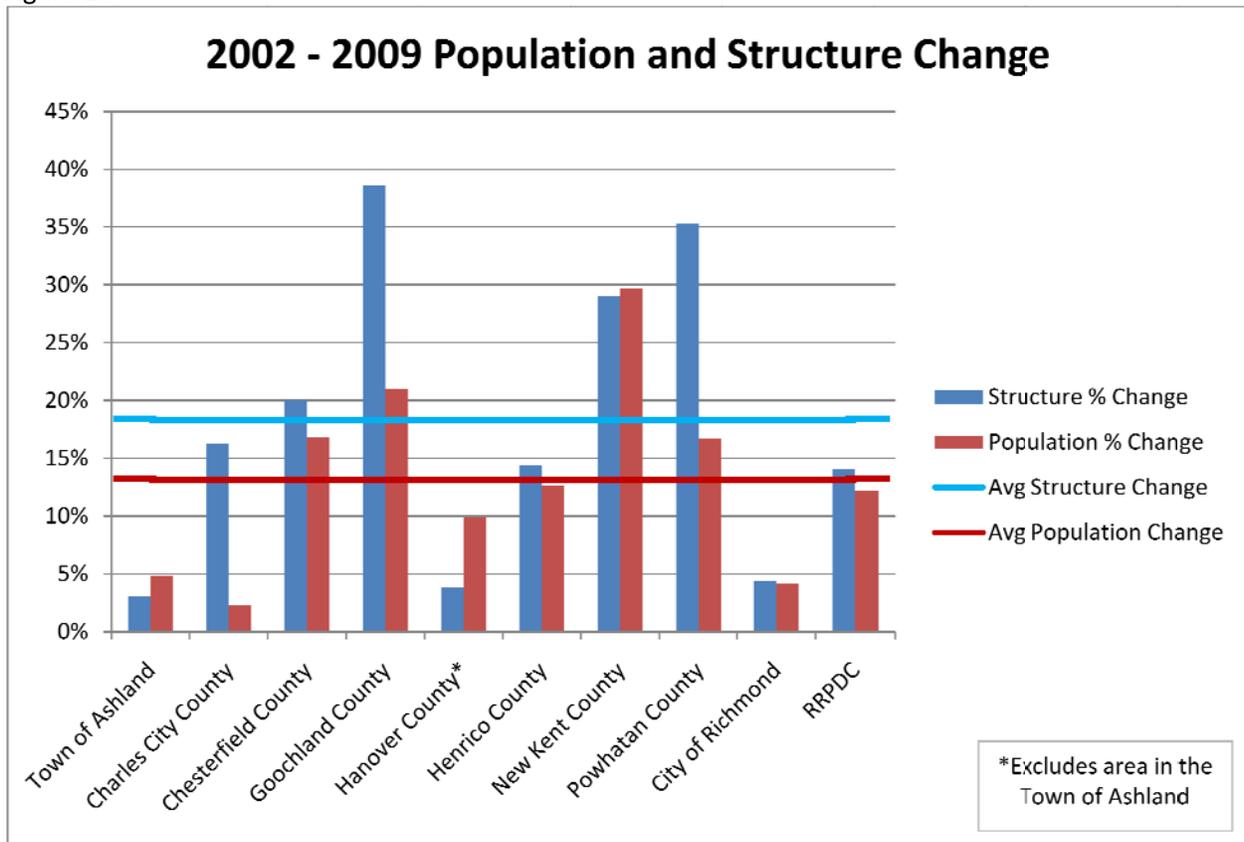


Table 6

Locality	2002		2009		Structure Acreage		Population	
	Structure Acreage	Population Estimate	Structure Acreage	Population Estimate	Increase	Percent Change	Increase	Percent Change
Town of Ashland	185	6,785	191	7,114	6	3%	329	5%
Charles City County	241	7,097	280	7,256	39	16%	159	2%
Chesterfield County	5,803	270,766	6,963	316,236	1,161	20%	45,470	17%
Goochland County	533	17,942	739	21,717	206	39%	3,775	21%
Hanover County*	2,761	84,365	2,866	92,749	105	4%	8,384	10%
Henrico County	5,775	272,394	6,606	306,935	830	14%	34,541	13%
New Kent County	431	14,210	556	18,429	125	29%	4,219	30%
Powhatan County	604	24,039	817	28,046	213	35%	4,007	17%
City of Richmond	4,003	196,085	4,179	204,214	176	4%	8,129	4%
RRPDC	20,336	893,683	23,197	1,002,696	2,861	14%	109,013	12%

*Excludes area in the Town of Ashland

Population estimates from Weldon Cooper Center

Moving Forward...

The 2009 Richmond Region impervious surface data can contribute to a series of analyses that will create a baseline as to the status of land and development in the Richmond Region. RRPDC staff is in the process of creating and maintaining several regional layers such as existing land use, parks, green infrastructure, transportation facilities, water quality monitoring data, etc. When paired with regional future land use data in addition to population and employment projections, all of these elements create an informative picture about growth in the Richmond Region.

References for More information on Impervious Surfaces and Water Quality

NOAA Office of Ocean and Coastal Resources Management
<http://coastalmanagement.noaa.gov/impacts.html>

US EPA Office of Water <http://www.epa.gov/ow/>

United States Geological Survey – The Water Cycle <http://ga.water.usgs.gov/edu/watercyclerrunoff.html>

USGS VIDEO: **Stormwater, Impervious Surface, and Stream Health** <http://gallery.usgs.gov/videos/298>

USDA National Agricultural Library, Water Quality Information Center
http://wqic.nal.usda.gov/nal_display/index.php?info_center=7&tax_level=1&tax_subject=596

Virginia DCR of Stormwater Management
http://www.dcr.virginia.gov/stormwater_management/index.shtml