

# Hampton Roads Coastal Resources Technical Assistance Program Fiscal Year 2016-2017 Final Report



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**HAMPTON ROADS COASTAL RESOURCES  
TECHNICAL ASSISTANCE PROGRAM**

**FISCAL YEAR 2016 - 2017  
FINAL REPORT**

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**Prepared by the staff of the  
Hampton Roads Planning District Commission**



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**AUTHORS:**

Benjamin J. McFarlane, AICP  
Senior Regional Planner

**ORGANIZATION NAME,  
ADDRESS AND TELEPHONE**

Hampton Roads Planning  
District Commission  
723 Woodlake Drive  
Chesapeake, Virginia 23320  
(757)420-8300  
<http://www.hrpdcva.gov>

**ABSTRACT**

This report describes the environmental technical assistance program conducted by the Hampton Roads Planning District Commission during FY 2016 – 2017 through its Coastal Resources Management Program. This program encompasses environmental impact review, participation in state and federal programs, coordination of regional programs addressing environmental issues, public information and education, and technical assistance to Hampton Roads localities. It contains representative examples of the technical work, comment letters, outreach materials, and associated materials generated and used in assisting the region's seventeen local governments, supporting the Virginia Coastal Zone Management Program, and working with the other Planning District Commissions in the Coastal Zone.

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## INTRODUCTION

In March 2016, the Hampton Roads Planning District Commission submitted a proposal to the Virginia Coastal Zone Management Program (VCZMP) for funding to continue the HRPDC's Technical Assistance Program. Through this program, the HRPDC provides technical assistance on a variety of environmental and coastal resources management issues to its seventeen member local governments and to coordinate their response to those issues.<sup>1</sup> It also provides assistance to the incorporated towns in the region as well as to a wide variety of non-governmental stakeholders. This program has operated successfully with financial assistance from the Virginia Coastal Zone Management Program since the VCZMP's inception in 1986. In October 2016, the HRPDC was awarded financial assistance to maintain its Technical Assistance Program through September 2017. This report provides an overview of the activities and accomplishments of the Hampton Roads Coastal Resources Technical Assistance Program during that period.

The Hampton Roads Technical Assistance Program is a comprehensive program, providing on-call staff capability, a regional coordination mechanism, and related technical studies. It assists the region's localities on short-term local issues, ensures a collective response to regional, state and federal issues as they arise, and facilitates cooperation and coordination among the localities. The Technical Assistance Program provides the resources to begin many efforts which are later funded through specific grants or local assessments, while in other cases, the program allows for the continuation of efforts after initial funding. Examples of these programs include the HRPDC's work on the Chesapeake Bay Program, coordination on stormwater management, and planning for sea level rise.

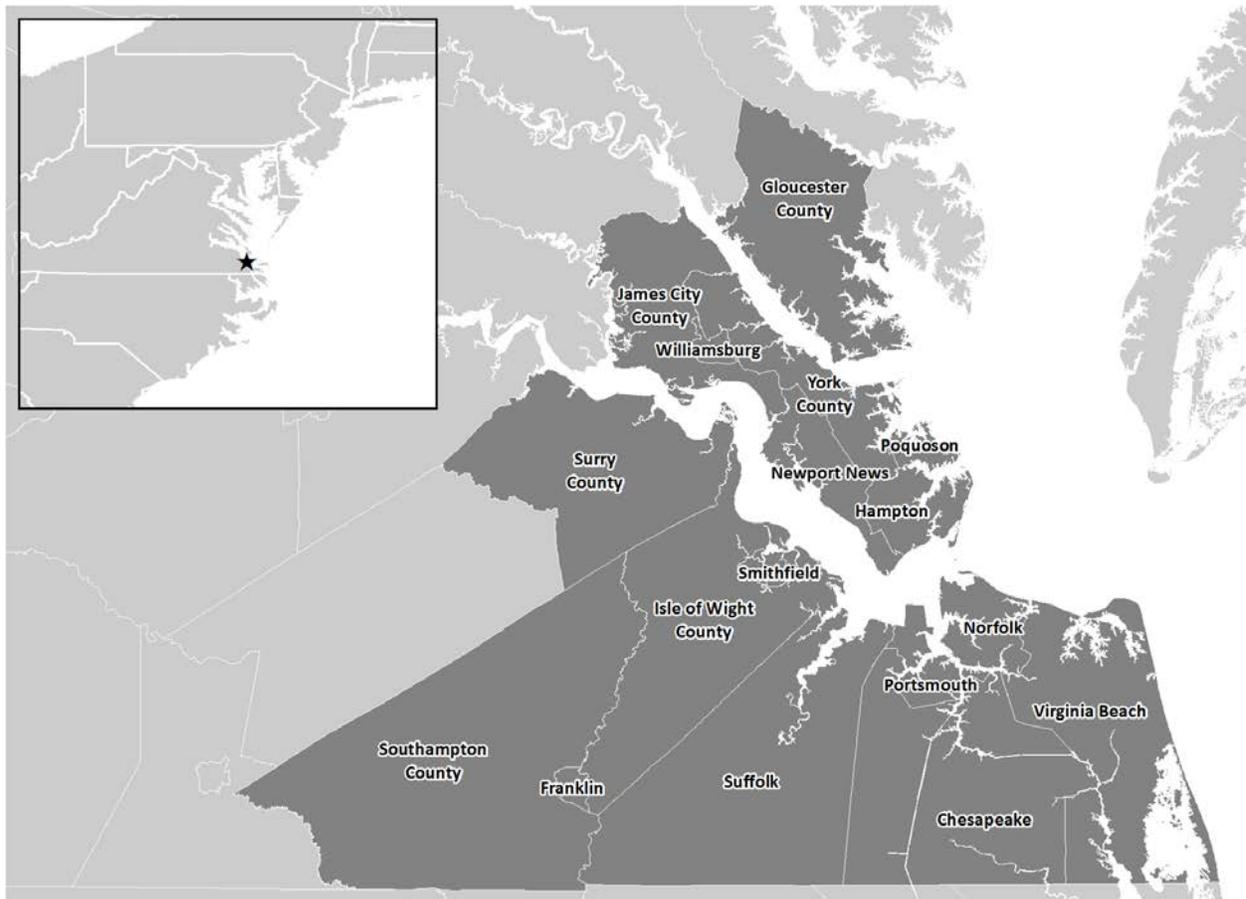
Of particular significance, VCZMP funding for this program has provided seed money allowing the region to undertake new environmental initiatives, such as the Regional Water Supply, Groundwater, Wastewater, Stormwater Management, and Coastal Resiliency Programs, including the public information and education components of each. These regional initiatives, which continue to evolve, are now institutionalized and have been enhanced through dedicated local funding. These regional programs are unique examples of intergovernmental cooperation in management of coastal resources in the Commonwealth.

The Hampton Roads Technical Assistance Program also enables the HRPDC to participate in and support a number of core elements of the Virginia Coastal Zone Management Program, such as the environmental impact review and federal consistency determination process, wetlands and dune regulations, Chesapeake Bay Preservation Act (CBPA) regulations, air quality regulations, and several state water quality programs. This participation results in cost savings to the state by educating localities collectively about

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<sup>1</sup> The Hampton Roads Planning District Commission consists of the Cities of Chesapeake, Franklin, Hampton, Newport News, Norfolk, Poquoson, Portsmouth, Suffolk, Virginia Beach, and Williamsburg, the Counties of Gloucester, Isle of Wight, James City, Southampton, Surry, and York, and the Town of Smithfield.

state and federal initiatives and coordinating local government input to these efforts. Over the past thirty-one (31) years, several hundred local government staff members from the region's seventeen local governments have received technical training in wetlands regulations and delineation, CBPA implementation, erosion and sediment control, stormwater management, low impact development and environmental site design, flood mitigation, geographic information systems, land conservation, coastal resiliency, green infrastructure, watershed management, and comprehensive coastal resources management. Local government board members, staff from other PDCs, and representatives of the private sector have also participated. As a result, the effectiveness of local government implementation has increased.



**Local Government Members of the Hampton Roads Planning District Commission**

Through review of environmental impact documents and coastal zone consistency determinations, the regional program has also facilitated rapid resolution of local government concerns with the impacts of state projects proposed by the Virginia Department of Transportation (VDOT), the Virginia Community College System, state supported colleges and universities, and others, as well as federal projects such as harbor dredging, military facility construction and operations, military encroachment issues, Coast Guard permits for marine events and operations, Outer Continental Shelf Energy Development, and related resource management programs.

The Technical Assistance Program allows the HRPDC to serve as a central source of environmental data and information, including water and wastewater data, soil surveys, historic aerial photographs, and regional land use data. HRPDC also houses and collects a wide variety of GIS datasets from various federal, state, and local partners, such as high-resolution elevation and land cover data, as well as datasets developed by HRPDC staff.

The FY 2016 – 2017 Hampton Roads Technical Assistance Program enabled the region's localities to continue to address, in a comprehensive and integrated fashion, many aspects of coastal resources management - the Chesapeake Bay Program, environmental impact review, local comprehensive planning, CBPA and Chesapeake Bay TMDL implementation, wetlands protection, shoreline management, coastal resiliency, public access, and environmental database development and analysis through the HRPDC's Geographic Information System (GIS). The program has allowed the continuation of regional support for and participation in the VCZMP, regional participation in other state and federal initiatives, completion of necessary technical studies, technical assistance to the region's localities, and conduct of public information and education activities.

## **PROGRAM OBJECTIVES**

At the outset of the FY 2016 – 2017 Hampton Roads Technical Assistance Program, the HRPDC, in cooperation with staff from its member local governments, established six (6) objectives for the Program. These overall objectives, while expanded in scope, have remained largely the same since program inception. They are:

1. To assist Hampton Roads localities in implementing the recommendations of the Virginia Coastal Zone Management Program, related state and federal environmental management programs, and related state legislation and regulations.
2. To support the Commonwealth of Virginia in implementing the VCZMP through coordination of local and regional review of environmental impact assessments/statements and applications for state and federal environmental permits and related environmental documents and by serving as an information conduit between the state and localities on coastal resource management issues.
3. To complete regional environmental studies, necessary to support local government consideration of state and federal priorities.
4. To enable the Hampton Roads region to continue to play an active role in the development, implementation and refinement of the Virginia Coastal Zone Management Program, the Chesapeake Bay Program, and related environmental initiatives.
5. To improve the coordination and quality of local and regional decision-making concerning coastal and related environmental resources.
6. To increase public awareness of the value of coastal resources and of the local and regional efforts to manage them.

To accomplish these objectives, a comprehensive program was structured involving a range of activities in the following categories: regional coordination, environmental impact review, public information and education, training, regional technical studies, and technical assistance.

## **PROGRAM ACCOMPLISHMENTS**

### **Regional Coordination**

The regional coordination component of the HRPDC's Coastal Resources Management Technical Assistance Program includes the facilitation of meetings between the area's local governments and participation in state and federal programs on the localities' behalf. Through the regional coordination process, the HRPDC works to ensure that local government planning and implementation activities in the areas of stormwater management, water supply and groundwater management, wastewater, Chesapeake Bay, sea level rise, resiliency, and coastal zone management are coordinated and mutually supportive. The synergy inherent in this coordination process provides opportunities for local government innovation and enhancement of activities in each of these areas.

### **Regional Coordination Process**

The Hampton Roads Technical Assistance Program enables the HRPDC to maintain a regional coordination process on environmental issues while also providing links to other ongoing regional environmental programs. Through the Regional Environmental Committee, HRPDC staff support local governments in implementing legal requirements regulatory programs. This process also helps the region by providing support for coastal resources management and environmental education. The Regional Environmental Committee meets approximately monthly.

The Hampton Roads Technical Assistance Program also enables the HRPDC staff to support regional coordination of issues related to coastal resiliency, sea level rise, recurrent flooding, and climate change. These issues fall under the purview of the HRPDC's Coastal Resiliency Committee, which is comprised of locality senior officials and department heads. The committee meets on a quarterly schedule, with additional workgroup discussions of technical matters scheduled for off-months when necessary.

During the course of the grant year, the HRPDC staff continued local government coordination of ongoing consideration of various environmental issues. Stormwater regulations and program management, the Chesapeake Bay TMDL, and sea level rise continue to be issues of considerable interest. The meetings usually include several main presentations by HRPDC staff, local committee members, or state agency representatives and often include discussion of potential project ideas or responses to regulatory developments. Each meeting also closes with an opportunity for regional and local staff to provide status reports or ask questions on issues relevant to the committee.

The following points summarize the activities of the Hampton Roads Regional Environmental Committee during the year. Full agendas and related materials for each meeting are available on the HRPDC website, [www.hrpdcava.gov](http://www.hrpdcava.gov).

- October 6, 2016 –The major focus of this meeting were two presentations by local committee members. Gayle Hicks from Hampton gave a presentation on a stormwater retrofit project the city recently finished, and Meg Pittenger of Portsmouth gave a presentation to the committee on that city’s floodplain management plan. The meeting also included updates and briefings from the HRPDC staff on the askHRgreen program, a state stormwater stakeholder advisory group, the Chesapeake Bay Program, and working waterfronts, in addition to local updates.  
Total Attendance: 39  
Total Stakeholders: 22
  
- December 1, 2016 –This meeting featured a presentation from Terry O’Neill, Hampton’s Director of Community Development, on steps the city is taking to build on a Dutch Dialogues workshop from 2015. The meeting also included a presentation on the Southeast Virginia Native Plants Guide by Virginia Witmer of the Virginia Coastal Zone Management Program. The meeting also included updates and briefings from the HRPDC staff on the Virginia Capital Trail, coastal zone program, state stormwater stakeholder advisory group, and working waterfronts, in addition to local updates.  
Total Attendance: 52  
Total Stakeholders: 25
  
- January 5, 2017 –This meeting featured a discussion of how localities are dealing with conflicts between the Chesapeake Bay Preservation Act and flood mitigation. The meeting also included updates on state stormwater regulations and policy developments, manufactured treatment devices, the coastal zone program, and the recently held Virginia Coastal Policy Center annual conference, in addition to local updates.  
Total Attendance: 58  
Total Stakeholders: 31
  
- February 2, 2017 – This meeting featured a presentation from Joe Rieger of the Elizabeth River Project on the restoration plan for the Eastern Branch of the Elizabeth River and a presentation from Roger Everton of the Department of Environmental Quality on recent changes in the Tidewater Regional Office. The meeting also included updates on regional joint land use studies with the military, a regional public access plan, and stormwater policies and regulations, in addition to local updates.  
Total Attendance: 51  
Total Stakeholders: 28
  
- March 2, 2017 – This meeting featured a presentation from Tim Cole and Tony Arnold from Virginia Beach City Public Schools on how green infrastructure was incorporated into the new Old Donation School. The meeting also included a presentation on the Commonwealth Center for Recurrent Flooding Resiliency and a briefing on stormwater projects in Newport News, in addition to local updates.

Total Attendance: 46  
Total Stakeholders: 27

- May 4, 2017 – This meeting featured a presentation from Dr. Todd Egerton of the VDH Division of Shellfish Sanitation on the state’s shellfish sanitation program. The meeting also included a presentation on James City County’s clean water heritage stormwater maintenance and repair program and a presentation on the Virginia Master Naturalists training program. The meeting also included updates from HRPDC staff on the coastal zone program and an environmental education campaign, in addition to local updates.

Total Attendance: 43  
Total Stakeholders: 26

- June 1, 2017 – This meeting featured a briefing and discussion on Virginia’s Chesapeake Bay Phase III Watershed Implementation Plan led by DEQ staff. The meeting also included updates on regional joint land use studies and the coastal program, in addition to local updates.

Total Attendance: 49  
Total Stakeholders: 23

- August 3, 2017 – This meeting featured a presentation from Steve Lambert of the HRTPO on the proposed Birthplace of America Trail and a presentation from Clay Bernick of the HRPDC on the regional solid waste management plan. The meeting also included a briefing on the stormwater local assistance fund, an update on the coastal zone program, a discussion of committee logistics, and local program updates.

Total Attendance: 43  
Total Stakeholders: 29

- September 7, 2017 – This meeting featured a presentation by the HRPDC staff on a regional strategic plan for public access and a presentation by Pam Mason of the Virginia Institute of Marine Science on the new AdaptVA portal. The meeting also included a presentation on the USDA’s policies and programs for controlling waterfowl and briefings on the coastal zone program, sea level rise viewers, and the regional stormwater budget and memorandum of agreement, in addition to local updates.

Total Attendance: 39  
Total Stakeholders: 22

The following points summarize the activities of the Hampton Roads Coastal Resiliency Committee and Coastal Resiliency Working Group.

- October 28, 2016 – The Coastal Resiliency Working Group meet for a discussion of data needs related to first floor elevations. The meeting included contributions from Rutgers University, Dewberry, and the U.S. Army Corps of Engineers.

- November 18, 2016 – The Coastal Resiliency Working Group met for a discussion of water level sensors, including planning, implementation, and data uses. The meeting included a presentation on the StormSense project by Dr. Derek Loftis of the Virginia Institute of Marine Science.
- December 9, 2016 – This meeting of the Coastal Resiliency Committee featured an update from Hampton city staff on FEMA regulations for permitting development in floodplains. The meeting also included discussion of regional legislative priorities and a presentation from Norfolk staff on how the city’s new comprehensive plan addresses sea level rise.  
     Total Attendance: 35  
     Total Stakeholders: 23
- February 3, 2017 – The Coastal Resiliency Working Group met for a discussion of proposal ideas for NOAA resilience grants.
- March 24, 2017 – This meeting of the Coastal Resiliency Committee featured a presentation from Dr. Derek Loftis of the Virginia Institute of Marine Science on a project to better model storm surge. The meeting also included discussion of FEMA policies and updates on legislative priorities, a subsidence monitoring proposal, and joint land use studies. The meeting also included discussion of regional legislative priorities and a presentation from Norfolk staff on how the city’s new comprehensive plan addresses sea level rise.  
     Total Attendance: 38  
     Total Stakeholders: 24
- May 26, 2017 – The Coastal Resiliency Working Group met to discuss draft guidance from the Federal Emergency Management Agency on permit requirements for development in floodplains.
- June 23, 2017 – This meeting of the Coastal Resiliency Committee featured updates on FEMA floodplain management permit requirements, state legislative actions, storm surge modeling, and several HRPDC projects.  
     Total Attendance: 41  
     Total Stakeholders: 25
- August 25, 2017 – The Coastal Resiliency Working Group met to discuss stormwater model applications and data needs. The meeting included a presentation on Virginia Beach’s master drainage study.
- September 22, 2017 – This meeting of the Coastal Resiliency Committee featured a presentation by HRPDC staff on the upcoming reauthorization of the National Flood

Insurance Program and discussions on program priorities, first floor elevation projects, and state legislative priorities, in addition to local updates.

Total Attendance: 31

Total Stakeholders: 20

## **Participation in State and Federal Programs**

Several state and federal environmental programs encourage use of PDCs as a cost effective mechanism for informing local governments and seeking their input for state and federal program development and accomplishment. For example, the Chesapeake Bay Program in both its 1996 and 2002 Local Government Participation Action Plans recommended better use of technical assistance providers, such as PDCs, to serve as vehicles to distribute information and outreach on Chesapeake Bay-related issues. It also suggested development of a network of local officials and staff with expertise in dealing with resource protection issues. Virginia's Regional Cooperation Act strongly recommends this type of role for PDCs. Several programs, including the Virginia Coastal Zone Management Program, do use the PDCs in this manner. Historically, NOAA's Section 312 evaluation of the Virginia Coastal Zone Management Program has recognized the benefits and cost-effectiveness of the network of PDCs in supporting the VCZMP and in assisting their member local governments. During the 2006 NOAA evaluation of the Virginia Coastal Zone Management Program, the Evaluation Team provided favorable comments on the role and activities of PDCs. Those comments were formalized in the final Section 312 Evaluation Report.

In the Hampton Roads region, the Hampton Roads Technical Assistance Program and its associated committees provide such a network. Both HRPDC staff and local government members of the HRPDC Advisory Committees (including the Regional Environmental Committee, Directors of Utilities Committee, and Coastal Resiliency Committee) frequently serve on state and federal advisory groups. On a regular basis, the participating localities request that the HRPDC staff serve as their representative to these advisory groups. Alternatively, the Committees may select a local government member to represent the region. In both cases, the HRPDC Committees provide all seventeen member localities with a mechanism to participate, at least indirectly, in the state or federal program(s). Also, data and information on Hampton Roads conditions are provided by the Hampton Roads representative (HRPDC or local government staff) to state and federal agencies on behalf of the localities, thus minimizing state and federal agency data collection and input costs. During FY 2015-2016, this program included regional participation on state and federal panels addressing stormwater management, groundwater, and the Chesapeake Bay Program.

The HRPDC staff works closely with state and federal agencies on coordination of programs as they affect the Hampton Roads region. This work involves follow-up to previous studies conducted by the HRPDC with VCZMP-funding, serving on advisory committees supporting plan and regulatory development, and development of new cooperative initiatives involving state, local, federal and private entities. In the past year, HRPDC staff served on several advisory groups, including the Stakeholder Advisory Group addressing stormwater

management laws and work groups supporting the Eastern Virginia Groundwater Management Advisory Committee.

### **Virginia Coastal Zone Management Program**

During the grant period, the HRPDC staff continued to participate in Coastal Zone PDC meetings, contributing to the ongoing refinement of the Virginia Coastal Zone Management Program. The HRPDC staff participated in Coastal Policy Team meetings on January 18, 2017 and August 3, 2017. HRPDC also attended Coastal PDC meetings on October 19, 2016 (hosted by the Middle Peninsula Planning District Commission) and May 24, 2017.

The Coastal PDCs provide a network linking all regional agencies and localities in the Coastal Zone to address environmental issues. In recent years this network has provided support for multi-regional partnerships and initiatives, including working waterfronts and planning for the Lower Chickahominy River Watershed. The HRPDC staff has played an integral role in the development and enhancement of these larger networks as well.

Efforts to coordinate activities with the other Coastal PDCs in all facets of environmental planning continued throughout the year. Representative activities in 2016 and 2017 focused on exchanging information among the PDCs on issues such as coastal resiliency, living shorelines, working waterfronts, and potential collaborative projects.

### **Chesapeake Bay Program**

The Hampton Roads Technical Assistance Program continues to support the HRPDC's participation, on behalf of its member localities, in the Chesapeake Bay Program. Beginning in FY 1998-1999, this element of the Program received greatly increased emphasis through several initiatives, including the renewal of the Chesapeake Bay Local Government Advisory Committee, establishment of a Metropolitan Areas Work Group, development of the Chesapeake Bay Agreement 2000 and development of new and revised Chesapeake Bay Program Implementation Strategies. The Commission's involvement with the Chesapeake Bay Program continued with the development of the Tributary Strategies and the Chesapeake Bay Watershed Model. Implementation of the Chesapeake Bay TMDL continues to be a major focus of HRPDC's environmental work.

In addition, both HRPDC and Hampton Roads local government staff maintain involvement on various federal and state advisory and regulatory committees. While this participation is often funded by other programs, the HRPDC provides a forum, through the Regional Environmental Committee, for those representatives to gather information and responses from other local governments in the region, and to convey information from these advisory groups back to the region. The HRPDC staff currently participates in the Chesapeake Bay Program's Climate Resiliency Workgroup; HRPDC staff attended an in-person meeting of the workgroup in June 2017 and also participated in conference calls.

## **ENVIRONMENTAL IMPACT REVIEW**

The HRPDC staff reviews and comments on applications for state and federal regulatory permits, including the associated Environmental Impact Assessments/Statements or federal consistency determinations. Local staff representatives are regularly contacted to identify any concerns individual local governments may have with specific projects. On occasion, the Hampton Roads Planning District Commission may be informed on particular projects with significant regional or local impacts. Generally, no formal action is taken by the Commission as a result of this notification; however, historically, the Commission has requested more extensive HRPDC staff and local government review of particular issues. HRPDC staff responds to nearly all requests for comments from the Department of Environmental Quality (DEQ).

From October 1, 2016 through September 30, 2017, the HRPDC staff reviewed and commented on four (4) environmental impact assessments, environmental impact statements, and federal consistency certifications for both state and federal projects. Projects reviewed included projects or actions proposed by the Department of the Navy, Department of Housing and Urban Development, Department of Defense, and Federal Aviation Administration. The specific projects are listed below. The HRPDC, in cooperation with the localities, worked to ensure that these projects were coordinated with and met local government requirements. HRPDC's responses are combined with any others from state agencies when DEQ makes its final determinations. While these determinations (and the collected comments) are conveyed back to HRPDC, DEQ staff does not generally identify any specific impacts to projects based on HRPDC staff comments. However, in several cases DEQ staff or staff from other state agencies has followed up with HRPDC staff to have comments clarified.

- 1) DEQ #17-055F – Updated Integrated Natural Resource Management Plan, Camp Pendleton State Military Reserve
- 2) DEQ #17-094F – Newport News/Williamsburg International Airport Perimeter Road Realignment
- 3) DEQ #17-096F – Colonial Arms Apartments
- 4) DEQ #17-109F – Hazardous Materials Warehouses & Gas Cylinder Sheds, Naval Station Norfolk and Norfolk Naval Shipyard

To improve the information available for consideration by the Commission and to facilitate tracking of local and state actions on environmental documents, the HRPDC staff developed a database and reporting system during a previous grant year. All environmental documents reviewed since July 2001 have been entered into the database. Appendix A contains the comment letter for DEQ #17-096.

Coordination of review and comment on environmental documents with the region's localities is frequently problematic, because of time constraints placed on the review process by the state and, in some cases, by project applicants who request expedited review from the state. In addition, projects are often submitted for environmental impact

review before designs are complete. Localities often wait for permit applications, which require complete designs and plans, prior to commenting.

## **SPECIAL PROJECTS AND TECHNICAL STUDIES**

HRPDC staff completed an initial hypsometric analysis of Hampton Roads localities' vulnerability to sea level rise and updated regional assessments of sea level rise exposure

The HRPDC staff regularly coordinates with local and regional partners to identify timely and appropriate special projects or technical studies that address important regional issues. The HRPDC staff and regional advisory committees identify potential topics for special projects or technical studies during the grant application process, but often there are important issues that arise during the grant year, and this grant allows HRPDC staff to respond to those needs as they occur. During the course of this grant, the HRPDC staff identified and completed work on one special projects. This project was a hypsometric analysis of vulnerability to sea level rise in Hampton Roads, which is described below.

### **Hypsometric Analysis of Vulnerability to Sea Level Rise in Hampton Roads**

One of the major focus areas of the HRPDC's coastal resources technical assistance program is support for local efforts related to planning for coastal resiliency and sea level rise. Understanding the potential impacts of recurrent flooding and sea level rise on local governments and communities in the near future and long-term is important to effective planning. Hypsometry, which refers to the measurement of land elevation relative to sea level, is a major component of vulnerability to tidal flooding. Previous studies by the HRPDC have focused on one or a few sea level rise or flooding scenarios, but a comprehensive assessment of different amounts of sea level rise had not been conducted.

Looking at a range of sea level rise scenarios is important for several reasons. First, vulnerability to flooding from sea level rise varies considerably across Hampton Roads. Some localities are highly vulnerable, while some are barely susceptible to tidal flooding. Second, since sea level rise will happen over a long period of time, modeling a range of scenarios can help determine when individual localities will become vulnerable. For this analysis, the HRPDC staff modeled sea level rise scenarios used in previous CZM-funded projects to estimate the relative vulnerability of Hampton Roads localities to half-foot increments of sea level rise between 0.5 feet and 7.5 feet.<sup>2,3</sup> The total land area vulnerable and percent of land area vulnerable under each scenario for each of the sixteen Hampton Roads cities and counties were calculated using GIS. Using total area, the most vulnerable communities are Virginia Beach, Chesapeake, and Gloucester County. Virginia Beach and

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<sup>2</sup> McFarlane, Benjamin J. "Coastal Resiliency: Adapting to Climate Change in Hampton Roads." Hampton Roads Planning District Commission (2013) <http://www.deq.virginia.gov/Programs/CoastalZoneManagement/Funding/2011Projects/2011VirginiaCZMGrantProjectTask5111.aspx>

<sup>3</sup> McFarlane, Benjamin J. "Sea Level Rise Planning and Technical Assistance." Hampton Roads Planning District Commission (2015) <http://www.deq.virginia.gov/Programs/CoastalZoneManagement/Funding/2013Projects/2013VirginiaCZMGrantProjectTask5413.aspx>

Chesapeake both see significant impacts by 2.0 feet of sea level rise, while Gloucester County's vulnerability increases more gradually. Using the percent of land area, the most communities are Poquoson, Virginia Beach, and Hampton. Poquoson's vulnerability climbs rapidly under even modest sea level rise scenarios, while both Virginia Beach and Hampton do not see significant impacts until 2.0 feet of sea level rise or more.

Results of this analysis are included in Appendix B.

## **LOCAL ASSISTANCE AND COORDINATION**

### **Technical Assistance**

This element of the Hampton Roads Technical Assistance Program entails staff support and assistance to local governments and private entities as they address key coastal resources and other environmental issues such as TMDLs, habitat restoration, riparian buffer creation and protection, energy, climate change, aspects of the Chesapeake Bay Program, wetlands and dune protection, and nonpoint source pollution in their comprehensive planning process and related activities. Specific local projects or issues to be addressed through this element are identified by the localities throughout the grant year. These requests encompass assistance on grant proposals, assistance on permit issues, identification of state or federal agencies that may be of assistance for local projects, information about legislation or regulations, identification of technical resources that may be useful to a locality in developing a study, and responding to an elected official's request for information. The localities and others frequently turn to the HRPDC for assistance on GIS mapping and analysis projects. Through this element of the program, the HRPDC staff also assists private or non-profit entities, such as the Back Bay Restoration Foundation, Elizabeth River Project, Friends of Powhatan Creek, Hoffer Creek Wildlife Foundation, Lynnhaven River NOW, and others in their environmental planning and restoration initiatives. Aerial photographs and additional technical information on wetlands, hazardous waste sites, and soils are provided to private consultants upon request. During this grant year, the HRPDC staff assisted localities with data needs for sea level rise and land cover. In addition, the HRPDC staff continues to work with local government representatives to identify research priorities for issues of interest, such as stormwater, groundwater, recurrent flooding, and sea level rise. For example, the region identified collecting subsidence data as a major priority and agreed to fund the U.S. Geological Survey to establish and annual measure a network of elevation benchmark. Discussions have also taken place regarding the need for more frequent land cover data collection and collection of first flood structure elevations.

The HRPDC staff continued to advise the region's seventeen localities on environmental issues in conjunction with development of and revisions to local comprehensive plans, development regulations, and related issues. The primary issues addressed through this program continue to be state and federal stormwater management programs, groundwater issues, the Chesapeake Bay Program, and sea level rise/recurrent flooding. Most of the

region's member localities have received individual assistance through this program during the past year. During FY 2016 – 2017, the areas of emphasis continued to be stormwater management, groundwater, the Chesapeake Bay TMDL, and sea level rise.

The HRPDC staff continued development and enhancement of the region's geographic information system (GIS). The HRPDC staff is currently working with staff from the Hampton Roads Sanitation District to develop a regional GIS that will draw data from individual localities to create consistent regional datasets. Over the past year, this effort has focused on developing an accurate and complete dataset of local parcel information, which will serve as the foundation for additional datasets. The HRPDC staff also continues to develop or acquire regional, state, and federal datasets, such as land use, elevation, and land cover, for regional and local projects.

## **PUBLIC INFORMATION, EDUCATION, AND TRAINING**

An integral component of the Hampton Roads Technical Assistance Program is the provision of public information and education on environmental issues in the Hampton Roads region. Provision of public information and education was identified by the participating localities at the outset of the program in 1986 as a critical need that could be met cooperatively through the HRPDC. Since that time, the HRPDC staff has provided written communications and briefings to the Commission and a wide range of interest groups on environmental issues and has provided regular briefings to many of those groups. These efforts continued during the grant year.

To ensure that the members of the HRPDC are kept informed about the status of ongoing HRPDC environmental program activities and pending environmental issues that may affect the Hampton Roads region, the HRPDC staff routinely briefs the Commission on environmental issues of importance. During the year, briefings were given to the HRPDC on the following topics: environmental education, working waterfronts, coastal resiliency, floodplain management, and drinking water.

The HRPDC staff has provided briefings on regional environmental programs, environmental issues and state and federal regulations to a variety of groups and given presentations on related HRPDC technical studies and programs at several state, regional, and national conferences. Briefings are also provided to state agency Boards, Legislative Commissions, local government Planning Commissions, City Councils/County Boards, and Town Councils on request. During the grant period, HRPDC staff presented individually or on panels on several environmental issues, including stormwater management, the Chesapeake Bay TMDL, groundwater, coastal resiliency, and water supply. These meetings and presentations included:

- Presentation at 2017 Coastal Geotools conference, “Integrating Coastal Resilience into Local Plans and Policies” – February 7, 2017

- Presentation at State Department workshop, Our Planet: Addressing Regional Effects of Extreme Weather Events – South and Central Asia , “Regional Planning for Sea Level Rise in Hampton Roads, Virginia” – March 24, 2017
- Presentation at 2017 Environment Virginia Symposium, “Regional Coordination on Resiliency in Hampton Roads” – April 6, 2017
- Presentation to Navy Community Plans Liaison Officers, “Regional Coordination on Resiliency in Hampton Roads,” – May 18, 2017
- Presentation to Virginia Master Naturalists, “Green Infrastructure Planning and Implementation in Hampton Roads” – May 22, 2017
- Presentation to Hampton Roads Chapter of the Appraiser Institute, “Building Resilient Communities in Hampton Roads” – June 13, 2017
- Presentation to Joint Subcommittee on Coastal Flooding, “Regional Resiliency Efforts in Hampton Roads” – June 20, 2017
- Presentation at Alliance for the Chesapeake Bay Forum in Smithfield, Virginia, “Regional Resources for Resilient Communities” – June 21, 2017
- Presentation on AWMA Climate Change Webinar – August 23, 2017

A copy of the presentation given to the Virginia Master Naturalists on May 22, 2017 is included in Appendix C.

In August 2010, HRPDC replaced a quarterly newsletter with an online publication an e-mailed “HRPDC Weekly Update,” which was distributed to nearly 4,000 individuals. In July 2011, the “HRPDC Weekly Update” was moved to a bi-weekly schedule and renamed the “Hampton Roads Update” and later renamed the “Hampton Roads e-Newsletter” in April 2012. The online publication was shifted to a list of news articles and reports from HRPDC staff directly accessible from the HRPDC website’s homepage ([www.hrpdcva.gov](http://www.hrpdcva.gov)). To enhance the effectiveness of all HRPDC public information materials, HRPDC Special Reports on specific topics are also developed and distributed to supplement the regular newsletter. All newsletters and special reports are now distributed electronically. During this grant, HRPDC planning staff posted sixteen (16) entries related to coastal management issues.

The HRPDC staff has devoted considerable attention and effort over the past year to the continued refinement of the Commission's web page ([www.hrpdcva.gov](http://www.hrpdcva.gov)). The website contains copies of all newsletters, complete copies of HRPDC technical reports and an overview of Commission activities. All Commission and most committee meeting agenda materials are now posted and available on the HRPDC website. It contains an extensive

section devoted to the HRPDC’s regional planning and water resources programs, including links to a number of other federal, state, local, and private sector sites. Efforts to further enhance the website remain ongoing. A Commission Action Summary is posted after each meeting, and the meetings can be viewed on YouTube in their entirety.<sup>4</sup>

Through the Regional Environmental Committee, HRPDC staff has provided, facilitated, or hosted training on a variety of topics to localities. HRPDC also subscribes to and hosts a series a webinars provided by the American Planning Association (APA) and American Institute of Certified Planners (AICP). These webinars cover a variety of planning issues and provide Certification Maintenance (CM) credits to AICP planners. The HRPDC also has continued to partner with Old Dominion University and Virginia Sea Grant to hold meetings of the Hampton Roads Sea Level Rise/Recurrent Flooding Adaptation Forum. These meetings often provide Continuing Education Credits (CECs) to Certified Floodplain Managers. HRPDC staff publicizes and coordinates these training webinars and opportunities. In total, these training opportunities provided local staff with up to 3.0 AICP Certification Maintenance credits and 12.0 CFM Continuing Education Credits. The specific training opportunities are listed below.

### **Educational and Training Opportunities Provided in FY16-17**

Program Title	Content Provider	Date	Host	Credits
<b>“Ethics and the Digital World”</b>	APA/AICP	December 7, 2016	HRPDC	1.5 CM Ethics
<b>Engaging Residents in Resiliency</b>	HRPDC/ODU/ Virginia Sea Grant	February 24, 2017	Old Dominion University	4.0 CEC
<b>Hampton Roads PDC Resiliency Workshop</b>	FEMA/USACE/ DCR/VDEM	April 27, 2017	HRPDC	
<b>Modeling and Managing Extreme Precipitation</b>	HRPDC/ODU/ Virginia Sea Grant	May 19, 2017	Old Dominion University	4.0 CEC
<b>“2017 Planning Law Review”</b>	APA/AICP	July 5, 2017	HRPDC	1.5 CM Law
<b>The Next Step to Resilience – Projects and Ideas</b>	HRPDC/ODU/ Virginia Sea Grant	July 28, 2017	Old Dominion University	4.0 CEC

<sup>4</sup> <https://www.youtube.com/user/HRPDC>

## **CZM SUCCESS STORY: ENHANCING COASTAL RESILIENCY IN HAMPTON ROADS**

In October 2008, the HRPDC was awarded the first of four grants by the Virginia CZM Program to study the impacts of climate change on the Hampton Roads region and identify potential responses to those impacts (FY '08 Task 12.03). Additional grants were awarded in October 2009 (FY '09 Task 12.04), October 2010 (FY '10 Task 12.04), October 2011 (FY '11 Task 51), January 2014 (FY '13 Task 54), and October 2015 (FY '15 Task 94.01). This effort required considerable research and analysis, and has resulted in six separate reports which are now available on the HRPDC's website. These reports included the results of significant GIS analyses and mapping efforts, and have formed part of the basis for an ongoing regional discussion of how local governments in Hampton Roads should respond to climate change impacts, particularly sea level rise, which was early on identified as one of the greatest concerns for this region. One of the most useful components of this effort has been the development of a set of maps showing the potential inundation impacts of various sea level rise scenarios. In addition, the recognition of the significance of this issue for Hampton Roads communities has resulted in a new Coastal Resiliency Program and Committee at the HRPDC, with dedicated funding for staff time on resiliency projects and efforts.

Building on both the technical work and coordination process, the HRPDC has, in partnership with several localities and the U.S. Navy, received a grant in February 2017 from the Department of Defense's Office of Economic Adjustment for a Joint Land Use Study covering Navy installations in the cities of Portsmouth and Chesapeake. The focus of the study will be to identify areas and infrastructure that are both vulnerable to flooding and that support Navy operations and readiness in the region while also addressing issues such as transportation infrastructure, congestion, and land and water use conflicts. The overall goal is to identify policies that the participating cities can implement once the study is completed. The two-year study is expected to be completed in March 2019.

In addition to the new Joint Land Use Study, the HRPDC's Coastal Resiliency Committee is also making progress on regional goals. These include agreeing to fund work by the U.S. Geological Survey to monitor subsidence through a network of benchmarks in the coastal plain, tracking local projects and initiatives related to resiliency (such as flood control projects, building elevations, land acquisitions, green infrastructure, etc.), and developing a coherent regional message on how localities are together addressing sea level rise.

## **CONCLUSIONS**

Through the Hampton Roads Technical Assistance Program, the HRPDC has provided technical assistance to its member local governments and others; has delivered public information and education to the citizens and government officials of the region; has conducted important technical studies; and has coordinated a regional approach to

participation in state and federal environmental programs, while also providing cost-effective support to the Virginia Coastal Zone Management Program.

The Hampton Roads Technical Assistance Program conducted through the VCZMP is a cost-effective solution to the need for environmental cooperation and coordination in the Hampton Roads region of 3,000 square miles and 1.7 million residents. It provides a vehicle for the ten cities, six counties, and eleven towns of Hampton Roads to work with a number of state and federal agencies and others to exchange information and develop coordinated approaches to environmental management issues, while concurrently providing technical support for routine local government planning and management activities. Based on state and federal legislative and executive branch responses to comments and recommendations developed through this process, it is an effective means for the region's localities to communicate their views on environmental issues. It also provides a cost-effective means of ensuring that this region can participate in and support important environmental initiatives of the Commonwealth, such as the Virginia Coastal Zone Management Program and the Chesapeake Bay Program. It also appears to be a cost-effective mechanism for the Virginia Coastal Zone Management Program and related state environmental programs to use in communicating with and soliciting input from local government. Over the years, funding from the VCZMP through the Hampton Roads Technical Assistance Program has provided the region with the seed to establish a number of new regional programs in the areas of water supply planning and coordination, watershed management, stormwater management and environmental education. The HRPDC and its member local governments continue to believe that the Hampton Roads Technical Assistance Program is an extremely valuable and cost-effective approach to environmental planning and management in the Hampton Roads region.

**APPENDIX A:  
REPRESENTATIVE ENVIRONMENTAL IMPACT REVIEW  
COMMENT LETTER**

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## Ben McFarlane

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**From:** Ben McFarlane  
**Sent:** Friday, August 04, 2017 5:51 PM  
**To:** julia.wellman@deq.virginia.gov  
**Subject:** DEQ#17-096F - Colonial Arms Apartments

Ms. Wellman,

The HRPDC staff has reviewed the federal consistency determination for this project (DEQ#17-096F – Colonial Arms Apartments). The proposal appears to be consistent with local and regional plans and policies. Although the project will not exceed one acre of land disturbance, and thus will not be required to acquire a VSMP permit, the city’s stormwater management ordinance will require a Land Disturbing Permit in accordance with the city’s Erosion and Sediment Control Ordinance if the project disturbs 2,500 square feet or more of land (See Appendix D Sec. 1-4(B) of the Virginia Beach Code of Ordinances).

We appreciate the opportunity to review this project. If you have any questions, please let me know.

Ben

**Benjamin J. McFarlane, AICP**  
**Senior Regional Planner**  
Hampton Roads Planning District Commission  
723 Woodlake Drive  
Chesapeake, VA 23320  
Phone: 757-420-8300 | Fax: 757-420-9300



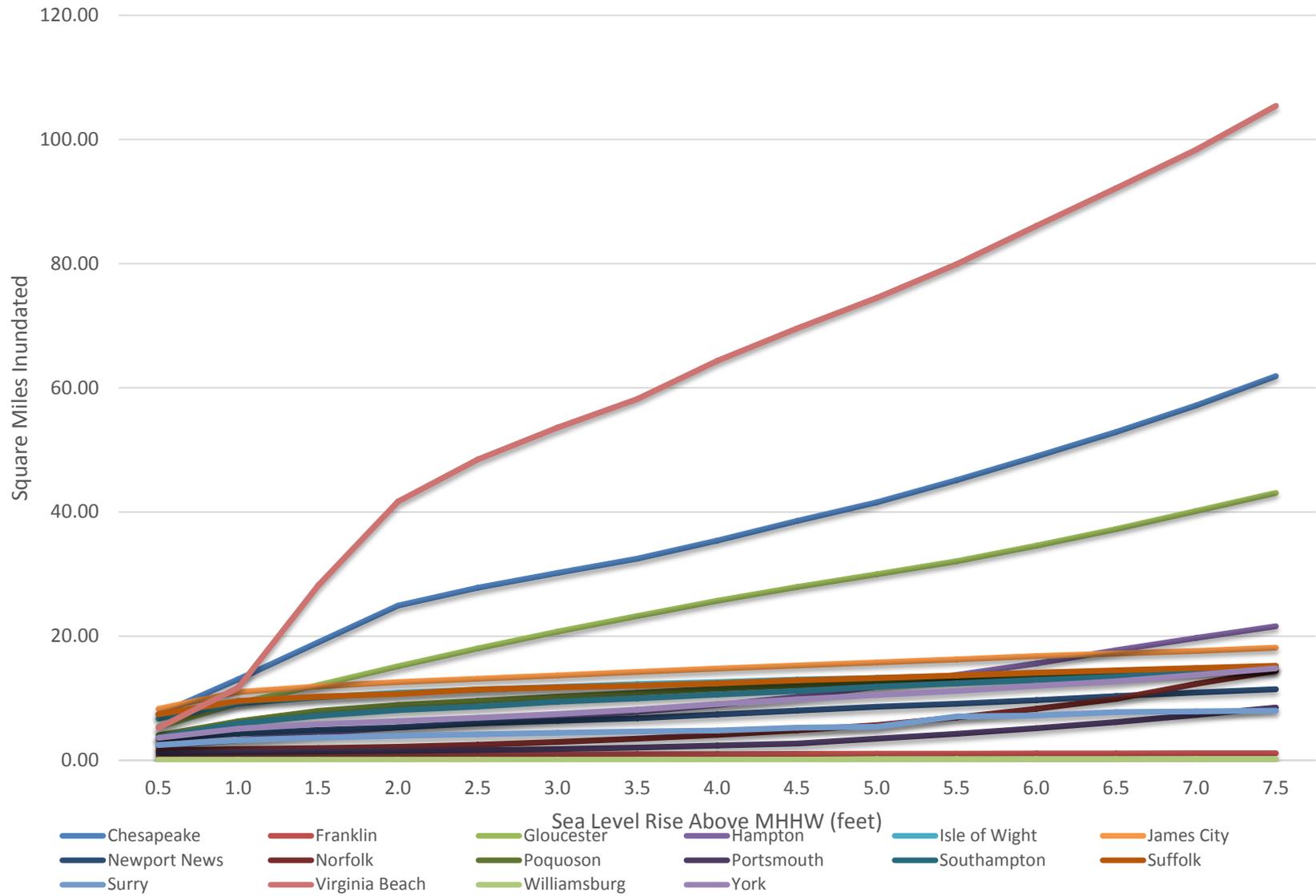
*All email correspondence to and from this address is subject to the Virginia Freedom of Information Act and to the Virginia Public Records Act, which may result in monitoring and disclosure to third parties, including law enforcement.*

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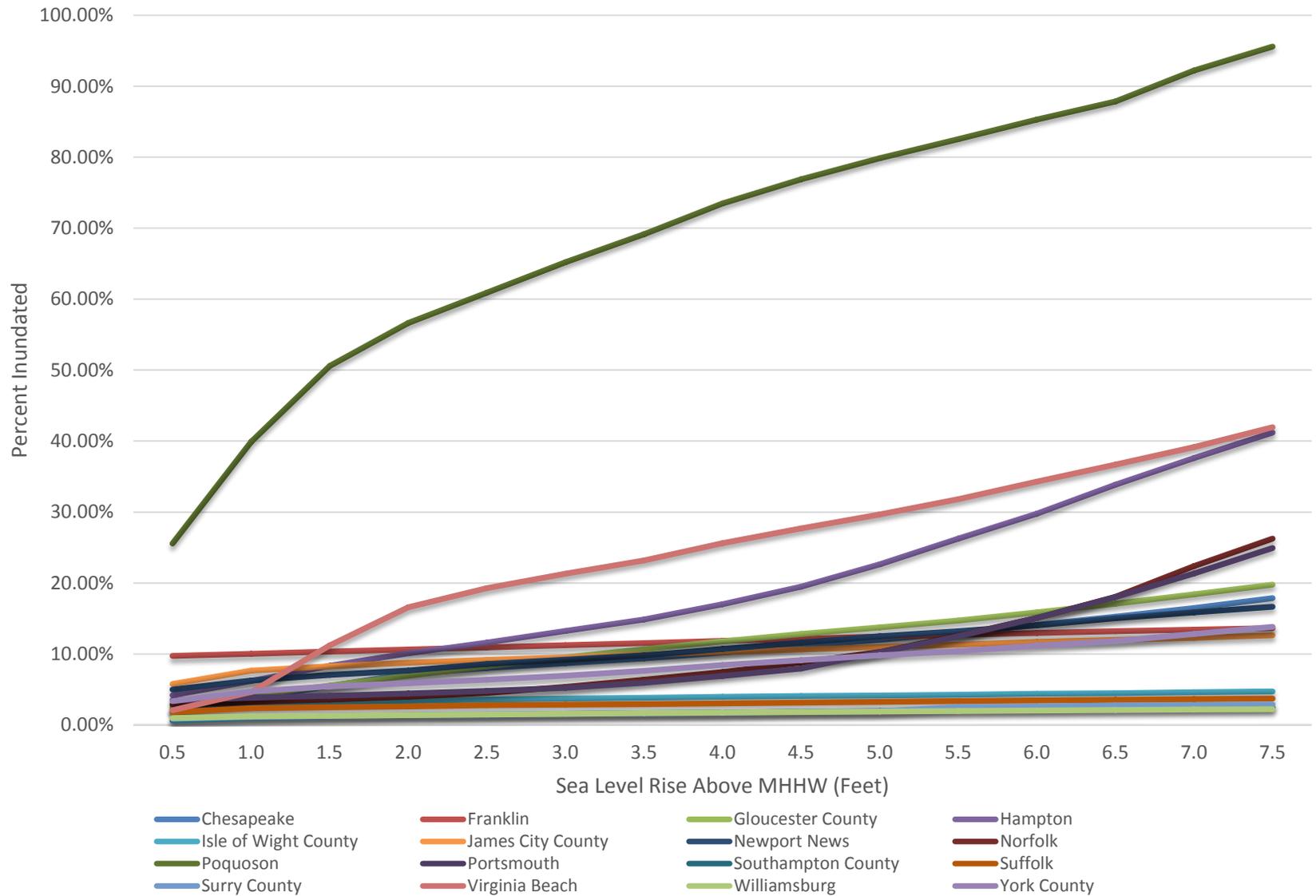
**APPENDIX B:  
HYPSONOMETRIC ANALYSIS OF VULNERABILITY TO SEA LEVEL RISE IN  
HAMPTON ROADS**

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### Area of Hampton Roads Localities Vulnerable to Sea Level Rise



### Percent of Hampton Roads Localities' Land Area Vulnerable to Sea Level Rise



**APPENDIX C:  
PRESENTATION TO VIRGINIA MASTER NATURALISTS, “GREEN  
INFRASTRUCTURE PLANNING AND IMPLEMENTATION IN HAMPTON  
ROADS” – MAY 22, 2017**

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## GREEN INFRASTRUCTURE PLANNING AND IMPLEMENTATION IN HAMPTON ROADS

### Virginia Master Naturalists Training

Sara J. Kidd, GISP  
Ben McFarlane, AICP  
HRPDC Senior Regional Planners



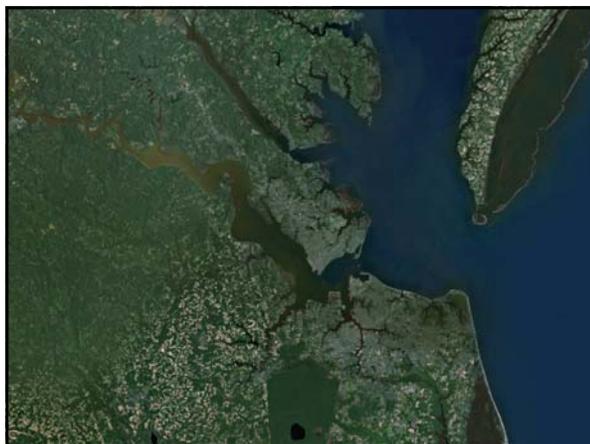
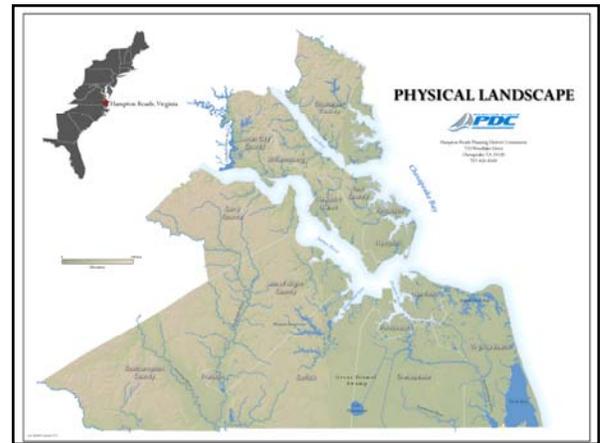
May 22, 2017

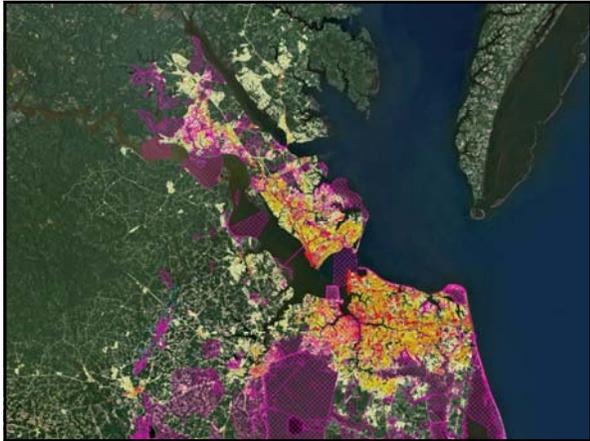
## WHAT IS THE HRPDC?

- 1 of 21 Regional Planning Agencies in Virginia
- State enabled; locally created
- 17 Cities & Counties (1 town)
  - 1.7 million people; 3,000 square miles; 5,000 miles shoreline
- Commission
  - 45 local elected officials & CAO
- Staff
  - Executive Director & 45 staff
- Funding
  - Local contributions, grants, and contracts
- Functions
  - Economics, Housing, Transportation, Environmental, Emergency Management, Regional Planning
- Role
  - Policy & Technical Analysis, Planning & Engineering Studies, Cooperative Problem Solving, Coordination

## WHAT DOES HRPDC DO?

- The Commission:
  - “serves as a forum for local and elected officials and chief administrators to **deliberate** and **decide** issues of **regional importance**”
- The Staff:
  - “provides the local governments and citizens of Hampton Roads credible and timely **planning, research, and analysis** on matters of mutual concern, and”
  - “provides **leadership and offers strategies and support services** to other public and private, local, and regional agencies, in their efforts to improve the region’s quality of life.”





## WHAT IS GREEN INFRASTRUCTURE?

A strategically planned and managed network of natural lands, working landscapes, and other open spaces that conserves ecosystem values and functions and provides associated benefits to human populations.

“Strategic Conservation Planning”

THE CONSERVATION FUND

## WHAT IS GREEN INFRASTRUCTURE?

- An interconnected network of a wide range of landscape elements that:
  - Support native species
  - Maintain natural ecological processes
  - Sustain air and water resources, and
  - Contribute to the health and quality of life for communities

**Multiple Benefits**

Benedict & McMahon, 2006

## GREEN INFRASTRUCTURE PLANNING

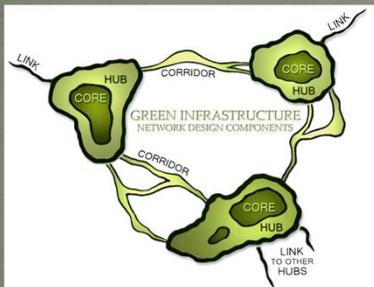
- Identify valuable areas and develop a plan to manage them




“Gray”                      “Green”



## GREEN INFRASTRUCTURE NETWORK



**Core Areas:**

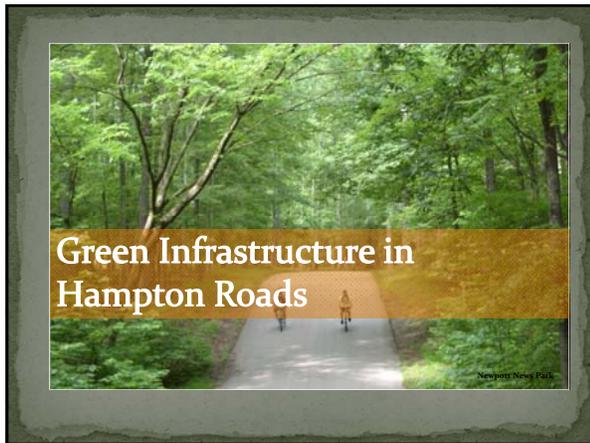
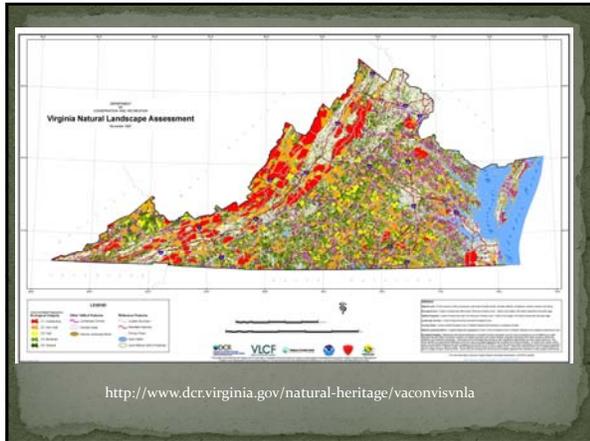
- Contain fully functional natural ecosystems
- Provide high-quality habitat for native plants and animals

**Hubs:**

- Slightly fragmented aggregations of core areas, plus contiguous natural cover

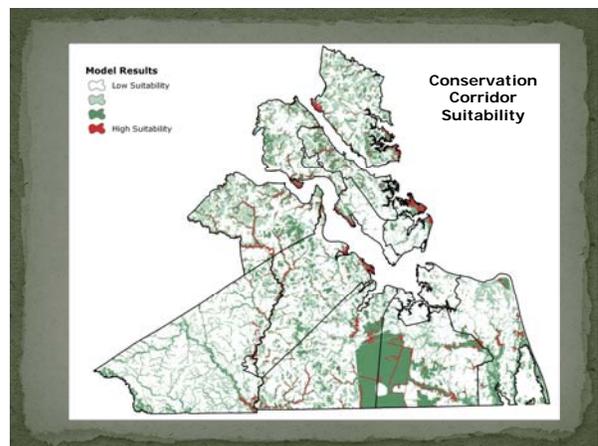
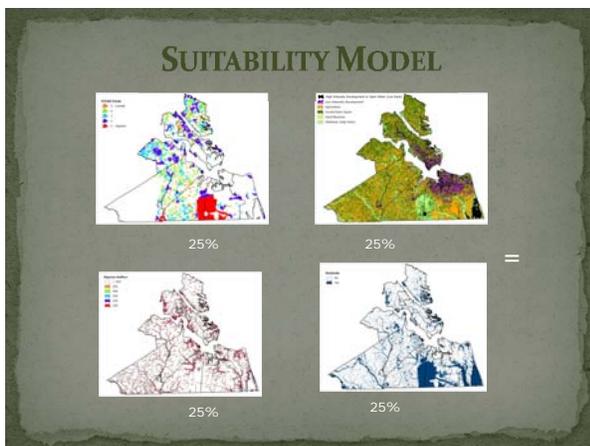
**Corridors:**

- Link core areas together
- Allow animal movement and seed and pollen transfer between core areas



### HAMPTON ROADS CONSERVATION CORRIDOR SYSTEM

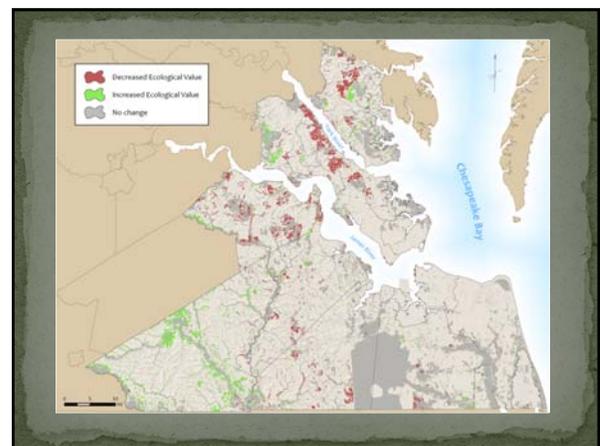
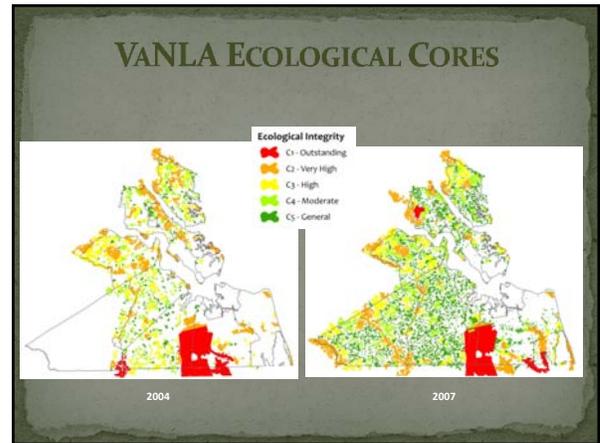
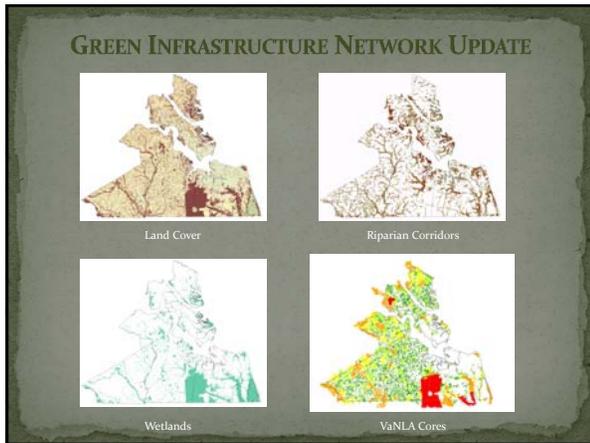
- **GOAL:** Identify and prioritize a network of valuable conservation lands to achieve multiple benefits
  - Identify areas of high ecological value and high water quality protection value
  - Opportunities for connectivity
- Stakeholder involvement
- GIS analysis
- Educational video
- 2006

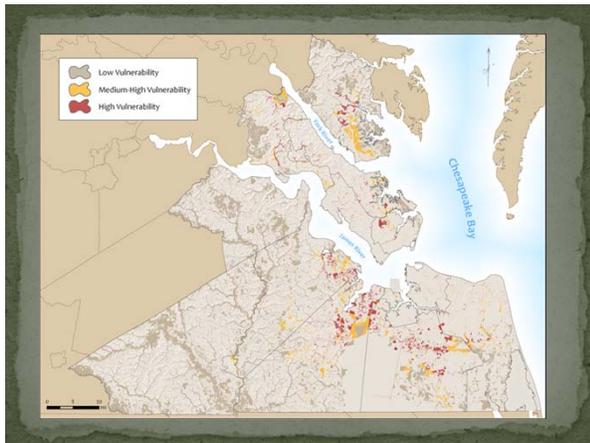
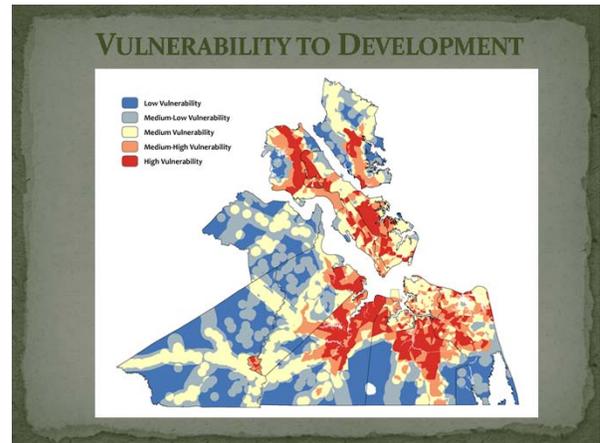
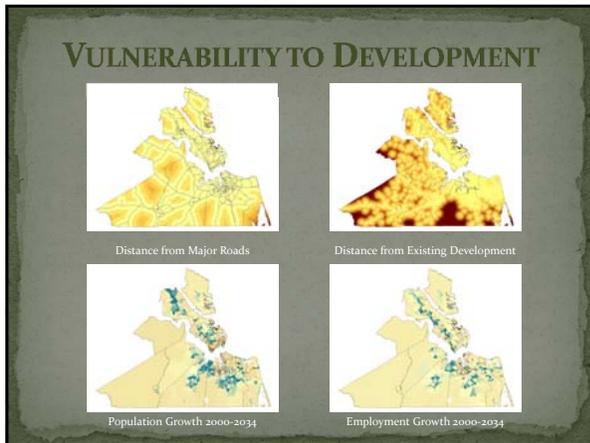




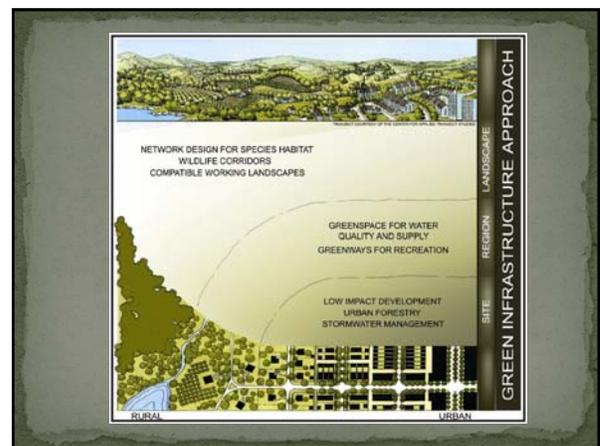
### HAMPTON ROADS GREEN INFRASTRUCTURE PLAN

- Updated green infrastructure network with new data
- Stakeholder review
- Vulnerability to development model
- Impact of storm surge on GI
- Parks and recreation inventory
- 2010





- ### IMPLEMENTATION OF GI
- Local Plans
    - Chesapeake Comprehensive Plan
    - Virginia Beach Comprehensive Plan
    - Southampton Parks & Rec Plan
    - Gloucester Comprehensive Plan
    - Franklin Comprehensive Plan
    - Northwest River Watershed Plan
    - Green Sea Greenway & Blueway Plan
  - Regional/State Planning
    - JLUS - Oceana, Fentress, Norfolk
    - Climate Change/Sea Level Rise
    - Virginia Outdoors Plan
  - Land Acquisitions



## WHAT IS GREEN INFRASTRUCTURE? 2.0

According to the EPA:

Green infrastructure is a cost-effective, resilient approach to managing wet weather impacts that provides many community benefits. While single-purpose gray stormwater infrastructure—conventional piped drainage and water treatment systems—is designed to move urban stormwater away from the built environment, green infrastructure reduces and treats stormwater at its source while delivering environmental, social, and economic benefits.

<https://www.epa.gov/green-infrastructure>

## GREEN INFRASTRUCTURE & WATER QUALITY

- In many localities, responsibility for maintaining or improving water quality is decoupled from planning
- Investments in stormwater systems are often driven by Engineering/Public Works
- Planning decisions can have a major impact on water quality due to the location and intensity of development
  - Certain areas are more sensitive than others (e.g. riparian buffers)
  - More impervious cover = lower water quality

## IMPACTS OF IMPERVIOUS COVER

- Impervious surfaces – parking lots, road, rooftops – have a direct, negative impact on watershed health
  - Runoff moves faster over impervious surfaces, causing shoreline erosion when it reaches waterways.
  - Runoff does not infiltrate into the ground, resulting in more water delivered to streams.

## PLANNING AND WATER QUALITY



U.S. Environmental Protection Agency

- One-acre, single-family lots
- Typical low-density suburban development
- Impervious Cover: 20%
- Total Runoff: 149,600ft<sup>3</sup>/yr
- Runoff/house: 18,700ft<sup>3</sup>/yr

## PLANNING AND WATER QUALITY

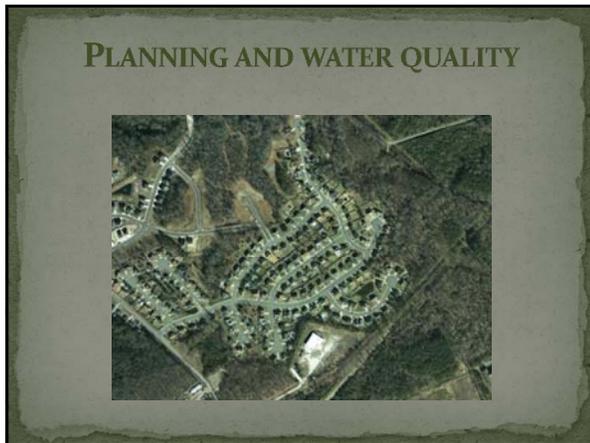


## PLANNING AND WATER QUALITY



U.S. Environmental Protection Agency

- One quarter acre, single-family lots
- Medium-density suburban development
- Impervious Cover: 38%
- Total Runoff: 49,600ft<sup>3</sup>/yr
- Runoff/house: 6,200ft<sup>3</sup>/yr



### PLANNING AND WATER QUALITY

- 1/8-acre, single-family lots
- Medium-density urban development
- Impervious Cover: 65%
- Total Runoff: 39,600ft<sup>2</sup>/yr
- Runoff/house: 4,950ft<sup>2</sup>/yr

Scenario C

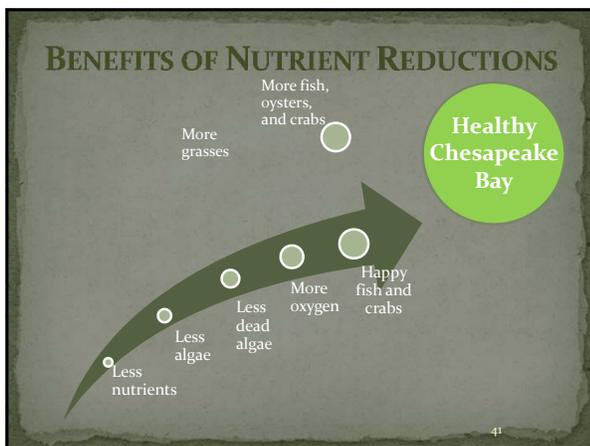
Impervious cover = 65%    Total runoff = 39,600 ft<sup>2</sup>/yr    Runoff/house = 4,950 ft<sup>2</sup>/yr

U.S. Environmental Protection Agency



### WHY NOW?

- Previous efforts to improve water quality in the Chesapeake Bay have not worked well enough
- The Chesapeake Bay TMDL and Virginia's new stormwater management regulations have placed new requirements on local governments to achieve water quality goals
  - Enforceable limits on nutrients (nitrogen, phosphorus, sediments)
  - Deadlines for achieving load reductions



### CHANGES IN STORMWATER MANAGEMENT APPROACHES

- Previous paradigm:
  - Move water offsite and into waterways as quickly as possible
- New paradigm:
  - Infiltrate onsite
  - Reduce quantity and velocity of water delivered to streams and waterways
- This change has major implications for the planning, design, and development of sites

### CHANGES IN STORMWATER MANAGEMENT APPROACHES

- Old paradigm required solutions in terms of engineering and infrastructure
- New paradigm requires new solutions
  - Land use changes
  - Better site design
  - Integration of stormwater with landscaping
  - Opportunity for multiple benefits
    - Floodplain management and hazard mitigation
    - Recreation
    - Beautification
    - Urban renewal and Smart Growth
    - Economic development

### 309 PROJECT OVERVIEW

- The goal of this project is to identify and develop implementable policies and practices that local governments in Hampton Roads can use to address the requirements of the Chesapeake Bay Total Maximum Daily Load (TMDL) and the new Virginia Stormwater Management Regulations.
- Two pilot localities (Norfolk and Suffolk)
- Three components
  1. Coastal Plain Stormwater Best Management Practice (BMP) Guidance
  2. Review of existing ordinances and policies for possible changes in pilot localities
  3. Modeling of example development scenarios in pilot localities

### COASTAL PLAIN BMP GUIDANCE

- New regulations increase stormwater management requirements and change the way pollutant loads are calculated.
- Localities asked for an assessment of which BMPs worked best in Hampton Roads, since some do not work as well as in other areas.
  - High water table
  - Flat terrain
  - Low soil permeability

### COASTAL PLAIN BMP GUIDANCE

- Guidance includes:
  - Summary of Stormwater Regulations
  - Obstacles to stormwater management in the coastal plain
  - Overview of Environmental Site Design (including design examples)
  - Review of the Runoff Reduction Method
  - BMP Descriptions and Specifications (including coastal plain design limitations and modifications)
    - Runoff Reduction
    - Pollutant Removal
    - Preferred, Accepted, Restricted

### COASTAL PLAIN BMP SUITABILITY

Practice	Preferred	Accepted	Restricted	Phosphorus Removal Efficiency (%)
Rooftop Disconnection	X2			5
Sheet flow to open space	X			50-75
Rainwater Harvesting	X			Up to 90
Permeable Pavement	X			59-81
Bioretention	X			55-90
Dry Swales	X			52-76
Wet Swales	X			20-40
Constructed Wetlands	X			50-75
Small Scale Infiltration	X			63-93
Soil Amendments		X		
Vegetated Roofs		X		45-60
Filtering Practices		X		60-65
Wet Ponds		X		45-65
Grass Channels			X	23
Extended Detention Ponds			X3	1
Large Scale Infiltration			X	63-93

### STORMWATER MANAGEMENT

Low Impact Development

Urban Forestry

## PROMOTING LOW IMPACT DEVELOPMENT

**LOW IMPACT DEVELOPMENT CHECKLIST FOR HAMPTON ROADS**

**DEFINITION:** Low Impact Development (LID) is a construction management approach that increases the infiltration and absorption of stormwater on-site, thereby reducing runoff volume and peak flow rates to stormwater management systems.

**OBJECTIVES:** Regulate the design and construction of new residential and commercial developments to promote LID. These requirements shall be applied to all new residential and commercial developments in the region. The intent is to reduce runoff volume and peak flow rates, improve water quality, and reduce the cost of compliance with the stormwater regulations.

**DESIGN REQUIREMENTS:**

- Use Environmental Site Design Principles to enhance infiltration and permeable surfaces and reduce runoff.
- Use LID practices to reduce runoff volume and peak flow rates.
- Use LID practices to reduce runoff volume and peak flow rates.
- Use LID practices to reduce runoff volume and peak flow rates.

**ENVIRONMENTAL SITE DESIGN**

Regulate the design and construction of new residential and commercial developments to promote LID. These requirements shall be applied to all new residential and commercial developments in the region. The intent is to reduce runoff volume and peak flow rates, improve water quality, and reduce the cost of compliance with the stormwater regulations.

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- Use Environmental Site Design Principles to enhance infiltration and permeable surfaces and reduce runoff.
- Use LID practices to reduce runoff volume and peak flow rates.
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**PERFORMANCE MONITORING PRACTICES**

Regulate the design and construction of new residential and commercial developments to promote LID. These requirements shall be applied to all new residential and commercial developments in the region. The intent is to reduce runoff volume and peak flow rates, improve water quality, and reduce the cost of compliance with the stormwater regulations.

**DESIGN REQUIREMENTS:**

- Use Environmental Site Design Principles to enhance infiltration and permeable surfaces and reduce runoff.
- Use LID practices to reduce runoff volume and peak flow rates.
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- Use LID practices to reduce runoff volume and peak flow rates.

## REVIEW OF LOCAL ORDINANCES

- Evaluation of local ordinances from Norfolk and Suffolk to:
  - Identify barriers to meeting stormwater and Chesapeake Bay requirements
  - Identify opportunities for new policies or changes to existing policies
- Primary barriers are ordinances and regulations that require minimum amounts of impervious surfaces
  - Parking
  - Setbacks
  - Road and sidewalk standards

## REVIEW OF LOCAL ORDINANCES

- Findings:
  - Many opportunities to reduce impervious cover requirements
  - Multiple benefits possible
  - Having an ordinance is not always enough; it must be implemented and utilized
- Examples
  - Parking and road standards
  - Transfer of Development Rights (TDR) and Cluster Ordinances
  - Landscaping standards

## SUFFOLK DEMO – NEW DEVELOPMENT

- Study area
  - Existing traditional design subdivision (Quaker Neck)
  - About 89 acres
  - 49 lots
  - Lots average 1.5 acres
  - Former agriculture field
  - Along Bennett's Creek with forest/wetland areas



## MODEL SCENARIOS

- Existing subdivision design (built out)
- Hypothetical redesign into cluster subdivision

Land Cover

Scenario	Forest	Turf	Impervious
Conventional Subdivision	29%	56%	15%
Cluster Subdivision	56%	39%	11%

## TRADITIONAL VS. CLUSTER



Existing Subdivision

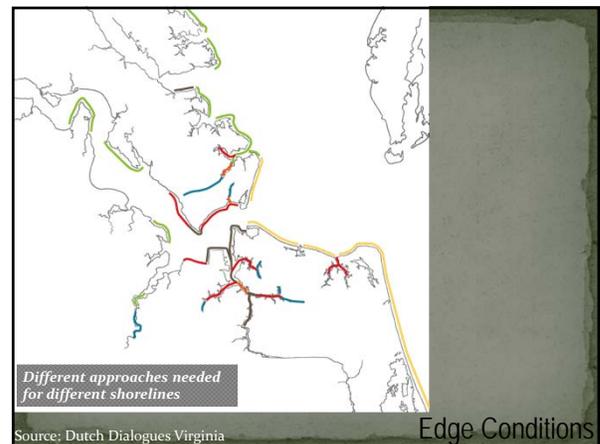
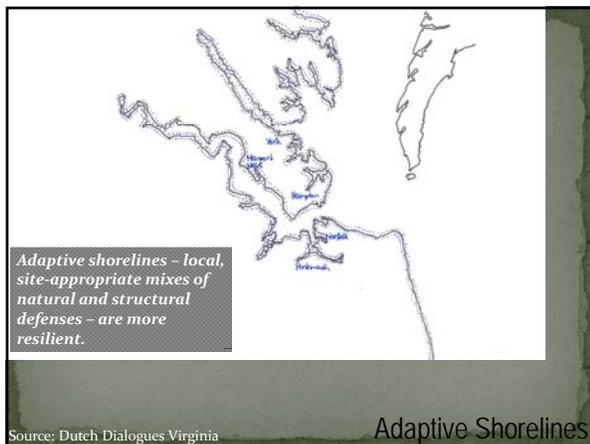
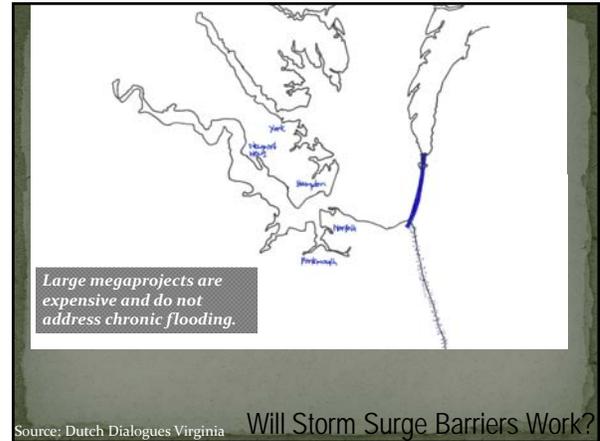
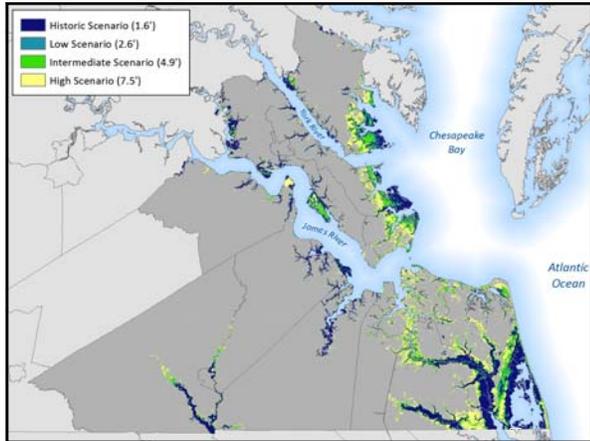
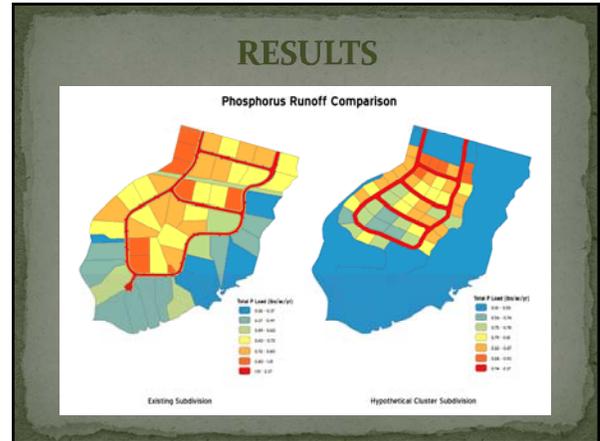


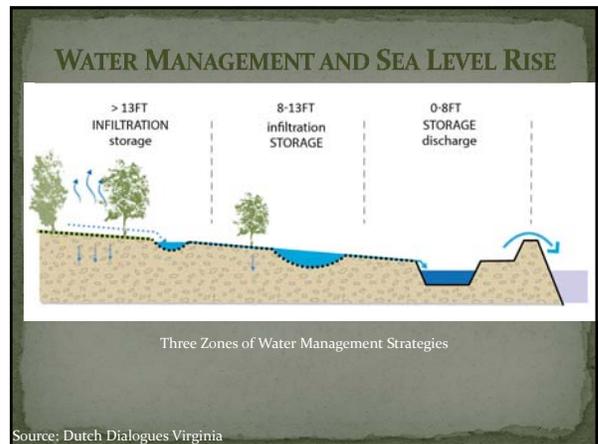
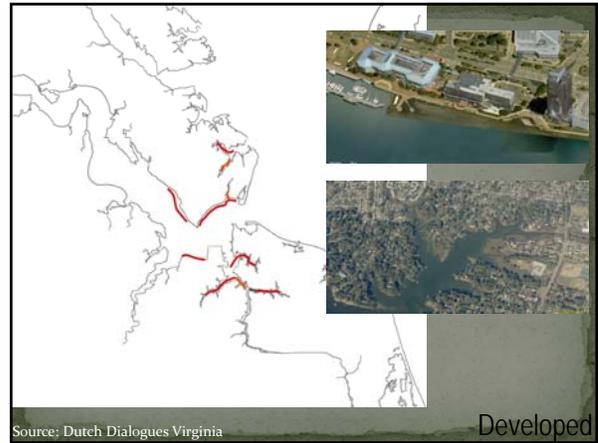
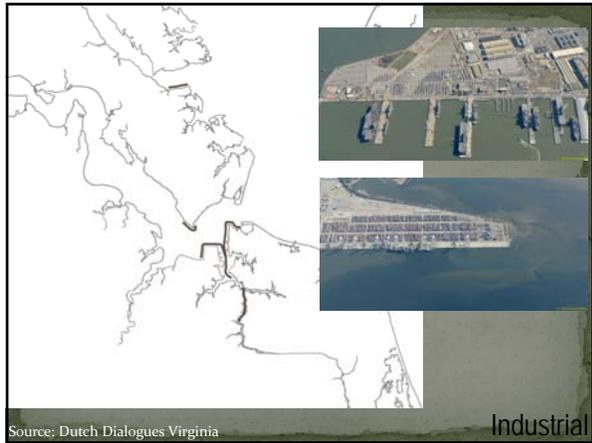
Hypothetical Cluster Subdivision

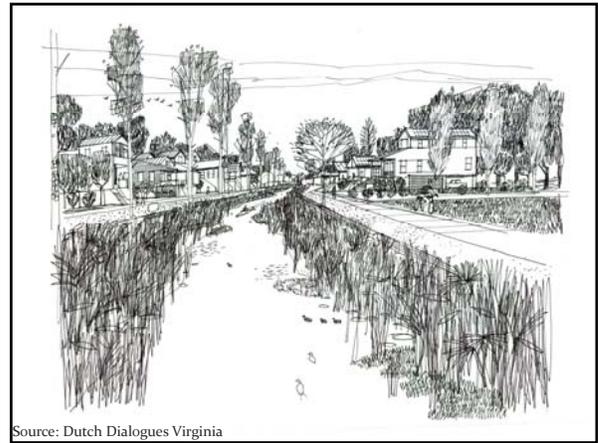
Impervious area

### RESULTS

Scenario	Total Treatment Volume (cubic feet)	Total P Load (lbs/yr)	P Load Target Goal (lbs/yr)	P Reduction Required (New Regulations) (lbs/yr)
Conventional Design	90,500	62.16	36.53	25.63
Cluster Design	68,449	47.04	36.53	10.56







**CONTACT**

Sara J. Kidd, GISP  
Senior Regional Planner  
[sjkidd@pdcva.org](mailto:sjkidd@pdcva.org)

Ben McFarlane, AICP  
Senior Regional Planner  
[bmcfarlane@pdcva.org](mailto:bmcfarlane@pdcva.org)

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