

FFY16

Richmond Regional PDC Technical Assistance FINAL REPORT

Grant Number:
NA16NOS4190171

Task Number: 48

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Virginia Coastal Zone
MANAGEMENT PROGRAM

Richmond Regional Planning District Commission

Planning district commissions make government more efficient and effective through coordinated planning and program analysis. Virginia's General Assembly created planning districts in 1968 under the authority of the *Virginia Area Development Act*-revised as the *Regional Cooperation Act* in 1995- "to promote orderly and efficient development of the physical, social and economic elements of the districts." Through planning district commissions, now 21 in number, local governments solve mutual problems which cross boundary lines and obtain expertise from professional staff and advice on making the most of scarce taxpayer dollars through intergovernmental cooperation.

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Executive Summary

Technical Assistance

RRPDC staff processed 52 environmental reviews and 24 intergovernmental reviews during the reporting period. RRPDC staff have also followed developments with the 2017 updated of the Chesapeake Bay TMDL and the US Army Corps of Engineers Chesapeake Bay Comprehensive Plan.

RRPDC staff participated on the Technical Advisory Committee (TAC) for RVA H2O, the City of Richmond's integrated permit planning process. The TAC exists to allow the City and DEQ staff the opportunity to vet program and permit elements with technical experts and stakeholders. Meetings were held every 6 to 8 weeks.

RRPDC staff attended several Coastal Program related meetings and environmental conferences including the Coastal Partners Workshop, Coastal Policy Team Meetings, Coastal PDC meetings, the 2017 Virginia Water Monitoring Conference, and the 2017 Environment Virginia Symposium.

RRPDC staff worked with locality staff and Capital Region Land Conservancy staff to update maps of conserved land in the Richmond region. These maps will form the basis for a conserved lands database in the region.

Coordination & Training

RRPDC staff holds at least four coordination and training meetings for member jurisdictions during the grant year.

On October 6, 2016 RRPDC staff hosted a regional meeting for annual update and coordination between local staff, VDCR staff and other stakeholder organizations concerning the Virginia Outdoors Plan (VOP). VDCR staff facilitated a conversation about local and regional priority recreation and conservation projects. Attendees were also briefed on the planned VOP Demand survey and update of the VOP for 2018.

On November 29, 2016 RRPDC staff hosted a regional "Bay Act 101" workshop in coordination with Crater PDC staff; the meeting was held in Chesterfield County. DEQ staff presented information about the background of the Chesapeake Bay Preservation Act in Virginia, Bay Act compliance reviews, and recent changes to the Bay Act and associated regulations.

On May 16, 2017 RRPDC staff hosted an Environmental TAC meeting. DEQ staff provided an informational presentation on Chesapeake Bay Protection Act local compliance reviews and the status of the Phase III WIP planning effort. City of Richmond staff provided an update of the RVA H2O process. The meeting concluded with a local round robin discussion of program and project updates.

On September 19, 2017, RRPDC staff, in cooperation with Crater PDC staff and DCR, hosted a Floodplain Management Workshop in Chesterfield County. The full-day workshop included information on the regulatory requirements of the National Flood Insurance Program and the Community Rating System, a program through which policy holders in qualified jurisdictions can get premium cost reductions.

Local Implementation Advocacy

RRPDC staff produced maps for GroundworkRVA depicting the location of project sites relative to recently collected urban heat island data. The maps allow Groundwork to prioritize the location of greening projects for areas suffering the most from urban heat island during the

summer months. More information about GroundworkRVA can be found on their website: <https://www.groundworkrva.org/> and associated social media accounts.

Benefits Accrued

RRPDC have compiled a summary report on benefits accrued associated with public access. This summary is included in the Final Product Report provided to the Virginia Coastal Zone Management Program.

Product #1: Technical Assistance

Throughout the grant year, RRPDC staff provided Technical Assistance to locality staffs. RRPDC staff processed 52 environmental and 24 intergovernmental reviews during FFY16. These reviews include, but are not limited to groundwater withdrawal permits, environmental impact reports, federal coastal consistency certifications, Virginia water protection permits, Virginia pollution abatement permits, etc.

Once these reviews are received, RRPDC staff communicates with local staffs about comments or concerns they may have. PDC staff performs any further research or analysis necessary to fully understand the regional impacts of proposed actions in question. RRPDC staff prepares and submits an appropriate comment letter for the proposed project or permit.

RRPDC staff participate in and follow local, regional, state, and national planning efforts related to Coastal issues. Information about these efforts is always shared with local staff at coordination meetings.

RRPDC staff have followed developments with the 2017 updated of the Chesapeake Bay TMDL and the US Army Corps of Engineers Chesapeake Bay Comprehensive Plan.

RRPDC staff participated on the Technical Advisory Committee (TAC) for RVA H2O, the City of Richmond's integrated permit planning process. The TAC exists to allow the City and DEQ staff the opportunity to vet program and permit elements with technical experts and stakeholders. Meetings were held every 6 to 8 weeks.

RRPDC staff provided a letter of support for a James River Association (JRA) NOAA-Bay Watershed Education and Training grant application. The proposed project enables every 6th grader in Richmond Public Schools to participate in the Students Investigating Urban Parks Program. JRA was granted \$445,000 to train teachers and support the program. An article about the project is included in Appendix A.

RRPDC staff are members of the James River Advisory Council (JRAC) attending regular meetings throughout the year. Information gathered at these meetings is always shared with local staffs. For more information about JRAC see www.jamesriveradvisorycouncil.org.

RRPDC staff attended several Coastal Program related meetings and environmental conferences including the Coastal Partners Workshop, Coastal Policy Team Meetings, Coastal PDC meetings, the 2017 Virginia Water Monitoring Conference, and the 2017 Environment Virginia Symposium.

RRPDC staff worked with local staff and Capital Region Land Conservancy (CRLC) staff to update conserved land maps for the Richmond region. The update process included a detailed review by RRPDC staff and local staff to ensure mapped accuracy. Many easements and other lands were added to a base map of DCR GIS data. RRPDC staff intend to use these maps as the beginning of a conservation lands database for the entire Richmond region to be developed over the next few years.

These maps were then used as a base map for a vision map for the CRLC. Copies of these maps are included in Appendix B.

Product #2: Coordination & Training

RRPDC Staff hosted four coordination and training regional meetings throughout FFY16.

- On October 6, 2016 RRPDC staff hosted a regional meeting for annual update and coordination between local staff, VDCR staff and other stakeholder organizations concerning the Virginia Outdoors Plan (VOP). VDCR staff facilitated a conversation about local and regional priority recreation and conservation projects. Attendees were also briefed on the planned VOP Demand survey and update of the VOP for 2018.
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- On May 16, 2017 RRPDC staff hosted an Environmental TAC meeting. DEQ staff provided an informational presentation on Chesapeake Bay Protection Act local compliance reviews and the status of the Phase III WIP planning effort. City of Richmond staff provided an update of the RVA H2O process. The meeting concluded with a local round robin discussion of program and project updates.
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Agendas and meeting materials from these meetings are included in Appendix C.

Product #3: Local Implementation Advocacy

In FFY16, RRPDC staff continued to support Groundwork RVA. Groundwork RVA is focused on creating the next generation of conservation leaders by engaging youth from underserved neighborhoods in projects and programs to give them the tools to improve their own neighborhoods. Over the past four years RRPDC staff has helped grow Groundwork from a fledgling organization to a respected member of the Richmond non-profit community, making meaningful, lasting change in urban neighborhoods and in the lives of young people.

During FFY16, RRPDC staff supported GroundworkRVA by creating several maps that can be used by Groundwork staff to analyze existing projects and better formulate future greening projects to best impact quality of life and the natural environment in the City of Richmond. During July 2017, GroundworkRVA volunteers worked with engineering students at Virginia Commonwealth University and scientists at the Science Museum of Virginia to take temperature measurements across the City throughout daylight hours over several days. These data were the processed into GIS so the results could be mapped. When displayed on a map, the temperature data enable viewers to see areas prone to urban heat island effects.

RRPDC staff used the GIS data to create maps depicting the location of existing and future Groundwork greening projects relative to the temperature data. This mapping exercise allows Groundwork to prioritize locations for greening projects where they may have the most impact on reducing the negative urban heat island effect. The final maps produced as well as two articles about the data creation process are included in Appendix D.

More information about GroundworkRVA's projects can be found at <http://groundworkrva.org/> in addition to social media: <https://www.facebook.com/groundworkrva> , <https://www.instagram.com/groundworkrva/> , and <https://twitter.com/GroundworkRVA> .

Product #4: Benefits Accrued

Public River Access

RRPDC has been dedicating CZM technical assistance funds over the past six years to projects which support, promote or make available public access to the Region's rivers:

- In FFY11 technical assistance funds were used to inventory and map all of the existing public access locations with descriptions of site, access, and location on the six rivers of the Richmond Region, including the North Anna, South Anna, Pamunkey, Chickahominy, James, and Appomattox Rivers.
- A FFY11 Coastal Focal Grant was used to support the James River Park System (JRPS) supported by in-kind volunteer labor to construct a one-mile river trail with interpretative signage and a kayak launch on Chapel Island of the Great Ship Lock Park. This project provides a vital access point to the James River, and offers the public greater opportunity to appreciate the varied history and important functions the site now serves to improve water quality.
- Making partial use of FFY14 and 15 technical assistance funds, the Regional River Guide was updated with additional public access points and reprinted to meet the demand for the brochure. Funding for the additional printing was secured from MeadWestvaco (now WestRock) in coordination with the Capital Region Collaborative (CRC). In the 2nd update images and information were edited for greater clarity. The 3rd printing included 15 additional access points through the mapping inventory. More information about the Rivers of the Richmond Region Guide is available here, and printed brochures continue to be made available through area visitor centers, parks & recreation departments and outfitters.

<http://www.richmondregional.org/planning/RiversGuide.htm> .

- An FY14 Coastal Focal Grant was secured to contribute to the T. Potterfield Dam Walk South Bank Habitat Restoration and Native Plant Demonstration project on the southern bank of the James River in downtown Richmond. The project cleared invasive species from the southern bank and then restored habitat using native plants, bioswales and rain gardens to filter runoff. An interpretative signage was installed to educate the public on the value of using native plants.
- FFY15 technical assistance funds enabled the RRPDC to provide technical support to the James River Association through the CRC in the preparation of a Regional Rivers Plan for the four (4) major rivers in the Richmond Region including the James, Appomattox, Chickahominy and Pamunkey rivers. The plan describes each river's character, providing an inventory of existing conditions, and outlining local and regional projects for implementation to make the rivers a more coordinated network for enhanced recreation, entertainment, and commerce.
- As of the close of FFY16, the Regional Rivers Plan has been used by the CRC, localities, and non-profit partners in the Richmond region to move priority projects and related efforts forward.

- City of Richmond Riverfront Plan – The First **Richmond Riverfront Plan**: The first amendment to the [Richmond Riverfront Plan](#) will be considered by City Council in September.
- **Gillies Creek Greenway**: Community stakeholders met at Stone Brewing July 13th to kick-off the Gillies Creek Greenway Green Infrastructure Planning Project. SKEO Solutions of Charlottesville is leading this project with support from the James River Association. The project will result in a plan to install green infrastructure along the planned greenway.
- **Malvern Hill / Turkey Island Creek Access**: [Capital Region Land Conservancy](#) continues to lead the effort to protect historic Malvern Hill. Public access on Turkey Island Creek is an important component of the project.
- **Primitive Camping at Lawrence Lewis, Jr. Park**: The James River Association is presented a proposal for primitive camping at Lawrence Lewis, Jr. Park to the Charles City County Board of Supervisors in September, and it was approved. The proposed primitive camping area will primarily serve paddlers and cyclists. The project concept plan is attached to this email.

APPENDIX A

http://www.richmond.com/news/local/education/city-of-richmond/federal-funding-to-allow-richmond-students-to-learn-from-james/article_b03f7a94-fdeb-54ae-85d7-6a7650a2a4b3.html

Federal funding to allow Richmond students to learn from James River

By JUSTIN MATTINGLY Richmond Times-Dispatch Sep 22, 2017



Sean Corson, acting director of NOAA's Chesapeake Bay office, announced the award as Richmond Mayor Levar Stoney (second from right) and others looked on.

DANIEL SANGJIB MIN/Times-Dispatch

Every sixth-grade student in Richmond Public Schools will receive environmental education focused on the James River, thanks to a federal grant awarded Friday.

The \$445,000 grant from the National Oceanic and Atmospheric Administration was announced at Great Shiplock Park in Richmond. The money, which is for three years, will allow students in sixth grade from all eight of the city's middle schools — about 1,600 students total — to take part in the Students Investigating Urban Parks program next month. Science teachers in the district also are receiving professional development focused on sixth-grade Standards of Learning guidelines.

Representatives from NOAA, the city, the James River Association and the Virginia Department of Education gathered at the Shockoe Bottom park to praise the nearby river, the funding and the opportunities for students.

"It only makes us better as a city," Richmond Mayor Levar Stoney said.

Through the Students Investigating Urban Parks program, students will do field-based investigations on systems that affect the health of the James in river parks.

"We need to work together to ensure that we can continue to open doors and unlock our river," Stoney said. "It doesn't matter what neighborhood you live in, or what your financial circumstance is, we can reach down and pull you up and give you the opportunity to enjoy the river like everyone in the region."

The James River Association and the Virginia Department of Education had to apply for the grant, which is being given to nine entities total. NOAA is also giving grant money — about \$1 million total — to Friends of the Rappahannock; the Elizabeth River Project; the Boxerwood Nature Center; and the Arlington, Hampton, Spotsylvania and York county school systems to help improve environmental education in the state.

The funding for Richmond students is the largest grant.

“Expanding the classroom and creating ways for students to read differently and to do math differently and creating excitement for them is what we need to do,” said David Myers, the chief financial officer for Richmond schools,

“This is the type of partnership that will allow that,” added Myers, who spoke at the news conference in place of interim Superintendent Tommy Kranz.

Speakers highlighted the importance of expanding the river’s tourism and engagement. About 1.4 million people visited the James River Park System in 2016, according to an economic impact study done by Virginia Commonwealth University. More than 800,000 of those visitors were not from Richmond.

Bill Street, CEO of the James River Association, said teachers will be able to incorporate more environmental education into their curriculum and that the impact of the funding will carry on even after the three years it’s allotted for.

“A polluted river divides us. A healthy river unites us,” he said. “And we’re here to ensure that for the future.”

jmattingly@timesdispatch.com

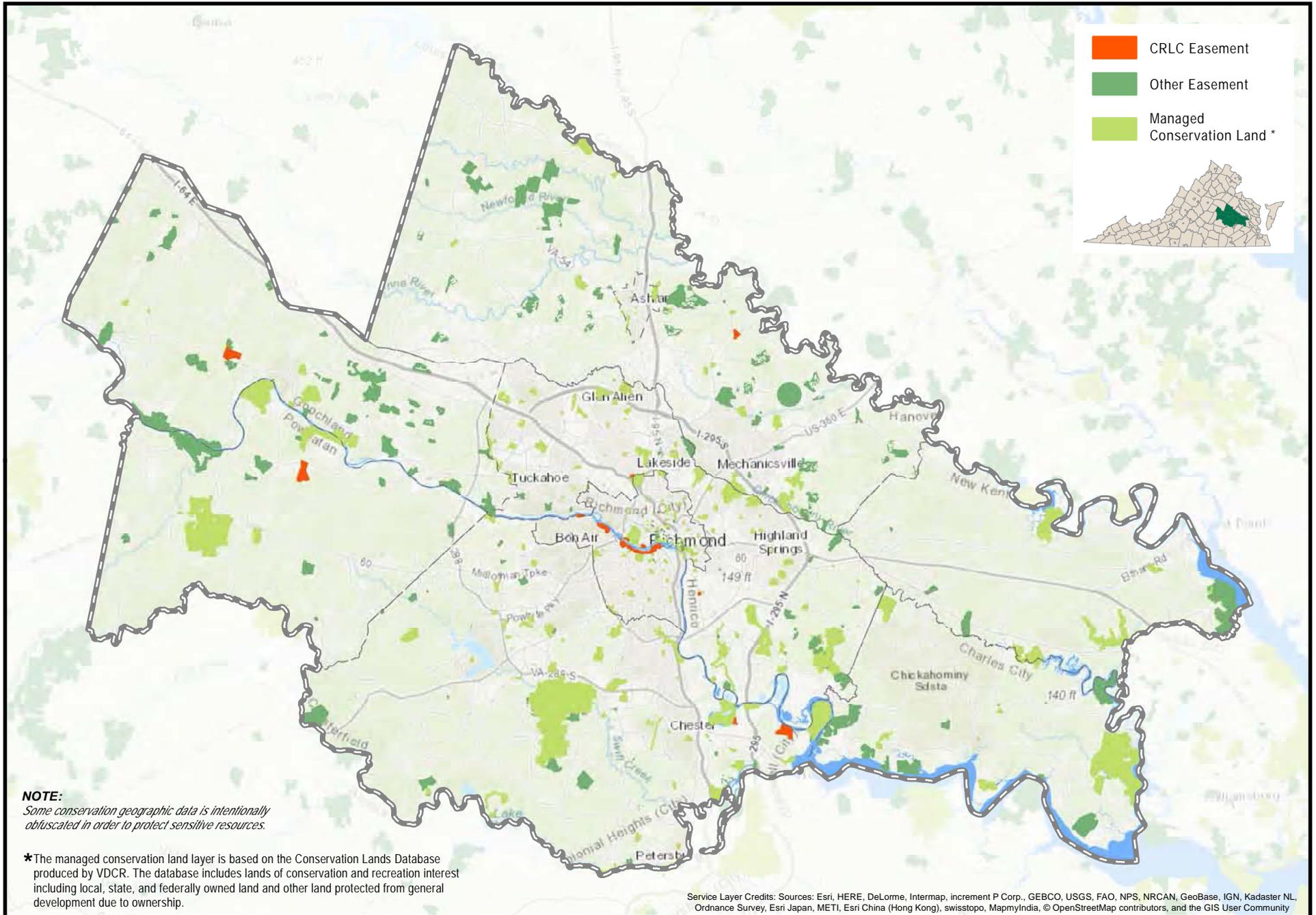
(804) 649-6012

Justin Mattingly

Justin Mattingly covers K-12 schools and higher education.

APPENDIX B

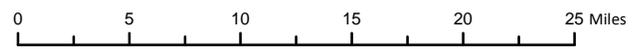
PROTECTED LAND IN THE CAPITAL REGION



NOTE:
Some conservation geographic data is intentionally obfuscated in order to protect sensitive resources.

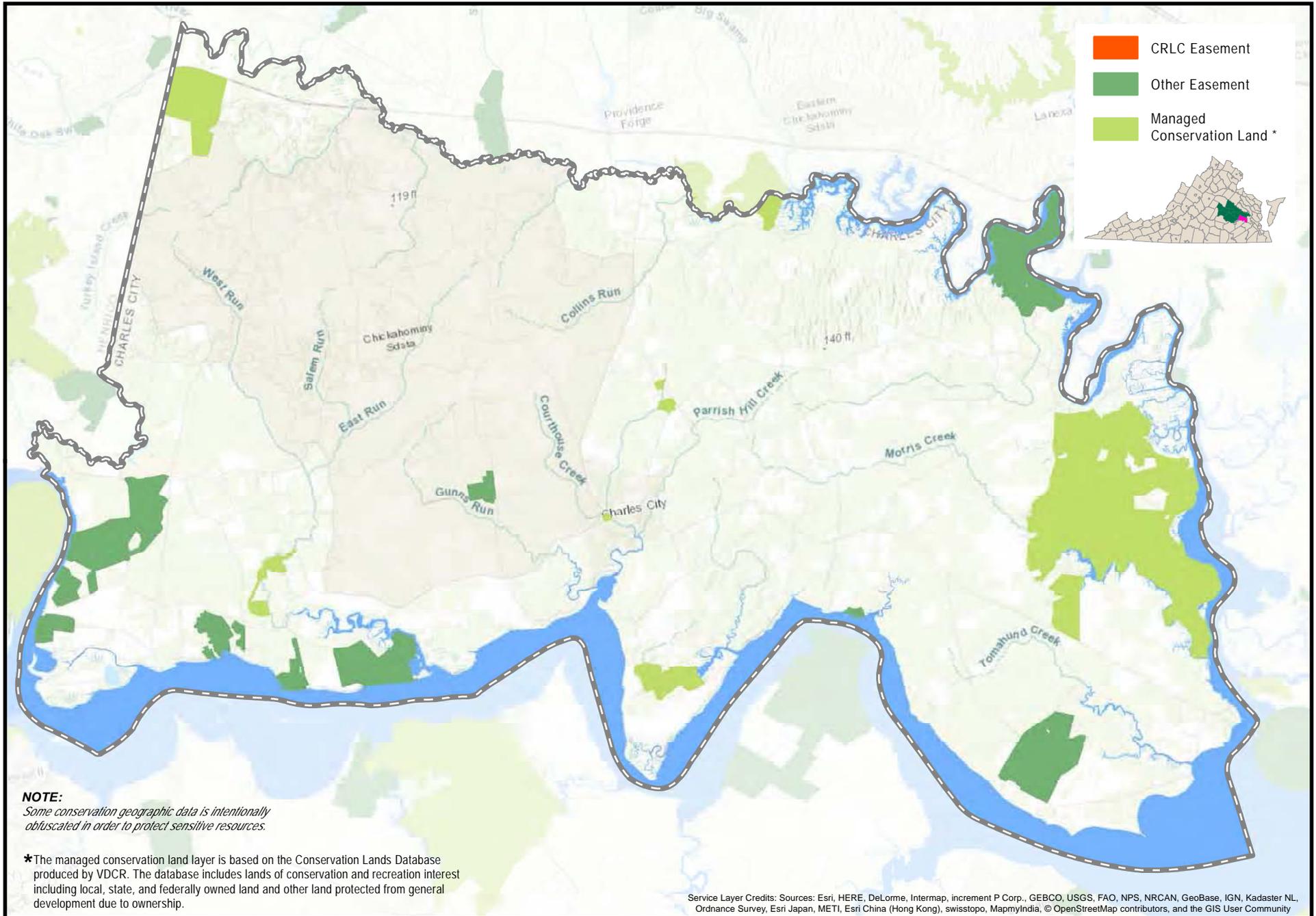
*The managed conservation land layer is based on the Conservation Lands Database produced by VDCR. The database includes lands of conservation and recreation interest including local, state, and federally owned land and other land protected from general development due to ownership.

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



PROTECTED LAND IN THE CAPITAL REGION

CHARLES CITY COUNTY



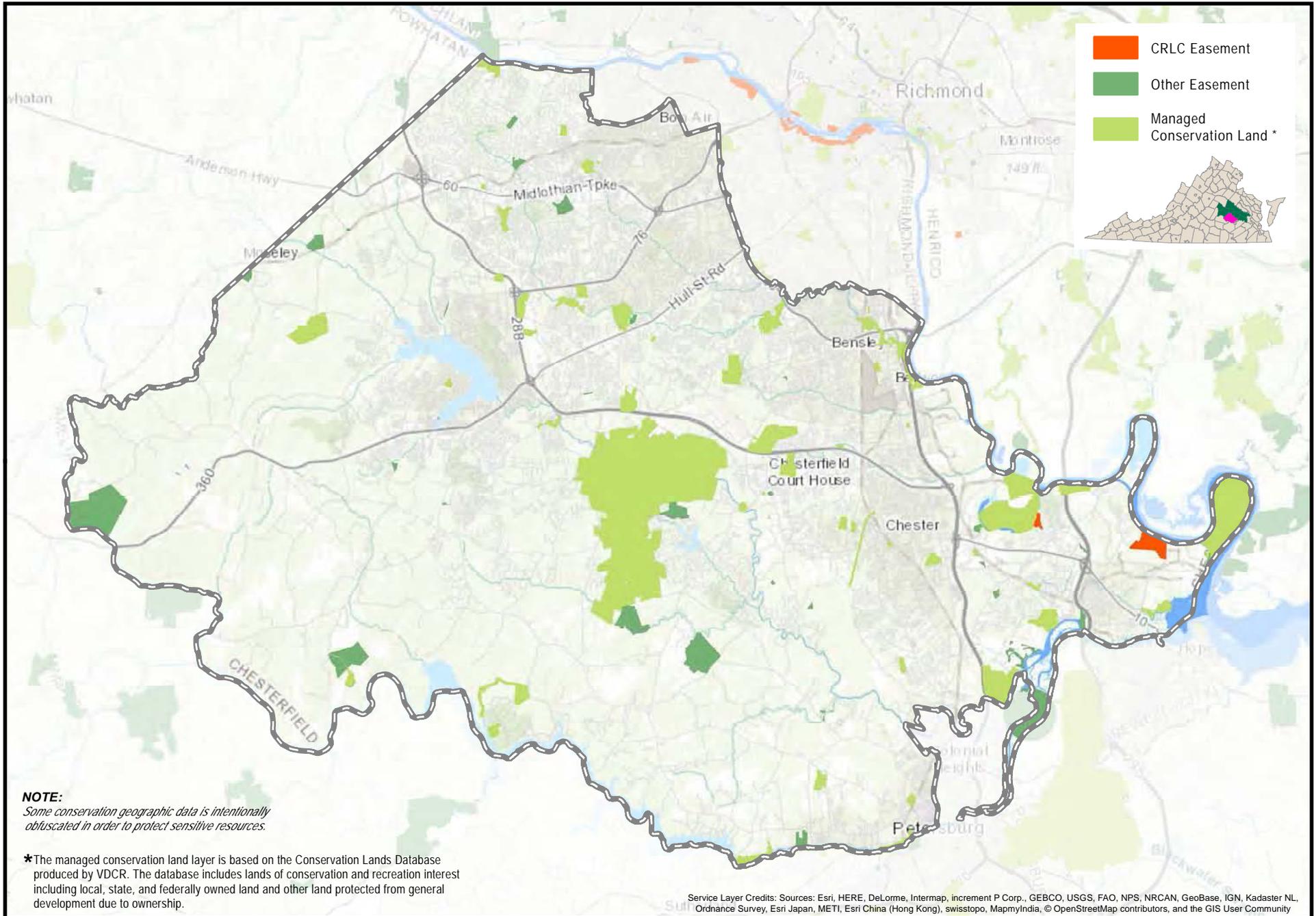
Sources: Virginia Department of Conservation and Recreation 2017, ESRI, 2017

Prepared by: Richmond Regional Planning District Commission on behalf of the Capital Region Land Conservancy, June 2017



PROTECTED LAND IN THE CAPITAL REGION

CHESTERFIELD COUNTY



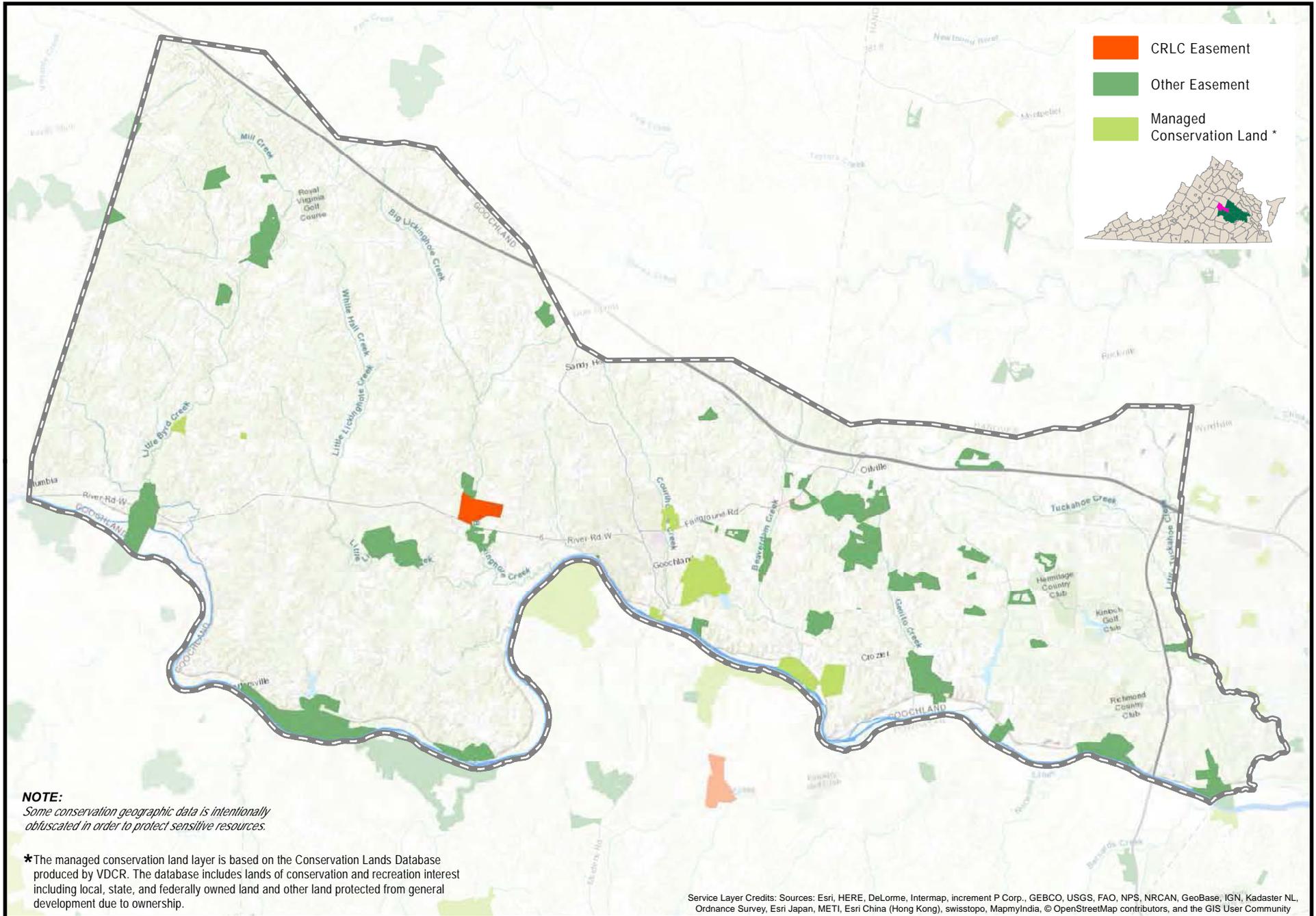
Sources: Virginia Department of Conservation and Recreation 2017, ESRI, 2017

Prepared by: Richmond Regional Planning District Commission on behalf of the Capital Region Land Conservancy, June 2017



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GOOCHLAND COUNTY



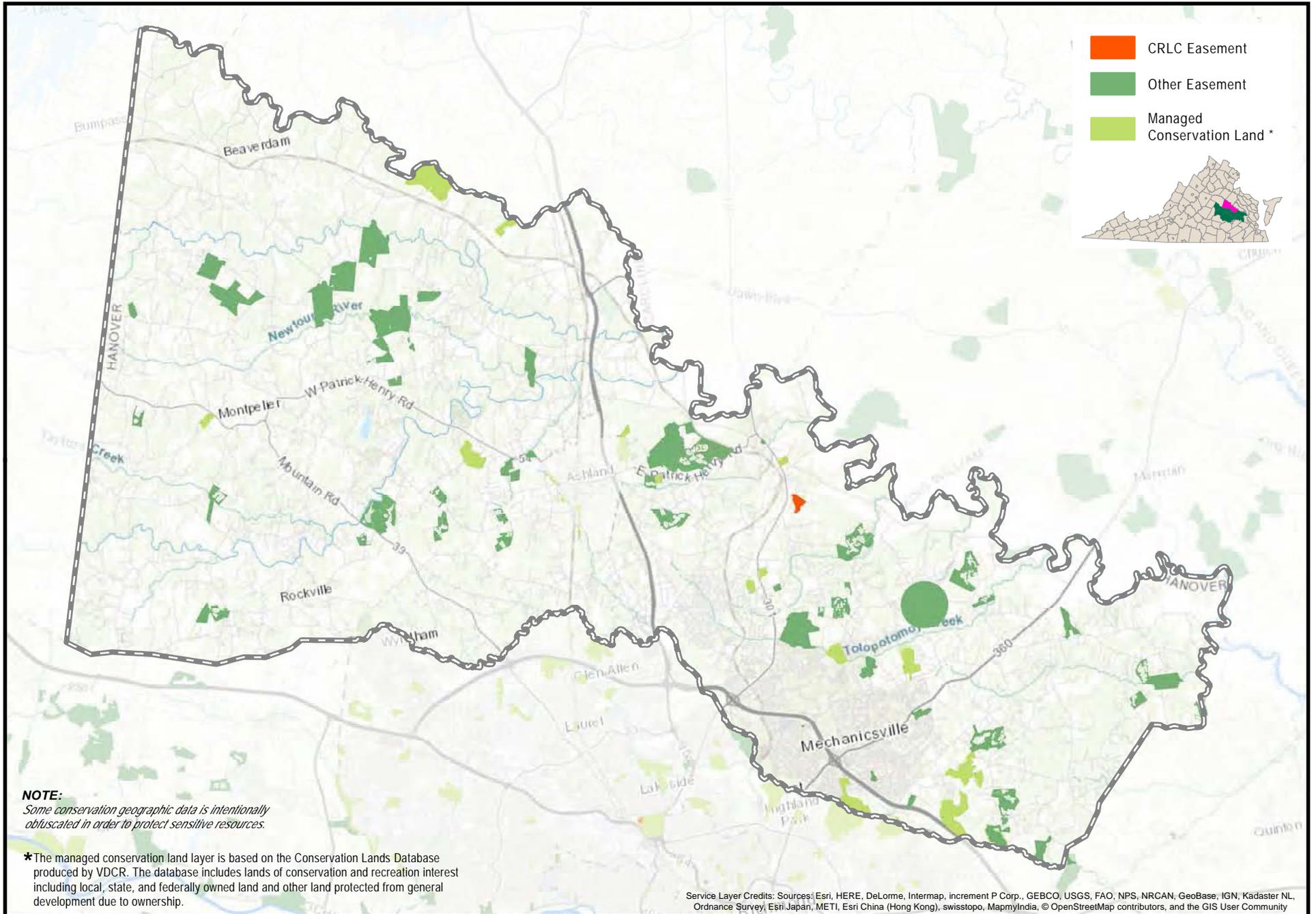
Sources: Virginia Department of Conservation and Recreation 2017, ESRI, 2017

Prepared by: Richmond Regional Planning District Commission on behalf of the Capital Region Land Conservancy, June 2017



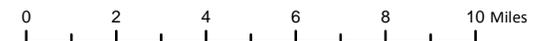
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HANOVER COUNTY



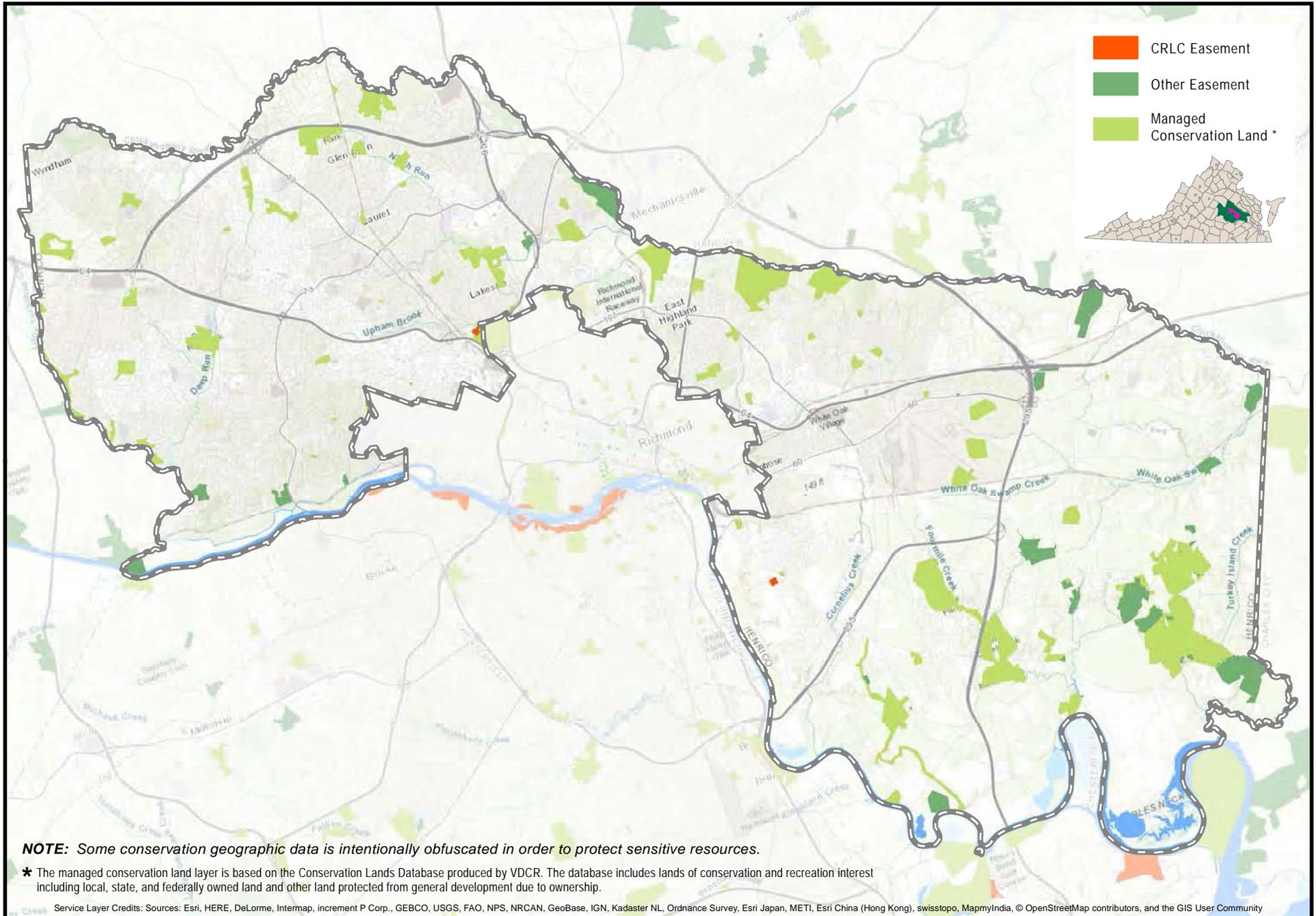
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Prepared by: Richmond Regional Planning District Commission on behalf of the Capital Region Land Conservancy, June 2017



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HENRICO COUNTY



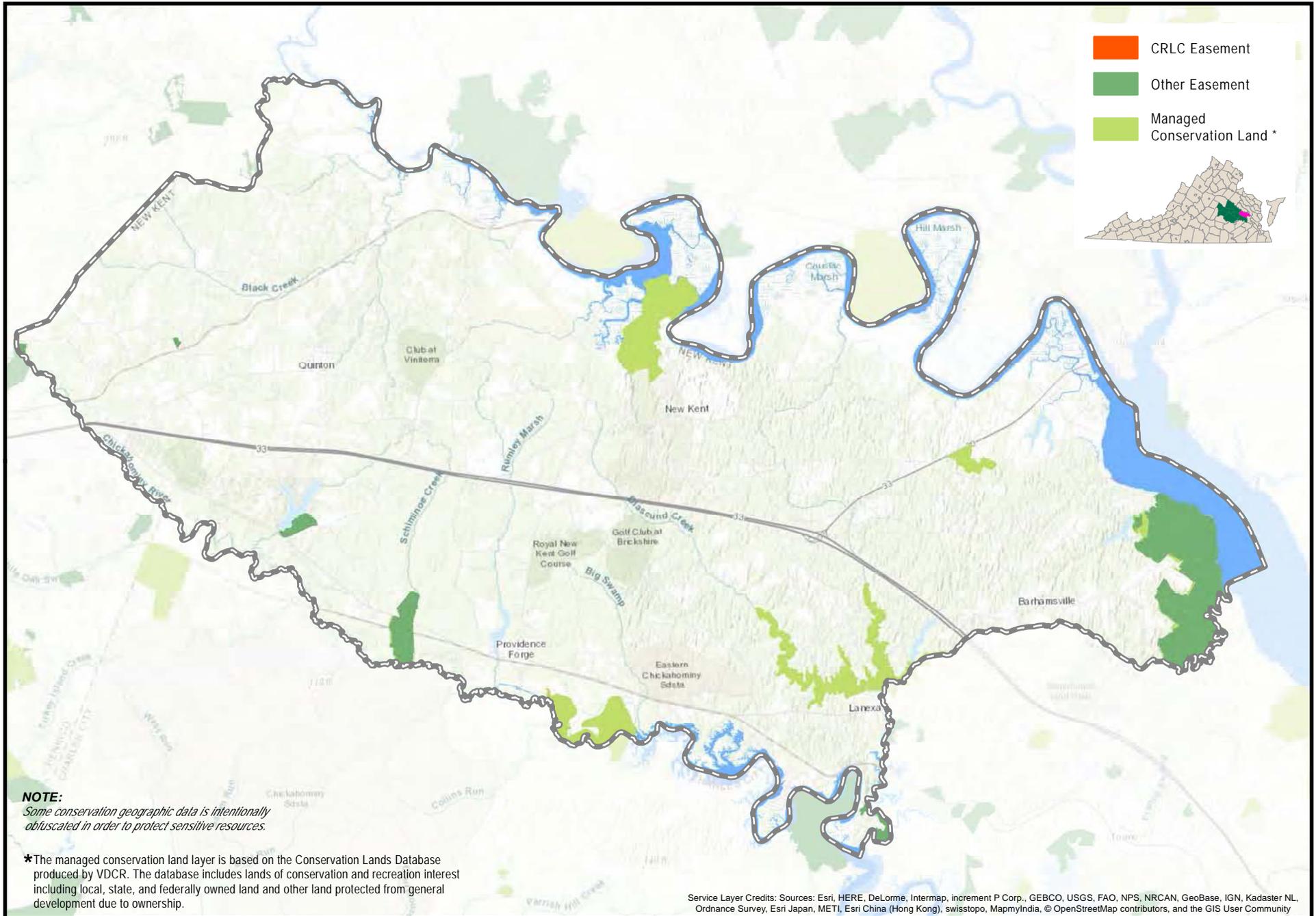
Sources: Virginia Department of Conservation and Recreation 2017, ESRI, 2017

Prepared by: Richmond Regional Planning District Commission on behalf of the Capital Region Land Conservancy, June 2017



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NEW KENT COUNTY



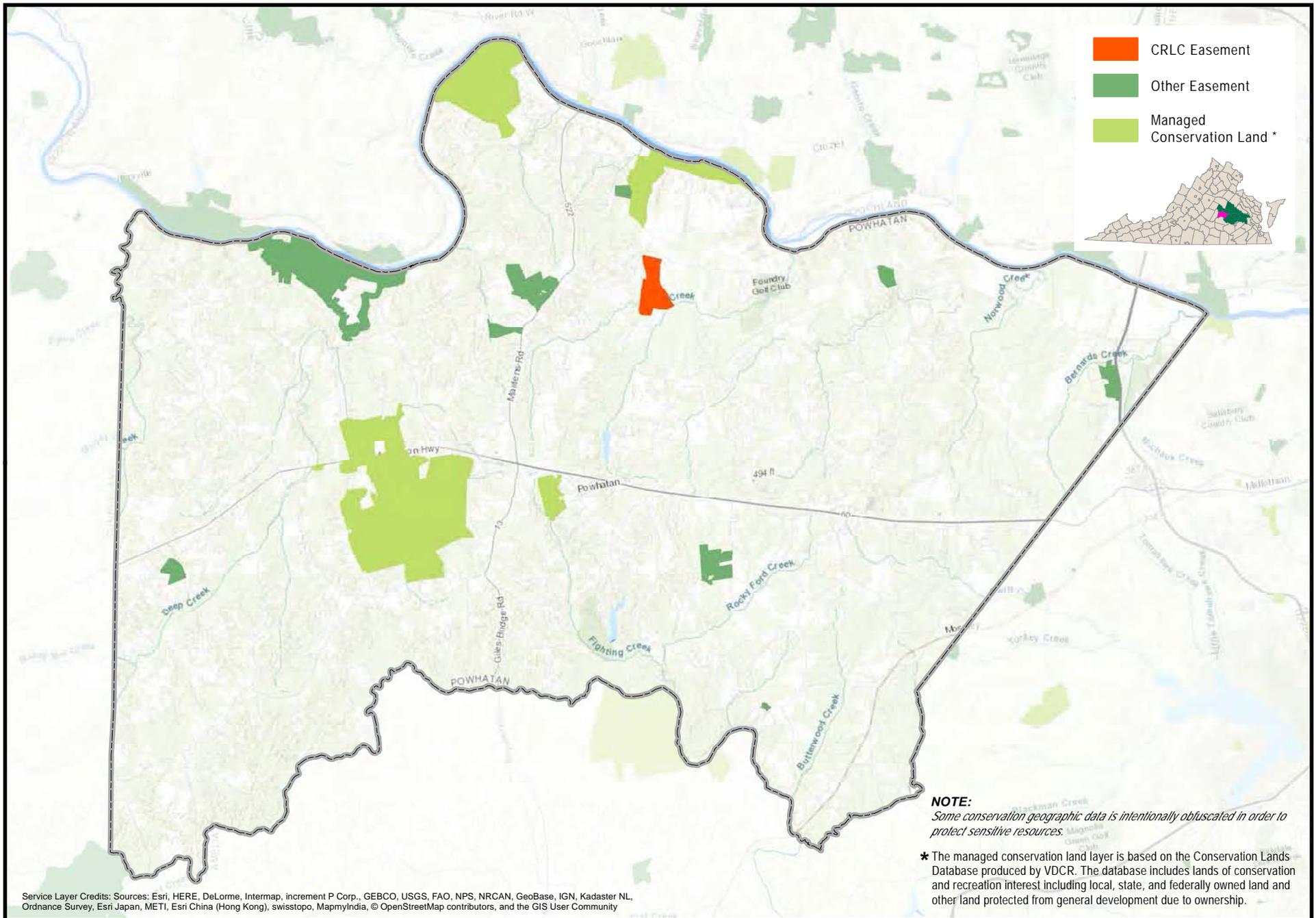
Sources: Virginia Department of Conservation and Recreation 2017, ESRI, 2017

Prepared by: Richmond Regional Planning District Commission on behalf of the Capital Region Land Conservancy, June 2017



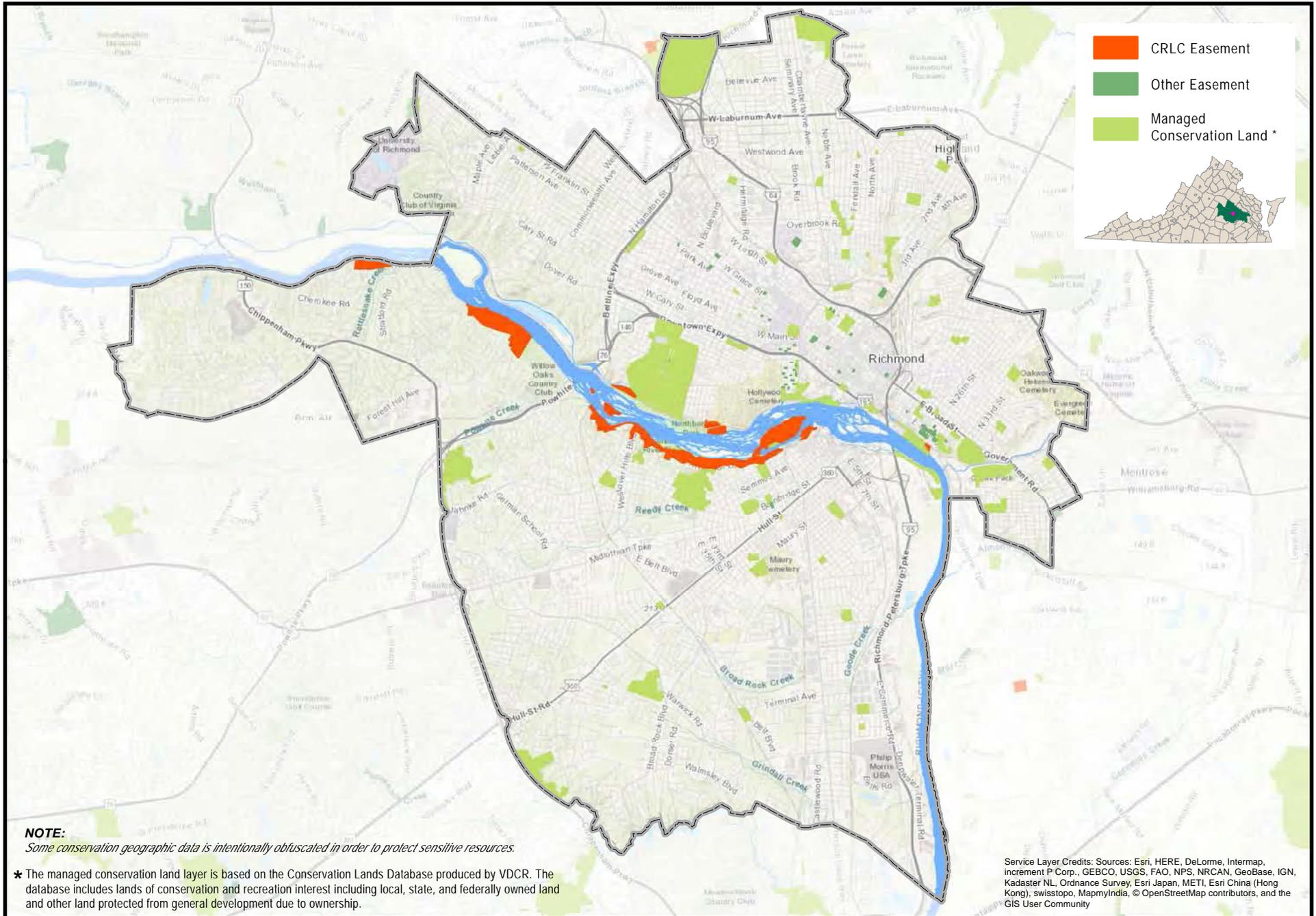
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POWHATAN COUNTY



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RICHMOND



APPENDIX C

Molly Joseph Ward
Secretary of Natural Resources

Clyde E. Cristman
Director



Rochelle Altholz
*Deputy Director of
Administration and Finance*

David C. Dowling
*Deputy Director of
Soil and Water Conservation
and Dam Safety*

Thomas L. Smith
Deputy Director of Operations

COMMONWEALTH of VIRGINIA
DEPARTMENT OF CONSERVATION AND RECREATION

***Thank you for attending this annual regional meeting to discuss the
Virginia Outdoors Plan***

October 6, 2016

1:30 p.m. to 3:30 p.m.

Richmond Regional Planning District Commission
9211 Forest Hill Avenue, Suite 200
Richmond, Virginia 23235

Agenda

Planning district staff welcome - **5 minutes**

Video introducing DCR - **5 minutes**

Welcome & meeting purpose - **5 minutes**

2016 VOP video - **15 minutes**

Planning region report - **15 minutes**

Regional VOP featured projects - **35 minutes**

Regional input and resources on VOP topics - **20 minutes**

- ✓ Economics and tourism
- ✓ Health, play and youth outdoors
- ✓ Scenic resource recognition and dark skies initiative
- ✓ Government ownership of recreation lands
- ✓ Biodiversity and land conservation
- ✓ Identify outdoor recreation carrying capacity conflicts in the region

Other outdoor recreation topics for the region - **5 minutes**

- ✓ VOP Mapper updates
- ✓ GIS updates

Next steps - **10 minutes**

For VOP Follow-up, please contact:

Bill Conkle, Park Planner

Bill.conkle@dcr.virginia.gov

804-786-5492

600 East Main Street, 24th Floor | Richmond, Virginia 23219 | 804-786-6124

*State Parks • Soil and Water Conservation • Outdoor Recreation Planning
Natural Heritage • Dam Safety and Floodplain Management • Land Conservation*

Molly Joseph Ward
Secretary of Natural Resources

Clyde E. Cristman
Director



COMMONWEALTH of VIRGINIA
DEPARTMENT OF CONSERVATION AND RECREATION

Rochelle Altholz
*Deputy Director of
Administration and Finance*

David C. Dowling
*Deputy Director of
Soil and Water Conservation
and Dam Safety*

Thomas L. Smith
Deputy Director of Operations

Virginia Outdoors Plan Regional Meeting Notes

Thursday, October 6, 2016

1:30 pm to 3:30 pm

Richmond Regional Commission - PDC 15

Richmond Regional Planning District Commission
9211 Forest Hill Avenue, Suite 200
Richmond, Virginia 23235

This document summarizes the regional meeting notes from the Richmond Regional Commission.

DCR staff: Bill Conkle, Janit Allen, Danette Poole, Lisa McGee, and Julie Buchanan.

Richmond Regional Commission Staff: Phil Riggin, Catie Bray, Sarah Stewart, Martha Shickel, and Anne Darby.

Meeting attendees:

Champe Burnley, VBF; Terry Lasher, VDOF; Richard Gibbons, VOP TAC/Scenic Virginia; Heather Barrar, Chesterfield Planning; John D. Watt, Chesterfield Economic Development; Marlie Smith, Richmond Parks; Greg Rollins, Richmond MORE; Bekky Monroe, Henrico Rec and Parks; Shane Sawyer, VDOT; Regan Gifford, Groundworks RVA; Michael Burton, DPR; Rosemary Deemer, Henrico County; Isaac Montero, VDH; Jow Collins, Ashland; Eunice Adu, VDH; Angel Smith, VDH; John Bulecek, VDOT; Sarah Birkhead, VDH; Carla Hegwood, VDH; Marley Hall, CRC; Stuart Connock, Chesterfield Parks and Rec; Greg Sager, Hanover County; Parker Agelasto, Capital Region Land Conservancy.

Martha Shickel of the Richmond Regional Commission welcomed participants to the regional meeting.

Danette Poole, DCR PRR Director shared the purpose of the meeting and introduced a film on DCR programs and a film introducing the planning staff at DCR.

DCR staff, Bill Conkle facilitated the meeting welcoming meeting attendees and offering an opportunity for round table introductions.

Sarah Stewart then gave a report on projects at the Richmond Regional Commission including ----
SARAH PLEASE ADD

the GIS contact for PDC 15 is Sarah Stewart (sstewart@richmondregional.org)

Identify regional accomplishments – featured projects

East Coast Greenway

- ✓ As a part of its active transportation work program to assist with the coordination and facilitation of the off-road alignment of the national East Coast Greenway route, the Richmond Regional Transportation Planning Organization is conducting a feasibility study of a potential multi-use trail that would allow for safe passage of non-motorized travel between the Town of Ashland, Hanover County, Henrico County and the City of Richmond. The trail could provide regional, statewide and national connections through the corridor.
- ✓ Groundwork RVA has received RTCA funding for planning. The neighborhood input portion of the project is complete. There are many community concerns and the Reedy Creek restoration project is at a standstill.
- ✓ Segment completed from Long Bridge Road to Downtown Richmond at Route 176.
- ✓ The National Youth Hostel is open in Downtown Richmond along the East Coast Greenway.
- ✓ The **Ashland** portion of the Trolley line trail that will connect Richmond to Ashland is near completion.

James River Heritage Trail

- ✓ (<http://www.chesterfield.gov/bikeplan/>)
- ✓ Jefferson Davis Corridor – Riverfront access is being studied

Virginia Capital Trail

- ✓ Henrico considering a small bike park for trail users on acquired property (parking and restrooms).
- ✓ Connector to Dorey Park has been completed.
- ✓ Funding for an eastern connector to Newport News is available.
- ✓ Courthouse to courthouse spur in from **New Kent** to **Charles City** is proposed. Application to VDOT has been made for funding.
- ✓ Potential spur off US Bike Route 76 to connect with US Bike Route 1 to follow capital trail at Long Bridge Road.

Hanover County

- ✓ Acquired land for new eastern Hanover Park. 55 acre site for active recreation. Phase I planned for 2019.
- ✓ Study on park-trail expansion. Study to be complete in 4-6 months. Widening trails is proposed to allow for multi-use.
- ✓ Identify potential scenic byways in Hanover County.
- ✓ There is a need for a park in Western Hanover to fill geographic gap.

Water Access

- ✓ JRA river regional action plan funded through Capital Region Plan.
- ✓ Tuckahoe Creek opened in Henrico County.

Regional Ride Center

- ✓ Pocahontas – Phase I open with 7 miles of new trails for mountain bikes and hand cycles.
- ✓ \$635,000 awarded from the General Assembly for 15 miles of trails and trailhead. These monies have been frozen at this time.

Connect James River Park to Pocahontas State Park – Keep as Featured Project. This is a major project on the East Coast Greenway corridor. Reference the City of Richmond and County of Chesterfield Comprehensive Plans.

Other Recommendations and Accomplishments

- ✓ All localities should review all VOP recommendations before sharing with external partners.
- ✓ Additional transportation modes to connect to outdoor resources, improve public transportation to outdoor recreation.
- ✓ Engage cycling community for infrastructure

City of Richmond

- James River Kanawha Canal – Phil Riggan’s Master’s Project is completed. The plan focuses on using the canal’s flat-water to access the river’s white water. The Richmond City Department of Public Utilities supports this Kanawha Canal Plan.
- ✓ The NPS RTCA(Rivers Trails Conservation Assistance) has listed the Enhanced Connections at Tredegar, James River, and the Community as a 2017 project. The lead partner is the Richmond National Battlefield. Anticipated Outcomes include providing a seamless recreational and historic experience at Tredegar Iron Works, the American Civil War Museum, and the James River Park system in downtown Richmond through improved physical connections, signage and interpretive programming. RTCA will assist with project coordination, facilitation, and planning to improve multi-modal access and wayfinding; promote active recreation, expand community outreach and youth engagement, and identify funding sources for implementation.
- ✓ James River Branch Trail is proposed from George Wythe High School to Cofer Road, and has applied for a VDOT grant.
- ✓ Consider trail along the Southeast high speed rail corridor.
- ✓ Bridge Park Foundation continues to work on options, cost, feasibility and DEQ approvals.
- ✓ Regional rivers plan is being developed by the James River Association
- ✓ Amtrak roll on bike service is available on some trains to Richmond.
- ✓ Richmond –Gambles Trail Connection to University of Richmond and Grove Avenue is under construction.
- ✓ Improve sidewalk on the north side of the nickel bridge to Pump House Drive.
- ✓ Richmond- There is a grant opportunity for replacing 2 Reedy Creek Bridges – Michael Burton will provide information.

Richmond Bikeway improvements

- ✓ Striping of more than 12 lane miles of bike lanes, the majority of which are buffered bike lanes accomplished thru “road diets” where we converted travel lanes to bike lanes, with an

emphasis on improving our bridges over the James River. This doubled what was on the ground prior to 2010.

- ✓ Requested and received authorization from FHWA to use green bike lanes along several projects at conflict zones to reduce the potential for car/bike conflicts (turn lanes, merge areas).
- ✓ Striping of the City's first contra-flow bike lane (allowing bikes to travel in both directions on a one-way street which avoided the need to cross US1/301 by allowing access to a grade separated route under the Lee Bridge from Oregon Hill), with a second contraflow lane designed and ready for striping.
- ✓ Construction has started on the City's first "bike boulevard" (2.25 mile traffic-calmed street that prioritizes bike and pedestrian travel).
- ✓ The region's first "cycle track" or barrier-separated bike lane currently in design.
- ✓ Completion of the City's segment of the Virginia Capital Trail
- ✓ Completion of 1.3 miles of paved shared-use path along the Cannon Creek Greenway
- ✓ Contract negotiations being finalized for a city bike share system
- ✓ Completion of the City's first bike master plan that charts the path forward
- ✓ Richmond - Grand opening of the T. Tyler Potterfield (Dam Walk) Bridge was December 2, 2016. Missing link needs to be addressed.
- ✓ Flood wall near Manchester climbing wall and Hull Street Bridge need improvements for Diversity Park.
- ✓ Water Fountains at Texas Beach and Manchester are needed.
- ✓ Richmond City is getting an easement along the Floodwall to prohibit development directly adjacent to the Floodwall.

Richmond City- main additions/improvements to the main (mountain bike/running) trail system:

- ✓ Construction of Buttermilk East. This is an extension of the Buttermilk Trail to the east from its old terminus at 21st tower to the Floodwall Trail behind Sun Trust. This is an important improvement as it creates an all off-road (and out of traffic) connection to the Floodwall Trail.
- ✓ New trails have been built in the Ancarrow's Landing portion of the Park. There are approximately 2.5 miles of new single-track to the east of Ancarrow's Landing as well as a new connector trail that bypasses the Slave Trail to accommodate the increased usage of the area.
- ✓ Improvements/additions are currently underway at the Belle Isle Skills Park.

Goochland County

- ✓ Tuckahoe Creek trail easement has potential to be a Virginia Capital Trail extension.
- ✓ FOLLOW-UP needed in Goochland County.

Henrico County

- ✓ Currently constructing a 30+-acre expansion to Short Pump Park, also in Three Chopt District. Development will include trails, picnic shelter and restroom, the west end's first public dog park, a spray fountain, play equipment and additional parking. The expansion is set to open in summer 2016.
- ✓ Short Pump and Tuckahoe Creek parks are open.
- ✓ \$87.1 million bond referendum on November 8, 2016.
- ✓ The Board of Supervisors has adopted the first phase master plan for 200-acre Greenwood Park on the north side in the Brookland District and will shortly be bidding construction plans for a portion of that plan to include synthetic turf soccer/multi-purpose fields, restroom, shelters, trail, sand volleyball courts, playground and parking. The park is planned to open in spring 2017.
- ✓ Virginia Capital Trail is completed! Over 2 miles through and connecting Dorey Park and Four Mile Creek Park, including a trailhead with picnic tables and parking for approximately 75 cars at Four Mile Creek on New Market Road. Additionally are funded for approximately 2 miles of VCT connecting asphalt trail (also 10" wide to match VCT) within Dorey Park that are separated from the park road and run all the way to the park entry on Darbytown Road. The first section of this additional connecting trail will be complete spring 2016.
- ✓ In 2015 the County acquired (2015) of 100-acre Taylor Park off Williamsburg Road east of Sandston near the Chickahominy YMCA. The site is proposed for both active and passive recreation.
- ✓ In 2015 the County also acquired of 2.5-acres of land adjacent to Virginia Capital Trail at Midview and New Market Road. Land will be developed as another trailhead with parking, picnic pavilion and restrooms possible among other amenities in the future.
- ✓ The County constructed a walk-in neighborhood facility in the Tuckahoe District. The **Tuckahoe Creek Park** boardwalk is several hundred feet of boardwalk along Tuckahoe Creek where Recreation and Parks owns 245 +/- acres of land (all in the flood plain).
- ✓

Chesterfield County

- ✓ Long range master plan to be adopted at the end of 2017. New featured projects may result.
- ✓ There is an effort to provide access to undeveloped public properties. (STUART to provide DETAILS)
- ✓ Bikeways and Trails Chapter of the County's Comprehensive Was approved. The 362-mile bicycle plan that will be built over the next 50 years.
- ✓ Ettrick Special Area Plan has been adopted.
- ✓ Northern Jefferson Davis Plan – The county started the public input process in fall 2015 to address riverfront access along James River.
- ✓ VSU Randolph Farm is the site of a trail along the James River in Ettrick.
- ✓ 109 acres along the James River were acquired in 2015 to connect Falling Creek with Drewry's Bluff.
- ✓ Tobacco Cessation programs that support banning of tobacco use in parks has been gaining a foothold in Virginia.

- ✓ Scenic Virginia and DCR are working on a scenic viewshed registry that could help identify and protect significant scenic resources in the Region.
- ✓ Recommend lifting moratorium on the acquisition of state lands.
- ✓ NPS is seeking to provide additional parks for low income areas and the underserved. Recognizing the benefits of outdoor recreation. There is a concern with youth activity levels and resulting health issues.

Powhatan County

- ✓ Consider expansion of the Powhatan State Park, utilizing a portion of the Beaumont Juvenile Detention facility, to be closed in 2017.
- ✓ Evaluate the re-use potential for other portions of the Beaumont Juvenile Detention facility property and buildings.
- ✓ Evaluate the potential for the historic Belmead on the James property in Powhatan County to be acquired and operated as a park, through public and private partners.
- ✓ Develop an amphitheater in Fighting Creek Park in Powhatan County.
- ✓ Powhatan State Park – Water access points and campground are completed with internal road expansion, county road improvements at intersection are planned. Requests to expand equestrian and mountain bike trails, as well as a connection to Belmead.

Town of Ashland

- ✓ Trolley Line Trail: The Town has the funding in place and the plans are set to begin development of Ashland's section of the Old Trolley Line, which once connected Ashland to Richmond. This will be a boardwalk multi-use trail. Construction will begin in 2017. The Town is working with partners to make connecting this trail with Richmond a regional priority.
- ✓ Parks and Recreation Master Plan Update: The Town of Ashland is working with the Richmond Regional Planning District Commission to update the Ashland Parks and Recreation Master Plan for the first time since 1997. In addition to content about the future bike trail along the Old Trolley Line and Mechumps Creeek, The Parks and Recreation Master Plan will also include content about expanding recreational opportunities, constructing a new park in the northern side of Ashland, and a financial plan to save for regular playground upgrades.
- ✓ Mechumps Creek restoration and trail: The Town hopes to complete the second half of a trail along the creek bed of Mechumps Creek. In addition to the trail, picnic tables and a kiosk at one of the trailheads is planned. The ultimate goal is to connect Ashland's portion of the East Coast Greenway, the Mechumps Creek trail, Ashland's existing trails, and a proposed 13 mile bike trail, to Ashland's parks, numerous neighborhoods, and downtown area.

Comments from the Richmond Regional Transportation Planning Organization

- ✓ It was good to see that there was public support for a connection between Pocahontas State Park and the James River Park System, as well as the completion of the planned Richmond Ride Center.
- ✓ We would like to see park master plans include phased plans to connect with the approved Chesterfield Bikeways and Trails Plan, which would also include trails designated to be a part of the East Coast Greenway.
- ✓ The Draft Phased Development Plan in the Pocahontas master plan should include trail connections with Chesterfield and the East Coast Greenway on the map and in the text of the document. The map for the Pocahontas State Park Master Plan includes some references in text to potential trails and road crossings that could connect with the Chesterfield and East Coast Greenway trails, but we would suggest that updates to the map show the general location of trails within the park that will connect with Chesterfield trails as reflected in the Chesterfield Bikeways and Trails Plan.

Next Steps

Meeting attendees and the planning district staff were thanked for their time and input in to the VOP update. It was mentioned that while the meeting was not a formal public meeting, additional thoughts and comments would be incorporated into the meeting notes if sent to Bill Conkle bill.conkle@dcr.virginia.gov . Sarah Stewart and Ann Darby will receive the draft meeting notes for review prior to distribution to the entire list of meeting invitees.

Bay Act 101
Tuesday November 29, 2016

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Planning District Commission

Metropolitan Planning Organization

Town of
Ashland
Counties of
Charles City
Chesterfield
Goochland
Hanover
Henrico
New Kent
Powhatan
City of
Richmond

AGENDA

RRPDC Environmental TAC

May 16, 2017

RRPDC Board Room
9211 Forest Hill Avenue, Suite 200
Richmond, VA 23235

CALL TO ORDER2:00 P.M.

- 2:00 Welcome
- 2:05 DEQ Update – Heather Mackey, DEQ
 - Bay Act Compliance Reviews
 - Bay TMDL Phase III WIP
- 2:30 RVA H20 – Grace LeRose, City of Richmond
- 2:45 RRPDC project updates
 - Current & future projects
- 3:00 Future of Env TAC
- 3:25 Locality Update Round-Robin
- 3:55 Wrap Up
- 4:00 Adjourn**

RRPDC Environmental TAC

May 16, 2017

Agenda

- **2:00** Welcome
- **2:05** DEQ Update – Heather Mackey, DEQ
 - Bay Act Compliance Reviews
 - Bay TMDL Phase III WIP
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- **2:45** RRPDC project updates
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RRPDC Projects

Potterfield Bridge Native Planting and Interpretive Signage

RRPDC Current project

The Tyler Potterfield Memorial Bridge project was planted exclusively with Virginia native plants, well-adapted to the local climate, annual precipitation, and soils. They promote biodiversity by providing habitat for native insects, birds, and animals and often benefit from symbiotic relationships with these species. In addition, they reinforce the ecology of the James River, enhancing the regional character of the riverfront.

Bridge plantings include:

- 18 tree species
- 29 shrub species
- 5 fern species
- 1 vine species
- 5 unique meadow seed mixes

Canada Serviceberry, Juneberry



Amelanchier canadensis

Serviceberry is good for multi-season interest and smaller gardens. At least 40 bird species eat the fruit of Amelanchier species, including Cardinals, Cedar Waxwings, and Towhees. It is beneficial to native bees.

Flowering Dogwood



Cornus florida

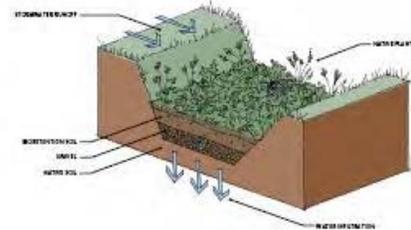
More resistant to dogwood anthracnose fungus (*Discula destructiva*) if planted in open areas. If planted in full sun, it will need to be watered during extended dry spells. Native Americans used the roots and the bark to make a red dye.

Sweetbay Magnolia



Magnolia virginiana

Sweetbay Magnolia was introduced into European gardens as early as 1688. Called "Baxretree" by colonists who caught beavers in traps baited with the fleshy roots.



The bio-retention basin in front of you is one of two on site. During a rain event, runoff pools in the basin and slowly infiltrates into the ground. More than two dozen native plants are planted in the basin to absorb phosphorus and other nutrients in the runoff from paved areas, like the path you are traveling, and therefore improve water quality.

By reducing the overall quantity of runoff through infiltration, and also improving the quality of water through plant uptake, these two basins exceed the requirements for the Chesapeake Bay Preservation Act on the Tyler Potterfield Memorial Bridge and help conserve our natural resources.



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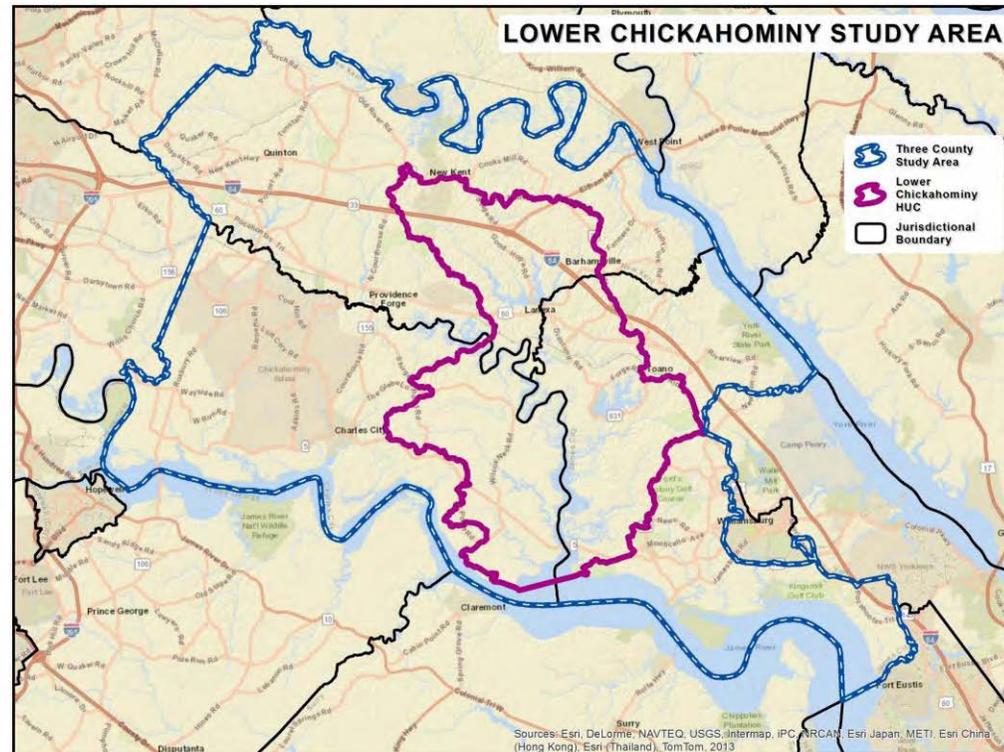
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Economics of Natural Resource Conservation in the Lower Chickahominy

RRPDC Current Project

- 5 Year Project strategy funded by NOAA via VCZM grant
 - Policy development
- 3 Counties, 2 PDCs, large stakeholder committee
- RFP for Economic Study should be released in next 2 weeks from VCZM Program



Coastal Technical Assistance Grant

RRPDC Current & Future projects

- Annual grant; 50-50 match
- Current
 - Environmental TAC
 - Environmental & Intergovernmental Reviews
 - Technical assistance and mapping for Groundwork RVA
 - Update regional Conserved Lands maps (coordinate with CRLC)
- Future
 - Regional Public Water and Sewer Inventory Update
 - Resiliency

Richmond Regional Water & Sewer Inventory



The James River supplies nearly 68% of the Region's public water

In October 2008, the Small and Large Jurisdictions Committees of the Richmond Regional Planning District Commission directed staff to compile baseline information on water and sewer systems of the Richmond Region. The goal of this information sharing is to create a regional picture of usage and capacity, educate the public, and develop a planning tool for the RRPDC's nine localities.



Water and Sewer in the Region

Inter-jurisdictional agreements for provision of utility service have created an interwoven, almost regional system operated at the individual locality level for the benefit of local residents and businesses.

The 2010 21st Annual Virginia Water and Wastewater Rate Report prepared by Draper Aden Associates, shows a total of 307,309 residential and 20,969 non-residential water units [not necessarily one connection per dwelling unit] are accounted for in the existing public water service area. Total permitted water capacity in the Region is approximately 277 million gallons per day (MGD) with an average daily use approaching 135 MGD.

Public sewer service is provided to the equivalent of 286,055 residential and 17,942 non-residential wastewater units.



The City of Richmond's wastewater treatment facility

Coastal Competitive Grants

*RRPDC did not submit proposal

Project idea - Reconciliation of Uses
Below the Falls of the James

- 3 year grant cycle
- \$500,000 for projects; fewer bigger projects instead of many smaller
- 12 proposals submitted
- Scoring Results: Two focal Areas
 - Promoting Sustaining Rural Coastal Industries: Shellfish Aquaculture and Ecotourism (VIMS user conflict, Oyster & Water Trail Ecotourism)
 - Coastal Resilience (VIMS research on living shorelines and elevation data in HR, regional collaboration in NVa)

Future of Environmental TAC

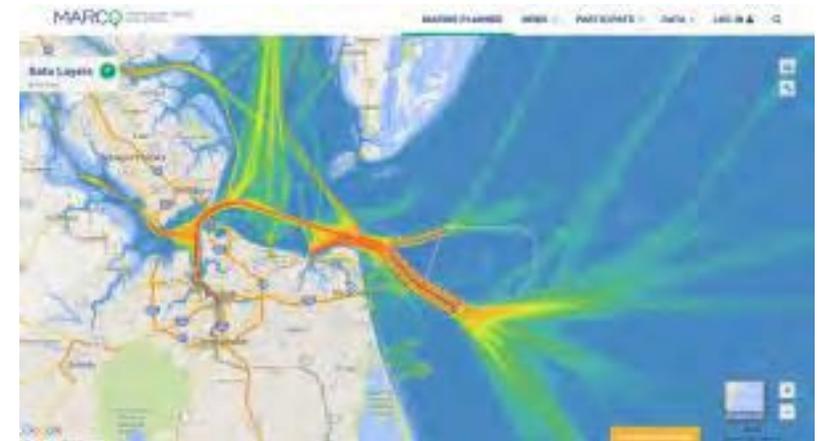
Questions for Consideration

- Setting specific meeting day, time, and/or frequency
- Meeting style
 - Discussion
 - Presentations – peers and outside experts
 - Topic based
 - Narrow Focus or Broad, Interdisciplinary Focus
 - Demonstration projects
 - Traveling and/or Field Trips
 - Public Education
- Additional people/groups
 - SWCDs
 - Other local departments (planning, recreation, etc)
 - State agencies (DEQ, DCR, DGIF, etc)
 - High School & Higher Ed (VCU, U of R, VSU, VUU, RMC, community colleges)
 - Non-profits
 - Designers & engineers
 - Private industry

Future of Environmental TAC

Project Idea

- Below the Falls of the James – Reconciliation of Uses
 - Uses:
 - Recreation – public access to river, VA Capital Trail
 - Water quality – Local and Bay TMDLs
 - Land conservation – conservation easements, historic character
 - Residential and industrial land development
 - Commerce & transportation – rail, I-95, Port of Richmond
 - Data portal & stakeholder forum
 - See MARCO Data Portal as example
<http://midatlanticocean.org/data-portal/>



Future of Environmental TAC

- Project & Topic Ideas
 - Bellemeade Walkable Watershed (Richmond) – demonstration project
 - Mechump’s Creek – demonstration project
 - Sea level rise and climate change effects in Central Virginia
 - Native & invasive plants, biodiversity, and water quality
 - Green infrastructure, stormwater, and recreation networks – planning and implementation
 - Public education & outreach
- HRPDC Write as Rain campaign (4:30 minute video)
 - <http://wavy.com/2017/05/02/reck-on-the-road-write-as-rain-secret-messages/>

Future of Environmental TAC

Questions for Consideration

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 - Non-profits
 - Designers & engineers
 - Private industry

Local Roundtable Updates

**Richmond Regional Planning District Commission and Crater Planning District Commission
Floodplain Management Workshop**

6610 Public Safety Way Chesterfield, VA 23832
September 19, 2017 | 9:00 AM to 5:00 PM



AGENDA

9:00 AM	Registration/Sign In
9:15 AM	Introductions
9:30 AM	Overview of the National Flood Insurance Program
	Floodplain Ordinances and Permitting
9:45 AM	<ul style="list-style-type: none">• Floodplain Management Regulations• Accessory Structures• Floodplain Ordinances and Administrative Procedure
11:00 AM	Break
	Floodplain Ordinances and Permitting
11:15 AM	<ul style="list-style-type: none">• Floodplain Ordinances and Administrative Procedures• Permitting Development• Elevation Certificates
12:30 PM	Lunch
	Flood Hazard Maps and Data
1:00 PM	<ul style="list-style-type: none">• Flood Insurance Rate Maps and Flood Insurance Studies• Accessing and Using Flood Hazard Data• Changing FIRMs and FIS Reports• Non-regulatory Products and Other Resources
2:45 PM	Break
3:00 PM	Pre-& Post-Disaster Considerations
3:30 PM	Community Rating System
	DCR Division of Dam Safety and Floodplain Management Update
4:00 PM	<ul style="list-style-type: none">• Floodplain Management Program Overview• Dam Safety Database
4:30 PM	Questions & Answers
5:00 PM	Adjourn

Floodplain Management Workshop

Richmond-Crater Planning District Commissions

Kristin Owen, AICP, CFM
Gina DiCicco, AICP, CFM

September 19, 2017
Chesterfield, VA



Agenda

- Introduction
- Overview of the NFIP
- Floodplain Ordinances and Permitting
 - Floodplain Management Regulations
 - Accessory Structures
 - Floodplain Ordinances and Administrative Procedures
 - Permitting Development
 - Elevation Certificates
- Flood Hazard Maps and Data
 - Flood Insurance Rate Maps and Flood Insurance Studies
 - Accessing and Using Flood Hazard Data
 - Changing FIRMs and FIS Reports
 - Non-regulatory Products and Other Resources
- Pre- & Post-Disaster Considerations
- Community Rating System
- DCR Division of Dam Safety and Floodplain Management Update
 - Floodplain Management Program Overview
 - Dam Safety Database



Introduction



Introduction

- DCR Staff Introductions
- Community Introductions
 - Name
 - Community name
 - Title
 - What you hope to gain from the workshop



Workshop Goals

- Remind communities of the basics of the National Flood Insurance Program, addressing community-specific questions and comments.
- Ensure that communities understand their roles and responsibilities in floodplain management.
- Provide communities with NFIP and DCR program updates.
- Establish a closer relationship between DCR and PDCs, to facilitate future collaboration.



Overview of the National Flood Insurance Program



National Flood Insurance Program (NFIP) Milestones

- **1968** – National Flood Insurance Act
- **1969, 1972** – Tropical Storms Camille and Agnes
- **1973** – Flood Disaster Protection Act of 1973 – mandatory purchase
- **1979** – FEMA created – NFIP moved
- **1988** – Stafford Act
- **1994** – National Flood Insurance Reform Act – creates Flood Mitigation Assistance grants, codifies mandatory purchase, lender penalties established
- **2003** -- DHS created, FloodSmart program, Hurricane Isabel
- **2004** – FIRA 2004 (BBB Act) – Reformed claims process, plain language mailings, appeals process, Florida hurricanes
- **2005** – Katrina, Rita, Wilma – \$14 billion in the hole
- **2012** – Biggert-Waters Flood Insurance Reform Act, Hurricane Sandy - \$20 billion in the hole
- **2014** – Homeowner Flood Insurance Affordability Act of 2014




NFIP Background

- Created by National Flood Insurance Act of 1968
- Participation is **voluntary**
 - Adopt and enforce regulations
 - Eligible for flood insurance
- **Benefits** of participation
 - Flood insurance
 - Grants and loans
 - Disaster assistance
 - Federally-backed mortgages
- **Goals** of the NFIP include
 - Save lives and protect property
 - Encourage a comprehensive approach to floodplain management

The Base Flood:
 The flood having a 1% chance of being equaled or exceeded in a given year. Used by the NFIP as the basis for mapping, insurance rating, and regulating development.





NFIP Background

- The NFIP is a **voluntary program**
 - Voluntary agreement between FEMA and the local government.
 - Elements and requirements of the program are in 44 CFR 59 – 75.
 - A locality complies with **44 CFR 60.3** by adopting a floodplain ordinance that meets or exceeds the minimum requirements and by implementing proper floodplain management. FEMA then provides the flood insurance rate maps (FIRMs) and authorizes the sale of flood insurance in the community.




Joining the NFIP

- Without mapped SFHA (NSFHA)
 - Resolution to join the NFIP Process
 - Submit application to DCR → FEMA
- With mapped SFHA
 - Resolution to join the NFIP Process
 - Adopt floodplain ordinance in compliance with 44 CFR
 - Submit application to DCR → FEMA
 - Communities have one year after their first FIRM to join the NFIP
 - If a community applies after that year, a Community Assistance Visit is required to ensure that all post-FIRM development in the SFHA complies with 44 CFR

FEMA DCR

NFIP Background

FEMA DCR

NFIP Flood Insurance Basics

- Sold by licensed insurance agents through
 - "Write Your Own" insurance companies
 - FEMA's Direct Servicing Agent
- Essential elements of rating include
 - Flood Zone
 - Elevation Difference (BFE, LFE)
 - Building/Occupancy Type
 - Construction Date (pre-FIRM vs. post-FIRM)
 - Coverage Limits & Deductible

	Emergency Program	Regular Program
Residential (1-4 family)		
Building	\$35,000	\$250,000
Contents	\$10,000	\$100,000
Other Residential		
Building	\$100,000	\$500,000
Contents	\$ 10,000	\$100,000
Non-Residential		
Building	\$100,000	\$500,000
Contents	\$100,000	\$500,000

FEMA DCR

NFIP Flood Insurance Basics



- Increased Cost of Compliance
 - Included in policy to help property owners in SFHA to pay for mitigation measures to bring NFIP insured structures into compliance
 - Provides up to \$30,000* for mitigation
 - Floodproofing (non-residential)
 - Relocation
 - Elevation
 - Demolition

**ICC coverage applies solely to buildings and only covers the cost of the compliance measures undertaken.*

FEDMA DCR

NFIP Roles: Federal and State

- **Federal**
 - National program oversight
 - Risk identification (mapping)
 - Establish development/building standards
 - Provide technical assistance to state/communities/agencies
 - Provide insurance coverage
- **State**
 - State program oversight
 - Establish development/building standards
 - Provide technical assistance to local communities/agencies
 - Evaluate and document floodplain management activities

FEDMA DCR

NFIP Roles: Local

- **Local Officials and Floodplain Administrators**
 - Adopt and enforce floodplain management ordinance compliant with Federal/State laws
 - Permit or deny development
 - Inspect development and maintain records
 - Make substantial damage determinations
- Development oversight is a **local responsibility**

FEDMA DCR

NFIP in Virginia

- There is no state-level floodplain regulation. The VA USBC contains standards for buildings in flood-prone areas and a statement that the local floodplain ordinance is not superseded by the VA USBC.
- VA Flood Damage Reduction Act, Section 10.1-600 to 10.1-603 of the Code of Virginia directs all state agencies to comply with floodplain regulations.
- Executive Memo 2-97 requires state projects in the SFHA to comply with the local floodplain ordinance.

NFIP in Virginia

- Currently, 290 Virginia communities participate in the NFIP.
- DCR is charged by the General Assembly in the VA Flood Damage Reduction Act, Section 10.1-600 to 10.1-603 of the Code of Virginia, to be the liaison between FEMA and communities.
- DCR assists communities with their floodplain ordinances and maps, and provides floodplain workshops and guidance.

NFIP Program Updates

- Impacts of recent reform legislation
 - Annual premium increase caps of 15-18%
 - Certain pre-FIRM subsidize-rated buildings in Zone A's, and V's increase 25% until reach full-risk rate*:
 - Non-primary residences
 - Commercial buildings
 - Repetitive loss structures
 - Substantially damaged buildings



**Rate using information from Elevation Certificate*

NFIP Program Updates

- Impacts of recent reform legislation (cont.)
 - Properties newly mapped into SFHA can get lower-cost Preferred Risk Policy (PRP) rates first year if purchased within 12 months of map change
 - Will then increase no more than 15-18% until reach standard Zone X rate or rated using current map, whatever is cheaper
 - Lapsed policies more than 90 days will be rewritten using full-risk rates
 - This affects pre-FIRM subsidized-rated and Newly Mapped policies



Legend:
 Added to SFHA
 Removed from SFHA

FEDERAL FLOOD INSURANCE PROGRAM (NFIP) logo and DCR logo are present at the bottom of the slide.

NFIP Program Updates

- Premium Increases and Surcharges**
 - Overall, premiums will increase from an estimated \$827 per policy to \$878, for an average increase of 6.3%
 - When the HFIAA surcharge and the Federal Policy Fee are included, the total amount billed to the policyholder will increase from \$953 to \$1,005, an average of 5.4%
 - Annual premium increases continue to comply with all the requirements of BW-12 and HFIAA 2014
 - No less than 5%-no more than 15% per rating class
 - Individual PH premiums no more than 18%-some exceptions
 - Specific 25% mandatory increase for certain categories

FEDERAL FLOOD INSURANCE PROGRAM (NFIP) logo and DCR logo are present at the bottom of the slide.

NFIP Program Updates

- Premium Increases and Surcharges-Pre-FIRM Subsidized Policies**
 - Primary Residences: The combined premium increase for all primary residence policies in SFHA is 5%, with a total increase of 5%
 - Non-Primary Residences: The combined premium increase for non-primary residence policies in SFHA is 24%, with a total increase of 21%
 - Pre-FIRM subsidized policies subject to 25% annual increases as required by BW-12 (non-primary residential, business, SRL, and SD/SI) will increase slightly less than 25%

FEDERAL FLOOD INSURANCE PROGRAM (NFIP) logo and DCR logo are present at the bottom of the slide.

Overview of the National Flood Insurance Program

Questions?



22

Floodplain Ordinances and Permitting



23

Floodplain Ordinances and Permitting

FLOODPLAIN MANAGEMENT REGULATIONS



24

Floodplain Management Regulations

- Minimum NFIP requirements are found in the Code of Federal Regulations, Title 44, Chapter 1, Subchapter B
 - Definitions: 44 CFR 59.1
 - Development Standards for flooding: 44 CFR 60.3
 - Variances: 44 CFR 60.6
- Land use authority granted to localities by the state (VA Code §15.2-2280 and §10.1-600 et seq.)
- Designed to address public health, safety, and welfare of citizens

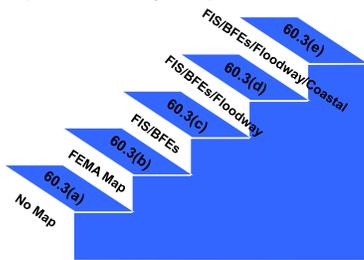


25



Regulation "Staircase"

- Regulations build cumulatively in increments according to mapping and flood zone designations.
- Each step adds more stringent requirements as risk increases.

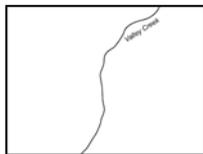


26



44 CFR §60.3(a): No Flood Map

- Applies to communities for which FEMA:
 - Identified no Special Flood Hazard Areas.
 - Prepared no flood map.



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60.3(a) Floodplain Management Criteria

- The community shall:
 1. Require permits for all proposed development.
 2. Ensure all necessary permits are received.
 3. Review permit applications for building sites to be reasonably safe from flooding.



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60.3(a) New Construction Criteria

- All new construction/substantial developments:
 - Are designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement.
 - Are constructed with flood-resistant materials.
 - Use methods and practices to minimize flood damage.
 - Protect utilities and other service facilities from intrusion of floodwaters.



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Protecting Utilities

- Raise HVAC components.
- Install backflow valve.
- Elevate electrical components.
- Anchor fuel tanks.
- Waterproof veneer.



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New Development: 60.3(a)(4) and (5)

- (4) Review subdivision and other new development proposals for:
 - i. Need to minimize flood damage.
 - ii. Location/construction of public utilities/facilities.
 - iii. Adequate drainage.
- (5) Require new and replacement water supply systems be designed to minimize or prevent infiltration of flood waters.

FEMA 31 DCR

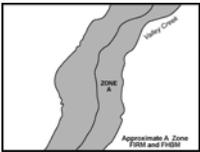
Sewage/Waste Disposal Systems: 60.3(a)(6)

- Within floodprone areas, require:
 - i. New/replacement sewage systems that minimize or eliminate infiltration of floodwaters.
 - ii. Location of onsite waste disposal systems to avoid impairment to them or contamination from them.

FEMA 32 DCR

60.3(b): Approximate Zone A

- FIRMs identify edges of Special Flood Hazard Areas (approximate Zone A).
- No maps/studies to determine:
 - Base Flood Elevations.
 - Regulatory floodways.
 - Coastal high hazard areas.



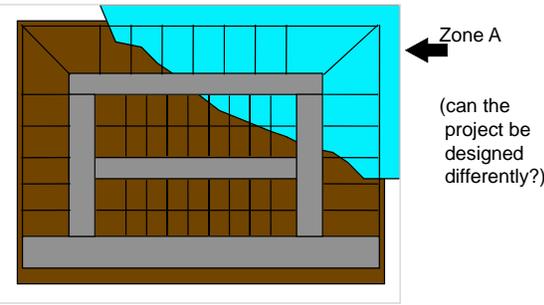
FEMA 33 DCR

60.3(b) Requirements (1)–(4)

1. Require permits for ALL development in mapped SFHAs.
2. Apply 60.3(a) (2)–(6) standards to development.
3. Require that subdivision and other development proposals include BFE data.
 - Subdivisions: 50 lots or 5 acres
4. Use available BFE and floodway data.



Review Subdivision Proposals: 60.3(b)(3)



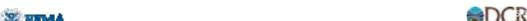
Zone A

(can the project be designed differently?)



60.3(b) Requirements (5) - (8)

5. Document lowest floor or floodproofing elevation.
6. Provide notification of watercourse alterations.
7. Ensure the flood-carrying capacity within an altered watercourse is maintained. (proper permits and adjacent jurisdiction/owner notification required)
8. Require that manufactured homes be elevated and anchored.



60.3(b) Requirements: Review

- Meet 60.3(a) requirements.
- Obtain BFE and floodway data.
- Elevate lowest floor to or above BFE.
- Install openings in enclosed spaces below lowest floor.
- Include BFE in subdivision proposals over 50 lots or 5 acres.

60.3(c): A Zones With BFEs

- FIRMs identify:
 - Special Flood Hazard Areas
 - Base Flood Elevations
- Not determined by maps or studies:
 - Regulatory floodways
 - Coastal High Hazard Areas

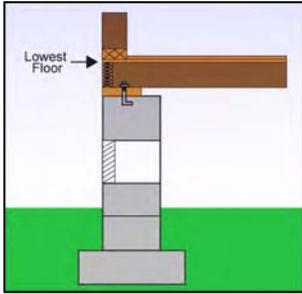
 

A Zones With BFEs

- 1-percent flood:
 - AO: Shallow sheet flow, depths 1–3 feet, average depths shown on FIRM
 - AH: Shallow ponding, depths 1–3 feet, BFE shown on FIRM
 - A1–A30, AE: BFEs determined
 - A99: Protected by flood protection system under construction

Lowest Floor, Zone AE: 60.3(c)(2) and(3)



The diagram shows a cross-section of a building on a green floodplain. A horizontal line indicates the 'Lowest Floor' level. The building's foundation is shown below the floodplain level. The FEMA and DCR logos are at the bottom.

Manufactured Homes

- Difference between 60.3(c)(6) and (12)
 - (6) Anywhere; manufactured home has been substantially damaged; replacement is required to be at or above the BFE.
 - (12) Only in a manufactured home park with no substantial damage from flooding; new or replacement can be on 3' reinforced piers regardless of the BFE.

Recreational Vehicles, 60.3(c)(14)

- Must be on site for less than 180 consecutive days,
- Be fully licensed and ready for highway use(wheels & tires, quick disconnects, no attached decks), or
- Meet the elevation and anchoring requirements for manufactured homes [60.3(c)(6)].

60.3(c) Requirements: Review

- Apply 60.3(b) requirements, including:
 - Elevate lowest floor to or above BFE.
 - Install openings in enclosed spaces below lowest floor.
- Development cannot cumulatively raise the BFE by more than 1 foot
 - 1 foot of rise includes existing and anticipated development
 - Community-wide
 - If development will increase the BFE by more than a foot, apply for a CLOMR (and subsequent LOMR).

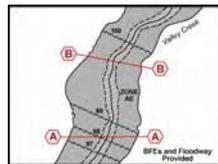


43



60.3(d): A Zones With BFE and Floodway

- FIRMs/FIS identify:
 - Special Flood Hazard Areas.
 - Base Flood Elevations.
 - Floodways.



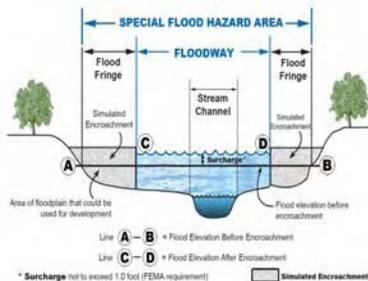
44



Floodways

Floodway is the channel designated to convey the fastest deepest moving waters during the base flood.

Also designed to help floodplain management – no federal minimum requirement for development outside the floodway to submit studies about BFE impacts.



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60.3(d) Requirements: Review

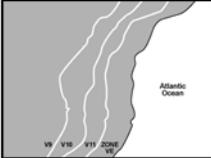
- Meet 60.3(c)(1)-(14) requirements
- Prohibit encroachments in the floodway, unless shown to cause no increase in BFE.
 - If development will increase the BFE, apply for a CLOMR (and subsequent LOMR).



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60.3(e): Zones VE and V1-30

- FIRMs/studies identify:
 - Special Flood Hazard Areas.
 - Base Flood Elevations.
 - Coastal High Hazard Areas.



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Zones VE and V1-30

- SFHA
- Areas of 1-percent chance coastal flood with velocity hazards (wave action >3 feet or seaward of landward toe of primary frontal dune)
- Base Flood Elevations and flood hazard factors determined



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60.3(e) Requirements: Review

- Meet 60.3(c)(1)-(14) requirements
- Elevate the bottom of the lowest structural member to or above BFE
- Certify that structures are anchored to resist floatation, collapse, and lateral movement resulting from both high velocity wind and water loads
- Require that the space below the lowest floor be free of obstruction (except for break away walls, lattice, etc.)
- Prohibit the use of structural fill
- Prohibit man-made alterations to sand dunes

NFIP Sanctions of program deficiencies and violations

- Probation
 - \$50 surcharge per policy
 - Help offset future claims
 - Apply pressure to comply
- Suspension
 - No new policies or renewals
 - No Federally related financing
 - No Federal financial assistance or aid

Floodplain Ordinances and Permitting

ACCESSORY STRUCTURES

Types of Development

- Residential Development
- Non-Residential Development
- Other Development

▪ *APPURTENANT STRUCTURE: A structure which is on the same parcel of property as the principal structure to be insured and the use of which is incidental to the use of the principal structure. (44CFR 59.1)*



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Accessory or Appurtenant Structures

- Considered non-residential structures
- 44 CFR 60.3(c)(3) & (e)(1) requires:
 - Must be at or above the BFE, or
 - Dry flood-proofed



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Wet-Floodproofing Exception

- FEMA guidance has been that small, low cost accessory structures can be wet-floodproofed
 - TB 7-93
 - TB 5-08
 - FEMA 480
- **PROBLEM:** What is small and low cost?



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What is Small & Low Cost?

- FEMA Region 3 has recently defined accessory structures as **600 ft² or less**.
- Wet-floodproofing Exception:
 - Certain conditions must be met.
 - Variances may be required.
 - Variances may not be issued for an accessory structure exceeding 600 ft².



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Accessory Structure Requirements

1. Not for human habitation
1. Be limited to no more than 600 ft² in total floor area
2. Be useable only for parking of vehicles or limited storage
3. Be constructed with flood damage-resistant materials below the base flood elevation
4. Be constructed and placed to offer the minimum resistance to the flow of floodwaters



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Accessory Structure Requirements (cont.)

6. Be anchored to prevent flotation
7. Have electrical service and mechanical equipment elevated to or above the base flood elevation
8. Shall be provided with flood openings (specific standards defined)
9. *A signed Declaration of Land Restriction (Non-Conversion Agreement) shall be recorded on the property deed*



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Accessory Structure Requirements (cont.)

- Variances
 - Not allowed for accessory structures exceeding 600 ft²
- Higher Standards
 - A community could choose a higher standard and limit accessory structures to a size less than 600 ft², such as 200 ft²
 - In that case, a variance could be issued for larger accessory structures, not to exceed 600 ft (i.e. between 200 ft² -600 ft²)

Ordinance Compliance

- Local ordinances must be in compliance with this accessory structure definition.
- Three options for compliance
 - Prohibit accessory structures in the SFHA
 - Allow accessory structures in the SFHA and identify minimum requirements in your ordinance
 - Don't address accessory structures and require a variance for all accessory structures

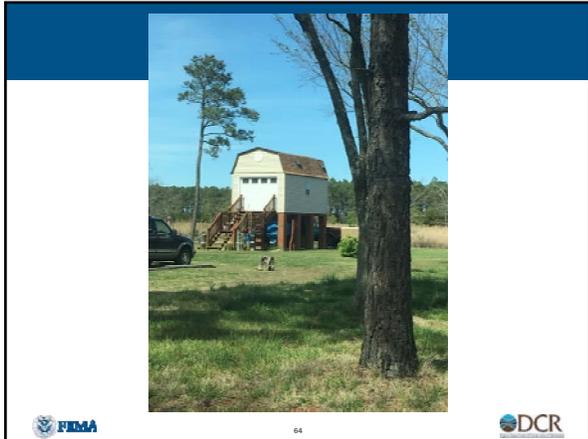
NOTE: This is only for wet-floodproofing. You can still permit these structures in the SFHA if they meet the requirements of a non-residential structure (elevated or dry-floodproofed).

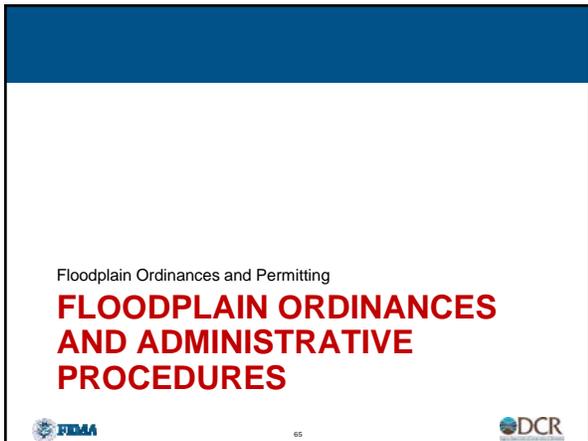
 

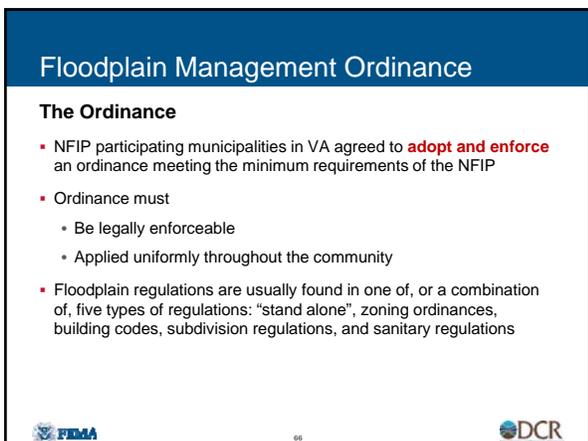
Model Ordinance Update

- New Definition
 - **Appurtenant or accessory structure** - A non-residential structure which is on the same parcel of property as the principal structure and the use of which is incidental to the use of the principal structure. Accessory structures are not to exceed 600 square feet
- Two options for compliance
 - Prohibit accessory structures
 - Address accessory structures and limit to 600 square feet







Stand Alone Ordinances

- One ordinance contains all NFIP requirements for development standards
- Developers and officials can easily see the requirements in **one place**
- Ensure that all offices/agencies are aware of floodplain standards when inconsistent
- May not be coordinated with other regulations or codes – regulations **could be in conflict**



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Contents of an Ordinance

- **Purpose:** Why was the ordinance adopted? What are its objectives?
- **Definitions:** What technical terms are needed?
- **Adoption of effective flood data**
- **Requirement for a floodplain development permit**
- **Development standards:** Must include provisions for
 - Building protection standards (elevation, floodproofing, anchoring) commensurate to the flood zones in your community
 - Standards for manufactured homes and manufactured home parks
 - Standards for subdivisions
 - Substantial damage/improvements
 - Construction in the floodway and standards for encroachments where floodways are not mapped



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Contents of an Ordinance

- **Designation of an administrator**
- **Variance and Appeals process**
- **Enforcement:** Clear penalties for violations must be specified
- **Abrogation and greater restriction:** Higher standard takes precedence
- **Severability:** One provision ruled invalid does not invalidate the rest



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VA Model Floodplain Management Ordinance

- Includes the provisions to comply with the NFIP
- Also includes recommended higher standards
- Refers to the VA Uniform Statewide Building code and other sources

Virginia Department of Conservation and Forestry (DCR) 10/27/2016

XV. Example Floodplain Management Ordinance

This is an example of an ordinance that could be used by municipalities to comply with the requirements of the National Flood Insurance Program (NFIP) to become or remain an NFIP community. It is not intended to be a model ordinance. It is intended to be a guide for communities that are seeking to meet the requirements of the NFIP. It is not intended to be a model ordinance. It is intended to be a guide for communities that are seeking to meet the requirements of the NFIP.

1



Common Higher Regulatory Standards

- Freeboard**
- Community Identified Flood Hazard Areas**
- Restrictions to Subdivision of Land**
- Non Conversion Agreement**
- Location Restrictions**
- Prohibition**
 - Development in SFHA or Floodway**
 - Manufactured Homes**
 - Fill**
- Flood Protected Setback**
- Certificate of Compliance**
- Historic Structures**



Higher Standards

- Recommended higher standards in the model ordinance**
 - 1.5 feet (18") of freeboard for residential and nonresidential construction
 - Manufactured homes required to meet new construction standards
 - Prohibition of manufactured homes outside of existing manufactured home parks
 - Size limit for enclosed space below lowest floor in VE Zone
 - Cumulative substantial damage
 - Different elevation requirements in Coastal A and VE Zones
 - Prohibition of critical facilities in Shaded X Zone
 - Non-conversion agreement requirement for accessory structures



Higher Standards Reduce...

- ...**work** and administrative burden
- ...**risk** and response/recovery efforts
- ...**costs** for insurance and rebuilding



Elevating Above the BFE Saves Money

- NFIP premiums based on April 2016 rates
- One-floor residential structure with no basement built Post-FIRM in SFHA
- \$200,000 coverage for the building and \$80,000 for contents
- At BFE Insurance Premium: \$2,136

Zone AE	Annual NFIP Insurance Savings	Savings Over 30 Year Mortgage*
1 ft. below BFE	-\$2,650	-\$79,500
At BFE	0	0
1 ft. freeboard	\$1,063 (50%)	\$31,890
2 ft. freeboard	\$1,426 (67%)	\$42,780
3 ft. freeboard	\$1,545 (72%)	\$46,350

*Estimate based on April 2016 rates only



Ordinance Enforcement

Discovering and Investigating Potential Violations

- Violations can be found through
 - Periodic inspections
 - Reports by other government agencies
 - Citizen's complaint
- Violations not remedied can result in
 - Increased risk to life and property
 - Increased insurance premiums
 - Probation – increased insurance rates for everyone
 - Suspension – NFIP insurance and many grants/loans unavailable

Investigate potential violations and take appropriate action!



Ordinance Enforcement Options

- **Check your ordinance for the enforcement procedures that have already been outlined**
- May include
 - Voluntary compliance by property owner
 - Written Notice of Violation or stop work order and/or revoke permit
 - Per day fine
 - Withhold certificate of occupancy
 - Record on Deed
 - Injunction – court order to stop non-compliant activity
 - Municipal housing court or building court
 - **Coordinate with your solicitor**

FEMA 76 DCR

Community Liability

- Flood problem awareness with no action
- Failure to warn citizens of known flood hazard
- Improper development that increases flood risk
- Inconsistent administration of floodplain provisions



(PEMA)

FEMA 77 DCR

Legal Backing

State and local governments are more likely to be successfully sued for permitting development that causes increased flooding than they are for prohibiting such development.

Ordinances that meet the NFIP minimum requirements have not been found to be a "taking."

State laws

- Provide communities with the authorities necessary to adopt and enforce floodplain management ordinances
- Establish procedural and other requirements that communities must follow in adopting and implementing land use ordinances
- State floodplain management laws and regulations establish additional requirements that communities must include in their floodplain management ordinances

FEMA 78 DCR

When You've Exhausted All Legal Recourse...

Your community can consider the use of **Section 1316**

No new flood insurance coverage shall be provided for any property that has been declared to be in violation of State or local laws, regulations, or ordinances which are intended to discourage or otherwise restrict land development or occupancy in flood-prone areas

Denying flood insurance means:

- Risk of flood losses with no insurance coverage
- Property may be difficult to sell
- Market value of the property may fall
- Lending institutions holding a mortgage could foreclose
- Some disaster assistance will be denied

Work with your State NFIP Coordinator and FEMA contact



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Floodplain Ordinance Resources

- VA DCR website
 - [Floodplain Management](#)
- FEMA 480, NFIP Floodplain Management Requirements
 - http://www.floods.org/ace-files/documentlibrary/CFM-Exam/FEMA_480_Complete.pdf
- Virginia Uniform Statewide Building Code:
 - <http://www.dhcd.virginia.gov/index.php/va-building-codes/building-and-fire-codes/regulations/uniform-statewide-building-code-usbc.html>
- FEMA Building Code Resource page
 - <http://www.fema.gov/building-code-resources>



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Administrative Requirements

- Generally, the NFIP requires an administrative process but does not detail what these administrative processes must look like
- Communities must establish administrative procedures that work and are compatible with other regulations and ordinances
- Other requirements not detailed in the regulations
 - Duties of the Floodplain Administrator
 - Appeals process
 - Issuance of variances
 - Permitting systems
 - Recordkeeping systems



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Duties of the Floodplain Administrator

- Review applications
- Make floodplain determinations
- Make Substantial Improvement / Damage determination
- Issue or deny permits
- Review plans and specifications
- Ensure all other permits are obtained
- Notification of watercourse alterations
- Maintain and help update flood data and maps
- Inspect development
- Recordkeeping
- Remedy violations

Keep good records! A project file should be kept for each development permit application to demonstrate that the project was built in compliance with your regulations.




Duties of the Floodplain Administrator

- **Training and education:** Understand the NFIP regulations, State regulations, and local ordinances
- **Community Outreach:** Educate residents on the need for permits, the benefits of floodplains, the economic sustainability of good floodplain management, and the benefits of flood insurance
- **Coordinate with other agencies:** State agencies, adjacent communities, public works, zoning, code enforcement, or building dept.
- **Apply ordinances consistently:** Get specific guidance from your community's legal counsel as necessary

Common legal questions and answers about floodplain regulations in the courts can be found in **Appendix C of ASFPM's No Adverse Impact: A Toolkit for Common Sense Floodplain Management.**




Appealing a Floodplain Admin's Decision

- Appeals are typically **administrative** in nature (could be to a floodplain determination, substantial improvement/damage determination, etc.)
- Appeals apply to the application of an administrative decision of a floodplain administrator ordinance
- Communities must establish a **process** and an **entity** for applicants to appeal an administrative decision when they disagree
- Basic appeals process

```

graph LR
    A[Applicant submits appeal to Board] --> B[FPA explains reason for decision]
    B --> C[Board reviews and issues decision]
    C --> D[Permit issued or denied based on decision]
  
```




Issuance of Variances

- Granting relief from ordinance requirements
- Establish a process and an entity for applicants to request variances
- Conditions of the property NOT the person
- Notice of increase to risk and insurance premiums
- Patterns of variances may result in sanctions



FEMA 85 DCR

Evaluate the Merits of a Variance

- General rule – **Do not grant variances**
- Very specific conditions must be satisfied to justify a variance
 - Good and sufficient cause
 - Unique site conditions (personal considerations do not apply)
 - Hardship – must be exceptional
 - No threat to public safety
 - Minimum necessary to afford relief



Think carefully before granting a variance to build below the BFE. The property will be more likely to suffer damage and insurance will be costly. Communities with patterns of issuing variances may face sanctions – costing all property owners more!

FEMA 86 DCR

Appealing an Appeal/Variance

If you **disagree** with the decision of the board to grant the appeal or variance...

...**appeal** the appeal/variance

- Why appeal? Granted for reasons inconsistent with criteria in ordinance
- Become familiar with the timeframe to file the appeal (30 days?)
- FEMA expects communities to exhaust all legal avenues

FEMA 87 DCR

Record Keeping Requirements

- Requirement to maintain compliance documentation **indefinitely**
- What records?
 - Permit application
 - Inspections
 - As-built documentation
 - Other compliance documentation (for instance, certifications)
 - Flood map changes and updates
- Best practices
 - Store permits by address (rather than property owner name)
 - Use colored file folders to identify floodplain properties

 For a structure located in the SFHA, FEMA and the State will require data to prove a potential violation is compliant.

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Floodplain Ordinances and Permitting

PERMITTING DEVELOPMENT

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Permits are Required for ALL Development

ALL development in the SFHA requires a permit

- Definition of development (as per 44 CFR 59)
 - **Any manmade change to improved or unimproved real estate**, including, but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, or storage of equipment or materials.
- Before any kind of development in the SFHA is allowed, the project must be permitted by the local floodplain administrator.
- **Ensure you have a process for capturing all floodplain development**

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Permits are Required for ALL Development

- Federal, state, and local government agencies must also adhere to floodplain management requirements.
- Executive Memorandum 2-97 requires:
 - State projects in the SFHA must comply with the local floodplain ordinance, if working in a participating community. This means obtaining permits from the community's floodplain administrator.
 - When doing a project in a community that does not participate in the NFIP, state agencies are still required to meet the minimum NFIP criteria as outlined in 44 CFR 60.3.

The Life of a Permit



Application Should Include...

- A good permit application should **capture all information** needed to evaluate the proposed work for compliance with required building/development standards of proposed work
- Application **MUST** include a **floodplain determination** and a **substantial improvement determination** (for modifications to an existing building)
 - For Official Use Only:**
 - Floodplain Determination: _____
 - Base Flood Elevation: _____
 - Cost of Improvement: \$ _____
 - Market Value of Structure: \$ _____
 - Improvement Percentage: _____ %

Application Review

Who are the people typically responsible for reviewing permits?

- Floodplain Administrator
- Building Code Officer
- Zoning Officer
- Community Engineer
- Third-party permitting/inspection company

Coordination with other reviewers:

- Is one person responsible for all aspects of floodplain development?
- If not, are all parties aware of the floodplain requirements?
- How is the permit application routed and either approved or denied?

FEMA DCR

Building Codes and the NFIP

- VA Uniform Statewide Building Code establishes building standards for new and substantially-improved buildings
- VA USBC incorporates parts of the ICC Codes
- **Not all** NFIP requirements appear in the VA USBC
 - Does not establish site or location requirements
 - Other types of development (non-structures)
- **Challenges of Administration**
 - Regulating development beyond buildings
 - Designate responsible party for meeting **all** NFIP requirements
 - Establish administrative procedures to assure coordination
 - **Do not assume** that the flood provisions of the VA USBC will be carried out by the community building official or third party

FEMA DCR

Building Codes and the NFIP



- **REMEMBER!**
 - You must adhere the most restrictive code, provision, or requirement
 - The absence of certain floodplain management requirements from existing building codes does not absolve the community from applying the requirements of its floodplain management ordinance and vice versa

FEMA DCR

VA Uniform Statewide Building Code

- The 2012 USBC (adopted in 2015) is currently in place.
- The 2015 USBC will likely be adopted in the spring of 2018.
 - The new USBC is expected to include some additional higher standards for building construction in floodplains, based on the 2015 International Codes.
- While the USBC excludes certain types of smaller development from requiring a building permit (section 108.6), this does not exclude them from needing a floodplain permit of some kind.
 - Currently, because these 15 activities are exempt from building permit requirements, a building permit may not be used for these types of development. Communities must use a different kind of permit to capture this development (such as a zoning or floodplain permit).

FEMA 97 DCR

Application Review

Review for completeness

- Forms filled out
- Site plan
 - Floodplain delineation
 - Elevations
- Building plans
- Certifications
- All other permits obtained

Review for compliance

- Proposed building elevations
- Proposed design standards
- Building/fill/material placement
- Mechanical elevations
- Compliant openings
- Flood resistant materials



FEMA 98 DCR

Review Permits For...

- **Location/Siting**
 - Floodplain determination
 - Zone and BFE identification
- **Use**
 - Residential
 - Non-residential
- **Type of work**
 - New construction/addition
 - Non-structural development
 - Placement of fill, etc.
- **Cost of improvement**
 - Substantial improvement?
- **Design standards**
 - Compliance with minimum and higher standards?
 - Is a variance necessary?



Elevated utilities (PEMA)

FEMA 99 DCR

Considerations for Zone A



Possible sources of elevation data

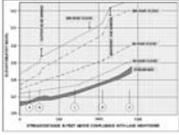
- Check other sources: Federal, State, and local
- Contour interpolation: point on boundary
- Data extrapolation: estimating from the FIS
- H&H study may be available – FEMA Engineering library

FEMA DCR

Considerations for Zone AE, AH, and AO

Zone AE

- Provide the necessary elevation data for effective permitting
- Use the flood profile to determine site-specific water surface elevations



Zone AH and AO

- Represent areas subject to shallow flooding and sheet flow where average depths range from 1-3 feet
- Average whole-foot elevation/depth derived from the FIRM
- Lowest floor \geq flood depth
or
Lowest floor \geq 2' when no depth is specified

FEMA DCR

Considerations for Zone AE

AE Zones without Floodways

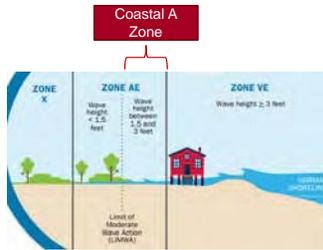
- Where FEMA has provided BFEs but no floodway, the community must review all development to **track cumulative rise**
- Ensure development does not increase the BFE more than 1.0 foot
- Once allowable rise is reached, **no further rise** is permitted
- Administrative procedure to track and collect cumulative impact

FEMA DCR

Considerations for Zone AE

Zone AE in Coastal Areas

- Use LiMWA to identify Coastal A Zone
- NFIP regulations do not have provisions for Coastal A Zones
- The 2015 VA USBC will include standards for Coastal A Zone construction



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Considerations for Zone VE

Zone VE

- Fill for structural support of buildings is prohibited
- Man-made alteration of sand dunes and mangrove stands that would increase potential flood damage is prohibited
- Buildings must be elevated on pilings with space below lowest floor free from obstructions
- Bottom of lowest structural member of lowest flood must be at or above BFE
- For construction and/or floodplain management purposes use elevations in the FIS Coastal Transect Parameters table when they are higher than the whole-foot elevation on the FIRM, otherwise use whole-foot BFE on FIRM



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Considerations for Floodways

Development must prove "no rise"

- No rise = zero foot (0.00')
- Rise is tracked both upstream and downstream of development location

Documentation requirement

- H&H study
- If existing structure, site plan showing footprint will not expand

Ensure "no rise" certificate is prepared and certified by a qualified and licensed engineer. Read the certification; ensure it shows no rise.



105



Issue/Deny Permit

- **Issue the permit**
 - Include any conditions (i.e. required inspections)
 - Start of work must commence within 180 days from the issuance of the permit
- **Deny the permit**
 - Provide written explanation citing the specific provisions of the ordinance not met in the application
 - Citation of specific provisions point out how to resubmit application in compliance with regulations
 - Provide instructions regarding appeal or a variance


106


Conduct Inspections

- **Importance of coordination:** Check for compliance with the NFIP minimum standards
 - Inspect frequently during construction
 - Check openings and mechanicals
- Recommend a **minimum** of three inspections
 1. After site is staked but before permanent foundation work
 2. After foundation is complete
 3. Before issuing certificate of occupancy



Schoharie, NY (FEMA photo library)

Identifying compliance issues prior to construction will be much easier – and cheaper – to correct than correcting compliance issues post-construction.


107


Considerations During Inspections

Address Non-Compliance Early

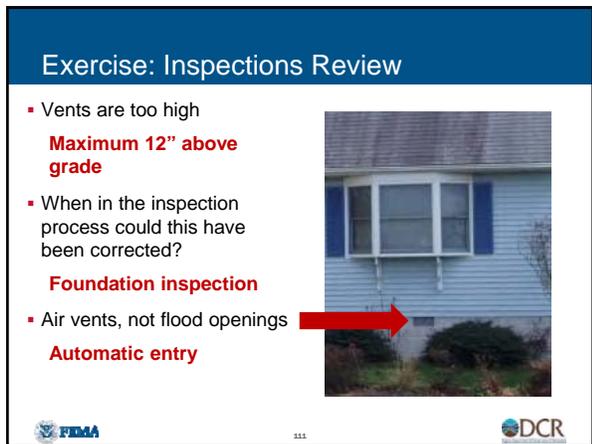
- If inspections reveal violations, take steps to bring into compliance
 - Voluntary option
 - Provide written notice
 - Issue fines or penalties
 - Withhold final approvals
- Refer to ordinance for specific enforcement procedures
- Insurance for non-compliant structures is available, **but it's very expensive!**




108





Exercise: Inspections Review

Most significant issues nationwide:

- Insufficient venting
 - Insurance rating heavily impacted
- Equipment not elevated
 - Expensive to replace
- Propane tanks not secured
 - Become explosive projectiles



112



Collecting Compliance Documentation

- Permit file **must contain as-built** or finished construction data for all new structures or substantial improvements in SFHA
- Required to prove compliance with the floodplain ordinance
- Must be **signed and sealed** by the design or certifying professional

- Examples of compliance documentation
 - Site plans and surveys
 - Building/architectural plans
 - FEMA Elevation Certificate (EC)
 - Floodproofing certificate
 - Engineered openings
 - Non-conversion agreement



113



Non-Conversion Agreement

- For enclosed spaces below BFE, uses are limited to parking, access, some storage
- Gives community official authority to revisit potential violations
- Consider requiring in ordinance
- Collect in advance of C.O.
- Attach to deed
- [Example non-conversion agreements on FEMA's website](#)



Baltimore County, MD (from FEMA Region III)

Note window coverings

114



Other Types of Development



- Other types of development require inspections
 - Placement of fill
 - Installation of fences
 - Storage of equipment and materials
 - Placement of recreational vehicles
 - Etc.
- Develop **administrative procedures** to permit for and inspect non-building development

(FEMA Region III)
Floodplain tour revealed unpermitted trailer storage in floodway, about 10 feet from top of bank.


115


Other Types of Development

- Develop a permitting and inspection process for manufactured homes and recreational vehicles
- Manufactured homes must be elevated on a permanent foundation and securely anchored
- Recreational vehicles are required to
 - Be licensed and road-ready
 - Be on site less than 180 days **or**
 - Meet the requirements of a manufactured home



(FEMA Region III)
A recreational vehicle washed into a manufactured home unit


116


Certificate of Occupancy/Compliance

- Final step in the permit process
- After final inspection, construction/development is completed, and all as built compliance documentation is received
- Certificate of Occupancy is key to
 - Utility connection
 - Property sale
 - Occupancy
- Compliance checks do not end with occupancy
 - Periodic "windshield" inspections are encouraged
 - Enclosure/full foundation wall issues


117


FEMA Draft Permitting Policy

- FEMA posted the draft policy on its website for public comment.
- While the public comment period has closed, you can still find the draft guidance at:

<https://www.fema.gov/media-library/assets/documents/131010>

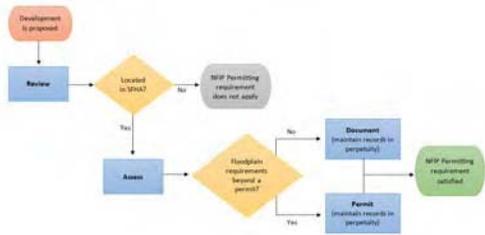


118



FEMA Draft Permitting Policy

- FEMA draft policy requires that development be reviewed, assessed, and documented.



119



FEMA Draft Permitting Policy

- Classes of activities may be reviewed upfront and considered to be permitted, without requiring an individual permit for each case.



120



Floodplain Ordinances and Permitting

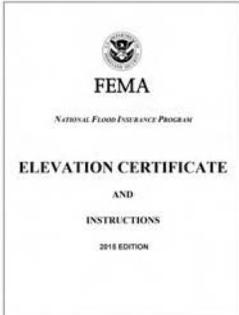
ELEVATION CERTIFICATES




121

The Elevation Certificate (EC)

- Administrative tool used to provide elevation information necessary to
 - **Ensure compliance with community floodplain management ordinances**
 - Determine the proper insurance premium rate
 - Support requests for certain Letters of Map Change





122

Reviewing an Elevation Certificate

- Floodplain Administrators should review for accuracy
- Incomplete form received? Send it back for revision
- **Considerations for EC Review**
 - Lowest floor in comparison to BFE
 - Lowest floor in comparison to LAG and HAG
 - Bottom of lowest horizontal structural member (Zone VE)
 - Building diagram
 - Mechanicals elevations
 - Openings requirement (engineered require certification)

A surveyor's mistake can lead to a very expensive insurance rate, and a less safe and non-compliant structure.




123

Building Diagrams

DIAGRAM 1A
All slab on grade single and multiple floor buildings taller than split-level and high-rise buildings, either attached or free type (e.g., townhouses), with or without attached garages.

DIAGRAM 1B
All attached slab on grade or slab on elevated with 60 degree roof and multiple floor buildings taller than split-level, either attached or free type (e.g., townhouses), with or without attached garages.

DIAGRAM 2A
All single and multiple floor buildings with basement (other than split-level and high-rise buildings with basement, either attached or free type (e.g., townhouses), with or without attached garages.

DIAGRAM 2B
All single and multiple floor buildings with basement (other than split-level and high-rise buildings with basement, either attached or free type (e.g., townhouses), with or without attached garages).

DIAGRAM 3
All split-level buildings that are not on grade, either attached or free type (e.g., townhouses), with or without attached garages.

DIAGRAM 4
All split-level buildings (other than split-level garages), either attached or free type (e.g., townhouses), with or without attached garages.

124

Building Diagrams

DIAGRAM 5
All buildings elevated on piers, posts, piles, columns, or parallel rows walls, the construction below the elevated floor.

DIAGRAM 6
All buildings elevated on piers, posts, piles, columns, or parallel rows walls with flat or gabled construction below the elevated floor.

DIAGRAM 7
All buildings elevated on rafters foundation walls with gabled, or flat construction below the elevated floor, or at least one side is at or above grade. The principal use of this building is located in the elevated portion of the building.

DIAGRAM 8
All buildings elevated as a component with the floor of the substructure at or above grade on at least 7 sides, with one without an attached garage.

DIAGRAM 9
All buildings (other than split-level) elevated on a slab grade substructure, with or without attached garages.

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Exercise: What Building Diagram is this?

126

Exercise: What Building Diagram is this?



FEMA

127

DCR

Exercise: What Building Diagram is this?



FEMA

128

DCR

Exercise: What Building Diagram is this?



FEMA

129

DCR

Exercise: What Building Diagram is this?



FEMA 130 DCR

Exercise: What Building Diagram is this?



FEMA 131 DCR

Exercise: What Building Diagram is this?



FEMA 132 DCR

Exercise: What Building Diagram is this?



FEMA 133 DCR

Exercise: What's Wrong with this EC?

- Assumptions
 - Structure is Post-FIRM
 - Structure has a basement
 - Address information is correct (hypothetical)
 - Community, map panel, and dates are correct
 - There is a seal for the surveyor
 - Form is properly signed
 - Datum conversion is -0.7 feet NGVD 29 to NAVD 88
 - BFE is 1610.4' NGVD 29 (1609.7' NAVD 88)

FEMA 134 DCR

Exercise: What's Wrong with this EC?

SECTION A - PROPERTY INFORMATION		FOR INSURANCE COMPANY USE
A1. Building Owner's Name JPM&P Flood		Policy Number
A2. Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and 1282 Riverside Drive		Company NAIC Number
City Forest Township	State Virginia	ZIP Code 22000
A3. Property Description (Lot and Block Numbers, Tax Parcel Number, Legal Description, etc.) Lot 15, Section A, Plats/View Subdivision as recorded in the Township of Platts, Book 100, Page 10		
A4. Building Use (e.g., Residential, Non-Residential, Addition, Accessory, etc.)		
A5. Latitude/Longitude Lat: 29.495533 Long: 41.329152	Horizontal Datum: <input type="checkbox"/> NAD 1927 <input checked="" type="checkbox"/> NAD 1983	
A6. Attach at least 2 photographs of the building if the Certificate is being used to obtain flood insurance.		
A7. Building Diagram Number (If applicable)		
A8. For a building with a crawlspace or enclosure(s):		
a) Square footage of crawlspace or enclosure(s)	1300.00 sq ft	
b) Number of permanent flood openings in the crawlspace or enclosure(s) within 1.0 feet above adjacent grade	10	
c) Total net area of flood openings in A8.b	1000.00 sq in	
d) Engineered flood openings?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
A9. For a building with an attached garage:		
a) Square footage of attached garage	sq ft	
b) Number of permanent flood openings in the attached garage within 1.0 feet above adjacent grade		
c) Total net area of flood openings in A9.b	sq in	
d) Engineered flood openings?	<input type="checkbox"/> Yes <input type="checkbox"/> No	

FEMA 135 DCR

Exercise: Answers

- Section A
 - **A4.** Building use (Building use is blank)
 - **A5.** Lat/Long (switched)
 - **A6.** Only one photograph is attached
 - **A7.** Building diagram (Incorrect building diagram - Should be Diagram 2A: basement instead of Diagram 9: below grade crawlspace)
 - **A8.** Venting (Insufficient venting - 1300 sq. ft. and 1000 sq. inch venting and basement issue)


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Exercise: What's Wrong with this EC?

SECTION B - FLOOD INSURANCE RATE MAP (FIRM) INFORMATION					
B1. NFIP Community Name & Community Number Township of Flood; 990068			B2. County Name Flood	B3. State Virginia	
B4. Map/Panel Number 9000980005	B5. Suffix A	B6. FIRM Index Date 08-18-1995	B7. FIRM Panel Effective/Revised Date 08-18-1995	B8. Flood Zone(s) AE	B9. Base Flood Elevation(s) (Zone AO, use Base Flood Depth) 1010
B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in item B9: <input type="checkbox"/> FIS Profile <input checked="" type="checkbox"/> FIRM <input type="checkbox"/> Community Determined <input type="checkbox"/> Other/Source: _____					
B11. Indicate elevation datum used for BFE in Item B9: <input checked="" type="checkbox"/> NAVD 1929 <input type="checkbox"/> NAVD 1988 <input type="checkbox"/> Other/Source: _____					
B12. Is the building located in a Coastal Barrier Resources System (CBRS) area or Otherwise Protected Area (OPA)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Designation Date: _____ <input type="checkbox"/> CBRS <input type="checkbox"/> OPA					


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Exercise: Answers

- Section B
 - **B9.** Whole foot BFE for a detailed area (1610' NAVD 88 listed, actual is 1610.4" NGVD 29)
 - **B11.** and **C2.** Vertical Datum (Datum different for BFE and Structure elevations)


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Exercise: Answers

- Section G
 - Low floor [Design flood elevation (DFE) is 1611.2' NAVD 88 and low floor listed is 1612.2' NAVD 88 but there is a basement at 1603.7' NAVD 88 which is below the BFE of 1609.7' NAVD 88]



Floodplain Ordinances and Permitting

Questions?



Flood Hazard Maps and Data



Flood Hazard Maps and Data

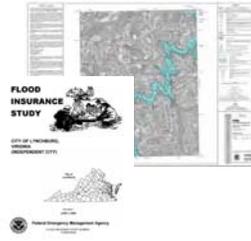
FLOOD INSURANCE RATE MAPS AND FLOOD INSURANCE STUDIES



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Key Terms Refresher

- Flood Insurance Rate Map (**FIRM**)
- Flood Insurance Study (**FIS**) Report
- Special Flood Hazard Area (**SFHA**)
- Flood Zone
- Base Flood Elevation (**BFE**)
- Regulatory Floodway
- Cross Section
- Coastal High Hazard Zone (Zone VE)
- Limit of Moderate Wave Action (**LIMWA**)



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Flood Insurance Rate Maps

- FEMA identifies flood hazards from rivers, coasts, ponding, lakes, etc., through scientific and engineering methods. Computer models consider the size of the watershed, roughness coefficient, etc.
- FEMA maps those hazards on a Flood Insurance Rate Map (FIRM).
- The FIRM is used for floodplain management, flood insurance, and to help communicate flood risk to communities and the public.



150

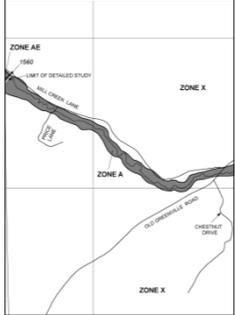
Special Flood Hazard Area

- The special flood hazard area (SFHA) is the land in the floodplain subject to a 1% percent or greater chance of being flooded in any given year.
 - Also referred to as 100-year floodplain.
- The elevation of 1% chance flood is the base flood elevation (BFE).
- Zoning and building code requirements are tied to the special flood hazard area.
- During the average 30-year mortgage, there is a 26% chance of a base flood occurring.



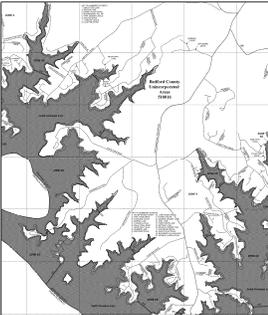
FEMA 151 DCR

FIRM – Zone A

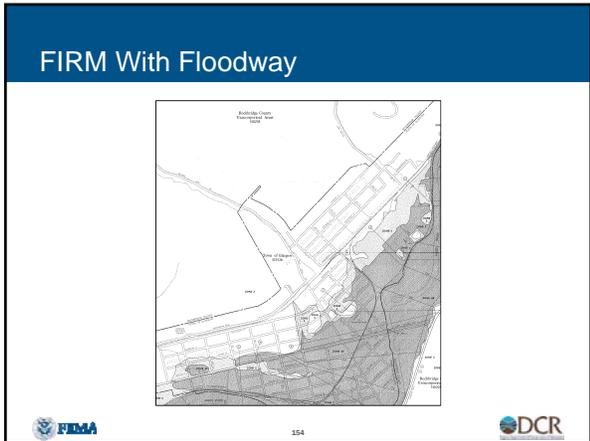


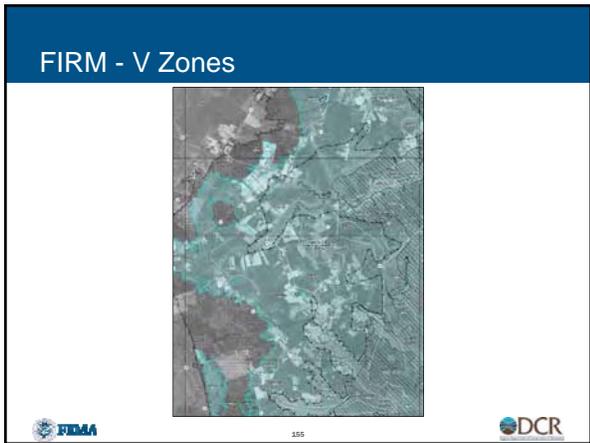
FEMA 152 DCR

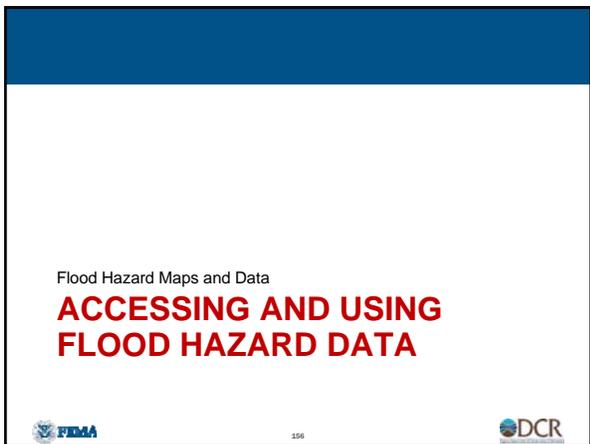
FIRM With Elevations – Zone AE



FEMA 153 DCR







The National Flood Hazard Layer (NFHL)

- FEMA's nationwide geospatial database of all digital **effective** FIRM data
 - [National Flood Hazard Layer](#)
 - Integrates FIRM data including LOMCs
 - Available in GIS format
 - FIRM and FIS are still the official source of data



FEMA DCR

Virginia Flood Risk Information System (VFRIS)

BACKGROUND

- In March 2015, the General Assembly amended §10.1-602 of the Code of Virginia, tasking DCR to develop a web-based flood protection plan for the Commonwealth that includes (among other things):
 - An inventory of flood-prone areas
 - The collection and distribution of information relating to flooding and floodplain management
 - Assist localities in their management of floodplain activities



FEMA DCR

What is VFRIS?

- Interactive map tool that brings together information from FEMA, FWS, Esri, VGIN, and others to provide an understanding of flood risk.
- Developed by the Virginia Institute of Marine Science and DCR.
- No longer managed by the State of North Carolina.



FEMA DCR

VFRIS Goals

- Provide local officials, home owners, realtors, and developers with an understanding of a property's flood risk.
- Create a mapping tool that is more flexible and current than what was afforded on the old VFRIS, maintained by the State of North Carolina.
- Develop a mapping tool that is specific to Virginia and can be customized to the needs of the commonwealth.



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VFRIS Timeline

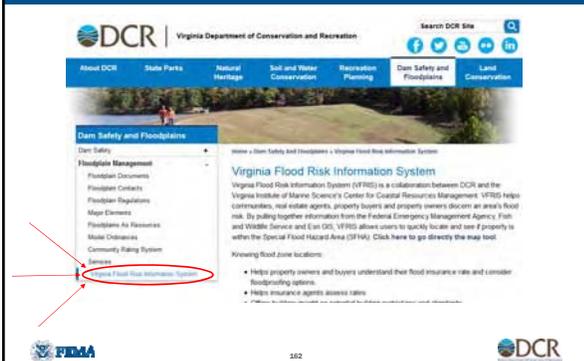
- Phase I of VFRIS was rolled out in February 2017.
- Phase II is underway and expected to be completed this fall.
- An additional phase or two expected, in addition to continued maintenance over the lifetime of VFRIS.



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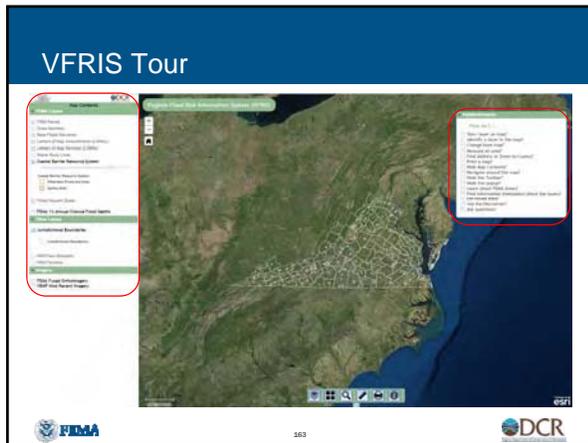


Access to VFRIS



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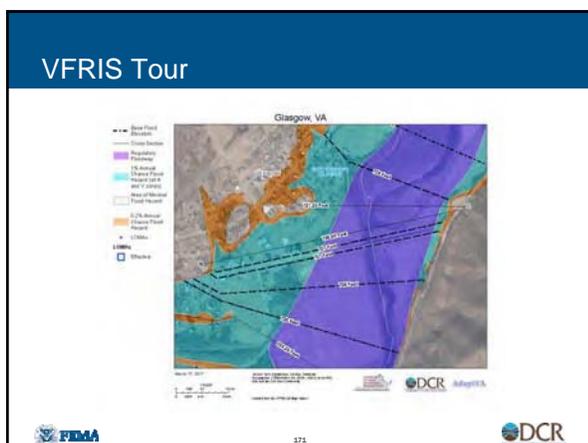












VFRIS Phase II

- Additional information from the NFHL/FEMA Map Service Center
 - Limit of Moderate Wave Action
 - Flood Insurance Study Reports
- VGIN Parcel Boundaries
- Additional Non-Regulatory FEMA data
 - Changes since last FIRM
 - Preliminary Maps
 - Water surface elevation grids in model-backed A Zones (Loudoun County as prototype)
 - HEC-RAS models (Loudoun County as prototype)
- Map capabilities
 - Link to map views
 - Upload shapefiles
 - Mark ups

FEMA 172 DCR

Accessing FIRM and FIS Report Data

- Map Service Center (MSC) – www.msc.fema.gov
 - PDF/hard copy format
 - NFHL Data download

Search Results for FRONT ROYAL, TOWN OF

Please Note: Searching All Products by county always all products for all communities within the county. You can refine your search results by specifying your specific jurisdiction location using the drop-down menus above.

FEMA 173 DCR

Using the Flood Insurance Study

- Use the FIS report for
 - Flood determinations for specific sites
 - Finding the **most accurate BFE** data
 - DO NOT** use the FIRM for riverine elevation determinations. **DO** use the FIRM for coastal flooding elevation determinations.
 - Red flag when reviewing riverine elevation data from surveyors – whole number BFEs

FEMA 174 DCR

Making a FIRMette

- Map Service Center (MSC) FIRMette – www.msc.fema.gov

Search Results—Products for PULASKI COUNTY UNINCORPORATED AREAS

The flood map for the selected area is number 51155C0006, effective on 09/26/2008



Layers of Map Change

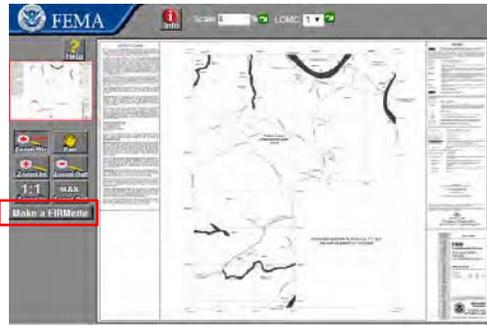
- Revisions (2)
- Amendments (2)
- Re-regulations (2)

Locator Map



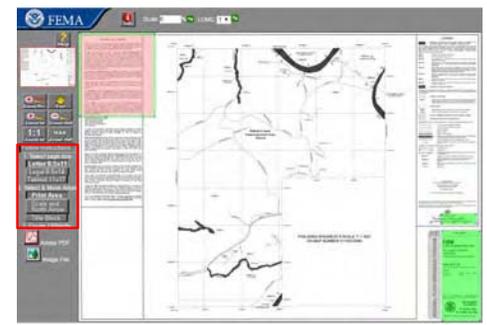
FEMA 175 DCR

Making a FIRMette



FEMA 176 DCR

Making a FIRMette



FEMA 177 DCR

Making a FIRMette

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Making a FIRMette

179

Making a FIRMette

- NFHL FIRMette builder – <http://fema.maps.arcgis.com/apps/webappviewer/index.html?id=49069b91c14a411fa8defc5c1f6266>

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Approximate A Zone Elevations

- Detailed studies are not available.
- Simplified methods can provide estimated BFEs.
- If you lack confidence in simplified estimation methods, require property owners to provide BFEs based on detailed studies.
- Simplified methods:
 - Contour interpolation
 - Data extrapolation (rarely applicable)

Contour Interpolation & Data Extrapolation

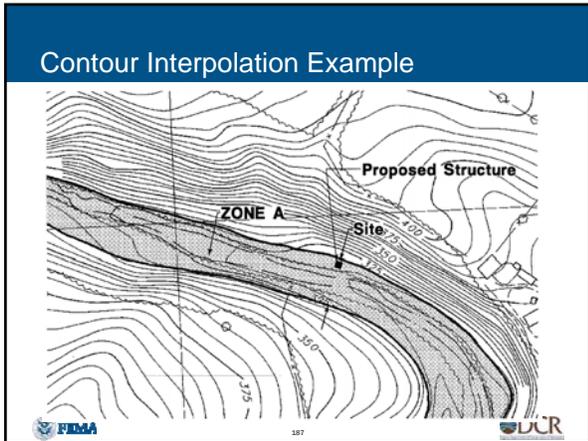
- Both are simplified methods, and cannot be used to support LOMA and LOMR-F applications.
- Contour interpolation overlays topographic maps on the FIRM.
- Data extrapolation extends flood profiles beyond the detailed study area.
- At least one other method plus previous flooding history should be used.
- See FEMA 265

Estimating a 1% Contour Interpolation

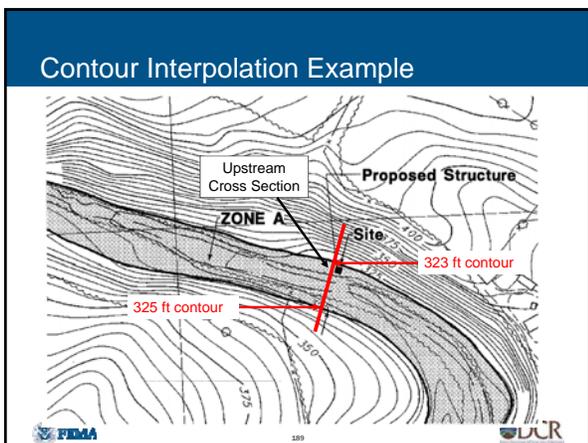
- Obtain a topographic map of the site
- Reduce/enlarge to FIRM scale
- Overlay Zone A floodplain boundary on the topographic map (can be done digitally)
- Does floodplain boundary follow contour lines within acceptable limits?
 - Elevations of left and right overbanks must be within one-half of the contour interval of the map



Contour Interpolation Example

- What is the contour interval?
- At the structure site, what is the elevation of the left (upper) bank?
- What is the elevation of the right (lower) bank?
- How many feet = $\frac{1}{2}$ of the contour interval?
- Is the method acceptable at this site?
- What is the estimated BFE?

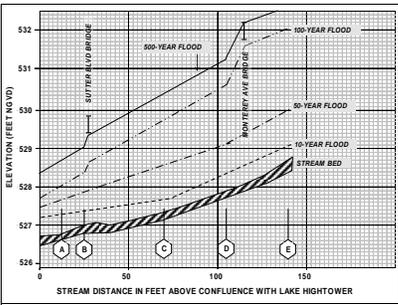


Contour Interpolation Example Answers

- Contour interval: 5 ft
 - $\frac{1}{2}$ contour interval: $5 \text{ ft} / 2 = 2.5 \text{ ft}$
- Elevation of the left bank: 323 ft
- Elevation of the right bank: 325 ft
- Difference between elevations: $325 - 323 = 2 \text{ ft} < 2.5 \text{ ft}$
- Difference $< \frac{1}{2}$ contour interval: **method is acceptable**
- BFE: lowest elev. + $\frac{1}{2}$ contour interval = $323 + 2.5 = 325.5 \text{ ft}$


190


Data Extrapolation: Extend Profile




191


Data Extrapolation Criteria

- Site must:
 - Be within 500 feet of the detailed study area.
 - Have floodplain characteristics similar to the detailed study area— for example:
 - The valley does not narrow rapidly upstream.
 - There is no waterfall.
 - Have no hydraulic structures such as dams and bridges.


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Data Extrapolation Steps

- Determine the location of the site on the flood profile for the detailed study area.
- Extrapolate the last segment of the flood profile that has a constant slope to the location of the site.
- Determine the BFE from the extrapolated profile.


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Data Extrapolation – Figures 11 and 12

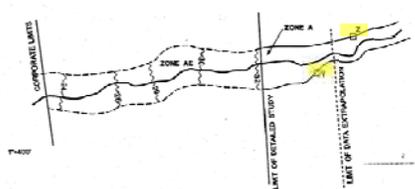


Figure 10 - Data Extrapolation Method - Plan View

Property P is approximately 370' upstream of the limit of detailed study (as measured along the streamline). Using the profile below, we can extrapolate the 100-year flood profile to determine that the BFE for property P is equal to 35'.

Property Z is approximately 700' upstream of the limit of detailed study (as measured along the streamline), and is therefore beyond the limit of data extrapolation.


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Data Extrapolation – Figures 11 and 12

Guide For Approximate Zone A Areas Developing BFEs

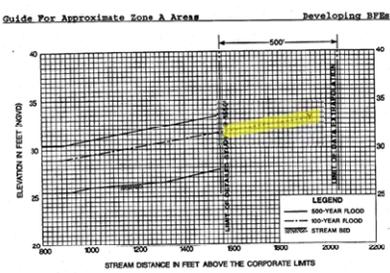
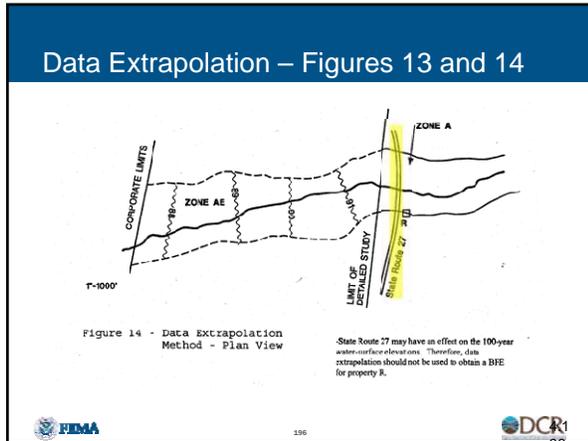
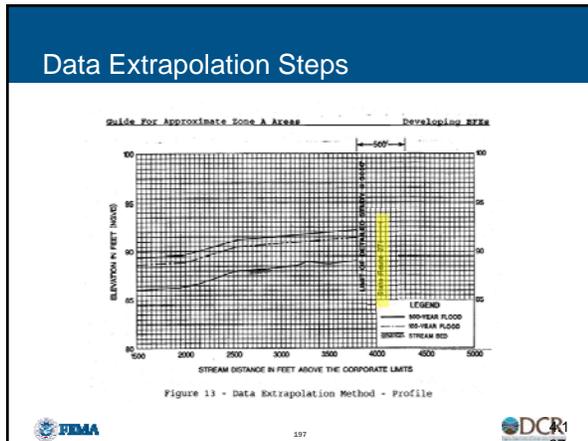


Figure 11 - Data Extrapolation Method - Profile


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Additional Data May be Available

- Zone A floodplains present a challenge
 - No BFEs available to inform how high to build
- Automated H&H was run for Zone A
 - Floodplain exists behind the scenes
 - Not detailed enough to be included on the FIRMs but can be used to approximate a 1% flood elevation
 - Another method to compare estimated methods
- Caveats:
 - Bridges and culverts not taken into consideration
 - Requires special skills to interpret data

Zone A cross sections will soon be available online!

Zone A cross sections will soon be available online!

Flood Hazard Maps and Data

CHANGING FIRMS AND FIS REPORTS




199

When to Use the LOMC Process




- To update the map due to better topographic data, a physical change in the floodplain, or better modeling (LOMR)
- To remove the mandatory Federal flood insurance requirement
 - Inadvertent inclusions – structures built on natural high ground (LOMA)
 - Structures elevated on fill* (LOMR-F)

* **Caution:** Placement of fill around an existing foundation to increase the LAG could result in a low floor violation.

Note: LOMAs are not issued in Zone VE based on Primary Frontal Dune




200

Requirement to Submit New Data

When is a community required to initiate a revision?

- Development occurring in Zones A1-30 and AE without a designated floodway for proposed increases of more than 1.0 foot
- Floodway encroachment (no rise requirement)
- Alteration or relocation of a stream (including but not limited to installing culverts and bridges)
- Submission of new technical or scientific data within 6 months of receipt/completion
 - Proposals greater than 50 lots or 5 acres
 - Better topographic information

The Coordinated Needs Management Strategy (CNMS) (<https://msc.fema.gov/cnms/>) tracking tool is used by FEMA to track map update needs. Communities can share needs with FEMA using this tool.




201

Requirement to Submit New Data

Role of the Floodplain Administrator

- Review CLOMR and LOMR applications
 - Appropriate revision and in line with ordinance?
 - Make use of local resources, such as an engineer or legal counsel
 - Pass the cost along to the applicant
- Make use of conditional process to ensure compliance
- Clearly communicate to developers their responsibility in the revision process
- Follow-up: ensure a LOMR is completed for final projects before issuance of certificate of occupancy/compliance


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LOMCs and Community Responsibility

- Community Acknowledgement form- understand your role: you do not have to sign!
- Assist applicant (review required for C/LOMR-F and C/LOMR)
- Requirement to submit new technical data within 6 months
- Tracking and storing information
 - LOMC determinations
 - Elevation Data
 - Permit and Inspection Data







203

LOMC Exercise: Timing is Critical

Example

- A permit application is received for a proposed structure currently located on a site currently shown in the SFHA
- The building site is on naturally high ground and the lowest adjacent grade is above the current BFE
- The applicant is proposing a single-story residential structure with a basement

Question: Since the ground elevations are above the corresponding BFE can the floodplain management requirements be waived?


204


LOMC Exercise: Importance of Timing

Answer: No

- For both regulatory and insurance purposes the site is considered to be in the SFHA
- The structure must be constructed in compliance with the floodplain ordinance – no basements (if the lowest floor of the basement will be below BFE)

Recommended Action: Recommend that the applicant obtain a LOMA

- A LOMA for the land will remove the structure from the SFHA and the requirements of the floodplain ordinance will not apply
- A LOMA for the land will remove the requirement to purchase flood insurance, and insurance will be available at reduced rates
- Single and multiple lot or structure LOMA applications are no cost

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Exercise LOMC: Importance of Timing

Example 2

- A permit application is received for a proposed structure on a site currently located within the SFHA. Structural fill will be placed, elevating the structure above the corresponding BFE.
- A CLOMR-F has been received by the applicant stating the property, including the building pad, will be above the BFE if built as proposed. There is no floodway and no other fill restrictions.

Question: *Since the applicant has a conditional letter from FEMA stating the property will be outside of the SFHA when filled as proposed, they want to waive the lowest floor requirement for structures built within the SFHA and propose adding a basement. Is this allowable?*

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Exercise LOMC: Importance of Timing

Answer: No

- For both regulatory and insurance purposes the site is considered to be in the SFHA until the effective map is officially revised through a LOMR-F. Even then, having a lowest floor below the adjacent BFE is strongly discouraged.
- The structure must be constructed in compliance with the floodplain ordinance – no basements

Recommended Action: If the LOMR-F is received removing the land from the SFHA, use FEMA Technical Bulletin 10-01 to ensure the structure is reasonably safe from flooding.

Potential issues:

- Flood insurance covers limited damages in basements from overland flow
- Foundation damage/collapse from subsurface flow

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LOMC and Permit Resources

- Application Instructions: <https://www.fema.gov/letter-map-changes>
- Elevation Certificate: <http://www.fema.gov/media-library/assets/documents/160?id=1383>
- LOMC Tutorials: <https://www.fema.gov/online-lomc-training>
- FEMA Map Service Center (MSC): <http://msc.fema.gov>
- FIRMette Resources: <https://www.fema.gov/media-library/assets/documents/34930>
- Orthometric Height Conversion (VERTCON): http://www.ngs.noaa.gov/cgi-bin/VERTCON/vert_con.pl

FEMA 208 DCR

Flood Hazard Maps and Data

NON-REGULATORY PRODUCTS AND OTHER RESOURCES

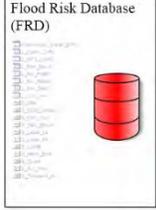
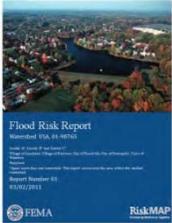
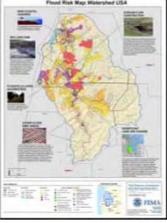
FEMA 209 DCR

Non-Regulatory Products and Other Resources

- Through the Risk Mapping Assessment and Planning (Risk MAP) Program, FEMA provides communities with both regulatory and non-regulatory products.
- Traditional regulatory products:
 - FIRM Database
 - FLOOD INSURANCE STUDY
 - FLOOD COUNTY

FEMA 210 DCR

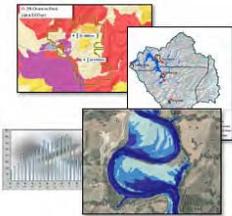
Non-Regulatory Products and Other Resources

- New non-regulatory products:
 -  Flood Risk Database (FRD)
 -  Flood Risk Report
 -  Flood Risk Map Watershed USA

FEMA DCR

Non-Regulatory Products and Other Resources

- The Flood Risk Database includes 4 datasets:
 - Changes Since Last FIRM
 - Flood Depth & Analysis Grids
 - Flood Risk Assessments
 - Areas of Mitigation Interest



FEMA DCR

Flood Risk Database

- Changes Since Last FIRM**
 - Horizontal Changes and Results
 - Structure/Population counts impacted by change
- Depth & Analysis Grids**
 - Depth (10, 04, 02, 01, 0.2 percent chance)
 - Percent Annual Chance
 - Percent 30-Year Grid
 - Delivery of Water Surface Elevation (multi-freq)
 - Water Surface Elevation Change Grid (1%)
- Velocity Grids**
- Multi Freq Grids for Coastal Areas, etc.**
- Flood Risk Assessment**
 - Average Annualized Loss – 2010
 - Refined Flood Risk Assessment
 - HAZUS or Non-HAZUS with improved data/assumptions
- Areas of Mitigation Interest**
 - Areas of Mitigation Opportunity or Awareness

*Red = Enhanced Flood Risk Database

FEMA DCR

Changes Since Last FIRM

The diagram illustrates the process of unbundling floodplain boundaries. It shows a cross-section of a river channel with 'Old FIRM' and 'New FIRM' labels. A large arrow labeled 'UNBUNDLING' points from the old FIRM to the new FIRM. Below this, a detailed cross-section shows the 'Old FIRM' and 'New FIRM' boundaries, with a legend for 'Old FIRM' and 'New FIRM' boundaries. The legend includes categories for 'Old FIRM' and 'New FIRM' boundaries, and 'Old FIRM' and 'New FIRM' boundaries.

FEMA 214 DCR

Flood Depth and Analysis Grids

- Flood Depth and Analysis Grids include:
 - Flood Depths for multiple flood frequencies
 - Water Surface Elevation for multiple flood frequencies
 - Water Surface Elevation Change Since Last FIRM (1%)
 - Percent Annual and 30-yr Percent Chance of Flooding
 - Velocity
 - Hillshade

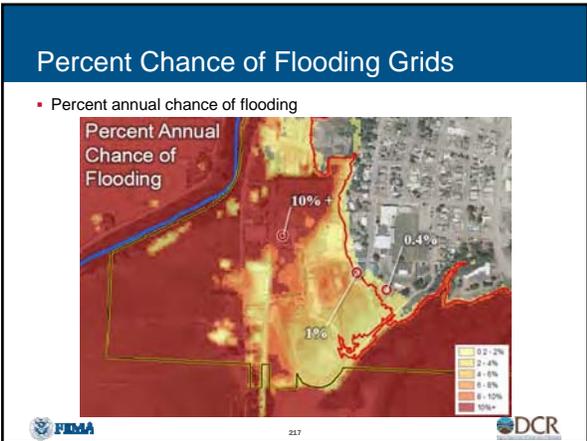
FEMA 215 DCR

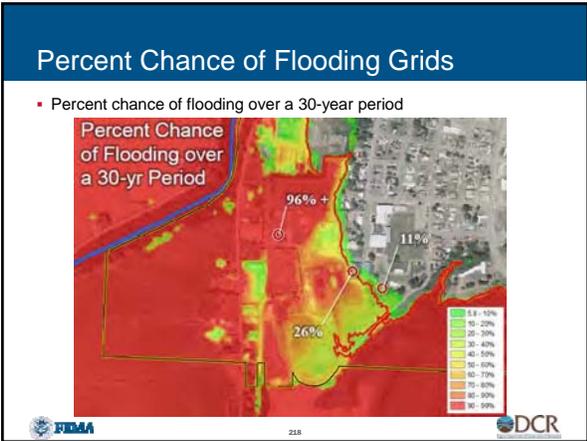
Flood Depth and Analysis Grids

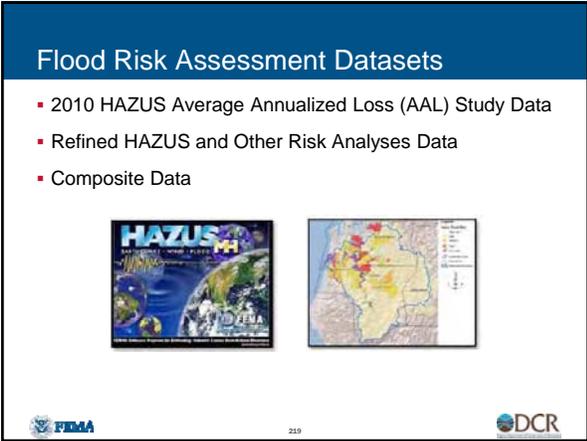
- Each square of the Flood Depth and Analysis Grid has a value:
 - Calculated by subtracting the elevation of the ground from the elevation of the water surface during a given flood event.

The diagram shows a map of a 'FIRM 1% Annual Chance (100-yr) Floodplain' and a '1% Annual Chance Depth Grid'. A yellow arrow points from the floodplain map to the depth grid. A cross-section 'XS' shows 'Depth' and 'XS'.

FEMA 216 DCR





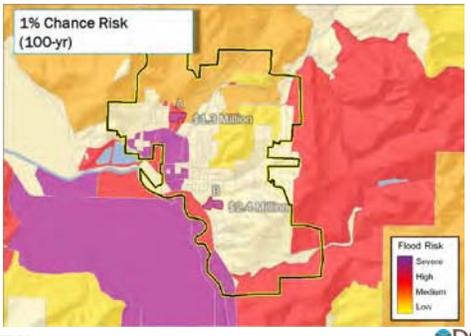


Flood Risk Assessment Datasets

- Identify Areas and Communicate Relative Flood Risk:
 - Flood prone areas
 - Vulnerable people and property
- Provide Flood Risk \$:
 - Potential damage severity for different flood frequencies
 - Identify locations with possible cost effective mitigation options
- Improve Estimates for Flood Risk \$:
 - Losses from Average Annualized Loss (AAL) Study
 - Refined losses from new flood study depth grids
 - Refined general building stock data from local sources

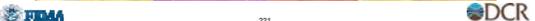


Flood Risk Assessment Datasets

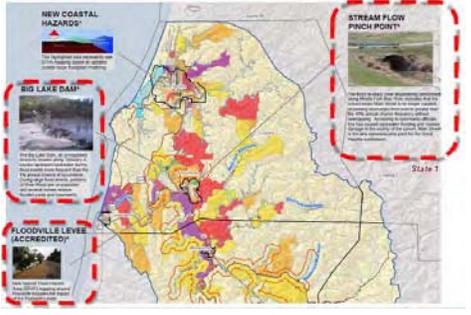


1% Chance Risk (100-yr)

Flood Risk
Severe
High
Medium
Low



Areas of Mitigation Interest



NEW COASTAL HAZARD

BIG LAKE DAM

FLOODVILLE LEVEE (ACCREDITED)

STREAM FLOW PINCH POINT

State 1



Flood Risk Report

- Background:
 - Purpose, Methods
 - Risk Reduction Practices
- Project Results
 - Changes Since Last FIRM
 - Depth & Analysis Grids
 - Flood Risk Assessment
 - Areas of Mitigation Interest
- Summarized by Locations
 - Communities and Watersheds



Flood Risk Report
 Loudoun County, Virginia (MAP Case # 11-03-20011),
 HUC-8 Watersheds: 62670000 and 62670010*
 Report Number: 01
 10/15/2014
 Final




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Where to Find Non-Regulatory Products

- FEMA Map Service Center: Search All Products - <https://msc.fema.gov/portal/advanceSearch>

FEMA Flood Map Service Center: Welcome!

Looking for a Flood Map?

Enter an address, a place, or longitude/latitude coordinates:

Enter an address, a place, or longitude/latitude coordi:

Looking for more than just a current flood map?
 Visit [Search All Products](#) to access the full range of flood risk products for your community.




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Where to Find Non-Regulatory Products

FEMA Flood Map Service Center: Search All Products

Choose one of the three search options below and optionally enter a posting date range.

Jurisdiction	Jurisdiction Name	Product ID
State VIRGINIA	Jurisdiction Name or FEMA ID (Ex. Fairfax Countywide or S1059K)	Product ID (Ex. Panel Number: LOMC Case Number)
County LOUDOUN COUNTY		
Community LOUDOUN COUNTY ALL JURISD		

Filter By Posting Date Range (Optional)


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Where to Find Non-Regulatory Products

Search Results for LOUDOUN COUNTY ALL JURISDICTIONS
DCR suggests to filter what notifications under products are updated

Please Note: Searching All Products by county displays all products for all communities within the county. You can refine your search results by specifying your specific jurisdiction location using the drop-down menu above.

- Effective Products (35)
- Regulatory Products (3)
- Non-Regulatory Products (21)
- Flood Risk Products (4)

Please Note: Flood Risk Products have purposes that are different from regulatory flood hazard products (i.e., Flood Risk Reports and Flood Databases). Regulatory Flood Hazard products are mandated by law and used to the national flood insurance program (NFIP) for rating flood insurance policies and enforcing the Federal Flood Insurance Purchase Requirements. Flood Risk Products are a supplementary resource for communicating flood risk to communities and may not entirely align with the regulatory flood maps. The information in these products reflect what was produced by the FEMA Risk Map Study of that area. Depending on the requirements of the study, the Flood Risk Products available for your community may consist of a Flood Risk Map, Flood Risk Report or Flood Risk Database.

- Flood Risk Maps (1)
- Flood Risk Reports (1)
- Flood Risk Database (3)

Product ID	File Format	MSC Posting Date	Size	Download
FIDLS1107C_GeoDatabase	GeoDatabase	10/15/2016	399KB	Get
FIDLS1107C_GeoTIFFs	GeoTIFFs	10/15/2016	344KB	Get
FIDLS1107C_Shapefiles	Shapefiles	10/15/2016	33KB	Get

FEMA DCR

Flood Hazard Maps and Data

Questions?

FEMA DCR

Pre- and Post-Disaster Considerations



FEMA DCR

Increase Your Capacity Pre-Disaster

- Know your areas of risk
- Obtain training (Floodplain management training, SD Estimator)
- Educate residents on the ordinance and substantial damage requirements
- Ensure ordinance is compliant
- Enter into a Mutual Aid Agreement
- Pre-load data onto SDE Tool
- Pre-identify an alternative site for permit office
- Contractor vetting
- Develop a Mitigation Plan



Substantial Improvement/
Substantial Damage
Desk Reference

October 2014 - May 2015




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Hazard Mitigation Plans

- Hazard mitigation plans help to prepare communities for disasters and guide post-disaster response and recovery efforts.
- The Federal Disaster Mitigation Act of 2000 requires localities to adopt a local or regional hazard mitigation plan in order to be eligible for funding through FEMA's Hazard Mitigation Grant Program and Pre-Disaster Mitigation Grant Program.
 - VDEM provides PDCs with funding to assist their member localities in developing regional hazard mitigation plans.
 - Most communities in Virginia choose to participate in regional hazard mitigation plans.
- Hazard mitigation plans are required to be updated every five years, but should be reviewed annually and after each disaster.
 - Floodplain managers should be included in annual reviews, to advocate for mitigation projects and help identify what mitigation has occurred.


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Hazard Mitigation Plans

- Almost universally, flooding is the number one disaster facing communities. Floodplain managers are the local experts on flooding and should be involved in gathering and vetting the data that will be included in the hazard mitigation plan.
- Hazard mitigation plans are required to include the number of NFIP policies and repetitive loss/severe repetitive loss claims. Floodplain managers should play a key role in increasing NFIP participation and reducing the number of vulnerable structures in the community.
- In CRS communities, the floodplain managers and CRS coordinator should work together closely to make sure that the hazard mitigation plans gets as much CRS credit as possible.
 - Communities wishing to get CRS credit for their hazard mitigation plans need to meet additional requirements.


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Post-Flood Disaster Checklist

- Review floodplain management ordinance
- Notify property owners of permit and building requirements
- Require permits for all development, not just for substantial damage
- Make floodplain determination for permitting using FIRMs
- Determine BFEs using FIS
- Perform substantial damage determination
- Notify property owners of determination results and subsequent building requirements in writing
- Tour floodplain to ensure development/rebuilding is compliant



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Permits Are Required

- A permit is required **regardless** of whether or not the repairs rise to the level of substantial damage.
 - Permits are required for repairs
 - The permit fee can be waived
 - The permit requirement **cannot be waived**
- Non-compliance post-disaster will have negative insurance implications and could result in sanctions.

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Substantial Improvement/Damage

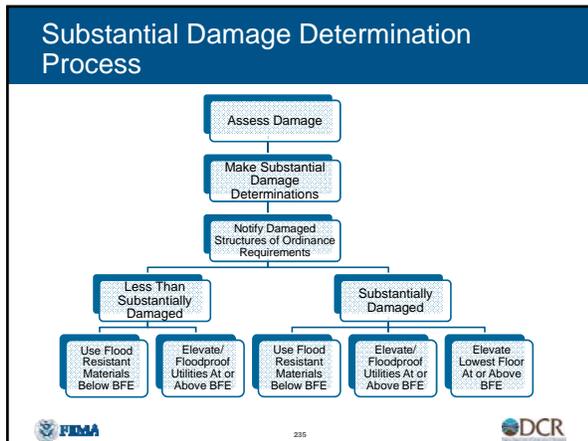
Definition:

- Cost to restore the structure to its **pre-damaged** condition equals or exceeds **50%** of its **pre-damage market value**



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Making Substantial Damage Determinations

- Substantial damage determinations are a **local responsibility**
- Ways to determine market value:
 - Tax assessed value
 - Appraisal (licensed professional)
 - Actual cash value, including depreciation
 - "Qualified estimates" based on professional judgment of local official

Foundation failure (FEMA Region III)

FEMA DCR

Substantial Damage Estimator

- Pre-populate property information pre-disaster in preparation for post-disaster substantial damage determinations
 - Basic structure characteristics, market value, etc.
- Downloadable for free at
 - [Substantial Damage Estimator Tool \(2.0\)](http://www.fema.gov/media-library/assets/documents/18692?id=4166)
 - [Substantial Damage Estimator Best Practices](http://www.fema.gov/media-library/assets/documents/26753)

FEMA DCR

Substantial Damage Implications

Benefits

- Reduces exposure to flood risk
- Compliance with local codes
- Fulfills one prerequisite for ICC eligibility
- Cost beneficial for HMGP grants
- Long term reduction in insurance premiums and damage costs

Challenges

- Long term increase in insurance premiums and damage costs
- Jeopardizes entire community's participation in the NFIP
- Short term increase in construction costs
- Typically requires significant changes to design of structure


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Post-Flood Opportunities

Mitigation Opportunities

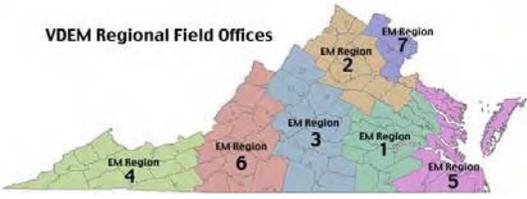
- Increase awareness of flood risk
- Encourage residents to build back safer and stronger
- Share low cost mitigation actions with property owners
- Distribute information on grant opportunities
- Capture high water marks




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VDEM Regional Contacts

VDEM Regional Field Offices



Chief Regional Coordinator (Region 1):
Lori Dachille
Lori.Dachille@vdem.virginia.gov

Regional Planner (Region 5):
Danielle Progen
Danielle.progen@vdem.virginia.gov


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Pre- and Post-Disaster Considerations

Questions?

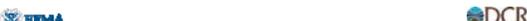


The Community Rating System (CRS)



The Community Rating System (CRS)

- Voluntary program for communities participating in the NFIP
- Recognizes activities beyond the minimum NFIP requirements by **reducing the cost of flood insurance from 5 to 45 %**
- Goals
 - Reduce flood damage to insurable property
 - Encourage a comprehensive approach to floodplain management
 - Strengthen/support the insurance aspects of the NFIP

Benefits of CRS

- Money stays in the community
- Insurance savings offset costs
- Improved flood protection
- Better organized programs
- Technical assistance
- Public information builds constituency
- Incentive to keep implementing


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CRS Premium Savings

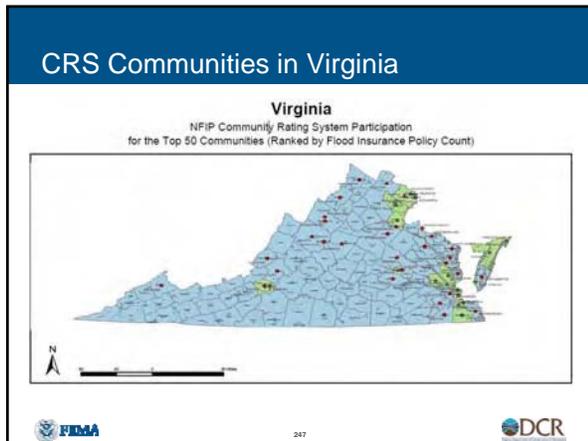
CRS Class	Credit Points	Premium Reductions	
		In SFHA	Outside SFHA
1	4,500 +	45%	10%
2	4,000 - 4,499	40%	10%
3	3,500 - 3,999	35%	10%
4	3,000 - 3,499	30%	10%
5	2,500 - 2,999	25%	10%
6	2,000 - 2,499	20%	10%
7	1,500 - 1,999	15%	5%
8	1,000 - 1,499	10%	5%
9	500 - 999	5%	5%
10	0 - 499	0	0


245

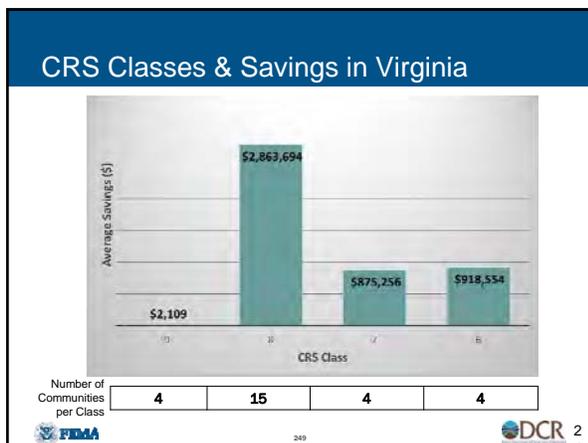

CRS Communities in the US




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- ### CRS Communities in Virginia
- ACCOMACK COUNTY
 - CITY OF ALEXANDRIA
 - ARLINGTON COUNTY
 - TOWN OF ASHLAND
 - TOWN OF BRIDGEWATER
 - TOWN OF CAPE CHARLES
 - CITY OF CHESAPEAKE
 - TOWN OF CHINCOTEAGUE
 - FAIRFAX COUNTY
 - CITY OF FALLS CHURCH
 - GLOUCESTER COUNTY
 - CITY OF HAMPTON
 - JAMES CITY COUNTY
 - CITY OF NORFOLK
 - CITY OF POQUOSON
 - CITY OF PORTSMOUTH
 - PRINCE WILLIAM COUNTY
 - CITY OF RICHMOND
 - CITY OF ROANOKE
 - ROANOKE COUNTY
 - STAFFORD COUNTY
 - TOWN OF VIENNA
 - TOWN OF VINTON
 - TOWN OF WACHAPREAGUE
 - YORK COUNTY
- FEDMA 248 DCR



Higher Class Prerequisites

- Class 6
 - Receive and maintain a classification of 5/5 or better Building Code Effectiveness Grading Scale (BCEGS)
- Class 4
 - Receive and maintain a classification of 4/4 or better BCEGS
 - Demonstrate programs that minimize flood losses, minimize increases in future flooding, protect natural floodplain functions, and protect people from the dangers of flooding.
- Class 1
 - Successful CAV within the previous 12 months
 - Demonstrate that it has a "no adverse impact" program

NOTE: Each class must meet the prerequisites required for the class(es) below it



Application Process

- Program Prerequisites
 - Activity Credit Points
- CRS Quick Check
- Letter of Interest
- ISO Verification Visit & Report
- FEMA approval
- Effective May 1 or October 1



NOTE: This process may take several months or even a year.



Maintaining CRS

- Recertify annually
- Cycle verification visits every 3-5 years
 - By ISO/CRS Specialist
- Modifications
 - Follow cycle verification process



Four Categories of Activities

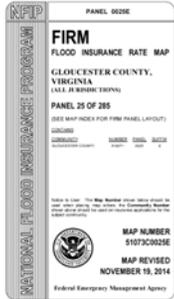
- 300 Series – Public Information
- 400 Series – Mapping and Regulations
- 500 Series – Flood Damage Reduction
- 600 Series – Warning and Response

19 Activities
94 Elements



Public Information Activities

- 310 – Elevation Certificates
- 320 – Map Information Service
- 330 – Outreach Projects
- 340 – Hazard Disclosure
- 350 – Flood Protection Information
- 360 – Flood Protection Assistance
- 370 – Flood Insurance Promotion

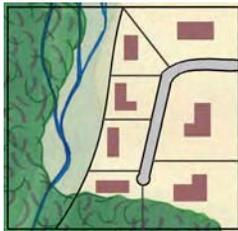


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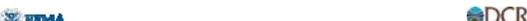


Mapping and Regulations Activities

- 410 – Additional Flood Data
- 420 – Open Space Preservation
- 430 – Higher Regulatory Standards
- 440 – Flood Data Maintenance
- 450 – Stormwater Management



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Flood Damage Reduction Activities

- 510 – Floodplain Management Planning
- 520 – Acquisition and Relocation
- 530 – Flood Protection
- 540 – Drainage System Maintenance



FEDMA 259 DCR

Warning and Response Activities

- 610 – Flood Warning & Response
- 620 – Levee Safety
- 630 – Dam Safety



FEDMA 260 DCR

CRS Activity Examples

- Preserving open land in the floodplain
- Having/enforcing statewide building codes
- Adding freeboard provision to ordinance
- Low density zoning
- Letters to property owners in floodprone areas
- Retrofitting floodprone buildings
- Removing floodprone buildings from floodplain
- Having/enforcing stormwater management regulations
- Maintaining drainage systems

FEDMA 261 DCR

Helpful Hints

- Most communities apply for credit for activities that they're already implementing
- Most communities can join as a Class 8 based on existing activities
- "New" community CRS initiatives for additional credit are often less expensive, public information activities
- To be successful, all the offices and departments that are responsible for flood-related activities should be involved



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The Community Rating System

Questions?



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DCR Division of Dam Safety and Floodplain Management Update



DCR Division of Dam Safety and Floodplain Management Update

FLOODPLAIN MANAGEMENT PROGRAM OVERVIEW



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Floodplain Management Program Overview

- DCR is charged by the General Assembly in the VA Flood Damage Reduction Act, Section 10.1-600 to 10.1-603 of the Code of Virginia, to be the liaison between FEMA and communities.
- DCR assists communities with their floodplain ordinances and maps, provides floodplain workshops and trainings, and provides technical assistance and guidance.
- DCR works closely with FEMA Region III, VA state agencies, other state NFIP offices in the Region, and the VA Silver Jackets team.



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Silver Jackets Program Goals

- Facilitate strategic life-cycle flood risk reduction.
- Create or supplement a continuous mechanism to collaboratively solve state-prioritized issues and implement or recommend those solutions.
- Improve processes, identifying and resolving gaps and counteractive programs.
- Leverage and optimize resources.
- Improve and increase flood risk communication and present a unified interagency message.
- Establish close relationships to facilitate integrated post-disaster recovery solutions.



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The Floodplain Management Plan for the Commonwealth of Virginia

- The plan will be a web-based resource that serves as a one-stop-shop for flood information in Virginia.
 - This is a departure from the 2005 plan, which was a 226 page document.
- The new Virginia Flood Risk Information System (VFRIS) is one major element of the website. Phase 1 of VFRIS was rolled out in February 2017.
- The draft website layout is complete and two pages are in the initial draft phase.
- Legal information and analysis has been provided by the Virginia Coastal Policy Center.

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State Model Floodplain Ordinance

- DCR updated the state model floodplain ordinance to incorporate new FEMA guidance on accessory structures.
 - DCR has been working with communities to understand this accessory structure guidance and incorporate it into their ordinances.
 - No statewide deadline for community adoption. DCR works with communities on a rolling basis.
- DCR is currently working to ensure the ordinance aligns with the current and future VA Uniform Statewide Building Code.

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DCR Division of Dam Safety and Floodplain Management Update

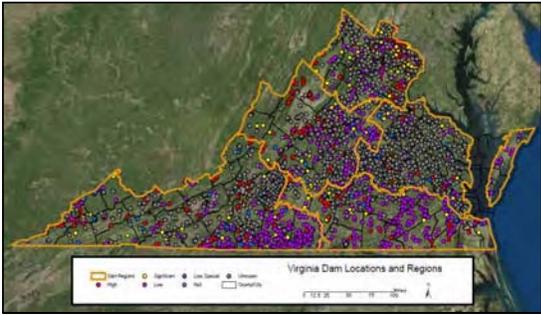
DAM SAFETY DATABASE

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Dam Safety Database



Virginia Dam Locations and Regions



Legend: Dam Regions (High, Low), Dam Types (Concrete, Masonry, Earthfill, Low Dam, High Dam), Dam Status (Operational, Decommissioned)

Dam Safety Database Goals

- Digital Files and Attachments
- Centralized Database
- Simplified Tracking
- Quickly Find Data
- Export Reports and Files for Sharing
- Public Facing
- Quickly Respond to Emergency Requests

Dam Safety Database Information

- Contact information
- Technical Specifications
- Inspections
- Permits
- Certificates
- Emergency Action Plans
- Map location and additional map layers (including dam break inundation zones and SFHA)

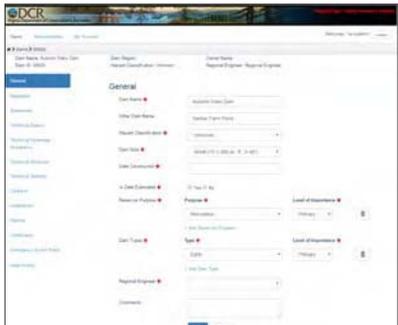

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Dam Safety Database

Id Number	Dam Name	Dam Other Name	Dam Name	Dam Region	City/County	Regional Engineer	Asset Classification	Dam Size	Dam Type
00101	Little Falling River Dam #1			3	Campbell County	Regional Engineer	Significant	2	Earth
00103	Little Falling River Dam #2			3	Campbell County	Regional Engineer	Significant	2	Earth
00104	Little Falling River Dam #3			3	Campbell County	Regional Engineer	Significant	1	Earth
00105	Lakewood Dam	Lynch Dam		3	Campbell County	Regional Engineer	Significant	2	Earth
00106	Brownhead Dam	PHILIPS CREEK DAM		3	Campbell County	Regional Engineer	Significant	8	Earth
00604	Walker Mill Dam	0180060500		3.4	Bedford County/City of Lynchburg	Regional Engineer	Significant	1	Earth
01915	Ramsey Dam	Dodson Dam 0066, Huntingwood Dam		3.4	Bedford County/City of Lynchburg	Regional Engineer	Significant	1	Earth


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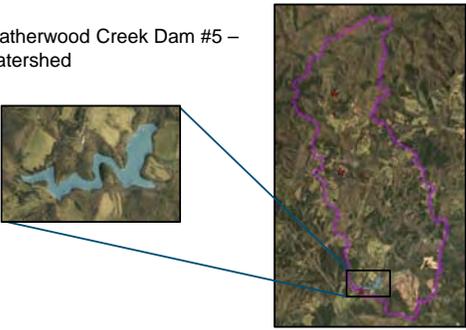

Dam Safety Database




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Dam Safety Database

Leatherwood Creek Dam #5 – Watershed



FEMA DCR

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Dam Safety Database

Leatherwood Creek Dam #5 – Watershed



FEMA DCR

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Dam Safety Database Contacts

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804-625-3977

James Martin, Conservation Data Specialist
James.Martin@dcr.virginia.gov
804-887-8916



FEMA DCR

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Floodplain Management Contacts

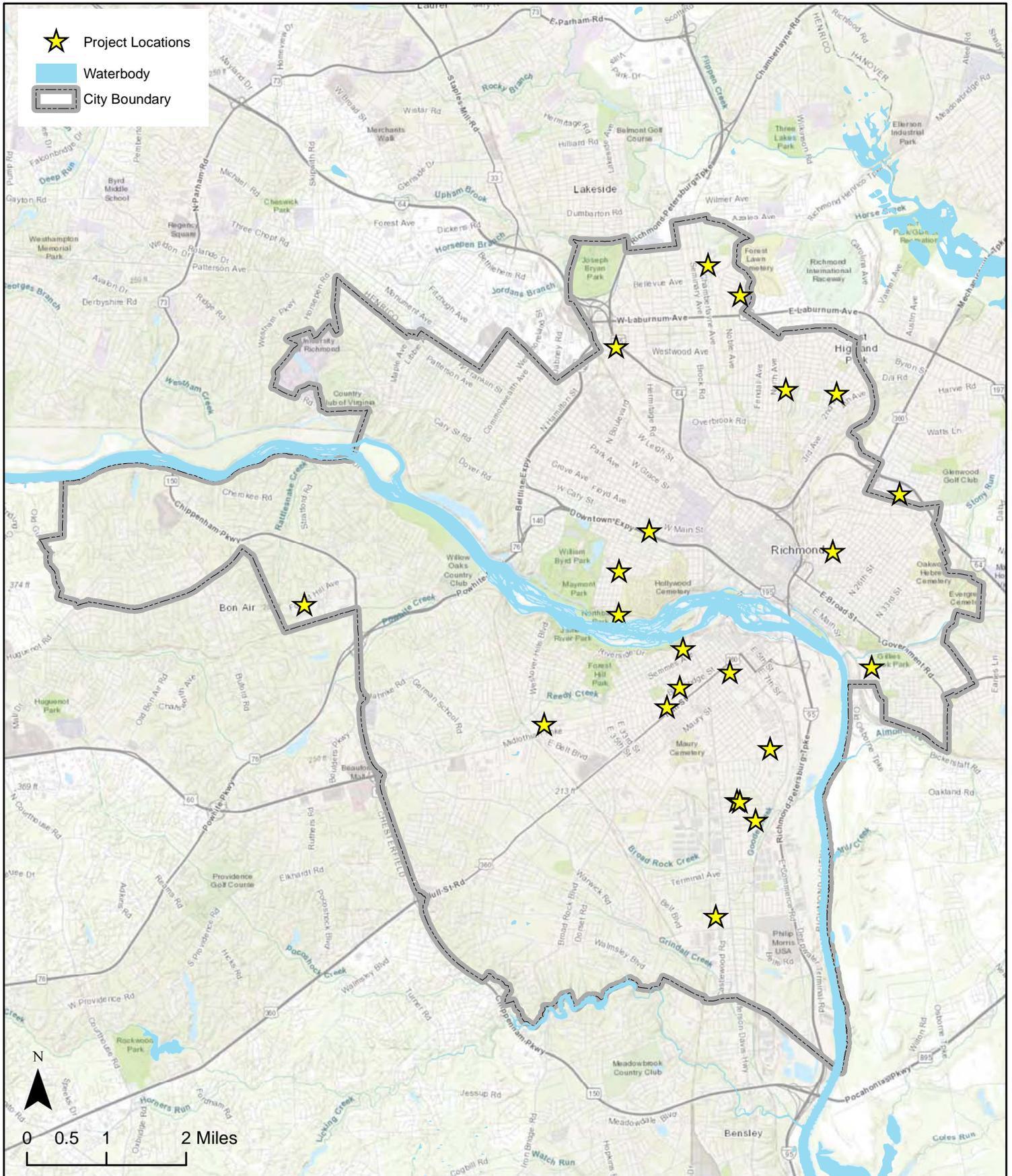
- FEMA Region III
 - Zane Hadzick - Lead Mitigation Specialist for VA
 - Zane.Hadzick@fema.dhs.gov
 - Charlie Baker - Backup Mitigation Specialist for VA
 - Charles.Baker@fema.dhs.gov
 - Rich Sobota - Insurance and CRS Specialist
 - Richard.Sobota@fema.dhs.gov
- ISO/CRS Specialist
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APPENDIX D

GroundworkRVA Project Locations

October 2017



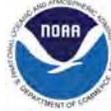
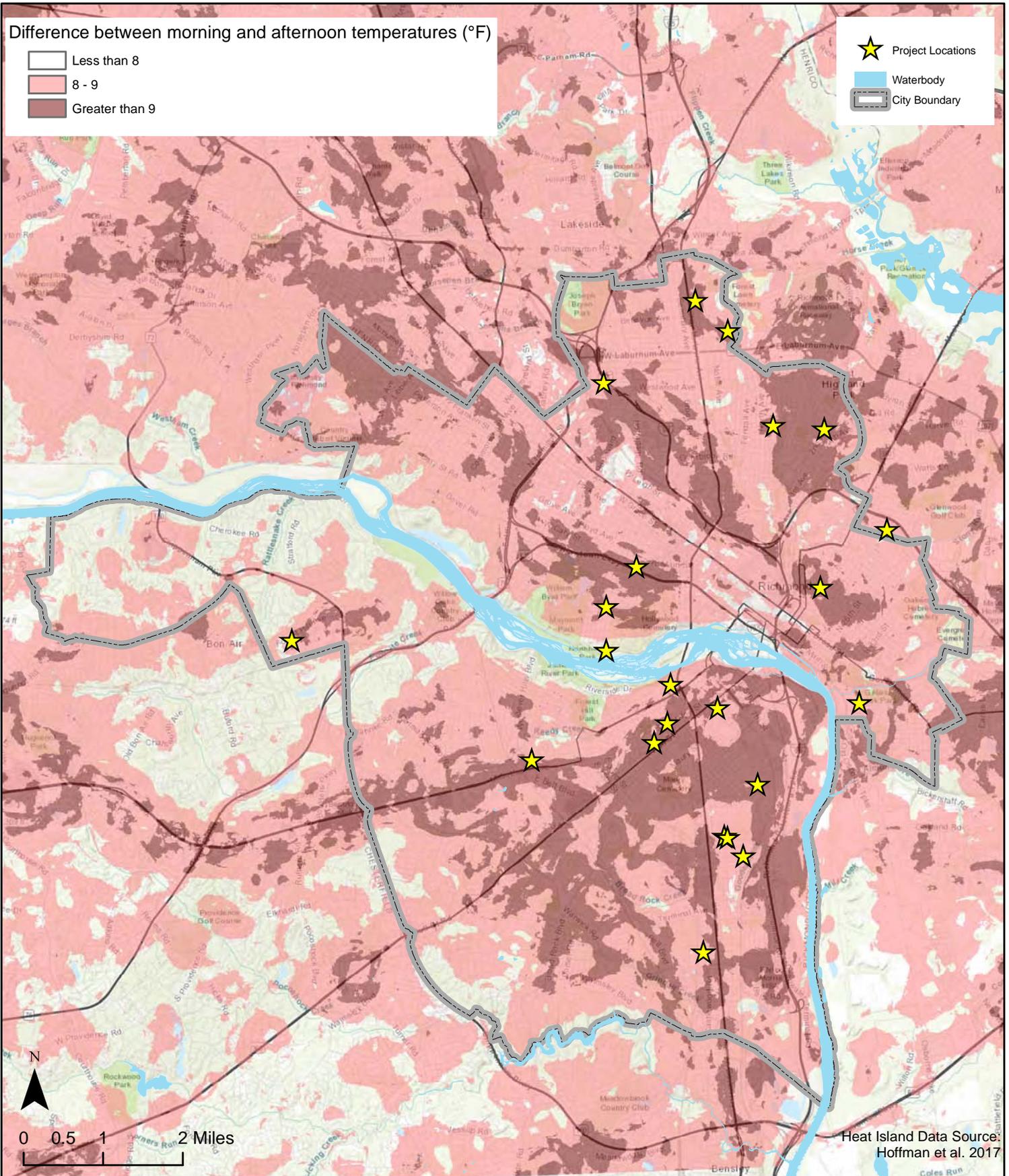
Virginia Coastal Zone
MANAGEMENT PROGRAM



This map, Task # 48, was funded in part by the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant #NA16NOS4190171 of the US Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

GroundworkRVA Project Locations & Day Temperature Increase (July)

October 2017



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http://www.richmond.com/weather/today-s-the-day-researchers-are-driving-around-richmond-to/article_c458acf0-72b6-50a5-9372-5c84503381b7.html

Today's the day: Researchers are driving around Richmond to map how heat affects area neighborhoods

By John Boyer Richmond Times-Dispatch Jul 13, 2017



The heat and humidity did not deter this runner as she jogged down the 2200 block of E. Marshall St. in the Church Hill section of Richmond, VA Friday, July 8, 2016.

BOB BROWN

UPDATE: The project's volunteers are set to gather temperature measurements all across the City of Richmond on Thursday.

Though the date for the project was arranged weeks in advance, this scorching weather pattern should make the city's hot spots readily observable.

The researchers leading the study expect to complete the computer analysis in the coming weeks. Look for another update to this story when the results are out.

Original story: June 22, 2017

A scorching summer day can feel several degrees hotter because of where you live, and a scientific project aims to map out the details of Richmond's hot spots this summer.

Local researchers and volunteers from Groundwork RVA will team up to create a neighborhood-by-neighborhood snapshot of temperatures across the city in July.

Jeremy Hoffman, a climate and earth scientist at the Science Museum of Virginia who holds a doctorate in geology, designed the project with the goal of making the city more resilient to extreme heat waves.

"Some details we're looking to figure out here in Richmond are just how much does the urban heat vary between and within city neighborhoods," Hoffman said. "How do different types of land uses — such as city parks, tall buildings, or parking lots — affect the Richmond urban heat island?"

Urban areas can be several degrees warmer than surrounding rural areas, both at day and at night, but there are significant variations in temperature even within a city's borders.

Buildings and parking lots absorb the heat of the day and re-release it at night, but trees and vegetation can help to cool the air.

On an appropriately hot mid-July day, measurement teams will gather temperature readings along winding paths in every corner of the city.

Eight teams will head out with a specially designed temperature sensor mounted to their cars, which will log a reading every second and match it to a GPS location. Volunteers on bikes will be able to gather the temperature of places that cars can't go, like parks and trails.

To see how the heat island morphs during the course of a day, the teams will repeat their journeys at daybreak, midafternoon and early evening.

Then, a model developed by researchers at Portland State University in Oregon will be used to match the temperature patterns to the landscape features and predict where heat waves could be most dangerous.

"Once we have an idea about those details," Hoffman said, "we can answer important questions like: Are there places in the city that could benefit from heat mitigation strategies such as urban greening, reflective roofing or park development?"

In addition to helping with the data collection, students and research teams from Virginia Commonwealth University and the University of Richmond will continue the project by studying where changes in land use practices could make the most impact in the future.

The number of days per year with a high temperature above 95 is likely to increase all across Virginia over the next century because of climate change.

The findings could also guide the city of Richmond's public health efforts during extremely hot weather.

The added temperature of the urban heat island can make the elderly, children and people who work outside more likely to become ill during a heat wave.

According to the National Oceanic and Atmospheric Administration, heat usually kills more Americans each year than hurricanes, floods or tornadoes.

"That will help us better engage with our community members to design realistic solutions that work for them," said Alicia Zatcoff, the city of Richmond's sustainability manager. "That's particularly important for our residents that are most vulnerable to these impacts either due to their socioeconomic status, age or health condition."

This study follows the design of a research project that revealed the heat islands of Portland and several other cities.

The 2014 Portland study found that temperatures are strongly affected by vegetation and the variation of building heights in a neighborhood.

Check Richmond.com/weather for John Boyer's videos and updates as the forecast evolves. Contact him at JBoyer@timesdispatch.com or (804) 649-6209, and follow him on Twitter, [@boyerweather](https://twitter.com/boyerweather).

jboyer

VCU NEWS

Monday, Nov. 6, 2017

VCU researchers to map Richmond's heat wave danger zones



VCU chemical engineering students Kevin Watson, a rising senior, and Devon Hunter, a rising sophomore, will be using highly sensitive thermocouples mounted to cars and bicycles to measure hot spots throughout Richmond.

By Emi Endo
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Thursday, July 13, 2017

Virginia Commonwealth University engineering and arts students are teaming with scientists and community volunteers in July to find out just how hot it gets in Richmond during a heat wave.

They intend to develop the first map of Richmond that identifies where large buildings or pockets without trees or vegetation create “urban heat islands” — areas that can be appreciably hotter than other parts of the city.

“We will know what areas will be most affected by a heat wave and how hot it’s actually going to get there,” said Stephen Fong, Ph.D., associate professor and vice chair of the Department of Chemical and Life Science Engineering in the VC School of Engineering.

Several of Fong’s students will be among researchers and volunteers fanning out across the city three different times on one hot day this month in cars and on bicycles. They will use highly sensitive thermocouples to collect data in real time.

Jeremy Hoffman, Ph.D., a climate and Earth scientist at the Science Museum of Virginia, who helped spearhead the project, said other research has relied on satellite or climate model data to characterize urban heat in the South. He called this effort “the first real, ground-based assessment of the heat island here in a humid Southeastern city like Richmond.”

Hoffman said it was important to find out “what exactly about the urban environment in Richmond causes hot weather to become even hotter. Through this analysis, we’ll be able to determine that.”

Urban Heat Islands



To learn more about urban heat islands, check out this video by Jeremy Hoffman, Ph.D., a climate and Earth scientist at the Science Museum of Virginia.

Hoffman contacted Fong after hearing about the new VC interdisciplinary class that built a green wall, a vertical living garden, in downtown Richmond.

“Dr. Fong and his colleagues’ interest in transforming Richmond into a more livable city, using things like green walls to combat urban heat and improve air quality, complements this heat island assessment in a unique way,” Hoffman said.

The researchers in Richmond are partnering with a team from Portland State University led by urban studies professor Vivek Shandas, Ph.D., who has developed a comprehensive mapping tool to overlay location-specific heat data with information about demographics, air pollution and features such as roads, buildings and trees. The Portland team will be visiting Richmond to help gather and analyze the data.

Other groups involved include Groundwork RVA, a community nonprofit group working with Richmond youth, who will help collect temperature readings, and students from the University of Richmond, who will analyze data.

sing the PS method as a model, Fong said the VC team would use statistical modeling to build an overlay map that will extrapolate the samples to cover gaps and “generate a map covering the entire city.”

“

They can allocate resources ahead of time to be proactive, not reactive.

Urban heat islands can lead to increases in heat-related illness, energy consumption and air pollution. Being able to identify the areas that are most vulnerable could help officials reduce such impacts.

Fong said the City of Richmond was eager to know where the extreme hot spots are.

“They can allocate resources ahead of time to be proactive, not reactive,” he said.

”

In the long term, Fong added, mapping extreme hot spots could help identify locations in the city to possibly install more green walls.

“[If more were installed] we should be installing them in those areas,” he said. “What we’ve been piloting can be part of a long-term solution.”

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