Hampton Roads Sea Level Rise Preparedness and Resilience Intergovernmental Pilot Project

Phase 1 Report:

Accomplishments and Lessons Learned

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- **Kevin Head**, Joint Base Langley-Eustis, COL, US Air Force
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James Utterback, Virginia Department of Transportation, Hampton Roads District
Jon White, Chair of Navy Task Force Climate Change, Rear Admiral, US Navy
Ricky Williamson, Commander Naval Region Mid-Atlantic, Rear Admiral, US Navy
Heather Wood, former Sustainability Director, Port of Virginia; Kennedy Jenks Consultants
Mayor Kenneth Wright, Chair, HRPDC; Mayor, City of Portsmouth
Executive Summary

Initiated in June 2014, the Hampton Roads Sea Level Rise Preparedness and Resilience Intergovernmental Pilot Project (Intergovernmental Pilot Project or IPP) convened at Old Dominion University is an effort to use the knowledge skills and expertise of all regional stakeholders to create a framework or template for intergovernmental strategic planning that can be used outside the region; and, to implement that integrated strategy in Hampton Roads, Virginia creating an effective and efficient method for planning holistically for sea level rise and recurrent flooding.

With active stakeholders from the Department of Defense, federal agencies and the White House as well as the Commonwealth of Virginia and many localities across Hampton Roads, Virginia, the IPP is truly a “whole of government” effort. Knowing water knows no jurisdictional bounds, that level of intergovernmental collaboration is necessary to develop integrated regional solutions and implement effective sea level rise preparedness and resilience strategies. Additionally, the wider community in Hampton Roads recognizes that they too will be affected by not only sea level rise itself, but also the adaptation strategies implemented in preparation. Thus, IPP stakeholders include representatives from private industry, infrastructure, non-profits, the real estate community, and vulnerable communities. Furthermore, while the IPP was conceived in Hampton Roads, the IPP recognizes that sea level rise affects the entire Commonwealth, and a successful ‘whole of government and community’ approach must eventually include regions beyond Hampton Roads and reach across the Coastal Virginia and the Commonwealth as a whole.

Throughout the past year stakeholders have attended numerous IPP meetings and many supporting events, but they have also, through their own personal and professional lives driven the resilience conversation in Hampton Roads and beyond. The IPP is completely unfunded and exists not as an entity, but as an experiment, bringing together the community, and leveraging and building upon other initiatives from the Secure Commonwealth Panel’s Subcommittee on Sea Level Rise to Urban Land Institute’s Resilient Region Reality Checks to NOAA and NASA scientists.

The first Phase of this two-Phase, two-year project came to completion during the summer of 2015 with a daylong leadership retreat. This report summarizes the stakeholder engagement and due-diligence process stakeholders undertook during Phase 1, but does not detail each meeting or event that took place. Phase 2 will continue to build on other initiatives and count on stakeholders to use these networks and knowledge to create an enduring entity, organization, or strategy to continue using economies of scale and the “whole of government and community” model for sea level rise preparedness and resilience in Hampton Roads and elsewhere.
Phase 1 Report: Accomplishments and Lessons Learned

Overview of Intergovernmental Pilot Project

Background
The Hampton Roads Intergovernmental Pilot Project was initiated to promote collaboration in a diverse region vulnerable to sea level rise, recurrent flooding, and coastal storms. While many news reports and scientific studies quantifying the risk vary, there is no question of vulnerability. For example, NOAA has cited Hampton Roads as the U.S.’s second largest population center at risk from sea level rise.\(^1\) More recently, in June 2015, CoreLogic estimated that nearly 400,000 properties are exposed to flood or surge inundation regionally.\(^2\) In order to consider living with the water in Hampton Roads, the region must join together and act innovatively and proactively.

This elevated risk is a result of geophysical as well as socio-economic factors. The geophysical conditions include a primarily flat topography, mostly within a few meters of sea level, a high rate of land subsidence, and an extensive network of tidal waterways weaving throughout the region. The Virginia Institute of Marine Science (VIMS) *Recurrent Flooding Study for Tidewater Virginia* (2013) report commissioned by the Virginia General Assembly highlighted the cities of Virginia Beach, Portsmouth, Norfolk, Chesapeake, Hampton, and Poquoson as confronting significant challenges related to sea level rise, assuming a 1.5 foot rise in sea level and a 3 foot storm surge. The study found that in these localities the percentage of the total land area vulnerable to flooding ranged from 11% to 69%.\(^3\)

The region has a population of over 1.7 million people, many of whom depend on the waterways indirectly for employment or for recreation, as well as a high concentration of valuable commercial, industrial, and military assets benefiting from their direct access to water-dependent assets. Along with other federal facilities, Naval Station Norfolk, the largest naval base in the world, and the Port of Virginia, which generates $60 billion in annual spending,\(^4\) are key economic drivers in the region. Supporting industries including shipbuilding and repair, defense contracting, rail transport and truck transport play a key role economically. Commercial and recreational fishing, outdoor recreation, tourism and the associated real estate development, and many other industries take advantage of the shorelines, wetlands and beaches. Institutes of higher education in the area, also economic drivers, boast strengths in water related programs and research. These industrial, commercial, residential, and

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\(^1\) Climate Change and the Chesapeake Bay, FAQ: Frequently Asked Questions, NOAA, available


environmental assets and pillars of the economy are key to the region’s success, but are at risk from the rising level of the very waters that drew them to Hampton Roads.

With a vast array of resources threatened by sea level rise, leaders across the region recognize that resources must be managed collectively and strategically for the region to continue thriving with the water as it has for hundreds of years. In order for the region to succeed moving forward, innovative adaptation strategies must be developed, evaluated and implemented. Adaptation strategies include changing land use patterns and regulations, building major storm protection infrastructure, implementing changes in local stormwater management approaches, and many more.

This wide range of both challenges and potential solutions crosses numerous governmental boundaries, both vertically and horizontally, as water knows no political borders. With 17 independent local jurisdictions in the region, and a prominent federal presence and investment, along with significant state resources, the need for effective and strategic regional planning and response across jurisdictional boundaries is essential but challenging. Regional collaboration could result in outcomes that:

- Avoid duplication and maintain consistent minimum design standards across the region.
- Allow for whole of system adaptation and reliability.
- Minimize disruption when multiple infrastructure agencies or companies must harden or otherwise alter their installations in the same area, through coordination of resources.
- Result in more effective regional solutions through utilizing economies of scale.
Government:

Depending on how the region is defined, Hampton Roads, Virginia includes approximately 17 municipal governments and 16 federal agencies. The region has several regional planning and service organizations as well, which facilitate various levels of inter-municipal cooperation. Across the 17 municipalities, the region varies greatly in land use patterns and socio-economic makeup, creating the illusion of competitive interests across the region, however the region is united in the effort to address recurrent flooding and sea level rise.

Regionally, the Hampton Roads Planning District Commission (HRPDC), for example, has taken great leadership in addressing sea level rise and recurrent flooding with its members and by providing a series of reports on local climate impacts. Again, though the scope of the IPP was initially limited to the HRPDC geographic boundaries, stakeholders have recognized that this does not fully represent the affected region across Coastal Virginia.

Additionally, several important aspects of local operations and infrastructure are managed directly by the Commonwealth, and at the recommendation of the Secure Commonwealth Panel Recurrent Flooding Sub-Panel, the Commonwealth has recently appointed a Chief Resilience Officer to lead incident command for coastal resilience issues. All of these governmental entities and political subdivisions are either currently impacted or will be impacted by coastal flooding. Moreover, the Commonwealth of Virginia is a Dillon Rule state, meaning that localities are limited in their authority to the powers granted them by the General Assembly. The Commonwealth has an inescapable role in ensuring localities have the tools necessary to adapt effectively.

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Private Infrastructure:

Several critical components of the infrastructure system in Hampton Roads (electricity, natural gas, telecommunications, freight rail, healthcare, etc.) are privately owned. While many large private companies are investing heavily in resiliency planning of their assets and are able to dedicate resources to business continuity in the face of flooding, many smaller companies simply do not have the information and resources available. Additionally, many of these companies know that they are only as strong as their workforce; their employees need to be able to both access the workplace and ensure the safety of their loved ones and homes. In addition, strategies and industry standards developed by companies prioritizing resilience as a means of protecting their own assets can benefit other private companies both in the region and elsewhere. Thus these companies are beginning to understand the benefits of collaboration and are active participants in the IPP.

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Community:

Current and future residents, businesses, and non-profits of Hampton Roads are exposed to risks associated with flooding and those risks increase with sea level rise. Like pollution and other pervasive phenomena, sea level rise does not know jurisdictional boundaries and will impact citizens across the region, especially our low and moderate-income families and senior citizens.

Importantly, the community will also be greatly impacted by the region’s approach and chosen adaptation strategies either temporarily (e.g. construction) or permanently (e.g. neighborhood buy-outs or storm surge barriers). As such, both community education and input are vital components of resiliency in Hampton Roads. Thus far the messaging surrounding both the risks of coastal flooding and sea level rise, as well as the potential adaptation methods for the region, has left substantial room for improvement through a collaborative approach.

Although many individuals, businesses, institutions, and government agencies are informed and developing plans to adapt and to protect assets, their work often occurs in or is based on inaccurate or unreliable data, putting this work at risk from decisions and actions made by key intersecting parties:

- If a state bridge connection is hardened with a raised deck and reinforced supports, but the local access is impassable due to high water, the state investment in the bridge becomes worthless.
- A hospital built to withstand Category 5 hurricane winds, storm surge, and sea level rise is of little use if roads flood, power is lost, drinking water is contaminated, sewer service fails, or fuel supplies are cut off.

In addition to the challenges noted above, the Hampton Roads region’s geophysical, ecological, and engineered environments as well as its legal, economic, and social systems are technically complex. Integration of access to the best available technical, scientific, legal, economic, and planning information is an essential element of effective response.

The risks associated with sea level rise are great in Hampton Roads. The potential for opportunity within a proactive region are also great. As one of the first regions in the US proactively and collaboratively addressing a major threat from sea level rise, Hampton Roads is uniquely positioned to be a pioneer in the field of coordinated planning, adaptation, research, and response.

Intergovernmental Pilot Project

The IPP is a 2-year project officially launched in June 2014 with a goal of addressing these challenges through a collaborative process that seeks to engage all major stakeholders. Envisioned as an initial step towards the development of systematic, structured coordination of Hampton Roads’ planning for and response to sea level rise risks in the region, the IPP aims to bring a Whole-of-Government and Whole-of-Community approach to addressing these issues.

The White House and Department of Defense each initiated three regional pilots following President Obama’s Executive Order, “Preparing the United States for the Impacts of Climate Change.” The Hampton Roads Intergovernmental Pilot Project is the only geographic location on both lists, and the
only pilot convened by a university across a region as varied as Hampton Roads. Furthermore, this initiative is the only one exploring the whole of government/community model and addressing coastal resiliency with a focus on regional resilience and local mitigation and adaptation to address national security concerns and economic impacts.

**MISSION:** The mission of the IPP is to establish in Hampton Roads a regional Whole of Government & Whole of Community organizational framework and procedures that effectively coordinate SLR Preparedness & Resilience Planning.

**VISION:** A regional ‘whole of government’ and ‘whole of community’ approach to sea level rise preparedness and resilience planning in Hampton Roads that also can be used as a template for other regions.

Recently highlighted by President Obama’s 2010 National Security Strategy\(^9\) the IPP utilizes the Whole of Government concept to improve integration and collaboration across federal, state, and local governmental agencies to more effectively leverage limited resources in order to plan for sea level rise and coastal flooding. Because this is a cross-jurisdictional issue, application of the Whole of Government approach to sea level rise preparedness and resilience planning will benefit the region greatly.

However, in a region of 17 localities, the whole of government process does not come easily, and the IPP aims to build bridges and increase understanding and collaborative processes during its two year experiment. Slowly moving towards a more formal planning arrangement ensures that due diligence is completed through the committee and working group structure, developing a more concrete vision of a final arrangement that can be recommended.

Though the Whole of Government concept was the initial goal of the White House and Department of Defense Pilots, the Whole of Community concept was added to bring regional ownership to the process. While the IPP will act as a model throughout the country for collaborative planning for climate impacts, in order to benefit as a region and to garner local buy-in, a true community effort is key. The IPP two-year process is designed to be an iterative one, with input gathered from all interested stakeholders in a manner that allows for adaptive management in response to changing information and conditions.

In the first year over 200 people have participated in Working Group or Committee meetings, and even more have attended community events designed to inform the process. A primary example of the iterative process included the Resilient Region Reality check jointly held by Urban Land Institute Hampton Roads and Old Dominion University, which was a region-wide multi-sector approach to communicating risks in the community and receiving feedback on community priorities. In addition to

hosted events, staff and volunteers regularly give presentations or workshops to interested groups, from civic leagues to Lead Hampton Roads.

![Photo Courtesy of Old Dominion University](image)

Participation in the IPP remains completely voluntary, for both Steering Committee members, and working group and working committee members. While some organizations, agencies, and localities, have tasked staff members with participation, others have simply volunteered their time and expertise. In Phase 1, Eric Jabs, CAPT, USN Ret. and Old Dominion University PhD candidate conducted a survey of IPP participants as a part of his dissertation research. His preliminary findings reveal that 92% of IPP stakeholders and respondents think the activities of the IPP have already had or will have a positive impact on regional resilience. After one year, this is a resounding vote of confidence in the collaborative process modeled in the Charter moving forward.

Old Dominion University (ODU) acts as the convener of the IPP and supports it with expert faculty, research facilities, and access to partnerships within academia, which expand the resources available to the IPP (e.g., the Virginia Institute of Marine Science (VIMS) and William and Mary’s Virginia Coastal Policy Center).

Despite herculean volunteer efforts, the IPP is limited by a lack of funding. Thus developing sustainable sources of funding for not only IPP Phase 2 efforts but the resulting entity or organization must be prioritized.

**Funding**

Importantly, the IPP is not independently funded. ODU and other partners have donated support by providing significant staff time, communications support, and the underwriting of various IPP events. Working groups of volunteers have contributed significant time. This time commitment of volunteer resources is not sustainable over a long period of time. As the convener, ODU has staffed the IPP, though at the end of Phase 2 when a new entity is created, independent staffing and funding will be necessary, though there will likely remain University research support from across the region.
The IPP is a two-phase project, each phase expected to last approximately one year. Objectives for each phase are attached in the Appendix.

**Overall Goals and Expected Outcomes**

The overall goal of the IPP is to create intergovernmental planning organizational arrangements and procedures to effectively coordinate sea level rise preparedness and resilience planning of Federal, State, and Local government as well as the private sector, in the context of the perspectives and concerns of the citizens of the region.

**Participants**

Participants in the IPP are drawn from multiple government organizations and agencies as well as private industry, academe, and non-profit sector. The organizations participating as of June 18, 2015 are listed on the attached Appendix and include at least 18 federal agencies or facilities, many Commonwealth partners, regional partners, municipalities, and the private sector. While the IPP has over 200 stakeholders, a goal for Phase 2 will be encouraging broad municipal support, which is essential to long-term success in regional planning. Although the HRPDC is an active partner and counts all 17 localities in Hampton Roads among its members, not all municipalities participate individually though all are invited.

**Project Structure**

The IPP structure consists of a Steering Committee, which directs the overall strategic direction for the Pilot and is informed and supported by a set of Working Groups and Advisory Committees. Steering Committee membership includes private industry, state and local representatives as well as non-voting federal liaisons. Because the results of the IPP will result in a proposal for effective local planning, Federal Liaisons are active participants but not voting members of the committee.

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<th>STEERING COMMITTEE</th>
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<tr>
<td>Jim Redick, Chair</td>
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The Legal, Infrastructure Planning, Land Use Planning, and Citizen Engagement Working Groups were formed by the Charter, while the Public Health Working Group was formed at a meeting of the Steering Committee in April 2015 after acknowledgement of a planning gap. Advisory Committees were convened as well, to provide key information to the Working Groups and Steering Committee. Figure 3 shows the basic organizational structure with primary communication relationships between Steering Committee, Working Groups, and Advisory Committees.

**Project Status as of July 2015**

**Deliverables**

In October 2014, the Steering Committee signed the Charter and formation of the various Working Groups and Advisory Committees commenced. By July 2015, every Working Group and Committee but the Economic Impacts Advisory Committee had a chair and was operational.

During Phase 1, the Legal Working Group established several operating principles for consideration by the Steering Committee and worked to develop a “Legal Primer Version 1.” The Primer details federal, state, and local laws and regulations related to planning for sea level rise, serving as a reference document for the Steering Committee and the other Working Groups (See Appendix).

All active Working Groups and Committees have set forth Action Plans and Scopes of Work during the course of Phase I, briefed the Steering Committee and Senior Advisory Committee on their efforts and requested feedback.

While some of the Phase I deliverables are on a longer timeline than originally anticipated, the IPP remains on track to propose an intergovernmental planning structure or structures by the end summer
of 2016. This proposal will be in coordination and support of other regional entities and organizations working towards a resilient future in Hampton Roads.

Though timelines will be altered from the original Charter schedule, the focus will remain on adapting to lessons learned in Phase 1 in the pursuit of establishing a regional entity focused on collaborative resilience planning, and many objectives remain the same. Based on research and lessons learned the Legal Working Group will report on potential structures for continued collaboration and operating procedures for the intergovernmental planning organization that will be established upon completion of the IPP, and the conveners will continue to provide updates to all stakeholders and the community. By the summer of 2016 the results will include a clear path forward for the region and the signing of a memorandum of understanding among partners to create a new entity in Hampton Roads if needed. A final report will be issued soon after the completion of Phase 2.

Project Milestones
As of July 2015, several major milestones have been achieved by the IPP:

Summer 2014

- **White House announces pilots at the IPP Kickoff at TechSurge** on June 3, 2014: In front of over 250 government and private industry planners, engineers, scientists, and others, both the IPP and the creation of the Mitigation and Adaptation Research Institute at Old Dominion University were announced. The IPP announcement panel included many current Steering Committee members and set the stage for the initiative with support from the Pentagon, the White House, the State and the region. The event closed with a short speech by EPA Administrator Gina McCarthy. This event also marked the beginning of the White House list of 3 pilots, IPP being the first.

![Photo Courtesy of Old Dominion University](https://www.mtsociety.org/conferences/techsurge/)

- **Rising to the Challenge: Bipartisan Forum Organized by Sen. Kaine:** Organized by Senator Kaine, Rising to the Challenge made national media take notice of the collaborative approach to sea level rise preparedness in Hampton Roads. In addition to Sen. Kaine, event panelists

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11 TechSurge is a program of the Marine Technology Society, information is available: [https://www.mtsociety.org/conferences/techsurge/](https://www.mtsociety.org/conferences/techsurge/).
included both Republican and Democratic members of the Hampton Roads Congressional delegation, as well as the Mayors of Virginia Beach and Norfolk and focused on leveraging expertise to take action on sea level rise preparedness and resilience.

![News Photo](image)

*Photo Courtesy of Old Dominion University*

- **Website Launch:** The website, [www.centerforsealevelrise.org](http://www.centerforsealevelrise.org), is constantly being updated with relevant resources and news. In addition to the newsfeeds, resources, social media accounts, and newsletter sign-up, the website also hosts a calendar listing many local, regional, national, and virtual events as well as IPP meetings and activities. Since the website has launched the ODU team has also used the “Center for Sea Level Rise” Facebook account and @ODUSEalevelrise Twitter accounts to promote awareness and IPP activities.
Fall 2014

• **Charter Drafted and Signed:** At a meeting of the Steering Committee on October 10th, 2014, many steering committee members signed on to the Charter (see Appendix).

• **Sen. Kaine Letters:** Sen. Kaine sends letters to federal agencies urging participation in IPP and agency responses sent to Sen. Kaine. The agencies replied throughout the winter with support, and designated points of contact for Hampton Roads. (See Appendix)

• **Department of Defense (DoD) Orders:** DoD officially acknowledged the Hampton Roads Intergovernmental Pilot as one of their three pilots throughout the country, and designated Navy as the lead service. (See Appendix)

Winter 2014-2015

• **FEMA NEP Tabletop Exercise:** FEMA National Exercise Program and the IPP participated in a day-long event serving as the first meeting of all Working Groups and Committees. In the afternoon, participants took a long-view of resilience planning and described how Hampton Roads would function in our children’s and grandchildren’s time. The report from this event is in the Appendix.

• **HRPDC Votes to Officially Participate in the IPP:** The HRPDC Commission officially voted to participate in the IPP, assigning Chair, Mayor Wright of Portsmouth, and Acting Executive Director, Randy Keaton, to the Steering Committee.

• **Committees Begin Work Engaging Stakeholders and Developing Work Plans:** Following the work completed during the FEMA NEP Tabletop Exercise, Working Groups and Committees initiated meeting independently, engaging more volunteers and developing work plans.
Spring 2015

• **Continued Committee Work:** Committees continued to engage new members, and develop work plans. Work plan status reports and feedback opportunities were provided to the Steering Committee and the Senior Advisory Committee in March 2015 (initially scheduled for February and delayed due to winter weather).

• **FEMA Federal Flood Risk Management Standard Public Listening Session:** After the announcement of the new Flood Risk Management Standard to improve the nation’s resilience to climate change, IPP stakeholders facilitated an official Listening Session for FEMA at ODU. Comments on the FFRMS closed in May 2015, and a revised Standard has not yet been issued.

• **HUD NRDC Competition, Public Listening Session for the Commonwealth’s Application:** The IPP fully supports and leverages its stakeholder network to assist the Commonwealth in HUD’s National Disaster Resilience Competition (NDRC). As Part of Phase 1 of the NDRC a public listening session was held regarding the Competition.

• **Urban Land Institute Resilient Region Reality Check:** As the first installment of an annual iterative process involving community feedback to prioritize resilience planning while educating the region, citizens from across ages, socio-economic backgrounds, and business sectors, came together for a day-long event as part of the Citizen Engagement Committee’s work plan development and outreach.12

12 Resilient Region Reality Checks are programs of the Urban Land Institute and Urban Land Institute Hampton Roads, Information is available: [http://virginia.uli.org/uli-action/resilient-region/](http://virginia.uli.org/uli-action/resilient-region/).
Summer 2015

• **Phase 1 Wrap-Up:** Phase 1 of the IPP officially closed in Summer 2014, and the IPP has now moved on to accomplishing Phase 2 goals with a lens towards lessons learned during the first year.

• **ULI Resilient Region Reality Report:** At the Urban Land Institute Hampton Roads Resilient Region Reality Check-In, Michelle Covi, co-chair of the Citizen Engagement Committee presented the results of the Resilient Region Reality Check that took place in March 2015. The Report from the December 2014 Advisory Panel on Fort Norfolk was also presented.13

• **Newsletter Initiated:** As more volunteers sign on to participate, and regional and national interest has grown in the IPP, the conveners have initiated a regular newsletter to provide open lines of communication. The website, Facebook, and Twitter accounts also provide easy means of staying informed.

Other important steps with respect to SLR planning have been taken in Hampton Roads and the Commonwealth since June 2014. The IPP aims to collaborate with, leverage and build upon the work of other organizations promoting adaptation and resilience planning in the region as part of the Whole of Government and Whole of Community process. The items below represent a small sample of the many conferences, events, local, state and federal initiatives taking place to increase resilience in Hampton Roads.

Summer 2014:

• **Governor’s Climate Change and Resiliency Update Commission:** The bi-partisan commission is comprised of leaders from around the state including Ray Toll, the convener of the IPP, Ben McFarlane, of HRPDC and IPP stakeholder, and many other partners. The Commission, tasked with developing a short list of priorities for the current Administration, will wrap up in late 2015.

• **HRPDC Special Committee on Recurrent Flooding (Now Sea Level Rise Advisory Committee) established:** At the request of local leadership, HRPDC established what is now the Sea Level Rise Advisory Committee to develop recommendations for local governments and advocate for federal and state support. All municipalities were invited to appoint staff to the committee, which meets regularly. Many IPP stakeholders are also the designated committee members, and IPP convener staff regularly attends to coordinate.

• **Joint Subcommittee to Study Recurrent Flooding:** Pursuant to HJ 16 (2014) and SJ 3 (2014) the committee is tasked with formulating recommendations for the development of a

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comprehensive and coordinated planning effort to address recurrent flooding. Final recommendations will be presented to the 2016 Session of the General Assembly. (See Appendix for Interim Report)

Fall 2014:

- **Recommendations to the Secure Commonwealth Panel on the Issue of Sea Level Rise and Recurrent Flooding in Coastal Virginia:** After a lengthy process involving many stakeholders throughout the state and approaching sea level rise from an incident command system perspective, the sub-panel submitted the report to the Secure Commonwealth Panel detailing clear recommendations. The comprehensive analysis by the Recurrent Flooding Sub-Panel put forward in this report inform the collaborative planning efforts of the IPP. In addition, the lead author and co-chair of the sub-panel sits on the IPP Steering Committee. The full report can be accessed at [www.norfolk.gov/DocumentCenter/View/17786](http://www.norfolk.gov/DocumentCenter/View/17786).

Winter 2014

- **Chief Resilience Officer Appointed:** Secretary of Public Safety and Homeland Security, Brian Moran was appointed by Governor McAuliffe as the Chief Resiliency Coordinator fulfilling a recommendation of the Secure Commonwealth Panels Subcommittee’s Report.

- **NIST Disaster Resilience Workshop in San Diego:** As part of the National Institute of Standards and Technology’s (NIST) development of an Initial Disaster Resilience Framework workshops were conducted around the country to provide opportunities for stakeholders to engage and provide feedback on resilience planning and implementation strategies. ODU Convener, Emily Steinhilber, presented the Pilot stakeholder engagement and ‘whole of government and community’ methods to NIST leadership and stakeholders.

Summer 2015

- **United States Senate Democratic Steering and Outreach Committee:** Ray Toll briefed many United States Senators from across the nation on the proactive activities taking place on the ground in Hampton Roads focusing on the IPP.

- **Dutch Dialogues Hampton Roads, Life at Sea Level:** After the success of the Dutch Dialogues in other regions through the country including New Orleans, a delegation of water management specialists from the Netherlands collaborated with local experts and stakeholders at Slover Library in Norfolk. The five-day charrette focused on two vulnerable areas – the Tidewater area in Norfolk, and the Newmarke Creek area in Hampton and Newport News. Many IPP stakeholders participated throughout the weekend as experts developed innovative water management solutions specifically for Hampton Roads.

- **IPP Strategic Planning Session:** At the close of Phase 1, the IPP Steering Committee, Working Group and Committee Chairs, and conveners participated in a day long retreat to look back on
the past year, and set a clear path forward for Phase 2. During this meeting, the Steering Committee elected Jim Redick of the City of Norfolk & Secure Commonwealth Panel as Chair and Shawn Talmudge, Homeland Security and Resilience Staff Director for the Commonwealth of Virginia as Vice-Chair.

Committee Reports

Steering Committee & Federal Liaisons

Chair: Jim Redick, City of Norfolk, Emergency Manager & Co-Chair Secure Commonwealth Panel Sub-Panel on Recurrent Flooding (As of August 4, 2015)

Vice Chair: Shawn Talmudge, Homeland Security and Resilience Staff Director, Secretariat of Public Safety and Homeland Security (As of August 4, 2015)

Convener: Ray Toll, Director of Coastal Resilience Research, Old Dominion University

The Steering Committee (see Appendix) and Federal Liaisons are all representatives of their organizations or sectors and participate voluntarily in the IPP. Understanding the risks faced by the region as well as the potential opportunities to a proactive region these leaders are committed to the collaborative process as established in the Charter (see Appendix). Many Steering Committee leaders came together at the IPP launch in June as well as at a bi-partisan event hosted by Senator Kaine later that month to discuss the IPP concept with a public audience. The Steering Committee and Federal Liaisons then met on October 10th, 2014 to discuss a path forward and sign the Charter.

On December 2nd, 2014, the Steering Committee & Federal Liaisons (IPP Leadership) came together at a large event in Norfolk, Virginia to launch the IPP Working Groups and Advisory Committees as part of a FEMA National Exercise Program event. From that point on the Working Groups and Advisory Committees continued to work on their own by following the direction given in the Charter under the leadership of the Convener, Ray Toll.

The IPP Leadership attended a joint meeting of the Senior Advisory Committee on March 18th, 2015, to provide feedback and discuss progress with all active Working Group and Advisory Committee Chairs. The next month on April 27th, IPP Leadership met jointly with the Legal Working group to discuss a logistical path forward for the “post-IPP” framework and entity in Hampton Roads. As a result of this productive meeting, the IPP Leadership, Working Group and Advisory Committee Chairs and selected Senior Advisors, participated in a facilitated strategic planning retreat to formalize the transition from Phase 1 to Phase 2 of the Pilot (see Minutes in Appendix).

Following the Retreat, the IPP Leadership emerged a stronger body capable of providing direction to Working Groups and Advisory Committees focused on creating both a nationally applicable framework as well as recommendations for a local entity charged with sea level rise preparedness and resilience. Among other decisions and strategies discussed, the Steering Committee appointed a Chair and Vice
Chair as seen above and determined that for simplification during the duration of the Pilot the boundaries would be reflective of the Hampton Roads Planning District Commission boundaries, but the group recognized the value of an inclusive approach that included all of those impacted by sea level rise and recurrent flooding within the Commonwealth.

**Working Groups**

**Legal Working Group**

Chair: Roy Hoagland, Director, Virginia Coastal Policy Center, William & Mary Law School

Date of Formation: September 2014

Scope of Work:

As defined by the Charter, the Legal Working Group (LWG) will address legal issues that arise during the IPP and draft a Memorandum of Understanding (MOU) for the follow-on project that emerges from the IPP. The draft MOU will be submitted to the Steering Committee no later than April 2016. The Working Group will consult with contacts designated by other Steering Committee members.

Key Findings and Actions:

- The LWG has sought an attorney from every Hampton Roads jurisdiction to participate in addition to private leadership groups, and has requested that the Steering Committee send a formal participation invitation letter to all Hampton Roads jurisdictions as follow up.
- The LWG has assigned liaisons to all Working Groups and Committees to communicate any legal questions that may arise to the LWG, but does not serve as counsel to the Working Groups or Committees.
- The LWG has developed the first version of a Legal Primer to serve as a legal reference document for the Steering Committee and other Working Groups and Advisory Committees. This living document will be supplemented as additional issues and questions arise, and the current version can be found in the Appendix.
- By the close of 2015, the LWG will have a set of permanent structure options available to share with the Steering Committee per the Steering Committee strategic planning meeting in August 2015.

**Infrastructure Planning Working Group**

Chair: Ann C. Phillips, Rear Admiral, US Navy (Ret.)

Formed: November 2014

Scope of Work:

As defined in the Charter, the Infrastructure Working Group (IWG), will review critical infrastructure in the Hampton Roads region, determine which are most suited to and will be most positively affected by
adaptation planning, and, make recommendations to the Steering Committee for intergovernmental coordination of that planning.

The IWG will further coordinate with the Private Infrastructure Advisory Committee, as well as other IPP working groups and committees where required due to impact on public infrastructure, to formulate recommendations to coordinate with privately owned infrastructure planning.

In its early meetings the IWG identified additional objectives in order to complete its work. The IWG aims to:

- Ensure appropriate agencies and organizations are represented in the IWG, with a focus on inclusion of municipalities, working through City Managers, to address representation as they designate.
- Address and identify representative studies that address SLR impact, adaptation planning, and critical infrastructure protection as applicable to the Hampton Roads region.
- Identify and obtain access to modeling and simulation efforts that may support, and or have already been developed in support of SLR impact, in particular as related to identification of and planning to protect, build resiliency, and where practical, quantify efforts to prioritize planning and protection of critical infrastructure across the HR region. Consider work done by Federal or State level agencies that may already be available and may facilitate working group’s objectives.
- Working with the Private Infrastructure Advisory Committee, consider privately owned utilities in this prioritization effort where they impact resiliency of public infrastructure.

Key Findings:

- The IWG does not recommend or endorse recommendations of any particular scientific body or report. For the purposes of conducting a test planning scenario, the IWG with the recommendations of VIMS and support of the Science Advisory Committee have made the following selections. This is not a “prioritization” demonstration or an endorsement of particular sea level rise planning scenarios.

- There are a number of quality studies done in this region surrounding the impact of storm surge and sea level rise on transportation infrastructure with focus on military transportation and use. Likewise, several notable studies from either the larger regional area, or from other areas, (RRAP, Gulf Coast II and NACCS) provide considerable insight into processes used to review the impact of storm surge and SLR, not only in this region, but elsewhere similar impacts are occurring. Further, NASA, NOAA, National Climate Assessment, VIMS, USACE, all have or use models that provide ever more accurate understanding of past SLR activity, and future SLR and subsidence predictions regionally. However, there is not a single study that this team has reviewed to date that describes what to do about SLR impact, in this area or elsewhere, other than in very general terms. There is a great need for such a study in this region, and for detailed analysis of the options, the cost of those options, and the cost of not doing any of those options and simply dealing with the after effects of storm surge and SLR activity as they occur. Until
such a study is undertaken, it will be very difficult for this region to prioritize regionally, and determine which actions will be the most cost effective and impactful, regionally, over time.

- Policy documents or studies reviewed recommend a collaborative regional planning process, and recommend action be taken to this end sooner rather than later. Whether talking about this region or others, complacency towards planning for a slow but nevertheless impactful threat only ensures a more costly and more negative outcome the longer that action is delayed. This committee feels a regionally structured plan, with clear legal authority, funded, executed and monitored by whatever government processes are necessary can achieve long-term success.

- The success of this committee to date stems from the participation of Federal, State, and Local government participants, which, according to membership, is the first time they have participated locally on this topic in a group with this level of diversity.

- Collaboration between committees and working groups of the IPP effort, in particular at the leadership level, will be critical to the success of Phase II of this pilot. At present there is not a format or venue for this collaboration to take place in a structured way. It is not clear to the IWG that all committees and working groups have the same understanding of IPP objectives and outcomes for Phase II.

- The IWG appears to be one of the more active bodies in the IPP. While this may be appropriate up to this point, it is the opinion of the IWG that other committees and working groups need to engage more fully to ensure that any findings are supported by sound analysis and research, to the extent possible. Broader engagement of such committees and working groups is also vital to obtain a regional consensus regarding future planning activities.

- Steering Committee participation and activity is critical to IPP success. Late engagement of the Steering Committee will eventually hinder the overall outcome and success of the effort. Increased engagement of the Steering Committee will be critical to address decisions that need to be made by the committees and working groups, despite data gaps and potential conflicts that could arise between the varying representatives as the planning decisions become more definitive. The retreat taking place at the transition from Phase 1 to Phase 2 and naming of Steering Committee leadership should drive Steering Committee engagement.

- Committee members and chairpersons participate as volunteers. There are inherent limitations to using voluntary working groups without committed staff hours or funding to conduct work of this complexity. Specific funding opportunities should be investigated across federal, state, local and non-profit partners, to address staffing issues and to ensure staffing consistency. In addition, funding for working group leadership and documentary support, and other key positions should be prioritized. In order to adequately document this effort, in particular in Phase II, assistance in documenting meeting proceedings and specific committee activities will be critical to success, and that assistance should be supported by the convening leadership (ODU) to ensure the outcomes and IPP processes are documented appropriately and with consistency.

- While there is such a thing as too many committee members, it is critical to ensure adequate and diverse representation from across the region.
• Representative exchange across committees (as in the Legal WG assigning reps to the other WG’s) has been very effective.

• A lot of work addressing SLR has previously been completed by several agencies. Bringing all of these disparate studies together has been a task unto itself but necessary in order to not duplicate work.

• There are significant data gaps that need to be addressed with respect to Economic Modeling in Phase II and beyond. For instance, the IWG has concluded that any planning activities taken to address infrastructure need to address the cost and benefits of proposed actions to aid in decision-making. Despite these identified needs, the Economic Impacts Advisory Committee created to study such issues has not had any meetings to date; therefore, their engagement must increase dramatically in Phase II.

**Land Use Planning Working Group**

**Chair:** Burrell Saunders, Chairman, Urban Land Institute Hampton Roads & Saunders + Crouse Architects

**Formed:** December 2014, Reinitiated in April 2015

**Scope of Work:**

In accordance with the Charter, the Land Use Planning Working Group (LUWG) will recommend which land use related plans, programs and policies in Hampton Roads require adaptation planning and formulate recommendations for intergovernmental coordination. In consultation with the Municipal Planning Advisory Committee, the Working Group will address land use planning, floodplain management, local government comprehensive plans, zoning, building codes and other plans, programs and policies it identifies in the course of its work.

**Key Findings:**

• Because the term “land use” encompasses so many elements of the ways in which we live, work, and do business in Hampton Roads, the Land Use group envisions its mission extending beyond the length of the IPP though continued collaborations of the Urban Land Institute Hampton Roads, Old Dominion University, and other partners.

• During Summer 2015 the LUWG engaged in extensive due diligence comparing current land use practices and recommendations for coastal resilience in Hampton Roads with practices and recommendations nationally. In addition, the LUWG has initiated the process of understanding both water-dependent and non-water-dependent land uses locally in an effort to develop short, mid, and long-term strategies for smart land use practices in the face of coastal change.

• Next, the LUWG envisions facilitating a regional mapping exercise or charrette to better understand our assets, liabilities, and opportunities as they pertain to our current water-dependent and non-water-dependent land use patterns.
Moving into the exploration phase of land use planning, the group will address a number of specific study areas, modeled on similar work completed by ULI in Boston addressing high and low vulnerability areas locally and generating short reports on each site. The group will then initiate a series of workshops and continue to lead an iterative process coupling exploration and understanding with implementation recommendations.

Citizen Engagement Working Group

Chairs: Michelle Covi, Climate Adaptation and Resilience, Assistant Professor of Practice, Old Dominion University, Virginia Sea Grant,
Chris Bonney, Chair, Hampton Roads Center for Civic Engagement & Bonney & Company


Scope of Work: As defined by the Committee in support of the Charter, the Citizen Engagement Working Group (CEWG) shall identify optimum strategies for creating respectful engagement between “whole of community” and “whole of government.” The CEWG shall also identify and segment key community segments, identify and tap into established community networks to assist in engagement and communications activities, identify and develop strategies for overcoming obstacles to engagement and communications. Identify community priorities for coordinating sea level rise preparedness and resilience activities. Create “base level” engagement and communications template suitable for all communities. Add customized elements for different communities.

Key Findings:

• Regional collaboration and public education and outreach are high priorities that apply directly to the CEWG.

• There are many established networks and ways of reaching people.

• There is a great deal of diversity in the networks and many ways to get word out from Girl Scouts to seniors.

• We are missing key groups in our engagement efforts.

• We need to find or develop strategies to have effective two-way engagement of citizens with resilience.

Public Health Working Group

Chair: Dr. Steven Becker, Professor of Community and Environmental Health, Old Dominion University

Date of Formation: April 2015

Scope of Work:
The aim of the newly-established Public Health Working Group is to make public health an integral part of the work of the pilot. Some of the most serious impacts of sea level rise are those affecting public health. At the most obvious level, bigger storm surges and increased flooding can result in deaths and injuries in affected communities. But there are also numerous, important indirect public health consequences of sea-level rise. For example, higher sea-water levels can encroach on essential public health facilities such as sewage treatment sites, water purification facilities, septic tanks, and even landfills, endangering water quality and spreading biological and chemical contamination. Rising sea-levels can also result in increased salinity of estuaries and aquifers, affecting critical drinking water supplies. Meanwhile, increased flooding can cause population displacement and dislocation, resulting in mental health effects and other health issues. And standing water left after floods can enable the rapid growth of mosquito populations, spreading infectious disease. These and many other effects make it clear that public health impacts and implications are central to the problem of sea-level rise.

The aim of the newly-established Public Health Working Group is to effectively incorporate public health issues, challenges, expertise and solutions into the work of the pilot. More specifically, the Public Health Working Group aims to:

- Analyze public health issues as they pertain to sea level rise in Hampton Roads.
- Identify ways to incorporate public health issues into the projects and activities of the IPP.
- Involve and engage the public health community in the work of the IPP.
- Identify special areas of expertise that public health can contribute to the IPP. These include public health emergency preparedness, health and environmental risk communication, health-related community outreach, epidemiology, industrial hygiene, and working with vulnerable/special needs populations.
- Develop new and innovative solution-oriented projects to address public health aspects of sea-level rise locally and in a way that may serve as a model for other communities around the nation.

**Advisory Committees**

*Science Advisory Committee*

**Chairs:** Larry Atkinson, *Professor of Oceanography, Old Dominion University*
Carlton Hershner, *Director, Center for Coastal Resources Management, Virginia Institute of Marine Science*

**Formed:** December 2014

**Scope of Work:**
The Science Advisory Committee is responsible for providing the Executive Steering Committee with critical information based on relevant scientific research of interest to the IPP. Topics will include information on global mean sea level rise, local relative sea level rise, vertical land motion, dynamical ocean change, ocean fingerprinting, extreme water levels, decision frameworks, risk management, and uncertainty management in addition to any other scientific inquiries made by the Executive Steering Committee.

Additional work includes providing updates on the activities of Federal agencies relevant to Hampton Roads to other stakeholders and developing a plan for and a mechanism to provide integrated information on science observations and information.

The Science Advisory Committee will also develop a ‘roadmap’ or ‘framework’ for summarizing sea level rise knowledge, integrating information, and identifying gaps in sea level rise observation.

**Key Findings:**

- The formation of the IPP and the Science Committee has significantly helped mobilize various state and federal science agencies to approach the needs of the region.

- It is important to keep critical lines of communication open between the many stakeholders and the science agencies.
  - Bi-weekly conference calls between the science agencies and local scientists are established and will continue for the purpose of facilitating the scientific needs of the Pilot and Hampton Roads Region. This call includes many scientists at NOAA headquarters and various USGS offices in Virginia and California.
  - A subsidence group has been coordinated by USGS that has met at HRPDC and will be developing a plan for subsidence measurements.
  - A Science Committee liaison to other Committees and Working Groups helps to communicate scientific information to other stakeholders and to learn what information needs exist in the other groups.
  - Specific findings of the Science Committee are collected in regular Newsletters published by the Committee and are included in this report as an Appendix.

- VIMS is in the process of completing its tasking by the Governor’s Climate Change and Resiliency Update Commission to update the sea level rise projections for coastal Virginia.

**Economic Impacts Advisory Committee**

**Chair:** Chip Filer, Associate Professor, Old Dominion University (as of September, 2015)

**Formed:**

While a group met during the December 2014 FEMA event, the group has not continued meeting, however, we expect this group to coalesce in the beginning of Phase 2, as many economists and private sector individuals are willing to collaborate as a member of this committee.
Scope of Work:

There is no scope of work clearly delineated in the Charter, and the group has not drafted a Scope of Work. We expect this Committee to work in a similar manner as that of the Science committee – experts from private, federal, state, local, and academic backgrounds coming together to address research gaps relevant to effective coastal resilience planning in Hampton Roads. Should the IPP become a separate funded entity, the scope of the Economic Impacts committee may change as funding becomes available to fund specific studies. Additionally, this or another committee should address, in detail potential funding mechanisms for adaptation to sea level rise regionally.

Key Findings:

While there are no significant key findings of the group, it is clear that in order to motivate a region to plan effectively for sea level rise and coastal change, significant information must be known with regards to the economic impacts of both doing nothing as well as implementing various methods of adaptation.

**Municipal Planning Advisory Committee**

**Chair:** NA

**Formed:** While a group met during the December 2014 FEMA event, the group has not continued meeting.

**Scope of Work:**

This group has not established an independent scope of work and instead the IPP closely monitors activity of the HRPDC Sea Level Rise Advisory Committee.

**Key Findings:**

This group has not been initiated in part due, to a Pilot effort not to duplicate existing committee work or processes within the region, but instead to collaborate with existing structures. In June 2014, HRPDC established the Special Committee on Recurrent Flooding and Sea Level Rise now called the Sea Level Rise Advisory Committee. Due to the Pilot’s close relationship with the HRPDC, and the HRPDC’s existing relationship with municipal staff across all 17 jurisdictions, the Pilot chose to instead request the HRPDC committee representative to participate in the LUWG and also attends meetings of the Sea Level Rise Advisory Committee. Despite the lack of independent Municipal Planning Advisory Committee, the Pilot maintains the importance of close relationships with municipal staff involved in sea level rise planning, and more municipal participation at all levels is welcomed and encouraged.

**Private Infrastructure Advisory Committee**

**Chair:** Carol Considine, *Associate Professor of Engineering Technology, Old Dominion University*

**Formed:** February, 2015
Scope of Work: The Private Infrastructure Committee (PIC) is responsible for providing support to the Infrastructure Planning Working Group (IWG) regarding critical private infrastructure for the IPP. Support will include identification of: critical private infrastructure, dependencies & interdependencies between private and public infrastructure, best practices of sea level rise (SLR) adaptation by industry sector and restrictions and limitations (administrative, managerial, jurisdictional or legal) to private/public SLR preparedness infrastructure planning. In Phase II of the IPP, the PIC will support IWG in the adaptation planning for two (2) selected infrastructures in the Hampton Roads region.

Key Findings:

- In order to minimize stakeholder engagement time, and begin work, the committee was composed of representative private infrastructure organizations. For example, while other hospitals operate in the area, only Sentara participated in the committee and the same was true for other sectors. In some cases, such as the electric industry this was not an issue as Dominion is the only provider regionally.

- The Private Infrastructure Committee has identified the following restrictions and limitations (administrative, managerial, jurisdictional or legal) to private/public SLR preparedness infrastructure planning:
  - The ability to identify interdependencies between private and public infrastructure and vulnerabilities when some information is proprietary.
  - Private industry, including infrastructure, needs to be informed as to what amount of sea level rise they should be using for planning in the short and long term or provided the necessary information to draw their own conclusions.
  - Uncertainty on how public and private organizations will work together (public/private partnerships).
  - Methods of sharing and protecting proprietary information should be developed for the purposes of resiliency planning.
  - Codes regarding construction standards related to SLR vary by city, a regional or Commonwealth code requirement should be implemented to eliminate confusion and could be included in DCR’s Floodplain Management Plan for the Commonwealth or elsewhere as applicable.
  - Underwriter insurance requirements may differ from code requirements causing confusion. What are the underwriter requirements by industry sector for the region?
  - Financial/funding barriers.

- The U.S. Department of Energy, Energy Infrastructure and Modeling and Analysis Division (EIMA) has recently completed a study to assess the potential exposure of energy facilities in the Hampton Roads region to a general rise in sea level and from storm surge at these higher sea levels. The analysis focused on the risk in 2050 and 2100, and included electricity assets, natural gas assets, and petroleum assets. The results of the study indicate that these assets would not be inundated under the National Climate Assessment (NCA) Intermediate-High SLR Scenario in 2050. However there is significant risk to these assets when a storm surge associated with a
Category 4 Storm is considered. In addition, the NCA Intermediate-High Scenario predicts 5 feet of SLR by 2100, which would inundate multiple energy assets in Hampton Roads. A Category 1 storm in addition to the 5 feet of SLR would cause extensive inundation of energy assets. The results of this report are being shared with respective energy providers for their consideration in SLR planning and adaptation efforts.

- Dominion Power has been proactive in hurricane preparedness planning per Federal Energy Regulatory Commission (FERC) requirements. They have already elevated and hardened some of their facilities. They are active in CIGRE, the Council on Large Electrical Systems, which is an international non-profit association that promotes collaboration and knowledge sharing with experts around the world to improve electrical systems. They have contributed to the development of and use the “Air Insulated Substation Design for Severe Climate Conditions, B3.31”, 2014, CIGRE publication which provides best practices for design of electrical infrastructure. While they have not incorporated sea level rise (SLR) into their current hurricane preparedness planning, they indicate that incorporating it in future planning will not be difficult.

- Lessons learned from Hurricane Isabel in 2003, and Hurricane Katrina in 2005 should inform the pilot’s planning process.

- Sentara Norfolk General Hospital, the only Level-1 Trauma Center in the region, specifically and the entire Sentara systems are proactive in severe weather and emergency preparedness. The hospital system must comply with the standards of the American Society for Health Engineering. Part of these standards includes the development of Hazard Vulnerability Analysis, which includes a matrix to determine risk exposure. Sentara is including adaptation/hardening of facilities in all capital improvement projects.

- Federal agencies are going to be instrumental partners as the pilot moves forward. Both the U.S. Department of Energy and the U.S. Environmental Protection Agency have provided or highlighted resources that they have to inform the pilot (data/reports) and contribute to best practices.

- The Private Infrastructure committee serves a support role to the Infrastructure Working Group. Having a liaison between these two committees has been critical in keeping the committee informed. It has also been informative and beneficial to have a liaison from the Legal Committee regularly attend and participate in the Private Infrastructure committee. As a support committee the work of the committee is heavily dependent on the decisions made within the Infrastructure Working Group.

- Private industry is becoming more aware of the impacts of SLR on the Hampton Roads region, however additional outreach is necessary. Some key industries are proactively identifying how SLR will impact their specific industry and are starting a process to incorporate SLR in their
planning process. There are many tools available to aid industry in the planning process, however additional research to identify these tools and make the available to industry in one location is necessary. In addition, research of best practices for public/private partnerships will be important as the IPP is formalized and continues to move forward.

**Senior Leadership Advisory Committee**

**Chair:** Joe Frank, *Former Mayor of Newport News & Partner, David, Kamp, & Frank LLC*

**Formed:** December 2014

**Scope of Work:**

The Senior Advisory Committee consists of community leaders, both retired and active, with extensive personal and professional networks as well as expertise in local, state, and national, policies and procedures. This group does not have formal tasking, but exists to provide support to the Convening staff as well as the Steering Committee when necessary.

**Key Findings:**

The Senior Advisory Committee first met during the December 2014 FEMA event and subsequently in March 2015 to be briefed by all active Working Groups & Committees. Since March 2015, the group has been called on as needed to provide advice to the conveners or members of the Steering Committee, and has participated in Steering Committee meetings in an advisory capacity. IPP participants believe, that while many of these committee members do not fit formally into focus areas of the IPP, the experiment would not be complete without certain members’ guidance and support.

**Conclusion**

After one year of IPP activity, the region is well on its way to establishing not only an entity to initiate regional sea level rise collaboration after the completion of Phase 2, but also an ongoing process for community engagement, research collaboration, and a Hampton Roads equipped to thrive with the water as it has done for hundreds of years.

While the organizational and stakeholder engagement process is time consuming, the process has been rewarding not only for the IPP leaders and conveners, but for many participants. Many goals initially set forth in the Charter have been accomplished and the process will move forward in Phase 2 with a greater eye towards establishing a long-term arrangement for collaboration with federal, state, local, and private parties.
Photo Courtesy of Amy Matzke-Fawcett
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N. Science Advisory Committee

1. Membership

2. Summary Narrative – Science Committee Observations and Realizations from Phase 1

3. Science Committee Newsletters

   1. Hampton Roads Pilot Science Team Update March 2015
   2. June 2015 Update of the Hampton Roads Intergovernmental Planning Pilot Project Science Advisory Committee

O. Senior Advisory Group

1. Membership
A. Charter, October 2014
Hampton Roads Sea Level Rise Preparedness and Resilience
Intergovernmental Planning Pilot Project
Charter
October 10, 2014

Mission

The mission of the Pilot Project is to develop a regional “whole of government” and “whole of community” approach to sea level rise preparedness and resilience planning in Hampton Roads that also can be used as a template for other regions.

Vision

Upon completion of the Pilot Project, Hampton Roads will have in place intergovernmental planning organizational arrangements and procedures that can effectively coordinate the sea level rise preparedness and resilience planning of Federal, state and local government agencies and the private sector, taking into account the perspectives and concerns of the citizens of the region.

Statement of the Problem

The Hampton Roads region has an economy and culture tied largely to the strength of its ports and waters. Its geography has attracted large military installations, shipping ports, manufacturing facilities, commercial fishing, residential development, academia, outdoor recreation and tourism. The vitality of the region as a whole is dependent upon the continuing maritime and coastal activity. Additionally, the operational effectiveness of the military bases in the region are critical to US national security.

The Hampton Roads region is already being impacted by sea level rise and this is projected to continue over the next century. The impacts of sea level rise are broad and without effective preparedness and resilience measures in place will have potentially serious consequences for the region, threatening the regional economy, safety and quality of life, and the ability of the region’s government and business sectors, such as military bases, transportation and public and private utilities, to carry out their missions. Effective regional preparedness and resilience planning for sea level rise requires coordination of the planning efforts of Federal, state and local government agencies and the private sector, with public participation in the planning process.

Timeline

The Pilot Project will be conducted in two phases, each tentatively lasting one year.

The goal of the first phase is to develop organizational structure and operating procedures for intergovernmental coordination of sea level rise preparedness and resilience planning. Phase I will include fact-finding to identify the relevant stakeholders in the regional sea level rise planning effort; review Federal, Commonwealth of Virginia, and regional reports and policy
documents that may provide guidance or recommendations applicable to this regional planning effort; review other regional sea level rise planning efforts in the United States and abroad to identify lessons learned and best practices; and assess the value of modeling and simulation tools for the initial planning efforts to be launched in Phase II. Utilizing the information gathered, the Project shall conclude Phase I with a report identifying the findings of the Steering Committee.

The goal of the second phase is to use the findings of the Steering Committee to draft a Memorandum of Understanding among the members of the Pilot Project that establishes an intergovernmental planning coordination organization that will commence operations upon conclusion of the Pilot Project. The Phase I report will be used conduct initial coordination of sea level rise preparedness and resilience planning on a trial basis to test and refine organizational structure and operating procedures. The lessons learned from the initial planning coordination efforts in Phase II will be used to prepare the Memorandum of Understanding.

Initial Structure

Voluntary Participation
Participation in the IPP is voluntary. Steering Committee members, Liaisons, Working Group members and Advisory Committee members may withdraw at any time for any reason. Participation in the IPP does not bind any member, or the organization that he or she represents, to any action or expenditure. Participation in the IPP does not obligate any member, or the organization he or she represents, to enter into any agreement or Memorandum of Understanding.

Steering Committee
Voting Members:
  Commonwealth of Virginia
    Office of the Secretary of Natural Resources
    Virginia Port Authority
    Virginia Department of Transportation, Hampton Roads District
    Virginia Coastal Zone Management Program
    Virginia Department of Conservation and Recreation
  Hampton Roads Regional Organizations and Local Authorities
    Chair and Vice Chair, Hampton Roads Planning District Commission
    Two Chief Administrative Officers selected by the HRPDC chair
    City of Norfolk, Office of Emergency Preparedness and Response
  Private Sector
    Huntington Ingalls Newport News Shipbuilding

Federal Government Liaisons

    US Navy
    Commander Navy Region Mid-Atlantic
    Commanding Officer, Naval Facilities Engineering Command Mid-Atlantic
Commander, Norfolk District, US Army Corps of Engineers
Commander Joint Base Langley-Eustis
US Coast Guard
Commanding Officer, US Coast Guard Shore Infrastructure Logistics Center
Commander Fifth Coast Guard District
National Security Council
Council on Environmental Quality

Responsibilities of Steering Committee Members and Federal Liaisons

- Actively contribute to the deliberations of the Steering Committee.
- Attend Steering Committee meetings and participate in other Steering Committee activities to the maximum extent possible.
- Principals may designate an alternate who has authority to speak and vote on behalf of the principal.
- Keep the Member’s organization informed of Steering Committee deliberations and activities, and provide feedback to the Steering Committee as appropriate.
- Provide “reach back,” serving as a link to other offices in the Member’s organization that may be able to provide information, analyses.

Chair and Vice Chair

The Steering Committee shall elect a Chair and Vice Chair from among its members to serve one year terms from the date they are elected.

Working Groups

The Steering Committee will establish Working Groups and Advisory Committees as required to accomplish the mission of the Pilot Project. Federal agencies will serve as liaisons to the Working Groups and Advisory Committees, as appropriate. The following list is provided as an initial structure and may be modified as necessary by the Steering Committee.

The Working Groups shall fulfill fact-finding, advisory, and/or planning functions. The Steering Committee shall task each Working Group with specific goals and functions. The Chairperson of the Working Group shall oversee the activity of the Working Group and report to the Steering Committee.

Legal Working Group. This Working Group will address legal issues that arise during the Pilot Project and draft a Memorandum of Understanding (MOU) for the follow-on project that emerges from the pilot project. The draft MOU will be submitted to the Steering Committee no later than April 2016. The Working Group will consult with contacts designated by other Steering Committee members.

Infrastructure Planning Working Group. This Working Group will recommend which infrastructures in Hampton Roads require adaptation planning and formulate recommendations for intergovernmental coordination of that planning, and in consultation
with the Private Infrastructure Advisory Committee, formulate recommendations for
privately owned infrastructure planning.

**Land Use Planning Working Group.** This Working Group will recommend which land use
related plans, programs and policies in Hampton Roads require adaptation planning and
formulate recommendations for intergovernmental coordination. In consultation with the
Municipal Planning Advisory Committee, the Working Group will address land use
planning, floodplain management, local government comprehensive plans, zoning, building
codes and other plans, programs and policies it identifies in the course of its work.

**Citizen Engagement Working Group.** This Working Group will prepare a communications
and engagement plan for the Steering Committee that addresses informing the public on the
Pilot Project on an on-going basis, and soliciting public comment on recommendations for
intergovernmental coordination of planning. The Working Group also will coordinate
messaging, oversee the ODU public-facing web site, and organize public events. The
individuals listed below may designate Working Group members from their organizations,
but are themselves responsible for approving the communications and engagement plan that
will be submitted to the Steering Committee. The Working Group will consult with contacts
designated by the other Steering Committee members and with the Citizen Engagement
Advisory Committee.

**Advisory Committees**

The Steering Committee will establish Advisory Committees as required to accomplish the
mission of the Pilot Project and designate Chairpersons for each. Advisory Committees will
provide information and recommendations to the Working Groups and the Steering Committee.
The following list is provided as an initial structure and may be modified as necessary by the
Steering Committee.

**Phase I**
- Science Advisory Committee
- Economic Impacts Advisory Committee
- Municipal Planning Advisory Committee
- Private Infrastructure Advisory Committee
- Citizen Engagement Advisory Committee
- Senior Leadership Advisory Committee

**Additional Advisory Committees for Phase II**
- Engineering, Planning and Design Solutions Advisory Committee
- Industry Advisory Committee
- Legal and Legislative Advisory Committee
- Natural Environment Advisory Committee
Deliverables

Phase I

- October 2014. Elect a Chair of the Steering Committee, approve chairs for the advisory committees, and approve a work plan for Phase I
- October 2014. Initial report on the jurisdictional and legal issues that must be addressed in establishing an intergovernmental planning organization. (Legal Working Group)
- December 2014. Report on the initial organizational structure and operating procedures for coordinating intergovernmental planning in Phase II, including proposals for resolving management and administrative issues, and the jurisdictional and legal issues identified by the Legal Working Group.
- February 2015. Report on specific preparedness and resilience planning issues to be addressed in Phase II. This need not encompass the full range of issues that should be addressed; it should identify a set of issues that reasonably can be addressed within anticipated time and resource constraints. The Scope of Planning section below provides a starting point for identifying these preparedness and resilience planning issues.
- March 2015. Report on the administrative, management, jurisdictional and legal issues that must be addressed to commence coordinated intergovernmental planning in Phase II and to establish an intergovernmental planning organization upon completion of the Pilot Project.
- April 2015. Submit Plan of Action for Phase II.
- June 2015. Final report on Phase I, including all the deliverables listed above and a template for establishing an intergovernmental planning organization that can be adapted to the unique circumstances of other regions.

Phase II

- July 2015. Commence work on the Action for Phase II.
- December 2015. Report on recommended organizational structure and operating procedures for the intergovernmental planning organization that will be established upon completion of the Pilot Project.
- January 2016. Progress Report on coordination of planning on the specific planning issues addressed in Phase II, including lessons learned during the planning process.
- March 2016. Comprehensive, detailed list of the preparedness and resilience planning issues to be addressed by the intergovernmental planning organization, including a list of the critical infrastructures that need to be included.
- March 2016. Procedures for monitoring implementation of individual plans developed by government agencies and stakeholders to ensure consistency with the regional interagency planning coordination guidance developed by the intergovernmental planning coordination organization, and periodic review of regional plans to improve them based on experience with implementing them and to keep them current with changing circumstances.
- April 2016. Memorandum of Understanding among the members of the Pilot Project that establishes an intergovernmental planning coordination organization that will commence operations upon conclusion of the Pilot Project.
June 2016. Final report on Phase II, including all the deliverables listed above and an update to the template developed in Phase I based on the lessons learned in Phase II.

Key Issues

A number of issues must be addressed in establishing an intergovernmental planning organization for coordinating sea level rise preparedness and resilience planning:

- Authority: The degree to which the intergovernmental planning organization will be able to coordinate regional planning, which could range from making recommendations on coordination of specific plans and policies across multiple government agencies and jurisdictions, to producing integrated regional plans to be implemented by all the government agencies and jurisdictions in the region.
- Structure: Government agencies and key private sector stakeholders that need to be included in coordination of planning, and public engagement.
- Governance: Leadership of the intergovernmental planning organization and decision-making procedures.
- Scope of Planning: Plans and policies to be coordinated, which could cover land use plans, local government comprehensive plans, zoning and building codes, floodplain management, design and prioritization of transportation projects, construction projects to protect or accommodate, resiliency requirements for privately owned infrastructure such as electrical distribution, natural gas and telecommunications, and other planning issues.
- Resources: Staffing and sources of funding for the intergovernmental planning organization, including the cost of research, travel and events required during the planning process.
- Execution: Monitoring implementation of individual plans developed by government agencies and stakeholders to encourage and assess consistency with the regional planning recommendations developed by the intergovernmental planning organization, and periodic review of regional plans to improve them based on experience with implementing them and to keep them current with changing circumstances.

Scope of Planning

The Pilot Project will adopt the adaptive management approach to planning. Application of this approach will be developed in Phase I and included in the Phase I Final Report. Phase II will include an initial test of the adaptive management approach.

Initial planning will address the four major impacts of sea level rise:
- Permanent inundation
- Increased tidal flooding
- Increased storm-related flooding, both frequency and magnitude. This is referred to as recurrent flooding in Commonwealth of Virginia planning.
- Combined impact of sea level rise, precipitation and groundwater elevation on storm water drainage.
The Pilot Project will assess whether additional sea level rise impacts should be added in Phase II or at a later time, including shoreline erosion, saltwater contamination of aquifers, and loss of wetlands and other natural areas that provide buffers against storm surge.

Planning will encompass the three strategies for adaptation:
- Protect
- Accommodate
- Retreat

Planning will address intergovernmental and private stakeholder coordination of key plans and policies:
- Land use planning, to ensure that adjacent areas controlled by different government agencies or private stakeholders adopt mutually supportive measures for adapting to permanent inundation, tidal flooding and storm surge
- Engineering and construction solutions for protecting vulnerable areas, which may have to extend across jurisdictional boundaries and encompass areas owned by private stakeholders
- Ensuring the resilience of critical infrastructure, including transportation, electrical distribution, water supplies, sanitation systems, telecommunications and others on the Department of Homeland Security list of critical infrastructures.

The Steering Committee will keep abreast of parallel Federal, Commonwealth of Virginia and Hampton Roads regional efforts that may impact the Pilot Project, including:
- Council on Climate Preparedness and Resilience and the State, Local and Tribal Leaders Task Force established by Presidential Executive Order 13653, “Preparing the United States for the Impacts of Climate Change”
- US Army Corps of Engineers North Atlantic Coast Comprehensive Study
- Federal Emergency Management Agency Floodplain Management Program and Region III Coastal Analysis and Mapping Storm Surge Study
- Virginia General Assembly, Joint Subcommittee on Recurrent Flooding
- Governor’s Climate Change and Resiliency Update Commission
- Hampton Roads Planning District Commission Special Committee on Recurrent Flooding and Sea Level Rise

**Communications and Public Engagement**

Federal statues and the Code of Virginia contain specific requirements for informing the public on the activities of public bodies and soliciting public input on proposed polices. The Steering Committee will ensure that the Pilot Project complies with applicable statutory requirements and coordinates its communications and outreach with those of participating government organizations.

**Initial Management**

Old Dominion University will serve as convener and facilitator until the Steering Committee takes action on permanent management.
**Resources**

- For Phase I Old Dominion University will serve as convener and facilitator, and provide a password-protected portal for Steering Committee members and an open web site for the public. ODU will identify staffing and resources required to carry out those functions. Individual government agencies and private stakeholders will fund their own expenses during Phase I.

- In Phase I the Pilot Project will identify staffing and sources of funding for the Phase II of the Pilot, in which initial coordination of planning efforts will commence. This should include the cost of staffing, research, travel and events required during the planning process.
This Charter is this ___ day of __________________, 2014, hereby signed by the following, consisting of the Steering Committee and Federal Liaisons to the Hampton Roads Sea Level Rise Preparedness and Resilience Planning Intergovernmental Pilot Project.

Steering Committee

____________________________________________
Commonwealth of Virginia, Office of the Secretary of Natural Resources

____________________________________________
Virginia Port Authority

____________________________________________
Virginia Department of Transportation, Hampton Roads District

____________________________________________
Virginia Coastal Zone Management Program

____________________________________________
Virginia Department of Conservation and Recreation

____________________________________________
Hampton Roads Planning District Commission

____________________________________________
City of Norfolk, Office of Emergency Preparedness and Response

____________________________________________
Huntington Ingalls Newport News Shipbuilding

Federal Liaisons

____________________________________________
Commander Navy Region Mid-Atlantic

____________________________________________
Commanding Officer, Naval Facilities Engineering Command Mid-Atlantic

____________________________________________
Commander, Norfolk District, US Army Corps of Engineers

____________________________________________
Commander Joint Base Langley-Eustis

____________________________________________
Commanding Officer, US Coast Guard Shore Infrastructure Logistics Center

____________________________________________
Commander Fifth Coast Guard District
B. Letters from Senator Kaine & Agency Responses
October 28, 2014

The Honorable Kathryn Sullivan
Administrator
National Oceanic and Atmospheric Administration
U.S. Department of Commerce
1401 Constitution Avenue NW
Washington, D.C. 20230

Dear Dr. Sullivan:

I write to request your official support for a pilot project underway in the Hampton Roads region of Virginia to coordinate the region’s response to sea level rise and recurrent flooding.

As you know, Hampton Roads comprises some 1.6 million people in 14 counties and independent cities and a regional economy based heavily on military assets, including the largest naval installation in the world. It is also a low-lying coastal region where sea level rise, land subsidence, and extreme weather vulnerability converge to create major flooding challenges.

Resiliency touches cross-cutting sectors such as commercial and residential buildings, transportation infrastructure, water infrastructure, air and water quality, and federal facilities. Governance of these sectors is distributed among federal agencies, Virginia state agencies, the Virginia General Assembly, Hampton Roads regional planning bodies, local governments, and the federal facilities that rely on resilient municipal infrastructure.

The Hampton Roads region has aimed to be vigilant in emergency preparedness, proactive in seeking federal support for resilient infrastructure, and cognizant of the impacts of flooding on federal facilities. This summer, Old Dominion University (ODU), in Norfolk, unveiled a Hampton Roads sea level rise adaptation pilot project to coordinate these efforts via a "whole of government" approach. The pilot is a two-year effort to bring together a team of federal, state, regional, and local agencies — with representatives of key private sector industries — to develop a menu of sea level rise adaptation policies. These policies will aim to remove barriers to interagency cooperation, enhance regional planning, and identify support that federal agencies can provide. While the project centers on the Hampton Roads region, its value is intended to stem in part from its potential for use in other regions.

Shortly after the announcement of this project, three bipartisan congressional colleagues and I hosted a public symposium at ODU entitled Rising to the Challenge: Sea Level Rise and Recurrent Flooding in Hampton Roads. We were privileged to be joined by panelists from the National Security Council, Department of Defense, Navy, Army Corps of Engineers, and local, state, and regional bodies. We listened to discussions and asked questions about how to prepare
for the infrastructure challenges that exist now and that scientific models tell us will intensify in coming years.

I encourage your department to support the ODU pilot project, and I request that you issue formal written correspondence to the applicable divisions and subagencies within your department that authorize them to participate in and cooperate with this pilot project, as appropriate. Old Dominion University will also be reaching out to your staff with requests to discuss this project further in person. For more information, please feel free to contact CAPT (USN, Ret.) Ray Toll, Director of Coastal Resilience Research at ODU, at rtoll@odu.edu or 757-635-0831.

If successful, this project will marshal the excellent work already underway in a coordinated, systematic effort to strengthen the infrastructure and preparedness of a low-lying coastal region and to prepare it for the sea level rise and flooding challenges it faces today and moving forward.

Thank you for your attention to this matter.

Sincerely,

[Signature]

CC:
The Honorable Chuck Hagel, Secretary, U.S. Department of Defense
The Honorable Ernest Moniz, Secretary, U.S. Department of Energy
The Honorable Jeh Johnson, Secretary, U.S. Department of Homeland Security
The Honorable Julian Castro, Secretary, U.S. Department of Housing and Urban Development
The Honorable Sally Jewell, Secretary, U.S. Department of the Interior
The Honorable Anthony Foxx, Secretary, U.S. Department of Transportation
The Honorable Craig Fugate, Administrator, Federal Emergency Management Agency
The Honorable Gina McCarthy, Administrator, Environmental Protection Agency
The Honorable Charles Bolden, Administrator, National Aeronautics and Space Administration
The Honorable Kathryn Sullivan, Administrator, National Oceanic and Atmospheric Administration
The Honorable John Conger, Deputy Under Secretary of Defense for Installations and Environment
The Honorable Jo-Ellen Darcy, Assistant Secretary of the Army (Civil Works)
The Honorable Dennis McGinn, Assistant Secretary of the Navy (Energy, Installations & Environment)
Ms. Alice Hill, Senior Advisor for Preparedness and Resilience, National Security Council
Mr. Mike Boots, Chair, White House Council on Environmental Quality
COL Paul Olsen, Norfolk District Commander, U.S. Army Corps of Engineers
The Honorable Molly Ward, Secretary of Natural Resources, Commonwealth of Virginia
The Honorable Paul Fraim, Mayor, City of Norfolk
The Honorable Will Sessoms, Mayor, City of Virginia Beach
Mr. Randy Keaton, Executive Director, Hampton Roads Planning District Commission
October 28, 2014

The Honorable Charles F. Bolden, Jr.
Administrator
National Aeronautics and Space Administration
NASA Headquarters, 300 E Street SW
Washington, D.C. 20546

Dear Administrator Bolden:

I write to request your official support for a pilot project underway in the Hampton Roads region of Virginia to coordinate the region’s response to sea level rise and recurrent flooding.

As you know, Hampton Roads comprises some 1.6 million people in 14 counties and independent cities and a regional economy based heavily on military assets, including the largest naval installation in the world. It is also a low-lying coastal region where sea level rise, land subsidence, and extreme weather vulnerability converge to create major flooding challenges.

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I encourage your department to support the ODU pilot project, and I request that you issue formal written correspondence to the applicable divisions and subagencies within your department that authorize them to participate in and cooperate with this pilot project, as appropriate. Old Dominion University will also be reaching out to your staff with requests to discuss this project further in person. For more information, please feel free to contact CAPT (USN, Ret.) Ray Toll, Director of Coastal Resilience Research at ODU, at rtoll@odu.edu or 757-635-0831.

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Thank you for your attention to this matter.

Sincerely,

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The Honorable Dennis McGinn, Assistant Secretary of the Navy (Energy, Installations & Environment)
Ms. Alice Hill, Senior Advisor for Preparedness and Resilience, National Security Council
Mr. Mike Boots, Chair, White House Council on Environmental Quality
COL Paul Olsen, Norfolk District Commander, U.S. Army Corps of Engineers
The Honorable Molly Ward, Secretary of Natural Resources, Commonwealth of Virginia
The Honorable Paul Fraim, Mayor, City of Norfolk
The Honorable Will Sessoms, Mayor, City of Virginia Beach
Mr. Randy Keaton, Executive Director, Hampton Roads Planning District Commission
October 28, 2014

The Honorable Julian Castro  
Secretary  
U.S. Department of Housing and Urban Development  
451 7th Street SW, Room 10120  
Washington, D.C. 20410-1000

Dear Secretary Castro:

I write to request your official support for a pilot project underway in the Hampton Roads region of Virginia to coordinate the region’s response to sea level rise and recurrent flooding.

As you know, Hampton Roads comprises some 1.6 million people in 14 counties and independent cities and a regional economy based heavily on military assets, including the largest naval installation in the world. It is also a low-lying coastal region where sea level rise, land subsidence, and extreme weather vulnerability converge to create major flooding challenges.

Resiliency touches cross-cutting sectors such as commercial and residential buildings, transportation infrastructure, water infrastructure, air and water quality, and federal facilities. Governance of these sectors is distributed among federal agencies, Virginia state agencies, the Virginia General Assembly, Hampton Roads regional planning bodies, local governments, and the federal facilities that rely on resilient municipal infrastructure.

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I encourage your department to support the ODU pilot project, and I request that you issue formal written correspondence to the applicable divisions and subagencies within your department that authorize them to participate in and cooperate with this pilot project, as appropriate. Old Dominion University will also be reaching out to your staff with requests to discuss this project further in person. For more information, please feel free to contact CAPT (USN, Ret.) Ray Toll, Director of Coastal Resilience Research at ODU, at rtoll@odu.edu or 757-635-0831.

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Thank you for your attention to this matter.

Sincerely,

[Signature]

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The Honorable Jo-Ellen Darcy, Assistant Secretary of the Army (Civil Works)
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Ms. Alice Hill, Senior Advisor for Preparedness and Resilience, National Security Council
Mr. Mike Boots, Chair, White House Council on Environmental Quality
COL Paul Olsen, Norfolk District Commander, U.S. Army Corps of Engineers
The Honorable Molly Ward, Secretary of Natural Resources, Commonwealth of Virginia
The Honorable Paul Fraim, Mayor, City of Norfolk
The Honorable Will Sessions, Mayor, City of Virginia Beach
Mr. Randy Keaton, Executive Director, Hampton Roads Planning District Commission
October 28, 2014

The Honorable Anthony Foxx
Secretary
U.S. Department of Transportation
1200 New Jersey Avenue SE
Washington, D.C. 20590

Dear Secretary Foxx:

I write to request your official support for a pilot project underway in the Hampton Roads region of Virginia to coordinate the region’s response to sea level rise and recurrent flooding.

As you know, Hampton Roads comprises some 1.6 million people in 14 counties and independent cities and a regional economy based heavily on military assets, including the largest naval installation in the world. It is also a low-lying coastal region where sea level rise, land subsidence, and extreme weather vulnerability converge to create major flooding challenges.

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I encourage your department to support the ODU pilot project, and I request that you issue formal written correspondence to the applicable divisions and subagencies within your department that authorize them to participate in and cooperate with this pilot project, as appropriate. Old Dominion University will also be reaching out to your staff with requests to discuss this project further in person. For more information, please feel free to contact CAPT (USN, Ret.) Ray Toll, Director of Coastal Resilience Research at ODU, at rtoll@odu.edu or 757-635-0831.

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Sincerely,

[Signature]

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The Honorable Ernest Moniz, Secretary, U.S. Department of Energy
The Honorable Jeh Johnson, Secretary, U.S. Department of Homeland Security
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The Honorable John Conger, Deputy Under Secretary of Defense for Installations and Environment
The Honorable Jo-Ellen Darcy, Assistant Secretary of the Army (Civil Works)
The Honorable Dennis McGinn, Assistant Secretary of the Navy (Energy, Installations & Environment)
Ms. Alice Hill, Senior Advisor for Preparedness and Resilience, National Security Council
Mr. Mike Boots, Chair, White House Council on Environmental Quality
COL Paul Olsen, Norfolk District Commander, U.S. Army Corps of Engineers
The Honorable Molly Ward, Secretary of Natural Resources, Commonwealth of Virginia
The Honorable Paul Fraim, Mayor, City of Norfolk
The Honorable Will Sessions, Mayor, City of Virginia Beach
Mr. Randy Keaton, Executive Director, Hampton Roads Planning District Commission
United States Senate
WASHINGTON, DC 20510-4607

October 28, 2014

The Honorable Craig Fugate
Administrator
Federal Emergency Management Agency
500 C Street SW, Room #8
Washington, D.C. 20472

Dear Administrator Fugate:

I write to request your official support for a pilot project underway in the Hampton Roads region of Virginia to coordinate the region’s response to sea level rise and recurrent flooding.

As you know, Hampton Roads comprises some 1.6 million people in 14 counties and independent cities and a regional economy based heavily on military assets, including the largest naval installation in the world. It is also a low-lying coastal region where sea level rise, land subsidence, and extreme weather vulnerability converge to create major flooding challenges.

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Thank you for your attention to this matter.

Sincerely,

[Signature]

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The Honorable Ernest Moniz, Secretary, U.S. Department of Energy
The Honorable Jeh Johnson, Secretary, U.S. Department of Homeland Security
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Ms. Alice Hill, Senior Advisor for Preparedness and Resilience, National Security Council
Mr. Mike Boots, Chair, White House Council on Environmental Quality
COL Paul Olsen, Norfolk District Commander, U.S. Army Corps of Engineers
The Honorable Molly Ward, Secretary of Natural Resources, Commonwealth of Virginia
The Honorable Paul Fraim, Mayor, City of Norfolk
The Honorable Will Sessoms, Mayor, City of Virginia Beach
Mr. Randy Keaton, Executive Director, Hampton Roads Planning District Commission
October 28, 2014

The Honorable Chuck Hagel
Secretary
U.S. Department of Defense
1300 Defense Pentagon
Washington, D.C. 20301-1300

Dear Secretary Hagel:

I write to request your official support for a pilot project underway in the Hampton Roads region of Virginia to coordinate the region’s response to sea level rise and recurrent flooding.

As you know, Hampton Roads comprises some 1.6 million people in 14 counties and independent cities and a regional economy based heavily on military assets, including the largest naval installation in the world. It is also a low-lying coastal region where sea level rise, land subsidence, and extreme weather vulnerability converge to create major flooding challenges.

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If successful, this project will marshal the excellent work already underway in a coordinated, systematic effort to strengthen the infrastructure and preparedness of a low-lying coastal region and to prepare it for the sea level rise and flooding challenges it faces today and moving forward.

Thank you for your attention to this matter.

Sincerely,

[Signature]

CC:
The Honorable Chuck Hagel, Secretary, U.S. Department of Defense
The Honorable Ernest Moniz, Secretary, U.S. Department of Energy
The Honorable Jeh Johnson, Secretary, U.S. Department of Homeland Security
The Honorable Julian Castro, Secretary, U.S. Department of Housing and Urban Development
The Honorable Sally Jewell, Secretary, U.S. Department of the Interior
The Honorable Anthony Foxx, Secretary, U.S. Department of Transportation
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Mr. Mike Boots, Chair, White House Council on Environmental Quality
COL Paul Olsen, Norfolk District Commander, U.S. Army Corps of Engineers
The Honorable Molly Ward, Secretary of Natural Resources, Commonwealth of Virginia
The Honorable Paul Fraim, Mayor, City of Norfolk
The Honorable Will Sessoms, Mayor, City of Virginia Beach
Mr. Randy Keaton, Executive Director, Hampton Roads Planning District Commission
October 28, 2014

The Honorable Sally Jewell
Secretary
U.S. Department of the Interior
1849 C Street NW, Mail Stop 6242
Washington, D.C. 20240-0001

Dear Secretary Jewell:

I write to request your official support for a pilot project underway in the Hampton Roads region of Virginia to coordinate the region’s response to sea level rise and recurrent flooding.

As you know, Hampton Roads comprises some 1.6 million people in 14 counties and independent cities and a regional economy based heavily on military assets, including the largest naval installation in the world. It is also a low-lying coastal region where sea level rise, land subsidence, and extreme weather vulnerability converge to create major flooding challenges.

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The Honorable Paul Fraim, Mayor, City of Norfolk
The Honorable Will Sessoms, Mayor, City of Virginia Beach
Mr. Randy Keaton, Executive Director, Hampton Roads Planning District Commission
October 28, 2014

The Honorable Jeh Johnson
Secretary
U.S. Department of Homeland Security
301 7th Street SW, Mail Stop 0501
Washington, D.C. 20528-0150

Dear Secretary Johnson:

I write to request your official support for a pilot project underway in the Hampton Roads region of Virginia to coordinate the region’s response to sea level rise and recurrent flooding.

As you know, Hampton Roads comprises some 1.6 million people in 14 counties and independent cities and a regional economy based heavily on military assets, including the largest naval installation in the world. It is also a low-lying coastal region where sea level rise, land subsidence, and extreme weather vulnerability converge to create major flooding challenges.

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The Honorable Molly Ward, Secretary of Natural Resources, Commonwealth of Virginia
The Honorable Paul Fraim, Mayor, City of Norfolk
The Honorable Will Sessions, Mayor, City of Virginia Beach
Mr. Randy Keaton, Executive Director, Hampton Roads Planning District Commission
October 28, 2014

The Honorable Gina McCarthy  
Administrator  
Environmental Protection Agency  
1200 Pennsylvania Avenue NW, Room 3426 ARN  
Washington, D.C. 20460

Dear Administrator McCarthy:

I write to request your official support for a pilot project underway in the Hampton Roads region of Virginia to coordinate the region’s response to sea level rise and recurrent flooding.

As you know, Hampton Roads comprises some 1.6 million people in 14 counties and independent cities and a regional economy based heavily on military assets, including the largest naval installation in the world. It is also a low-lying coastal region where sea level rise, land subsidence, and extreme weather vulnerability converge to create major flooding challenges.

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Mr. Randy Keaton, Executive Director, Hampton Roads Planning District Commission
The Honorable Ernest Moniz  
Secretary  
U.S. Department of Energy  
1000 Independence Avenue SW  
Washington, D.C. 20585-0800  

Dear Secretary Moniz:

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The Honorable Molly Ward, Secretary of Natural Resources, Commonwealth of Virginia
The Honorable Paul Frain, Mayor, City of Norfolk
The Honorable Will Sessions, Mayor, City of Virginia Beach
Mr. Randy Keaton, Executive Director, Hampton Roads Planning District Commission
October 28, 2014

The Honorable Jo-Ellen Darcy
Assistant Secretary of the Army (Civil Works)
108 Army Pentagon
Washington, D.C. 20310-0108

Dear Secretary Darcy:

I write to request your official support for a pilot project underway in the Hampton Roads region of Virginia to coordinate the region’s response to sea level rise and recurrent flooding.

As you know, Hampton Roads comprises some 1.6 million people in 14 counties and independent cities and a regional economy based heavily on military assets, including the largest naval installation in the world. It is also a low-lying coastal region where sea level rise, land subsidence, and extreme weather vulnerability converge to create major flooding challenges.

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The Honorable Molly Ward, Secretary of Natural Resources, Commonwealth of Virginia
The Honorable Paul Fraim, Mayor, City of Norfolk
The Honorable Will Sessoms, Mayor, City of Virginia Beach
Mr. Randy Keaton, Executive Director, Hampton Roads Planning District Commission
The Honorable Tim Kaine  
United States Senate  
Washington, DC  20510

Dear Senator Kaine:

Thank you for your October 28, 2014, letter to the Secretary of Defense encouraging our participation in the Old Dominion University convened climate change preparedness planning pilot encompassing the Greater Hampton Roads area of Virginia. I am responding on the Secretary’s behalf.

The Department of Defense (DoD) Climate Change Adaptation Planning Official, Mr. John Conger, participated in the public symposium you hosted last June along with representatives from the Military Services. In accordance with Executive Order 13653, “Preparing the United States for the Impacts of Climate Change,” DoD is committed to identifying several sites as part of the effort to encourage Federal agencies and communities to assess and address their shared vulnerabilities to the specific impacts of climate change in their region. The Greater Hampton Roads was selected because of its potential to leverage resources and relationships, establish additional partnerships, and develop a regional planning process that will be supportive of the DoD mission and the surrounding communities. DoD intends to coordinate its efforts with Old Dominion University to the extent practicable and consistent with authorities.

The Department appreciates your continued support for its climate-change related activities.

Sincerely,

Frank Kendall
The Honorable Tim Kaine
United States Senate
Washington, DC 20510-4607

Dear Senator Kaine:

On behalf of Secretary Julián Castro, thank you for your letter about your commitment to making Virginia more resilient and better prepared to deal with risks associated with sea level rise and future floods. The following information is from the Department of Housing and Urban Development’s (HUD) Office of Community Planning and Development.

The challenges that Hampton Roads faces are great, as recently represented in the May 31, 2014 Washington Post article that described the situation in Norfolk where the community faces the loss or impairment of major recent infrastructure investments in light of rising sea levels. Not only does this represent a grave threat to the mobility and safety of Hampton Roads residents, it also illustrates the care with which current infrastructure investments must be made and the degree to which they must increasingly consider future vulnerabilities.

You may be aware that the President announced this summer that HUD was planning a National Disaster Resilience Competition (NDRC). On September 17, 2014 Secretary Castro launched the competition, which will award $1 billion to help communities recover from recent Presidentially-declared disasters in a manner that better prepares them to deal with risks and vulnerabilities to future extreme weather events. There are 67 eligible applicants, including the Commonwealth of Virginia, as the result of the impacts of major declared disasters that occurred between 2011 and 2013. The NDRC will encourage collaboration and coordination across state departments and jurisdictional boundaries to broadly consider the unmet needs resulting from the past qualifying disaster, and will provide resources to help communities develop innovative, forward-looking approaches to respond to those disasters while considering future risks and vulnerabilities. The Department hopes that the Commonwealth of Virginia will submit a proposal. Enclosed is a one-page fact sheet about the NDRC. Additional information can be accessed at: https://www.hudexchange.info/cdbg-dr/resilient-recovery/

The Department is available to assist recipients of Community Development Block Grant (CDBG) funds in evaluating how those funds might be used or leveraged to help address various resilience needs. In addition, HUD has several resources that may be of help as you implement the Old Dominion University pilot project. The HUD Exchange (https://www.hudexchange.info/) serves as our national clearinghouse of best practices website, and offers a range of materials and technical assistance opportunities to recipients of CDBG funds. Recently, HUD has launched a new resource page on resilience as a part of this site, featuring new material and a series of webinars in the next several weeks and months, all of which are specifically focused on
Thank you for your interest in the Department’s programs. Please let me know if I can of further assistance.

Sincerely,

Erika L. Moritsugu
Assistant Secretary for Congressional and Intergovernmental Relations

Enclosure
**National Disaster Resilience Competition**

**BACKGROUND**

This NOFA (FR-5800-N-29) will competitively award approximately $1 billion ($999,108,000) in supplemental disaster recovery Community Development Block Grant (CDBG-DR) funds for resilient recovery activities across the United States. HUD is setting aside $181,000,000 for applications serving Hurricane Sandy Qualified Disasters in the states of New York and New Jersey and in New York City due to the catastrophic level of damage caused in those areas from Hurricane Sandy and tropical storms in 2011.

In 2011-2013, the President declared major disaster areas in over 2,100 counties and 48 states. In response to Hurricane Sandy, the Disaster Relief Appropriations Act, 2013 (P.L. 113–2) included $15 billion for disaster recovery from major disasters declared in 2011, 2012, and 2013. At this time, HUD has allocated approximately $14 billion in disaster recovery funds, by formula and to Rebuild by Design projects.

This competition is structured iteratively to guide each applicant through broad consideration in Phase 1 and reconsideration at a more granular level of detail in Phase 2. Phase 1 is the framing phase, in which the applicant will comprehensively frame the recovery needs, relevant risks and vulnerabilities, and related community development opportunities in its target geographical area. Applicants must demonstrate a logical link or tieback to addressing Unmet Recovery Needs from disasters in 2011, 2012, or 2013.

In Phase 2, the implementation phase, the highest scoring applicants from Phase 1 will be invited to more fully articulate a resilience-enhancing disaster recovery or revitalization project or program and will compete for implementation funding. Awards for Phase 1 and 2 will be made at the conclusion of Phase 2.

For more information, please visit: https://hudschange.info/cdbg-dr/resilientrecovory

**TWO-PHASE COMPETITION PROCESS**

**Phase 1**

**Framing Unmet Recovery Needs, Vulnerabilities, and Community Development Objectives**

- **NOFA PUBLISHED**: 9/17/2014
- **PHASE 1 APPLICATION DEADLINE**: 3/16/2015
- **60 DAYS (~2 MONTHS)**
- **PHASE 1 REVIEW PERIOD**
- **180 DAYS (~6 MONTHS)**
- **PHASE 1 WINNERS ANNOUNCED**: June 2015
- **Highest-Scoring Phase 1 winners advance to Phase 2**

**Phase 2**

**From Framing to Implementation**

- **PHASE 2 APPLICATION DEADLINE**: October 2015
- **Funds Awarded**: December 2015

**CITIES AND COUNTIES**

- **Phase 1**: Birmingham, Alabama
- **Phase 2**: Boston, Massachusetts

**FUNDING INFORMATION**

- **Phase 1**: For Phase 1 applicants that are not invited to continue to Phase 2, but which met all the requirements of the NOFA, are eligible to receive CDBG-DR funds totaling up to $2.5 million (for applicants that are not current CDBG-DR grantees under P.L. 113-2) or $500,000 (for current grantees under P.L. 113-2), HUD will award up to $30 million of the total funding availability to such applicants. Any reserve pool funds not awarded at this stage will be allocated in a similar manner following Phase 2 to any applicants meeting the same criteria.

- **Phase 2**: The minimum award amount is $1,000,000 and the maximum is $500,000,000.

**Note**: These dates are tentative and subject to change at HUD’s discretion.
and local resilience activities. Those resources can be located at the links provided above. We hope that you find these materials helpful in your efforts.

Thank you for your interest in the Department’s programs. Please let me know if I may be of further assistance.

Sincerely,

Erika Moritsugu
Assistant Secretary for Congressional and Intergovernmental Relations

Enclosure
Xerox Fax Confirmation

<table>
<thead>
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<td>Job Number</td>
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</tbody>
</table>
National Aeronautics and Space Administration

Headquarters
Washington, DC 20546-0001

November 24, 2014


The Honorable Tim Kaine
United States Senate
Washington, DC 20510

Dear Senator Kaine:

Thank you for your letter of October 28, 2014, requesting NASA support for the pilot project underway in Virginia’s Hampton Roads area to coordinate the region’s response to sea level rise and recurrent flooding. Administrator Bolden has asked that I respond to your request.

As the lead NASA facility in the Hampton Roads area, the NASA Langley Research Center (LaRC) is pleased to support this pilot project and has already been actively involved in sharing research data and analytical tools with the local, state and Federal governments and agencies to help address shared concerns regarding sea level rise and recurrent flooding issues in the Hampton Roads area. To this point, during the symposium held at Old Dominion University (ODU) in June 2014, participants noted that geographic information system (GIS) tools and science data produced by LaRC had already contributed to on-going regional planning decisions.

NASA has an established history of conducting climate change research activities. Enclosed is a report issued by LaRC in 2011 entitled, “Adapting to a Changing Climate.” LaRC briefed this report and the enclosed handout on “Projected Climate Change Impacts for LaRC Research Center,” several times to local, state and Federal stakeholders in the Hampton Roads area over the last three years. On June 5, 2013, then LaRC Director Lesa Roe and Dr. Bruce Wielicki briefed your office on climate research and recent accomplishments, including the results of the enclosed climate change impact study and NASA climate related research.

Future meetings to determine how NASA can further support this pilot project are scheduled between several key members of the LaRC science community and Ray Toll, the ODU pilot project leader. In addition to this effort, LaRC scientist, Dr. Patrick Taylor is participating on the Commonwealth's Climate Change & Resiliency Commission.

Sincerely,

L. Seth Statler
Associate Administrator
for Legislative and Intergovernmental Affairs

2 Enclosures
Adapting Now to a Changing Climate

Langley Research Center
Climate data collected over the past 80 - 100 years in the Hampton Roads area clearly show a long-term pattern of sea level and temperature rise, accompanied by periods of shorter term variability.

Climate models project continued sea level rise and warmer temperatures in the Hampton Roads region. Along with sea level rise, storm surges from hurricanes or nor' easters may increasingly make natural and built systems vulnerable to disruption or damage. Government and other organizations, including utilities and planning commissions, are currently assessing the potential of climate hazards to affect the region and their operations.

This handout can help area leaders (NASA together with its tenants, neighbors, and area partners) understand what they may expect in the future, and plan accordingly.

**Observed Climate**

Hampton Roads area
(1910 – 2008)

*Trend = +0.36°C per decade*  
*Trend = +1.7 in per decade*  

Temperature data are from Norfolk; sea level rise data are from Sewells Point. These weather stations were chosen because they have long-term data records. All data are from the National Oceanic and Atmospheric Administration (NOAA).
NASA Langley Research Center (LaRC) occupies nearly 800 acres in Hampton, Virginia. The Center borders the Northwest Branch and Southwest Branch of the Back River, which flows east to the Chesapeake Bay. Most of the acreage of LaRC is located to the west of Langley Air Force Base (LAFB), with several small parcels to the east within Langley Air Force Base. Air Force runways lie between these West and East Areas.

At the mouth of the Chesapeake Bay, the Hampton Roads area is a bustling confluence of shipping, tourism, retail, arts, and industrial interests, with a strong federal presence including the Army, Navy, Air Force, Marines, Coast Guard, and NASA. The Port of Hampton Roads is the Nation’s third largest seaport. Primary cities include Hampton, Newport News, Norfolk, Portsmouth, Poquoson, Chesapeake, Suffolk, Williamsburg, and Virginia Beach, together home to almost 2 million people. Temperatures in the area range from an average of 40°F (January) to 79°F (July). Annual average precipitation is 47 inches, with rain relatively evenly distributed throughout the year.
NASA Langley Research Center generates an annual economic impact of approximately $900M and supports about 8,000 jobs beyond its gates. Approximately 3,800 people work within the Center, about half civil service employees and half contractors. LaRC's facilities are conservatively valued at $3.3B. Originally focused on aeronautics research, the unique skills (e.g., computational analysis) and research and testing facilities (e.g., Gantry and Wind Tunnels) at LaRC make critical contributions to the development of NASA's next generation of heavy-lift rockets and capsules for the upcoming phase of space exploration to the moon, Mars, and beyond. Aeronautical engineers and scientists continue to research ways to make aircraft greener, quieter, faster, and safer.

LaRC research leads to possible applications of innovative technologies to sectors beyond NASA including transportation, public health, and recreation. The Innovative Partnerships Program at LaRC promotes the progression of LaRC technologies from the lab to the marketplace.

LaRC, together with Langley Air Force Base, is the foundation of the area’s space exploration and aeronautics identity. These federal agencies, plus the National Institute of Aeronautics and the Virginia Air & Space Center, mentor, educate, entertain, and inspire citizens in the surrounding communities, and draw millions of visitors every year. The science and engineering presence within the community results in many science, technology, engineering, and mathematics educational opportunities for students of all ages.

Like so many Chesapeake Bay neighbors, LaRC works to steward the diverse natural resources of the Nation’s largest estuary. The Back River and its tributaries are important sources of shellfish, crabs, and fish to local fisheries. The area falls within the Atlantic Flyway for migratory birds and is home to many water fowl, song birds, and raptors. Three types of wetlands on the northern and eastern boundary—Forested, Emergent, and Scrub-Shrub—serve as habitat for wetlands species.
The Climate Science Context
Scientists have collected weather and climate data and indicators of longer-term climate patterns (such as ice cores and tree rings) from the entire globe. Based on analyses of these data, plus a growing understanding of physical processes that control climate, scientists have developed sophisticated models that project future climate changes. Climate models consistently project that climate change will accelerate this century. The US Global Climate Change Research Program's report summarizes these results at www.globalchange.gov/publications/reports/scientific-assessments/uss-impacts. NASA climate scientists are an important part of the international research effort. NASA is a key player in climate modeling and collection of both earth-based and space-based data used to develop and validate climate models and identify climate impacts. LaRC researchers use these satellite- and ground-based data to examine the role of the atmosphere in climate change.

The Hampton Roads Climate Today
The subtropical climate of the area produces relatively mild winters and little snowfall. Summers are hot and humid. The climate of the region is heavily influenced by its location near the Atlantic Ocean. Temperatures in coastal locations are moderated by the ocean and the close proximity of the Gulf Stream. Tropical storms and nor’easters are fairly common along the east coast of the US, bringing heavy rainfall, strong winds, and coastal flooding. Ocean/land breezes and thunderstorms, which are most frequent in the summer, also contribute to area climate patterns.

Future Climate Projections
NASAs Goddard Institute for Space Studies used site-specific climate data (temperature and precipitation) from the Langley Air Force Base and Norfolk International Airport stations and Sewells

Model results of projected changes

<table>
<thead>
<tr>
<th>Climate Variables</th>
<th>Baseline</th>
<th>2020s</th>
<th>2050s</th>
<th>2080s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Temperature</td>
<td>59.9°F</td>
<td>+1.5 to 2.5°F</td>
<td>+2.5 to 4.5°F</td>
<td>+3.5 to 6.5°F</td>
</tr>
<tr>
<td>Annual Precipitation</td>
<td>46.8 in</td>
<td>0 to +10%</td>
<td>0 to +10%</td>
<td>0 to +15%</td>
</tr>
<tr>
<td>Sea Level Rise</td>
<td>NA</td>
<td>+2 to 5 in</td>
<td>+7 to 11 in</td>
<td>+12 to 21 in</td>
</tr>
<tr>
<td>Sea Level Rise – Rapid Ice Melt Scenario (See Rapid Ice Melt text box for more detail)</td>
<td>NA</td>
<td>~5 to 10 in</td>
<td>~19 to 28 in</td>
<td>~41 to 53 in</td>
</tr>
</tbody>
</table>

Temperature and precipitation projections reflect a 30-year average centered on the specified decade; sea levels are averages for the specified decade. The baseline for temperature and precipitation is the most complete 30-year data period centered around the 1980s; the baseline for sea level is 2000-2004. The baseline temperature and precipitation is an average of baseline data from the Langley Air Force Base and Norfolk International Airport stations. Sea level rise projections are for Sewells Point, Virginia, and include the impacts of subsidence in the area. Temperatures are rounded to the nearest half degree, precipitation projections to the nearest 5%, and sea level rise to the nearest inch. Data are from the NOAA National Climatic Data Center.
Point (sea level rise) combined with climate model outputs to generate projections specific to the Hampton Roads area. This “downscaling” process can provide a more precise projection for a specific location (in this case, Hampton Roads) than modeling for an entire region, such as the southeast US. Overall, the projections for Hampton Roads indicate higher mean temperatures and rising mean sea levels, with little change expected in annual precipitation.

The Case for Adaptation
Because of its location on the Back River/Chesapeake Bay, sea level rise and storm surge may be the biggest climate threats to LaRC. The area has always been subject to nor’easters and hurricanes, and the associated high winds and flooding. The combination of rising sea level and severe storms could produce catastrophic impacts on LaRC and the surrounding high-profile infrastructure assets, human capital, and natural resources. Furthermore, land subsidence in the area worsens the impacts of rising seas and storm surges. Projected changes in the frequency of some extreme events like hot and cold days (see tables below) may also lead to large impacts. Langley’s future is intricately connected with broader social, economic, and environmental trends expected throughout the Chesapeake Region, so LaRC stewards developing adaptation strategies will also need to work together with regional decision-makers.

A Note on Interpreting Climate Projections
Do the projections in the Climate Variables chart mean it is appropriate to say, “In 2043, the average temperature at LaRC will be 63.4°F?” No. Models do not provide this degree of certainty. Still, they suggest a significant and progressive long-term warming trend that could have considerable impacts on life and work in the Hampton Roads area; more specifically, it is appropriate to say that models suggest that between 2040 and 2070, temperatures may increase 2.5 to 4.5 degrees above the average baseline temperature.

<table>
<thead>
<tr>
<th>Daily Temperatures</th>
<th>Baseline</th>
<th>2020s</th>
<th>2050s</th>
<th>2080s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max temperature at or above 90°F (days)</td>
<td>34</td>
<td>40 to 47</td>
<td>49 to 64</td>
<td>55 to 66</td>
</tr>
<tr>
<td>Max temperature at or above 100°F (days)</td>
<td>0.7</td>
<td>1 to 3</td>
<td>3 to 7</td>
<td>5 to 16</td>
</tr>
<tr>
<td>Min temperature at or below 40°F (days)</td>
<td>102</td>
<td>83 to 89</td>
<td>71 to 83</td>
<td>59 to 77</td>
</tr>
<tr>
<td>Min temperature at or below 32°F (days)</td>
<td>48</td>
<td>34 to 39</td>
<td>26 to 34</td>
<td>19 to 30</td>
</tr>
</tbody>
</table>

**Extreme Events: 2020-2090**

<table>
<thead>
<tr>
<th>Event</th>
<th>Direction of Change</th>
<th>Likelihood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat Stress</td>
<td>↑</td>
<td>Very likely</td>
</tr>
<tr>
<td>Intense Precipitation Events</td>
<td>↑</td>
<td>Likely</td>
</tr>
<tr>
<td>River Flooding</td>
<td>↑</td>
<td>Likely</td>
</tr>
<tr>
<td>Drought</td>
<td>↑</td>
<td>More likely than not</td>
</tr>
<tr>
<td>Intense Winds</td>
<td>↑</td>
<td>More likely than not</td>
</tr>
</tbody>
</table>

Based on global climate model simulations, published literature, and expert judgment

The number of days per year exceeding 90°F is projected to rise dramatically in the coming century, and the number of days with temperatures below 32°F is projected to decrease. More hot days would affect outside work, energy use, and habitats.
The time to develop and implement adaptation strategies is now. Executive Order 13514 directs federal agencies to assess and manage the effects of climate variables on their operations and mission in both the short and long term. A changing climate in the Hampton Roads area will impact facility operations (e.g., water management, energy demands), natural resources (e.g., salt marsh habitat changes, increase in invasive species, increase in pest species), infrastructure that is vital to mission success (e.g., flooded buildings), quality of life in the community (e.g., increased number of hot days), and the region’s economy (e.g., increased percentage of public funds for utility costs). By considering these impacts during existing planning and decision-making cycles at Langley Research Center, impacts to their missions may be abated or reduced. Strategies developed for the Center may also prove beneficial to the local community as planners implement short-term tactical changes now, while simultaneously planning for longer term strategic adaptation measures. Some of these potential impacts are listed in the chart below.

<table>
<thead>
<tr>
<th>Climate Variable</th>
<th>Potential Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sea Level Rise</td>
<td>Exacerbated flooding from storm surges; reduced emergency response capabilities; increased salinity impacts to drinking water resources and habitats</td>
</tr>
<tr>
<td>Coastal Flooding</td>
<td>Impacts to wastewater treatment plants on the coast; damage to infrastructure; changes in shoreline habitats; overloading of stormwater management system</td>
</tr>
<tr>
<td>Overall Increased Temperature</td>
<td>Increased cooling costs in the summer; decreased heating costs in the winter. Changes in plant and animal cycles, including pest and disease vector species</td>
</tr>
<tr>
<td>Increased Number of High Temperature Days</td>
<td>Potential for damage to infrastructure materials; potential for limiting work and recreation outdoors; increased health problems related to heat stress</td>
</tr>
<tr>
<td>Precipitation Changes</td>
<td>Increased flooding from extreme precipitation events; increased risk of drought as temperatures rise</td>
</tr>
</tbody>
</table>
A Note about Downscaling Climate Data Specifically for Individual NASA Centers

The quantitative climate projections in this document are based on global climate model simulations conducted for the IPCC Fourth Assessment Report (2007) from the World Climate Research Programme’s (WCRP) Coupled Model Intercomparison Project Phase 3 (CMIP3) multi-model dataset. The simulations provide results from sixteen global climate models that were run using three emissions scenarios of future greenhouse gas concentrations. The outputs are statistically downscaled to 1/8 degree resolution (~12 km by 12 km) based on outputs from the bias-corrected (to accurately reflect observed climate data) and spatially-disaggregated climate projections derived from CMIP3 data. Results provide a more refined projection for a smaller geographic area. This information is maintained at http://gdo-dcp.ucar.edu/downscaled_cmip3_projections and described by Maurer, et al. (2007).

The rapid ice melt scenario and qualitative projections reflect a blend of climate model output, historical information, and expert knowledge. For more information about rapid ice melt models, see a paper and references at http://www.nature.com/climate/2010/1004/pdf/climate.2010.29.pdf.

Climate projections and impacts, like other types of research about future conditions, are characterized by uncertainty. Climate projection uncertainties include but are not limited to:

1) Levels of future greenhouse gas concentrations and other radiatively important gases and aerosols,
2) Sensitivity of the climate system to greenhouse gas concentrations and other radiatively important gases and aerosols,
3) Climate variability, and
4) Changes in local physical processes (such as afternoon sea breezes) that are not captured by global climate models.

Even though precise quantitative climate projections at the local scale are characterized by uncertainties, the information provided here can guide resource stewards as they seek to identify and manage the risks and opportunities associated with climate variability/climate change and the assets in their care.

Projected Climate Change Impacts for NASA Langley Research Center.
The Honorable Tim Kaine  
United States Senate  
Washington, D.C. 20510

Dear Senator Kaine:

Thank you for your October 21, 2014 letter to the U.S. Environmental Protection Agency (EPA) requesting support for the pilot project coordinating the region’s response to sea level rise in the Hampton Roads region of Virginia.

Sea level rise is a major challenge and our national assets in the Norfolk and Hampton Roads areas are particularly at risk. I applaud the efforts of Old Dominion University’s (ODU) Mitigation and Adaptation Research Institute and the impressive partnership they have created to coordinate a “whole government” approach. Local and community-based efforts such as this are key to building a nationally resilient infrastructure that can respond and adapt to the effects of climate change.

EPA is a leader in working with stakeholders to understand the science, develop tools, and implement actions to respond to the impacts of climate change. On October 31, 2014, EPA released its Climate Adaptation Plan as part of President Obama’s comprehensive strategy to reduce greenhouse gas emissions and to prepare the country for climate change impacts such as flooding, sea level rise, severe weather, and temperature extremes. Last November, I traveled to ODU to meet with students and faculty from the Department of Civil & Environmental Engineering who were working on innovations with biofuels as part of EPA’s People, Prosperity and the Planet (P3) program. EPA has also worked with several academic institutions across the Mid-Atlantic Region to develop agreements to reduce their carbon footprints and support environmental sustainability.

EPA is active in Hampton Roads, supporting investments in green infrastructure and other initiatives aimed at improving the area’s resiliency to climate change. In the new Chesapeake Watershed Agreement, signed by all the watershed states and EPA in June 2014, EPA and our partners committed to increase the resiliency of the Chesapeake Bay watershed, including its living resources, habitats, public infrastructure, and community, to withstand adverse impacts from changing environmental and climate conditions. We recently partnered with the Rockefeller Foundation’s Resilient Cities Initiative in Norfolk to aid that community in its adaptation efforts and to share some of EPA’s resilience tools. EPA has also been working with water utilities to discuss mutual aid following extreme weather events. Building resiliency in Hampton Roads is vital and can serve as a model for the nation. We have reached out to Mr. Ray Toll, Director of Coastal Resilience Research at ODU, and have begun discussions on ways that EPA can contribute to this project.
If you have any questions, please do not hesitate to contact me or have your staff contact Mr. Matthew Colip, EPA’s Virginia Liaison, at 215-814-5439.

Sincerely,

Shawn M. Garvin
Regional Administrator
The Honorable Tim Kaine  
United States Senate  
Washington, DC 20510-4607

Dear Senator Kaine:

Thank you for your October 28, 2014, letter to Secretary Moniz regarding Old Dominion University’s (ODU) Hampton Roads Sea Level Rise Adaptation Pilot Project.

This project is very timely as my office, the Office of Electricity Delivery and Energy Reliability, has also recently conducted a pilot project examining the impacts to energy infrastructure from sea level rise. In the past, the Department of Energy (DOE) has worked closely with a number of Federal agencies, namely the Department of Defense and the Department of Homeland Security, on energy security issues in the region. In addition, under the American Recovery and Reinvestment Act, we provided funds to the City of Virginia Beach to conduct a local energy assurance plan.

DOE is highly committed to addressing climate change adaptation and mitigation policies that can improve emergency response and resilience at the Federal, State and local levels and across multiple sectors. The Department is aware of this request and Captain Toll (USN, Retired) has been contacted by David Ortiz, Deputy Assistant Secretary, Energy Infrastructure Modeling and Analysis division of my office to assess their needs.

Once again, thank you for your letter. If you have any questions, please do not hesitate to contact me or Ms. Jaime Shimek, Deputy Assistant Secretary for Senate Affairs, Office of Congressional and Intergovernmental Affairs, at (202) 586-5450.

Sincerely,

Patricia A. Hoffman  
Assistant Secretary  
Office of Electricity Delivery and Energy Reliability
The Honorable Timothy Kaine  
United States Senate  
388 Russell Senate Office Building  
Washington, D.C. 20510

Dear Senator Kaine:

This is in response to your letter dated October 28, 2014, regarding sea level rise in the Hampton Roads area. I share your enthusiasm toward a “whole of government” approach to address sea-level rise and climate change.

Sea level rise and climate change present challenges to our Nation, the valuable infrastructure that supports the Port of Virginia, and the economies of the communities that comprise Hampton Roads, which are vulnerable to extreme weather events. Earlier this summer, the Corps published the USACE Climate Change Adaptation Plan and Report. In alignment with this document, I will continue to support interagency coordination and the progress of current and future projects under our Civil Works authorities. The Norfolk District has actively engaged in efforts to discuss, educate and coordinate mitigation efforts at the regional, state and local levels, including the Old Dominion University (ODU) pilot project.

Following Hurricane Sandy, Congress directed the Secretary of the Army to conduct a comprehensive study to address the flood risk of vulnerable coastal populations in areas that were affected by the storm within the boundaries of the North Atlantic. The North Atlantic Coastal Comprehensive Study, due to Congress in January 2015, will highlight the city of Norfolk within the Hampton Roads region as a focus area. At the commonwealth level, the USACE Virginia Silver Jackets Team has engaged with the Secure Commonwealth Panel Recurring Flooding Subpanel, who is identified as a partner to facilitate coordination among agencies of all sectors, and levels of government in the Recommendations to the Secure Commonwealth Panel on the Issue of Sea Level Rise and Recurrent Flooding in Coastal Virginia.

Through our Continuing Authorities Program (CAP), the Norfolk District is partnering with the cities of Hampton and Norfolk and the Fort Monroe Authority to address flood risk management and sea level rise. In addition, through the Flood Plain Management Services (FPMS) Program, the cities of Hampton and Portsmouth are receiving assistance to evaluate the vulnerability of their sanitary sewer pump stations and updating their flood plain management plan, respectively. No single agency has all the answers, but leveraging multiple programs, such as Silver Jackets, CAP, and FPMS, we can develop more holistic, watershed based solutions.
We fully support the local efforts underway within the commonwealth, including the ODU pilot project, and look forward to the development of strategies to improve the resilience and sustainability of the region. Thank you for your interest in the Army Civil Works program.

Very truly yours,

Jo-Ellen Darcy
Assistant Secretary of the Army
(Civil Works)
Dear Senator Kaine:

Thank you for your letter requesting the National Oceanic and Atmospheric Administration (NOAA) support the Hampton Roads sea level rise adaptation pilot project.

NOAA’s National Ocean Service (NOS) and Office of Oceanic and Atmospheric Research (OAR) have been engaged in this project since its inception, including participating at the Tech Surge event led by Old Dominion University this past summer. At that time, NOAA committed to providing data from our National Water Level Observation Network and other climate, oceanographic and geospatial data in support of this effort.

Since that time, NOAA has maintained communications with the local leader for this effort, CAPT Ray Toll (USN retired). A follow up meeting between NOAA and CAPT Toll took place in late November and efforts to further clarify the level of engagement and services NOAA might provide are ongoing.

NOAA is pleased to lend its support to this effort, and I have directed the appropriate offices to do so within available resources.

If you have further questions, please contact Amanda Hallberg Greenwell, Director of NOAA’s Office of Legislative and Intergovernmental Affairs at (202) 482-4981.

Sincerely,

Kathryn D. Sullivan, Ph.D.
Under Secretary of Commerce for Oceans and Atmosphere
The Honorable Timothy Kaine  
United States Senate  
388 Russell Senate Office Building  
Washington, D.C. 20510

Dear Senator Kaine:

This is in response to your letter dated October 28, 2014, regarding support for the Old Dominion University pilot project in the Hampton Roads region. I share your enthusiasm toward a "whole of government" approach to address sea-level rise and climate change. I apologize for the delay in responding.

Sea-level and climate change present challenges to our Nation, the valuable infrastructure that supports the Port of Virginia, and the economies of the communities that are vulnerable to extreme weather events in the Hampton Roads region. Earlier this summer, the U.S. Army Corps of Engineers (Corps) published the "USACE Climate Change Adaptation Plan and Report." In alignment with this document, I will continue to support interagency coordination and the progress of current and future projects under our Civil Works authorities. The Norfolk District has actively engaged in efforts to discuss, educate, and coordinate mitigation efforts at the regional, state, and local levels, including the Old Dominion University (ODU) pilot project.

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We fully support the local efforts underway within the commonwealth, including the ODU pilot project, and look forward to the development of strategies to improve the resilience and sustainability of the region. Thank you for your interest in the Army Civil Works program.

Very truly yours,

Jo- Ellen Darcy
Assistant Secretary of the Army
(Civil Works)
The Honorable Tim Kaine  
United States Senate  
Washington, DC 20510

Dear Senator Kaine:

Thank you for your letter regarding Old Dominion University's (ODU) sea level rise adaptation pilot project, which is underway in the Hampton Roads region.

As you may know, President Obama’s Climate Action Plan puts high priority on increasing resilience and adapting to the effects of climate change. The U.S. Department of Transportation recognizes that climate variability and change pose threats to the U.S. transportation system, including the potential for roadway deterioration, weakened infrastructure, and restricted access to local economies and critical assets.

Several of the Federal Highway Administration’s (FHWA) studies focused on the risks posed by sea level rise and subsequent flooding in the lower Chesapeake Bay region, including Hampton Roads. In 2010, FHWA awarded a competitive grant to the Virginia Department of Transportation and the University of Virginia for a pilot project to guide transportation stakeholders through the process of collecting and integrating climate and asset data to identify critical vulnerabilities in the Hampton Roads region. The Hampton Roads Planning District Commission and Hampton Roads Transportation Planning Organization also collaborated on this project.

During the year-long pilot program, pilot teams formed a community of practice, exchanged ideas, presented draft results, and participated in a series of webinars and peer exchanges. The FHWA used the feedback and lessons learned from the pilot projects to revise the draft conceptual model into the Climate Change & Extreme Weather Vulnerability Assessment Framework, available on the FHWA Web site. This study has added to our understanding of the transportation challenges posed by the unique vulnerabilities of the area. See: http://www.fhwa.dot.gov/environment/climate_change/adaptation/case_studies/hampton_roads/index.cfm.
The Honorable Tim Kaine

We look forward to learning more about the ODU pilot projects and exploring potential cooperation with ODU, relevant Virginia Commonwealth and local authorities and other Federal agencies, as this study progresses. Your staff may contact Jacob Glass in the Office of the Secretary at 202-366-1374 or Jacob.Glass@dot.gov.

If I can provide further information or assistance, please feel free to call me.

Sincerely,

[Signature]

Anthony R. Foxx
The Honorable Tim Kaine  
Member of Congress  
388 Russell Senate Office Building  
Washington, DC 20510

Dear Senator Kaine:

Thank you for your letter of October 21, 2014, concerning the impact of sea level rise and recurrent flooding in the Hampton Roads region of Virginia. These are serious issues in a region of vital importance to the Nation’s economy.

As you may know, the Department of the Interior conducts scientific research to inform decisions made at the landscape level. It develops tools to analyze, visualize, and translate research for application on the landscape and to inform land and resource planning, policy, and mitigation activities. This effort is shared and leveraged with other Federal agencies, State and local governments, Tribes, academia, and communities.

The Department also has a significant investment in climate science. The U.S. Geological Survey (USGS) provides research to better understand and forecast the impacts of climate change that can help prepare communities, and provides new technologies for resilient infrastructure to help the Nation become more prepared for a changing climate.

Decision makers require tools to forecast the vulnerability of coastal resources and communities to erosion and the increasing impacts of climate change and sea level rise. The USGS is documenting topography and bathymetry to analyze shoreline changes that will inform future response and recovery actions for coastal storms in the Atlantic Ocean.

To this end, the USGS Virginia Water Science Center positioned six streamgages in the Blackwater River flood warning network to provide advance warning of flood inundation to localities in southeastern Virginia and has purchased 10 tide gages that will provide tide surge monitoring in southeastern Virginia during major storm events once implemented.

The USGS Virginia Water Science Center is currently involved with the Old Dominion University sea level rise adaptation pilot project. The USGS Virginia Water Science Center Director Mark Bennett (mrbennet@usgs.gov; 804-261-2643) is a participant on the Science Advisory Committee (SAC) for the pilot project. While the role of the SAC in the pilot project has yet to be fully defined, the USGS representative on the SAC will be able to reach out to the
appropriate expertise within the USGS should it be needed and to inform the SAC of USGS sea-level rise research in the Hampton Roads region.

Thank you for your inquiry.

Sincerely,

Kristen J. Sarri
Principal Deputy Assistant Secretary
Policy, Management and Budget
C. Navy Memorandum and Response to Senator Kaine
MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY (INSTALLATIONS, ENERGY AND ENVIRONMENT)  
ASSISTANT SECRETARY OF THE NAVY (ENERGY, INSTALLATIONS AND ENVIRONMENT)  
ASSISTANT SECRETARY OF THE AIR FORCE (INSTALLATIONS, ENVIRONMENT AND ENERGY)  

SUBJECT: DoD Climate Preparedness and Resilience Planning Pilots

In July 2014, the Council on Environmental Quality (CEQ) launched a series of Preparedness Pilots in response to feedback from the State, Local and Tribal Leaders Task Force initiated under Executive Order 13653, “Preparing the United States for the Impacts of Climate Change.” The pilots are an effort to get Federal agency sites and the communities surrounding them working together to assess and address their shared vulnerabilities to the specific impacts of climate change in their region. CEQ requested that DoD commit to leading pilot efforts in at least three sites with a goal to have the pilots launched within six months and completed within one year. DoD requested and received draft guidance on the scope of the pilots from CEQ.

After discussions with your staffs and CEQ, the following three sites were selected: Greater Hampton Roads (Navy), Michigan Army National Guard (Army), and Mountain Home AFB (Air Force). The diversity of location and climate challenges these sites represent will help to inform future regional planning efforts. I&E has prepared guidance (attached) for the DoD pilot efforts that will leverage the Department’s existing relationships and resources, develop additional partnerships, and result in a regional preparedness planning process that is supportive of the DoD mission and the surrounding communities. This DoD guidance has been briefed to CEQ and is acceptable in place of their original draft guidance. We look forward to hearing about the progress of your pilots in the coming months.

Thank you for your continued support of the Department’s efforts to ensure a resilient Force for the future. My point of contact for climate change integration is Ms. Rebecca Patton at 571-372-6382 or elsa.r.patton.civ@mail.mil.

John Conger
Acting Deputy Under Secretary of Defense
(Installations & Environment)
DoD-Led Climate Change Preparedness and Resilience Regional Pilots

Goal: Development of a regional long-term climate change preparedness and resilience planning framework that incorporates stakeholder perspectives and concerns into a regional plan. Stakeholders may include Federal, state and local government agencies, private sector representatives, and citizens. An intergovernmental planning organization may be formed to establish the planning framework and create a regional plan.

Outputs: 1) A regional intergovernmental planning process and procedures for executing it.

2) A compilation of regionally pertinent climate change data and information that is accessible for planning purposes.

3) A regional planning process for climate change preparedness and resilience that identifies shared vulnerabilities, known development plans, and a roadmap for identifying adaptations that reduce risk and enhance future resilience.

Considerations: Things that need to be thought about as the pilots are being established.

- Stakeholders: Identification of and representation by major stakeholders, interested parties, and informed observers.
- Governance: Leadership of the framework development and intergovernmental planning organization; coordination and decision-making criteria; conflict resolution process; and succession planning for future leadership.
- Scope of Planning: Definition of the geographic region and climate change related impacts to be considered, and the relationship to any existing plans.
- Resources: Staffing, in-kind services, and funding for planning framework development, coordination of the intergovernmental planning organization, including costs associated with development of regional climate scenarios, after action reports and lessons learned from other regional pilots, travel and events.
- Metrics: Monitoring progress and defining success.

Timeline: The pilots will be conducted in phases. Phase 1 will be the development of the planning framework. The framework development necessitates the definition of the geographic region and which of the climate change impacts will be addressed; identification of participants and what level of participation they should be expected/are willing to commit to; the compilation of available data and information on current climate change resilience and preparedness efforts that can be used by group; and time frames to fill gaps. Phase 2 will be the development of a regional plan for climate change preparedness and resilience. Phase 3 will be implementation of the plan as resources allow.
D. Initial Phase 1 Objectives

• Gather basic information
  o Identify a representative cross-section of relevant stakeholders
  o Identify reports and policy documents that inform planning/coordination effort
  o Review other SLR planning efforts in US and internationally for lessons learned and best practices
  o Account for base level capabilities, planning, and procedures already in place and used by DOD, Federal, State, Regional, and Local governments, as well as industry and citizenry
  o Assess value of Modeling and Simulation tools for initial planning (to be used in Phase 2)
  o Begin gathering citizen perspectives and input

• Develop organizational structure and operating procedures for intergovernmental coordination
  o invite participation of identified stakeholders
  o form working groups and advisory committees to synthesize the gathered information and begin coordinated planning effort
  o develop initial system for prioritizing infrastructure improvement/adaptation projects in Hampton Roads
  o Set up pilot system for planning and decision-making with respect to SLR adaptation

• Identify 1 or 2 critical infrastructure test cases to conduct initial coordination of SLR preparedness and resiliency planning to test and refine organizational structure and operating procedures during phase 2.
E. **Initial Phase 2 Objectives**

- With consideration of the work of other Pilot stakeholders including those recommendations of the Legal Working Group, the Steering Committee shall draft a Memorandum of Understanding that establishes an intergovernmental planning coordination organization of the type determined to be both politically feasible, legally possible, and the best path forward for intergovernmental collaboration for sea level rise preparedness and resilience.

- The Steering Committee shall, with the support of the Pilot Stakeholders, including the Infrastructure Planning Working Group, shall conduct initial coordination of SLR preparedness and resilience planning for selected critical infrastructure test cases.
F. Participating Organizations

• United States Government:
  o Federal Emergency Management Administration (FEMA) Region 2, 3
  o Mid-Atlantic Regional Coastal Ocean Observing System (MARACOOS)
  o National Aeronautics and Space Administration (NASA) Langley
  o National Oceanic and Atmospheric Administration (NOAA)
  o US Air Force, Joint Base Langley-Eustis
  o US Army Corps of Engineers (USACE), Norfolk District
  o US Army National Guard, Camp Pendleton
  o US Coast Guard Shore Infrastructure Logistics Center
  o US Department of Energy (DOE)
  o US Department of Health and Human Services (HHS)
  o US Department of Homeland Security (DHS)
  o US Department of Transportation (USDOT)
  o US Economic Development Administration (EDA)
  o US Environmental Protection Agency (EPA)
  o US Geological Survey (USGS)
  o US Naval Facilities Engineering Command Norfolk
  o US Navy (USN), Mid-Atlantic Region
  o US Small Business Administration (SBA)

• Commonwealth of Virginia:
  o Department of Environmental Quality (DEQ) & Coastal Zone Management
  o Secretary of of Natural Resources
  o Fort Monroe Authority
  o Office of the Attorney General of Virginia
  o Secure Commonwealth Panel Recurrent Flooding Sub-Panel
  o Secretary of Public Safety and Homeland Security
  o Virginia Department of Transportation (VDOT)
  o Virginia Port Authority

• Regional Organizations:
  o Hampton Roads Planning District Commission (HRPDC)
  o Hampton Roads Military and Federal Facilities Alliance (HRMFFA)
  o Hampton Roads Sanitation Department (HRSD)
  o Hampton Roads Transportation Organization (HRTPO)

• Local Governments of Hampton Roads:
  o City of Chesapeake
  o City of Hampton
  o City of Newport News
  o City of Norfolk
  o City of Poquoson
  o City of Portsmouth
- City of Virginia Beach
- Isle of Wight County

• Academic/Research Institutions:
  - Old Dominion University (ODU)
    - Office of Research
    - School of Public Service
    - Communication and Theater Arts
    - Community and Environmental Health
    - Geographic Information Systems
    - Academic Affairs
    - Batten College of Engineering & Technology
    - Virginia Modeling, Analysis & Simulation Center
    - Center for Coastal Physical Oceanography
    - Mitigation and Adaptation Research Institute
  - William and Mary School of Law:
    - Virginia Coastal Policy Center (VCPC)
  - Virginia Institute of Marine Science (VIMS)
  - Virginia Sea Grant
  - George Washington University
  - Penn State University

• Non-Profit Organizations and Associations:
  - Center for Climate and Security
  - CIVIC Leadership Institute
  - Climate Nexus
  - Hampton Roads Association for Commercial Real Estate
  - Hampton Roads Center for Civic Engagement
  - Hampton Roads Community Foundation
  - Hampton Roads Military and Federal Facilities Alliance
  - Hampton Roads Realtors Association
  - League of Women Voters
  - Lynnhaven River Now
  - Peninsula Chamber of Commerce
  - Resilient Virginia
  - The Planning Council
  - Urban Land Institute
  - Virginia Maritime Association
  - Wetlands Watch
  - World Resources Institute (WRI)
  - WHRO

• Private Industry:
  - AMEC Environmental and Infrastructure
o Building Constructive Solutions, LLC
o Clark Nexsen
o Comparity Insurance
o Concursive
o CostalObsTechServices
o COX Communications
o FEDEX
o Gaston Group
o Guagamela, LLC
o Harbor Group
o Harvey Lindsey Real Estate
o Huntington Ingalls
o Jody’s Popcorn
o Kaufman and Canoles
o MacNeilan and Associates
o Moffat and Nichol
o MYMIC
o Norfolk and Portsmouth Beltline
o Norfolk Southern
o PBMares
o Schexnider & Associates, LLC
o Sea Connections Consulting
o Sentara Healthcare
o Sorkin Productions
o StormCenter Communication, Inc.
o Terry Peterson Company
o Verizon
o Virginia Dominion Power
o Virginia Natural Gas
o Weston Solutions
o Williams Mullen
G. FEMA National Exercise Program Out-Brief Slides, December 2, 2014
Desired Outcome(s)

- The Senior Advisory Committee should aim to provide practical, historical experience to the other Working Groups and Advisory Committees.
- Help other Working Groups and Advisory Committees gather information and perspectives from municipal administrators, business owners, and other key community stakeholders.
### ACTIONS – Immediate

- Spread the word about the potential impacts of sea level rise throughout the community
- Gather additional local senior leaders from the public and private sectors (such as banking) to augment this committee
- Disperse throughout the other Working Groups and Advisory Committees to provide perspective
- Develop a template for other Working Groups and Advisory Committees to gather local data and information from public and private sector to assist in developing a range of mitigation strategies moving into the future
  - What information do local planners need?
  - When do they need it?

### ACTIONS – Near-Term

- Develop a briefing of sea level rise issues for area city managers to use in planning and threat analysis
- Regularly convene municipal administrators, city managers, federal agencies, military community, and other relevant stakeholders from area municipalities in a formal body to determine their needs in dealing with sea level rise
- Recommend a separate banking and finance planning group
- Identify key issues that this group can help address, including (but not limited to):
  - Impacts of sea level rise on municipal water systems
  - Sewer, stormwater, and sanitation systems
  - Banking and finance issues related to sea level rise (mortgages, interest rates, etc.)
ACTIONS – Long-Term

- Spread the word about the potential impacts of sea level rise throughout the community
- Get individual municipalities to think beyond their borders to develop a regional strategy

Out-Brief Slides: Land Use Planning Group
ACTIONS – Immediate

- Good, modern, global database/baseline and tools that are universally agreed upon
- Based on that data, a vulnerability index to build a common picture
- Education to planners, decision makers, builders, citizens on this new data, what it really means
- Consider infrastructure such as transportation and power in addition to buildings

ACTIONS – Near-Term

- Update local CEMP and create a regional CEM
- Provide input in to regional hazard mitigation plan
ACTIONS – Long-Term

- Make amendments to regulations for building codes based on common data

Out-Brief Slides: Private Infrastructure
Desired Outcome(s)

- Protect existing infrastructure and develop timelines for the protection of future infrastructure
- Promote private entities coming together to develop community solutions where costs can be shared

ACTIONS – Immediate

- Identify immediate actions that need to be taken in the next 60 - 90 days
  - Obtain planning data, science projections/predictions, forecasting
  - Create organization and the political will to promote public-private partnerships
  - Identify infrastructure that will be available during different events
  - Develop a Lessons Learned program where private infrastructure can learn from communities that have been previously impacted
ACTIONS – Near-Term

- Identify near-term actions that need to be taken in the next 6 - 12 months
  - Develop collaborative plans
  - Distribute findings
  - Public-private sharing to open information
  - Identify critical infrastructure and needed mitigation plans

ACTIONS – Long-Term

- Identify long-term actions that need to be taken in the next 12 - 18 months
  - Identification and prioritize funds necessary for infrastructure improvements
  - Dissemination of planning information
  - Continuously modify planning
  - Business community groups continue to collaborate to identify weaknesses/gaps
Challenges and Opportunities

- What obstacles may prevent immediate, near-, and long-term actions from being completed?
  - Public-Private coordination and communication
  - Leadership
  - Different goals and priorities between government and business
  - Grass-roots understanding of priorities

- What opportunities can you seize today to help you complete your immediate, near-, and long-term actions?
  - Local knowledge
  - Recognition of the problem
  - Resources
  - Federal presence
  - Private industry strength to react
Desired Outcome(s)

- Provide a short description of the key desired outcome(s) for your working group / advisory committee

1. Establish frequent and regular interaction with each of the working groups
   - Process for engaging legal working group

2. Develop legal primer with anticipated issues for working groups
   - Facilitate regular interaction with legal working group

3. Establish vetting process for working group issues
   - Ensure legal review of/opinion on proposed solutions
   - Provide recommendations

ACTIONS – Immediate

- Identify immediate actions that need to be taken in the next 60 - 90 days

1. Review/Revise charter to address any conceptual ambiguities
   - Structure
   - Authorities
   - Funding

2. Develop legal “handbook” resource
ACTIONS – Near-Term

- Identify near-term actions that need to be taken in the next 6 - 12 months

1. Recommend/determine organizational structure that best implements final version of charter
   - Identify potential “paths”
   - Finalize based on requirements
   - Develop timeline and milestones to complete within first 12 months

ACTIONS – Long-Term

- Identify long-term actions that need to be taken in the next 12 - 18 months
Desired Outcome

- Support other charter committees and working groups by providing and synthesizing economic impact data so that the region can plan for the economic impacts due to climate change
**ACTIONS – Immediate**

- Identify and confirm a committee chair
- Confirm that the committee has all the necessary stakeholders
- Engage other committees to determine how the Economic Impacts Advisory Committee can support their efforts

**ACTIONS – Near-Term**

- Using ODU as a mediator, educate the region on sea level rise/enhanced flooding and the potential economic impacts of not addressing these hazards
- Using ODU as a mediator, educate the region on the benefits of planning for sea level rise/enhanced flooding
ACTIONS – Long-Term

- Begin to determine a model for determining cost/benefit analysis and life cycle costs for increasing resilience of critical infrastructure and key resources
- Support jurisdictional long term and resilience planning efforts to address the impacts from sea level rise/enhanced flooding
- Begin to identify innovative solutions to fund resiliency efforts
- Continue to support efforts to identify economic opportunities for increasing resilience efforts now

Challenges and Opportunities

- What obstacles may prevent immediate, near-, and long-term actions from being completed?
  - 16 different jurisdictions and balancing the needs of all 16

- What opportunities can you seize today to help you complete your immediate, near-, and long-term actions?
  - Continued education and continued dialog with the jurisdictions
  - Innovative technology development through regional resources (ODU, NASA, etc.)
Out-Brief Slides: Citizen Engagement Working Group

Desired Outcome(s)

- Provide a short description of the key desired outcome(s) for your working group / advisory committee
  - The goal of the Citizen Engagement Committee is to bring citizens into the planning process and encourage citizen participation.
  - The Committee wants to identify the several social networks and community organizations that have already been established as a way to avoid duplicative efforts.
  - The Committee felt that while there is not a need for new information, there is a need to better communicate and modify the existing information to show citizens the direct local impacts of sea level rise.
ACTIONS – Immediate

- Identify immediate actions that need to be taken in the next 60 - 90 days
  - Identify the existing social networks and community groups in the region.
  - Break down the issues and risks into a way that is engaging to the relevant communities.

ACTIONS – Near-Term

- Identify near-term actions that need to be taken in the next 6 - 12 months
  - After creating a database of existing social networks and groups, create a venue for engagement between these groups.
    - Engagement should explain why action needs to be taken and what can be done to prepare and educate their communities.
  - Localize the existing information to make it engaging and relevant to specific communities.
  - Create a website and/or mobile app that allows people to access information and help individual disaster planning.
ACTIONS – Long-Term

- Identify long-term actions that need to be taken in the next 12-18 months
  - Create universal awareness of the fact that the issue of sea level rise exists.
  - Educate people to know where to go when emergency conditions already exist.

Challenges and Opportunities

- What obstacles may prevent immediate, near-, and long-term actions from being completed?
  - There is no way for citizen feedback to make its way back to the Advisory Committees.
  - There are many community groups and organizations that focus on a multitude of climate change related issues, but they are not all connected.
  - There is no one universally usable way to being community engagement or how to gain traction in communities.
    - What resonates with one community may not with another.
    - Twenty-five percent of the Newport News population lacks access to internet, including vulnerable populations.

- What opportunities can you seize today to help you complete your immediate, near-, and long-term actions?
  - The ways to organize people already exist, they just need to be used.
  - Many networks exist for community warning, they just need to be localized to have an impact.
Desired Outcome(s)

- Ensure representation from all regional municipalities and counties
- Create scientific-based messaging representing what impacts the region can anticipate for planning purposes
- Create consistent messaging delivered by elected officials to all stakeholders
- Communicate, educate, and listen to constituents in order better inform planning strategies
- Develop a toolbox for planning, mitigation, and adaptation for residents
**ACTIONS – Immediate**

- Create the charter for the committee
  - Mission Statement
  - Membership
  - Operational process
  - Deliverables
- Coordinate with regional emergency management officials on critical infrastructure and mass care (ESF6)
- Develop draft scientific-based messaging

**ACTIONS – Near-Term**

- Research of best practices
  - Transfer of development rights
  - Uniform Building Code for Regional Adaptations
- Develop recommendations for legislative actions based on research and community input
- Establish a single point of contact for citizens to obtain information on climate change mitigation and adaptation
ACTIONS – Long-Term

- Finalize recommendations for legislative action and submit to local governments for inclusion in legislative agendas

Challenges and Opportunities

- Challenges:
  - Number and complexity of municipalities
  - Different levels of development among the cities
  - Resource constraints

- Opportunities:
  - Working with federal partners to understand center of gravity for coastal communities, sea level rise, and climate adaptation
  - Collective need for action
  - Ability to capitalize on work done and current initiatives
  - Strong focus on climate change adaptation from the whole community including local, state, and federal partners
Desired Outcome(s)

- All residents and visitors and businesses (whole community) understand their risks and be equipped to take action.
- The region maximizes its available community rating system (CRS) credits.
ACTIONS – Immediate

- Assess what we’re already doing across the region, what outreach networks are out there, and how to leverage them.
  - Inventory networks
  - Identify gaps
- Craft 3 to 5 key messages for the public.

ACTIONS – Near-Term

- Develop a clearinghouse of the various audiences and technologies available to deliver the message.
- Engage with regional leadership who will be carrying the message:
  - Executive leadership from the school divisions (public and private)
  - Faith-based groups
  - Media
  - Others
- Coordinate message development across pilot project working groups.
ACTIONS – Long-Term

- Engage with technology experts
  - Develop a system to navigate flooded roadways (GPS app)
  - Simulation games
- Produce Public Service Announcements
- Use social media as a platform for community outreach
- Engage with real estate and insurance industries
- Work with private sector to develop homeowner demonstrations

Challenges and Opportunities

- What obstacles may prevent immediate, near-, and long-term actions from being completed?
  - Temptation for focus to be too broad
    - Prioritizing efforts
    - Get tied up with cause of climate change rather than solutions
  - Problem is viewed as too hard
    - People run away rather than address climate change issues
  - Maintain momentum and leverage efforts that are underway
  - Integration with current policy and regulations
Out-Brief Slides: Science Advisory Committee

Desired Outcome(s)

- Base decisions on science.
ACTIONS – Immediate

- Identify agencies that are improving their services.
- Help agencies refine what they are offering
- Reinsurance industry engaged in science.

ACTIONS – Near-Term

- Develop operational protocols for operational forecasts to guide decision makers with regard to sea level rise.
- Have consistency; advise education and outreach community.
ACTIONS – Long-Term

- Define and implement subsidence monitoring network
- Inform steering committee on risk
- Provide guidance on ocean monitoring

Challenges and Opportunities

- Budget
- Science isn’t easy and is hard to consume
**Out-Brief Slides: Infrastructure Planning Working Group**

**Desired Outcome(s)**

- Determine methodology for assessing infrastructure affected by climate change
- Understand impacts
- Formulate recommendations to coordinate across infrastructure
ACTIONS – Near-Term

- Expand membership as appropriate
- Understand what already exists (data) with regard to vulnerabilities
- Need assistance from legal to understand legal ramifications
- Identify interactions w/ science and economic impact to quantify economic impact

ACTIONS – Long-Term

- Understand vulnerabilities
- Develop pilot infrastructure to fully understand vulnerabilities and impacts
- Need regional strategic vision
### H. Legal Working Group

#### 1. Membership

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
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<tbody>
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2. Legal Primer
To: Jim Redick, Chair, IPP Steering Committee

Fr: Roy Hoagland, Chair, IPP Legal Working Group

Da: August 13, 2015

Copy: Ray Toll, Director of Coastal Resilience Research, ODU
     Emily Steinhilber, Assistant Director of Coastal Resilience Research, ODU
     IPP Legal Working Group Members

RE: IPP LEGAL PRIMER

Jim:

Please note the attached Legal Primer for the IPP. The generation of this product is the result of discussions at the IPP FEMA workshop last year and subsequent dialogue among the Legal Working Group members along with conversations of those members with other Working Group representatives.

As noted in the Executive Summary of the Legal Primer, the Primer is intended to complement the efforts of both the Steering Committee and the various Working Groups. The goal of the Primer “is to serve as a reference guide to assist members of the Working Groups in addressing the myriad legal issues that have been identified as particularly pertinent to the coordination of sea level rise preparedness and resilience planning across governmental and community lines.” In creating this document, the Legal Working Group envisioned updating the Primer as appropriate when necessary to “reflect changes in policy and law.” To do so effectively, we seek feedback on the Primer on an ongoing basis from all members of the Steering Committee and Working Groups.
The Primer contains not only a wealth of substantive law, but also an important disclaimer:

_This Legal Primer is not intended to serve as and should not be taken as legal advice or other communication to a client, or as attorney work product. Accordingly, this Legal Primer is not subject to either the Attorney-Client Communication Privilege or the Attorney Work Product Privilege. Nothing contained in this Legal Primer constitutes any type of official opinion from any of the governmental attorneys, or their offices, who participated in its drafting. It is designed as a baseline document that can assist participants outside the Legal Working Group. For further consultation by the Pilot Project working groups and the Steering Committee generally, please contact your Legal Working Group liaison. For agency specific questions, please consult your respective legal counsel within your organization._

I am requesting that you please ensure the distribution of the Primer to the Steering Committee and Working Groups with this memo accompanying the document. Should anyone working within the IPP collaborative have any questions, they should feel free to direct them to either their Legal Working Group liaison or me. My contact information is: rahoagland@wm.edu; 804.221.0404 (c); 757.221.7404 (o). I am also asking that you have the Primer posted on the IPP webpage; we will also host it on the Virginia Coastal Policy Center website.

Finally, please note that the production of this Primer, while reflecting the collective effort of the members of the Legal Working Group, would not have been possible without the assistance of Commander Mark Nevitt of the US Navy. We thank him and the Navy for their willingness to contribute in such a substantial manner.

Roy A. Hoagland  
Chair, IPP Legal Working Group  
Director, Virginia Coastal Policy Clinic, William & Mary Law School
Executive Summary

The Hampton Roads area is experiencing the highest rates of sea-level rise along the U.S. East Coast. It is second only to New Orleans, Louisiana as the largest population center at risk from sea level rise in the country. And it is anticipated that Virginia will experience between 2.3 to 5.2 feet of sea level rise by the end of the century. This unprecedented challenge requires a comprehensive and effective planning response.

The mission of the Hampton Roads Sea Level Rise Pilot Project (“Pilot Project”) is to develop a regional whole of government and whole of community approach to sea level rise preparedness and resilience planning for the Hampton Roads community. This is a two-year project with the goal of establishing arrangements and procedures that can effectively coordinate the sea level rise preparedness and resilience planning of federal, state, and local government agencies, citizens groups, and the private sector. Ideally, this Pilot Project will generate a template for use by other regions of the United States also working with similar issues of sea level rise preparedness and this Legal Primer is an important part of this effort. It provides an overview of the myriad legal and policy concerns that the Pilot Project will face in developing practical and whole of government solutions.

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1 Several members of the Legal Working Group assisted with the creation of this document. They include: Professor Roy Hoagland (Director: Virginia Coastal Policy Center); Mr. Joe Durant (Newport News City Attorney Office); Mr. Jeremy Forrest (Virginia Coastal Policy Center Student); Ms. Kelly Lackey (City of Chesapeake); Lieutenant Commander Deborah Loomis, JAGC, USN (Fleet Forces Command Legal); Mr. Benjamin McFarlane (Hampton Roads Planning District Commission); Commander Mark Nevitt, JAGC, USN (Region Environmental Counsel, Mid-Atlantic); Mr. Adam Olson (USCG Legal); Mr. Miguel Padilla (USCG Legal); Mr. J. Duncan Pitchford (Commonwealth of Virginia Attorney General’s Office); Mr. Henry “Speaker” Pollard (Law Firm of Williams Mullin); Mr. Mark Popovich (Isle of Wight County Attorney); Ms. Lynne Rhode (Commonwealth of Virginia Attorney General’s Office).


3 See, e.g., Andrew C. Stilton & Jessica Grannis, Virginia Case Study: Stemming the Tide How Local Governments can Manage Local Flood Risks, GEORGETOWN CLIMATE CENTER (May 2012); VIRGINIA INSTITUTE OF MARINE SCIENCE (VIMS), RECURRENT FLOODING STUDY FOR TIDEWATER VIRGINIA
As presently organized, the Pilot Project has a Steering Committee, a Legal Working Group, and five subject matter working groups addressing specific areas of concern. The Steering Committee consists of members from state and local government, non-voting liaison members from the federal government (Navy, Coast Guard, Army Corps of Engineers, Air Force), and private industry. The Legal Working Group is chaired by Professor Roy Hoagland (Clinical Professor, William & Mary School of Law) and consists primarily of attorneys from public (federal, state, and local) and private law practices.

Five subject matter working groups receive support from the Legal Working Group in some capacity:

(1) Private Infrastructure;
(2) Public Infrastructure;
(3) Citizen’s Engagement;
(4) Land Use; and
(5) Public Health.

This Legal Primer complements the efforts of both the Steering Committee and these Working Groups. Its goal is to serve as a reference guide to assist members of the Working Groups in addressing the myriad legal issues that have been identified as particularly pertinent to the coordination of sea level rise preparedness and resilience planning across governmental and community lines. This Primer contains inserted hyperlinks to source documents throughout the document as well as footnotes and applicable reference material to assist the reader.

As sea level rise and resiliency planning is a fast-moving and ever-changing area of policy and law, it is envisioned that this Legal Primer may be updated to reflect changes in policy and law. Feedback on this product is sought from all members of the Pilot Project Working Groups. This Primer necessarily focuses on planning for sea level rise adaptation at the state, local, and federal levels to address foreseeable effects of sea level rise, recurrent flooding, and other related risks. It does not specifically focus on climate mitigation measures (such as the reduction of Greenhouse Gas (GHG) emissions), as this is not the central purpose of the Pilot Project.

Adaptation is defined by the U.S. Environmental Protection Agency (EPA) as the “adjustment or preparation of natural or human systems to a new or changing environment which moderates harm or exploits beneficial opportunities.” 4 Adaptation measures can either be structural or non-structural. Traditionally, flood and erosion risks have been managed using structural techniques such as sea walls and levees. 5 Non-structural adaptation measures include changes to land use practices that can be done via a change in zoning regulation. Legal authorities and

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5 This is often referred to as “armoring” infrastructure. See, e.g., Stilton & Grannis, supra note 3, at 1.
issues relevant to both structural and non-structural adaptation measures are addressed in this Primer.

This Legal Primer is not intended to serve as and should not be taken as legal advice or other communication to a client, or as attorney work product. Accordingly, this Legal Primer is not subject to either the Attorney-Client Communication Privilege or the Attorney Work Product Privilege. Nothing contained in this Legal Primer constitutes any type of official opinion from any of the governmental attorneys, or their offices, who participated in its drafting. It is designed as a baseline document that can assist participants outside the Legal Working Group. For further consultation by the Pilot Project working groups and the Steering Committee generally, please contact your Legal Working Group liaison. For agency specific questions, please consult your respective legal counsel within your organization.

I. Jurisdictional Issues: Federal, State, & Local Law

As a general matter, zoning, flood management and building codes are a matter of state and local government law. Each working group should be cognizant of the various jurisdictions’ comprehensive plans, zoning ordinances, and building codes for the jurisdictions in which they are working and consult these various source documents to guide their work. A table of applicable local law is found in section I.C.

A. Federal and Constitutional Law

The federal government, to include the Department of Defense (DoD) and all federal agencies, is a large property owner within the Hampton Roads region. Adaptation measures at federal agencies and on federal property effectively fall outside the state and respective locality’s zoning and building guidance.

1. Doctrine of Sovereign Immunity and Federal Supremacy: Under the legal doctrine of sovereign immunity, the U.S. government (and its agencies) may not be sued without its express consent through an explicit congressional waiver.

   a. Federal supremacy ensures that state and local governments cannot hinder essential government functions. Hence, as a general matter, the activities of the federal government are often free from state and local government regulation.6

   b. In the land use and building code context, a congressional waiver of sovereign immunity does not exist. Thus, state and local building and property codes cannot generally be enforced against federal facilities. Federal law requires that each building constructed or altered by a federal agency must consider the laws of a state or political subdivision of a state which would apply if it were not a building constructed or altered by a federal agency. These include

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6 McCullough v. Maryland, 17 U.S. 316 (1819).
consideration of state and local zoning laws and laws relating to landscaping, open space, historic preservation, and similar laws. Nevertheless, this does not constitute a sovereign immunity waiver and does not authorize a fine, penalty, or cause of action against a federal agency for failure to comply. In sum, it does not mandate compliance – only that consideration is given.

c. However, there are numerous federal environmental laws where Congress has waived sovereign immunity (such as the Clean Water Act), which requires federal agencies and their facilities to comply with environmental laws and requirements in the same manner and to the same extent as a non-governmental entity. Key federal laws are discussed in greater detail below.


a. Property Clause: Article IV of the Constitution states that “Congress shall have power to dispose of and make all needful Rules and Regulations respecting . . . the Property belonging to the United States; and nothing in this Constitution shall be so construed as to prejudice any Claims of the United States, or of any particular State.” The Property Clause provides constitutional authority for the management and control of federal lands by Congress.


c. The Supremacy Clause: This provision states that the Constitution, federal laws, and treaties “are the Supreme Law of the Land.” The Supremacy Clause ensures the supremacy of federal law over state law in the event of a conflict, provided that Congress is acting pursuant to its constitutionally authorized powers.

7 40 U.S.C. § 3312 (c)(1)-(2).
9 U.S. CONST. art. IV. § 3 cl. 2.
10 U.S. CONST. amend. V. State and Federal jurisdiction may be considered exclusive, partial, concurrent, or proprietary. This is a complex area of law and questions should be directed to the appropriate member of the Legal Working Group as they arise.
11 In certain circumstances, federal courts have applied a broad view of “public use” and have not restrained state and local governments from seizing privately owned land for private commercial development on behalf of private developers. See Kelo v. City of New London, 545 U.S. 469 (2005). However, pursuant to a recent amendment to the Virginia Constitution, state and local governments are severely constrained, if not altogether prohibited, in taking such action. See Va. Const., art. I, § 11.
12 U.S. CONST. art. VI. cl. 2.
d. **Underlying Federalism Principles:** It is beyond the scope of this Primer to address all the federalism issues associated with sea level rise in Hampton Roads, but the Tenth Amendment states that all powers not delegated to the United States by the Constitution remain at the state level.

3. **U.S. Law: Zoning Requirements and Building Codes**

   a. As discussed above, state and local building codes must be considered by federal agencies when constructing, but they are not binding regulatory requirements.

   b. 40 U.S.C. § 3312: “Compliance with Nationally Recognized Codes”
      
      i. A building constructed by a Federal Agency “shall be constructed or altered . . . in compliance with one of the nationally recognized model building codes and with other nationally recognized codes. . . ” Projects for construction shall be constructed to the maximum extent feasible with one of the nationally recognized model building codes.
      
      ii. Each building constructed or altered by the Administrator of the General Services shall be done only after consideration of all requirements – to include state or local zoning laws – which would apply to the building if it were not a building constructed or altered by a federal agency.
      
      iii. Neither of these obligations amount to a federal sovereign immunity waiver, however. Hence, they do not create a cause of action for non-compliance.

   c. The General Services Agency (GSA) has the authority to promulgate regulations governing the acquisition, use, and disposal of real property. It applies the technical requirements issued by the International Code Council (ICC). The ICC family of codes is available at [www.iccsafe.org](http://www.iccsafe.org).

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13 Federalism is defined as “The relationship and distribution of power between the individual states and the national government.” BLACK’S LAW DICTIONARY 253 (POCKET ED. 1996).
14 U.S. CONST. amend X. “The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people.” Real property owned by a sovereign (The United States) within the geographic boundaries of another sovereign (an individual state) creates a question of which sovereign’s law will apply to that property.
16 40 U.S.C. § 3312 (c).
17 Inasmuch as Virginia models its statewide building code on such standards and other national standards, the risk of conflict between federal building standards and what would normally be required at the state or local levels in Virginia appears to be reduced in this respect. See Va. Code Ann. §§ 36-98 & 36-39.
4. **Applicable Federal Statutes Impacting Sea Level Rise Preparedness and Governance**

   a. **Coastal Zone Management Act (CZMA)**\(^{18}\)

      i. Purpose. To encourage and assist states to develop and implement management programs over the use of the land and water resources of the Coastal Zone. The CZMA minimizes loss of life and property caused by improper development in flood-prone, storm-surge, and erosion-prone areas.

      ii. Applicability. Each federal agency must ensure consistency with approved state coastal zone management programs, “to the maximum extent practicable,” when 1) conducting or supporting activities directly affecting the coastal zone or 2) undertaking any development project in the coastal zone.\(^{19}\)

   b. **Clean Water Act (CWA)**\(^{20}\)

      i. Purpose. To restore and maintain the chemical, physical, and biological integrity of the Nation’s waters. It requires the establishment of water quality standards and sets permit requirements for point source pollutant discharges into “waters of the United States” of dredge and fill material and of pollutants contained in industrial and municipal wastewater and industrial, municipal and construction stormwater discharges. “Waters of the United States” was recently clarified by EPA and U.S. Army Corps of Engineers regulations following a string of Supreme Court cases.\(^{21}\)

      ii. Virginia has a fully authorized National Pollutant Discharge Elimination System (NPDES) permitting authority under the Clean Water Act. Virginia Authorization to Implement. Pursuant to EPA-granted authorization, most of day-to-day administration and implementation of the Clean Water Act’s permit programs for wastewater and stormwater discharges occurs at the state level in Virginia.\(^{22}\)

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\(^{19}\) 16 U.S.C. § 1456.

\(^{20}\) 33 U.S.C. §§ 1251-1387, See §1344, entitled “Permits for Dredged or Fill Material.”

\(^{21}\) EPA and the Corps of Engineers have just revised the definition of “waters of the United States.” See 80 Fed. Reg. 37054 (June 29, 2015), to be codified at 40 CFR 230.3 and 33 CFR 328.3.

iii. Sovereign Immunity Waiver. Each federal agency “shall be subject to, and comply with, all Federal, State, interstate, and local requirements, administrative authority, and process and sanctions respecting the control and abatement of water pollution . . .”

c. Clean Air Act (CAA)

i. Purpose. To protect and enhance the quality of the Nation’s air resources so as to promote the public health and welfare. The CAA establishes a complex permitting program for the control of emissions of certain pollutants into the lower and upper atmosphere.

ii. Sovereign Immunity Waiver. A federal agency having jurisdiction over any property or facility or engaged in activity resulting or which may result in the discharge of air pollutants “shall be subject to, and comply with, all Federal, State, interstate, and local requirements, administrative authority, and process and sanctions respecting the control and abatement of air pollution in the same manner, and to the same extent as any nongovernmental entity.”

iii. The Clean Air Act addresses climate mitigation efforts through the regulation of Greenhouse Gas (GHG) emissions.

iv. A recent Supreme Court case, Massachusetts v. EPA, serves as an important precedent in describing the scope of the Clean Air Act’s ability to address rising sea levels. Under Massachusetts v. EPA, the state of MA brought suit against EPA for failure to regulate GHG emissions, and was found to have judicial standing.

v. Virginia Authorization to Implement. Pursuant to EPA-granted authorization and approval of Virginia’s State Implementation Plan, most of the day-to-day administration and implementation of the Clean Air Act’s permit programs occur at the state level in Virginia.

d. Resources Conservation and Recovery Act (RCRA)

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24 42 U.S.C. § 7401 et seq.
26 The standing requirements are easier for the state (vice an individual) to meet. See Massachusetts v. EPA, 549 U.S. 497 (2007).
27 See 40. C.F.R. §§ 52.5420 et seq.
28 42 U.S.C. § 6901 et seq.
i. Purpose. To reduce or eliminate the generation of hazardous waste. To treat, store, or dispose of hazardous waste so as to minimize threat to human health and the environment. Also controls the management of non-hazardous solid waste at landfills.

ii. Sovereign Immunity Waiver. 29 A federal agency or department having jurisdiction over any solid waste management site or engaged in any activity resulting, or which may result, in the disposal or management of solid or hazardous waste shall be subject to, and comply with, all Federal, State, interstate, and local requirements respecting control and abatement of solid waste or hazardous waste disposal and management.

iii. Virginia Authorization to Implement. Pursuant to EPA-granted authorization, day-to-day administration and implementation of RCRA programs occurs at the state level in Virginia.30

e. National Environmental Policy Act (NEPA)

i. Purpose. NEPA requires federal government and all agencies to “use all practicable means to create and maintain conditions under which man and nature can exist in productive harmony...”31

ii. Council on Environmental Quality (CEQ) Draft Guidance on Climate Change and Greenhouse Gas Emissions. Provides draft guidance to Federal agencies on how to consider greenhouse gas emissions and the impacts of climate change in their NEPA analysis.

f. Coastal Barriers Resources Act (CBRA)

i. Purpose. To minimize loss of human life, wasteful expenditure of Federal revenues, and damage to fish, wildlife, and other natural resources associated with the coastal barriers along the Atlantic and Gulf Coasts. Regulates the issuance of flood insurance under the National Flood Insurance Program within coastal areas designated as Coastal Barrier Resources System (CBRS) units, as well as

31 42 U.S.C. § 4331 (b).
financial assistance provided by FEMA to applicants in CBRS units.

ii. **Sovereign Immunity Waiver.** CBRA does not provide for a waiver of federal sovereign immunity. Instead, it has a provision that outlines “priority of laws” between federal and state regulation of CBRS land that also strives to protect state regulation of land within its boundaries.

g. **Endangered Species Act (ESA)**

i. **Purpose.** To conserve endangered and threatened species and resolve water resource issues in concert with endangered species conservation.

ii. **Sovereign Immunity Waiver.** Each federal agency must ensure that any action authorized, funded or carried out by that agency is not likely to jeopardize the continued existence of any endangered/threatened species or result in destruction or adverse modification of critical habitat for such species.

h. **Fish and Wildlife Coordination Act.**

i. **Purpose.** The Fish and Wildlife Coordination Act of 1934, as amended, requires that wildlife, including fish, receive equal consideration and be coordinated with other aspects of water resource development. This is accomplished by requiring consultation with U.S. Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration (NOAA) Fisheries, and appropriate state agencies whenever any body of water is proposed to be modified in any way and a federal permit or license is required.

i. **Marine Mammal Protection Act (MMPA).**

i. **Purpose.** The MMPA’s purpose is to protect essential marine mammal habitats, including the rookeries, mating grounds, and areas of similar significance from the adverse effect of man’s actions.

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33 16 U.S.C. § 1531 et seq.
j. **Migratory Bird Treaty Act (MBTA)**\(^{37}\)

   i. **Purpose.** The MBTA’s purpose is to protect migratory birds native to the United States and in danger of extinction from being killed, captured, taken, or exported.

k. **Magnuson-Stevens Fishery Conservation and Management Act**\(^{38}\)

   i. **Purpose.** The Magnuson-Stevens purpose is to conserve and manage the fishery resources found off the coasts of the United States, and promote the protection of essential fish habitat (EFH) in the review of projects conducted under Federal permits, licenses, or other authorities that affect or have the potential to affect such habitat. It requires federal agencies to consult with NOAA Fisheries when any activity proposed to be permitted, funded, or undertaken by a federal agency may have adverse effects on designated EFH.

l. **National Historic Preservation Act (NHPA)**\(^{39}\)

   i. **Purpose.** The NHPA’s purpose is to protect the nation’s historical and cultural foundations against inadvertent loss or alteration, and to improve the planning and execution of Federal and federally assisted projects to encourage their preservation.

m. **National Historic Lighthouse Preservation Act (NHLPA)**\(^{40}\)

   i. **Purpose.** The NHLPA’s purpose is to create a process and policies for the conveyance of historic light stations, and to monitor their use.

5. **Federal Executive Orders & Executive Guidance:** There have been numerous executive orders addressing federal agency efforts relating to sea level rise.

   a. **Executive Order 13693:** “Planning for Federal Sustainability in the Next Decade.” Primarily related to climate mitigation measures, it orders the reduction of Greenhouse Gas emissions and sets sustainability goals for federal agencies.

   b. **Executive Order 13690:** “Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input.” This executive order updates an

\(^{37}\) 7 U.S.C. § 703 et seq.

\(^{38}\) 16 U.S.C. § 1801 et seq.


earlier E.O. addressing federal action in floodplains and establishes new flood plain standards for federal actions.

c. **Executive Order 13677:** “Climate Resilient International Development.” Establishes a working group on Climate-Resilient International Development which will identify, develop, and assess federal agency strategies, programs and investments towards climate-resilience.

d. **Executive Order 13653:** “Preparing the United States for the Impacts of Climate Change.” Encourages, through agency guidance, grants, and technical assistance, climate-resilient investments by states, local communities, and tribes.

e. **Executive Order 13547:** “Stewardship of the Ocean, Our Coasts, and the Great Lakes.” Establishes a national policy to ensure protection and restoration of ocean, coastal, and Great lakes ecosystems, enhance sustainability of ocean and coastal economies, respond to climate change, and coordinate with national security and foreign policy interests.

f. **Federal Climate Action Plan (June 2013):** directs federal agencies to take the appropriate actions to reduce risk to federal investments, specifically to “update their flood-risk reduction standards.”

6. **Applicable Federal Agencies & Programs**

a. **Environmental Protection Agency (EPA)**

   i. Provides information regarding the effects of climate change on coastal areas, including sea level rising and flooding. EPA also provides a Sea Level Rise and Coastal Flooding Impacts Viewer to “visualize the potential impacts of sea level rise on coastal communities,” including Mississippi, Alabama, Texas, and Florida. Additional coastal counties are anticipated to be added over time.

b. **Federal Emergency Management Agency (FEMA)**

   i. Created by the Disaster Relief Act of 1974 \(^{42}\) to provide federal natural disaster assistance to state and local governments.

   ii. Encourages the development of disaster preparedness plans by state and local government.

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\(^{41}\) 40 C.F.R. § 1.

\(^{42}\) 42 U.S.C. § 5131, *et seq.*
c. **National Oceanographic and Atmospheric Association (NOAA)**

NOAA provides a Sea Level Trends map that illustrates regional trends in sea level, with arrows representing the direction and magnitude of change. It also provides detailed information for each area identified on the map.

d. **U.S. Geological Survey (USGS)**

The USGS partners with NOAA to release a report that “examines and describes climate change impacts on coastal ecosystems and human economies and communities, as well as the kinds of scientific data, planning tools and resources that coastal communities and resource managers need to help them adapt to these changes.”

e. **National Aeronautics and Space Administration (NASA)**

NASA provides information regarding climate change and vital signs of the planet including sea level and sea level rise data, indicating that the rise is due to two primary causes: “added water from melting land ice and the expansion of sea water as it warms.” NASA also provides charts showing the change in sea level.

f. **National Flood Insurance Program**

i. Provides affordable insurance to property owners to help reduce the impact of flooding on private and public property. NFIP also “encourages communities to adopt and enforce floodplain management regulations.”

ii. The NFIP program “reduces the socio-economic impact of disasters by promoting the purchase and retention of Risk Insurance in general, and National Flood Insurance in particular.”

iii. FEMA provides a Flood Insurance Rate Map (FIRM). This is “the official map of a community on which FEMA has

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44 30 C.F.R. § 2 (A) (4).
45 Louis Cafiero and Catherine Puckett, *USGS-NOAA: Climate Change Impacts to U.S. Coasts Threaten Pub. Health, Safety and Econ.*, U.S. GEOLOGICAL SURVEY (Jan. 28, 2013, 1:00 PM); see also Adele Young & Kristen Clark, *Go Green, Save Money: Lowering Flood Insurance Rates in Virginia with Stormwater Management and Open Space*, VIRGINIA COASTAL POLICY CLINIC WHITE PAPER (2015) (showing how “local governments can save constituents money and build support for stronger environmental protection is to participate in the Federal Emergency Management Agency's (FEMA) “Community Rating System” (CRS) program –a voluntary incentive program that awards credits to communities that implement proactive measures to reduce flood risk”).
delineated both the special hazard areas and the risk premium zones applicable to the community.”

g. **Readiness and Environmental Protection Integration (REPI)**

i. Provides a current statutory basis to allow DoD to enter into cost-sharing partnerships with outside groups (e.g., The Nature Conservancy) to protect land areas outside the military installation and to ensure that development around the installation is conducive to mission readiness and operations. REPI allows the military to enter into agreements with eligible entities (e.g., states, political subdivision of a state, or a private entity with a conservation or preservation goal) to address the use or development of real property “in the vicinity of or ecologically related to” military installations for purposes of:

1. Limiting any development or use of the property that would be incompatible with the mission of the installation;

2. Preserving habitat on the property that is compatible with environmental requirements and relieve environmental restrictions that interfere (directly or indirectly) with military testing or operations on the installations.

h. **National Levee Safety Program**: establishes a “Committee on Levee Safety” to inspect levees – defined as “embankment[s], including floodwalls, the primary purpose of which is to provide hurricane, storm, and flood protection” – and issue recommendations for a national levee safety program.

7. **Agency Specific Policy Guidance**

a. **Department of Defense (DoD) and Military Departments.** Within DoD, the current Unified Facilities Code states that DoD planners should consider climactic conditions during construction, but it does not formally mandate specific sea level rise or climate resilient investment in any one project. In addition, there is not an easily identified “climate change” or “climate adaptation” fund that is appropriated by Congress and specifically designated for future climate resilient investment.

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48 10 U.S.C. § 2684a, entitled, “Agreements to limit encroachments and other constraints on military training, testing and operations.”

49 33 U.S.C. §§3301 et seq.
i. DoD projects on federal installations must take into account two important components: (1) the Unified Facilities Criteria; and (2) the DoD funding process. The Unified Facilities Criteria applies to the Military Departments, the Defense Agencies, and DoD Field Activities for planning, design, construction, sustainment, restoration, and modernization of facilities, regardless of funding source. Not all documents apply to all services; an alpha-designator following the document number indicates a document applying to a particular service (e.g., A for USACE, F for Air Force, N for Navy).

ii. DoD Climate Adaptation Roadmap

iii. Center for Naval Analyses Studies

iv. 2014 Quadrennial Defense Review

v. Navy Task Force Climate Change

vi. Center for Climate and Security Resource Hub

b. Department of Homeland Security (DHS) Policy. DHS applies DHS-specific Environmental Management directives 025-21, 023-02, and 023-01, and “where practicable,” tries to meet or exceed sustainable practice goals of other federal agencies.

i. DHS Directive 007-03: Integrated Risk Management - Establishes responsibilities for implementing DHS policy for risk management, including mitigating risks from natural disasters.

ii. U.S. Coast Guard (USCG) - Agency Specific Policy Guidance

1. COMDTINST 16478.5- Environmental Compliance Evaluation: Establishes policies, procedures, and responsibilities for the Coast Guard Environmental Compliance Evaluation (ECE) Program.

2. COMDTINST 16475.1D- National Environmental Policy Act Implementing Procedures and Policy for

51 The U.S. Coast Guard is organizationally part of the Department of Homeland Security (DHS).
Considering Environmental Impacts: Establishes policies and responsibilities for Coast Guard implementation of the NEPA, supra at I (A) (3) (c), including provisions for USCG planning, environmental documentation, and preparation of Environmental Impact Statements.

3. **COMDINST 16004.2A - Coastal Zone Management, Federal Consistency Procedures**: Establishes policies and procedures for USCG implementation of Coastal Zone Management Act (CZMA), including USCG procedures, exemptions, and State Agency objections to USCG determinations.

4. **USCG Western Hemisphere Strategy (2014)**, at 16-23: noting that climate change will exacerbate transnational risks and threats. Rising sea levels could lead to coastal erosion, property destruction, and an increase in displaced refugees who become even more vulnerable to extreme weather events. Changing precipitation patterns can reallocate flood and drought, disrupting access to food and water in vulnerable areas. Extreme weather events produce dangerous storm surges, disrupt trade routes, and consume resources of responding agencies.

B. State Law: Commonwealth of Virginia

The Commonwealth of Virginia is a **Dillon Rule state**. Under the Dillon Rule, localities have the authority to act only in instances where they have been expressly granted such authority from the Commonwealth of Virginia or as may reasonably be inferred therefrom. The Dillon Rule requires Virginia courts to narrowly interpret delegations of power to local governments. However, the exercise of police powers is given greater leeway routinely, and this is particularly true for issues of safety and welfare which would reasonably include adaptation measures for sea level rise. Indeed, prior legal analysis indicates that the Dillon Rule should only have a limited

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52 “Dillon’s Rule” is named after John Dillon, a Chief Justice Iowa Supreme Court Justice who crafted the rule in the 19th century. It was quickly adopted by Virginia and several other states. In contrast to the Dillon Rule, in “Home Rule” allows local governments to make public policy decisions, such as creating special zoning and tax districts to finance a specific infrastructure project (arena, road, etc.), unless the state has specifically limited local authority.

53 Res. Conservation Mgmt., Inc. v. Bd. of Supervisors of Prince William County, 238 Va. 15, 22, 380 S.E.2d 879, 883 (1989) (stating that when a locality regulates local physical hazards, “specificity is not necessary even under the Dillon Rule”); see also Stilton & Grannis, supra note 3, at 6 (asserting that “accounting for sea-level rise would not require local governments to imply new powers or impose new criteria”).
impact on planning for sea level rise at the local level due to broad delegations that are in place.

The Virginia Supreme Court has stated that localities cannot generally be hamstrung when regulating land use.\textsuperscript{54} As discussed in greater detail below, the Virginia legislature has already delegated a myriad of flood control, zoning, and similar authorities to local governments – all areas of importance when determining local authority to address sea level rise and recurrent flooding. And the legislature continues to act on such measures.

Furthermore, multiple state programs, laws, regulations, executive initiatives and policies both directly and indirectly address concerns associated with sea level rise and resiliency planning.

1. **Dillon Rule Overview:** Municipalities exercise only the powers specifically granted by the state, the powers necessary to carry out the specifically granted powers, and the powers indispensable to the declared purposes of the municipality. Accordingly, while there have been broad delegations to localities in Virginia in flood control and zoning, it still remains important to have a legal basis within local law that is derived from a Virginia statute delegating such authority as applied to local zoning, water quality, and sea level rise issues.

2. **Virginia State Constitution**

   a. Places a prohibition against damaging or taking of private property except and only to the degree necessary for public use, and then only with just compensation (Art 1, Sec. 11). This allows for compensation for damages, not only the taking of private property.

   b. Authority for and limitations on local government debt: (Article VII, Sec. 10).

3. **Key Judicial Rulings Applying Virginia Constitutional Law**

   a. *Livingston v. VDOT:* May place localities at increased risk for takings liability when private property is damaged due to the locality’s failure to maintain a public improvement.\textsuperscript{55}

   b. *Byler v. Va. Elec. & Power Co.:* Va. Const. Art. 1, § 11 of the Virginia Constitution does not authorize a remedy for diminution in property value caused by public improvement, such as power lines.\textsuperscript{56}

   c. *Kitchen v. City of Newport News:* Landowner’s inverse condemnation claim alleged sufficient facts, and survived demurrer

\textsuperscript{55} 284 Va. 140, 726 S.E.2d 264 (2012).
\textsuperscript{56} 284 Va. 501, 731 S.E.2d 916 (2012).
filed by City of Newport News, when City’s infrastructure led to a series of floods on landowner’s property.\textsuperscript{57}

4. \textbf{Virginia State Law: Flood Control}

a. State interest in flood control: Virginia law authorizes the implementation of measures to mitigate and alleviate the effects of stormwater surges and flooding.\textsuperscript{58}

b. Flood protection programs and coordination: Authorizes the implementation of flood prevention programs to minimize loss of life, property damage, and negative impacts on the environment.\textsuperscript{59}

c. Construction of dams, levees, seawalls, etc: Authorizes localities to construct such items to prevent tidal erosion, flooding or inundation of such locality.\textsuperscript{60}

d. Condemnation by localities authorized: Authorizes localities to acquire by condemnation title to land, buildings, easements, earth, and water.\textsuperscript{61}

5. \textbf{Virginia State Law: Zoning}

a. Building of houses and establishing setback lines: Authorizes localities to adopt mandatory setbacks. Setbacks are building restrictions that establish a distance from a boundary line where owners are prohibited from building structures.\textsuperscript{62}

b. Zoning ordinances generally: Authorizes localities to classify the use of land, flood plains, etc.\textsuperscript{63}

c. Purpose of zoning ordinances: Authorizes localities to create zoning ordinances to protect surface water and ground water, from loss caused by flood, and to preserve historic areas.\textsuperscript{64}

d. Matters to be considered in drawing and applying zoning ordinances and districts: Authorizes localities to draw zoning ordinances and districts considering future requirements of community as to the

\textsuperscript{57} 275 Va. 378, 657 S.E.2d 132 (2008).
\textsuperscript{60} Va. Code Ann. § 15.2-970.
\textsuperscript{61} Va. Code Ann. § 15.2-1901.1.
\textsuperscript{62} Va. Code Ann. § 15.2-2279.
\textsuperscript{63} Va. Code Ann. § 15.2-2280.
\textsuperscript{64} Va. Code Ann. § 15.2-2283.
land, preservation of flood plains, the preservation of life and property, etc.  

6. **Virginia State Law - Coastal Zone Management State Program Consistency Review.** Under the federal Coastal Zone Management Act (CZMA), certain actions and projects occurring in the designated coastal zone of Virginia must under consistency review to ensure compliance with state coastal zone programs. This review process is administered by the Virginia Department of Environmental Quality.  

   a. Virginia water resources policy – generally.  
   b. State ownership and control of tidal and non-tidal submerged lands.  
      i. Improvement of navigability.  
      ii. Piers, docks and landings.  
   c. Submerged bottomlands belonging to state should be maintained for public use.  
   d. State Water Control Law: Provides overarching foundation for most of Virginia’s major water quality and water resources management programs.  
   e. Wetlands protection:  
      i. Virginia Water Protection Permit Program.  
      ii. Wetlands impact permits and local wetland boards.  

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iii. Wetlands policy.75

f. Surface water withdrawals, preservation of instream flow, interbasin transfers of water: Virginia Water Protection Permit Program.76

g. Stormwater management and erosion control

i. Stormwater discharges by localities, certain government facilities and higher education institutions: Virginia Stormwater Management Act.77

ii. Stormwater discharges and erosion management for land-disturbing and other construction activities and post-development stormwater control (private and public property).


i. Chesapeake Bay and tributary protections (buffers, set-backs and other land use restrictions): Chesapeake Bay Preservation Act;82 Chesapeake Bay Preservation Regulations.83 The CBPA could be utilized by localities to prohibit construction 100 feet from the edge of the wetland or shore. CBPA buffers do not apply to federal lands.

j. Coastal sand dune and beach protection.84

k. Wastewater and sewer control:

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75 9 VAC 25-380-10 et seq.
78 §§ 62.1-44.15:24 et seq.
79 9 VAC25-870-10 et seq.; (control of stormwater from non-construction industrial activities (Va. Code Ann. § 62.1-44.15(5); 9 VAC 25-31-120; myriad general permit regulations)
81 9 VAC 25-840-10 et seq.
83 9 VAC 25-830-10 et seq.
84 Va. Code §§ 28.2-1400 et seq.
i. Industrial wastewater: Wastewater discharges; no-discharge treatment systems.  

ii. Municipal wastewater (domestic and industrial sewage) treatment and discharges.  

iii. Septic systems and other sewage handling.  

l. Animal feeding operations (“AFOs”):  

i. No discharge;  

ii. With discharge.  

m. Waterworks and Water Supply:  

i. Waterworks and public water supply treatment.  

ii. Virginia water supply and resources planning.  

iii. Impoundment of surface waters.  

8. **Solid waste collection, recycling and disposal** (e.g., landfill siting, design construction, and contamination): Virginia Waste Management Act; Virginia Solid Waste Management Regulations.  

9. **Hazardous waste generation, storage, treatment, transportation and disposal**: Virginia Waste Management Act; Virginia Hazardous Waste Management Regulations.  

10. **Voluntary Remediation Program**: Addresses voluntary cleanup of properties with contamination or potential contamination where remediation is not clearly mandated by law.  

11. **Storage tanks and petroleum releases, generally**

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85 Va. Code Ann. § 62.1-44.15(5); 9 VAC 25-31-10 et seq.  
86 9 VAC 25-32-10 et seq.  
87 Va. Code Ann. § 62.1-44.15(5); 9 VAC 25-31-10 et seq.; 9 VAC 25-790-10 et seq.  
90 Va. Code Ann. § 62.1-44.15(5); 9 VAC 25-31-10 et seq.  
97 9 VAC 20-60-12 et seq.  

b. Aboveground storage tanks ("AST's") and petroleum releases generally: Regulation of AST's, contingency planning for AST storage and releases, and remediation and liability for releases from AST's and non-tank releases.\footnote{Va. Code Ann. §§ 62.1-44.34:14 et seq.; 9VAC25-91-10 et seq.}

12. **Open space preservation and conservation**

a. Open Space Land Act: authorized localities to acquire lands to provide for open, undeveloped space.\footnote{Va. Code Ann. §§10.1-1700 et seq.}


13. **Virginia Administrative Process Act** (VAPA): General standards for making case decisions and developing and issuing regulations by state and local agencies and bodies (similar to federal Administrative Procedure Act).\footnote{Va. Code Ann. §2.2-4000 et seq.}

14. **Key Virginia Common Law\footnote{“Common Law” is defined as “the body of law derived from judicial decisions and opinions, rather than from statutes and constitutions.” BLACK'S LAW DICTIONARY 113 (POCKET ED. 1996).} Concepts**

a. State Riparian Water Rights:

i. Each property owner is entitled to the natural flow of water in a natural watercourse adjoining real property subject to “reasonable use” of water of upstream riparian\footnote{See Mumpower v. Bristol, 90 Va. 151, 17 S.E. 853 (1893); Hite v. Luray, 175 Va. 218, 8 S.E.2d 369 (1940); Purcellville v. Potts, 179 Va. 514, 19 S.E.2d 700 (1942). But see Va. Code §§ 62.1-10 et seq.} owner.

ii. There is a riparian right to flow and reasonable use tied to ownership of land adjacent to a stream; the right lies not in the water itself, but in reasonable use thereof so as not to injure downstream riparian owner.\footnote{Riparian rights is the rule that owners of land bordering on a waterway have equal rights to use the water passing by their property. BLACK'S LAW DICTIONARY 554 (POCKET ED. 1996).}

\footnote{Riparian rights is the rule that owners of land bordering on a waterway have equal rights to use the water passing by their property. BLACK'S LAW DICTIONARY 554 (POCKET ED. 1996).}
iii. Riparian ownership also entitled to use of shoreline for access to property and to water, including right to install piers in a manner not interfering with navigation of the watercourse, but this has been modified by statute.107

b. Real and Personal Property-Related Causes of Action

i. Trespass: Claim by property owner resulting from damage (including loss of use and enjoyment) caused by other party’s unauthorized entry (or other party causing something to enter upon the property; requires actual physical entry.108

ii. Nuisance Law

1. Private nuisance: Claim by property owner for damage (including loss of use and enjoyment) caused by another party’s use of his own property (noise, light, noxious odors); does not necessarily involve physical entry onto injured party’s property.109

2. Public nuisance: An activity or condition that of itself poses a danger to the public at large; it may be remedied by governmental authorities.110

iii. Negligence: Failure to exercise the level of care a reasonably prudent person would perform under like circumstances to avoid harm to another; the law attributes a duty of care owed to another.111

iv. Strict liability: Liability arising through inherently and ultra-hazardous dangerous actions of a party (e.g., blasting); liability arises regardless of fault or negligence; duty imposed by law given nature of circumstance.112

15. Key Virginia Executive Orders


i. EO-35 (Dec. 2, 2014): Continuation of the Virginia Coastal Zone Management Program

ii. EO-19 (July 1, 2014): Convening the Governor's Climate and Resiliency Update Commission

iii. EO-4 (Jan. 11, 2014): Delegation of the Governor's Authority to Declare a State of Emergency

16. Recent Relevant Virginia State Legislation

i. House Bill 1812 (2015): Chesapeake Bay Watershed Agreement; requirements of annual report that addresses 2014 Chesapeake Bay Agreement.

ii. House Bill 1817 / Senate Bill 1079 (2015): Directs the Department of Conservation and Recreation to regularly update the flood protection plan for the Commonwealth and to make the plan accessible online. Passed March 2015.

iii. Senate Bill 1443 (2015): Titled “Comprehensive plan shall incorporate strategies to combat projected sea-level rise and recurrent flooding.” Provides that any locality included in the Hampton Roads Planning District Commission shall incorporate into the next scheduled and all subsequent reviews of its comprehensive plan strategies to combat projected relative sea-level rise and recurrent flooding.\textsuperscript{113} This requires such review to be coordinated with the other localities in the Hampton Roads Planning District Commission and requires that the Department of Conservation and Recreation, the Department of Emergency Management, the Marine Resources Commission, Old Dominion University, and the Virginia Institute of Marine Science provide assistance upon request from one of these local jurisdictions.\textsuperscript{114}

17. State-level Climate Resiliency and Preparedness Efforts

i. Governor’s Chief Resiliency Officer

ii. Governor's Climate Change and Resiliency Update Commission

iii. General Assembly Joint Subcommittee on Recurrent Flooding

iv. Secure Commonwealth Panel, Flooding Subpanel Report

\textsuperscript{113} Comprehensive plans establish the general blueprint for future community development. Va. Code Ann. §§ 15.2-2223 to 15.2-2232.

\textsuperscript{114} Added at Va. Code Ann. § 15.2 – 2223.3.
C. Municipal and Locality Law

“Hampton Roads” is not specifically defined in the Pilot Charter. And different definitions are used by the Hampton Roads Planning District Commission,\(^\text{115}\) the Hampton Roads Transportation Planning Organization,\(^\text{116}\) and the U.S. Office of Management and Budget.\(^\text{117}\) The definition of Hampton Roads used by the Hampton Roads Planning District Commission will be used as the starting point for the purposes of the Legal Primer and will be adjusted when we receive further clarification from the Steering Committee.

1. Property and Infrastructure

Many relevant powers have already been granted by the state to local governments, which serves to minimize Dillon Rule concerns in some cases. Among these are the powers to obtain and utilize real property, to undertake infrastructure projects, to regulate the use of land, and to regulate construction. Many of these powers are implemented through state-local cooperative programs, where state law mandates the creation of regulations which are then implemented through local programs.

Localities in Virginia have broad authority to undertake infrastructure projects to combat flooding and coastal erosion.\(^\text{118}\) For example, Virginia Code Ann. § 15.2-970(A)-(B), entitled “Construction of dams, levees, seawalls, etc.” is particularly relevant for looking to the authority for localities to take adaptation measures and is an example of a structural adaptation measure that has been granted to localities. Virginia state law broadly allows localities to construct dams, levees, seawalls to prevent flooding. It states:

Any locality may construct a dam, levee, seawall or other structure or device, or perform dredging operations hereinafter referred to as "works," the purpose of which is to prevent the tidal erosion, flooding or inundation of such locality, or part thereof. The design, construction,
performance, maintenance and operation of any of such works is hereby declared to be a proper governmental function for a public purpose.\textsuperscript{119}

Localities, including cities, counties, and towns, in Virginia have the explicit authority to purchase, sell, and use real property for public uses,\textsuperscript{120} as well as the power of eminent domain or condemnation to acquire real or personal property for public uses.\textsuperscript{121}

Localities are also granted broad sovereign immunity (i.e. freedom from lawsuit) when undertaking these projects. The exception to this rule occurs in the case of eminent domain if the infrastructure results in a taking of property without just compensation.\textsuperscript{122}

In addition, the Virginia Supreme Court has determined that localities are responsible for damages to property resulting from any infrastructure which causes flooding to property.\textsuperscript{123}

\subsection*{2. Land Use and Planning}

Title 15, Chapter 22 of the Code of Virginia governs local powers related to land use and planning. Section 15.2-2223 directs local planning commissions to prepare and recommend comprehensive plans for their jurisdictions and governing bodies to adopt such plans. All seventeen localities in the Hampton Roads Planning District have adopted comprehensive plans. Several additional laws require comprehensive plans to address issues relevant to this project.

Section 15.2-2223.2 requires localities in Tidewater Virginia\textsuperscript{124} to incorporate coastal resource management guidance into their comprehensive plans.

\textsuperscript{119} Va. Code Ann. § 15.2-970(A). It further states, “No person, association or political subdivision shall bring any action at law or suit in equity against any locality because of, or arising out of, the design, maintenance, performance, operation or existence of such works but nothing herein shall prevent any such action or suit based upon a written contract. This provision shall not be construed to authorize the taking of private property without just compensation therefor and provided further that the tidal erosion, flooding or inundation of any lands of any other person by the construction of a dam or levee to impound or control fresh water shall be a taking of such land within the meaning of the foregoing provision.” Va. Code Ann. § 15.2-970(B).

\textsuperscript{120} Va. Code Ann. § 15.2-1800.


\textsuperscript{122} Va. Code Ann. § 15.2-970(B).

\textsuperscript{123} See Jenkins v. Shenandoah County, 246 Va. 467, 436 S. E. 2d. 607 (1993); Livingston v. Virginia Department of Transportation, 284 Va. 140, 726 S. E.2d 264 (2012); see also James Andris, \textit{State and Local Liability for Failure to Adapt and Protect Against Recurrent Flooding: Applying Farmers Insurance Legal Framework to Virginia Circumstances}, VCPC WHITE PAPER (Spring 2015).

\textsuperscript{124} Tidewater Virginia is defined in §62.1-44.15:68 to include the Counties of Accomack, Arlington, Caroline, Charles City, Chesterfield, Essex, Fairfax, Gloucester, Hanover, Henrico, Isle of Wight, James City, King and Queen, King George, King William, Lancaster,
Comprehensive plans establish the blueprint for future community development that is legally implemented via local zoning ordinances.\textsuperscript{125} Beginning July 1, 2015, this will require that localities in the Hampton Roads Planning District Commission incorporate strategies to address sea level rise and recurrent flooding into their comprehensive plans. Section 62.1-44.15:74 directs local governments in Tidewater Virginia to incorporate the protection of the quality of state waters into their comprehensive plans.

In addition to these specific requirements, localities are also required or authorized to adopt policies and ordinances to regulate the general use of land. Section 15.2-2240 requires localities to adopt subdivision ordinances. Section 15.2-2280 allows localities to adopt zoning ordinances to regulate the use of land and the dimensions and the construction of structures.\textsuperscript{126}

3. Regulation of Construction

Several state laws establish programs that are developed by state agencies and implemented by local governments through local ordinances. For example, the Virginia Board of Housing and Community Development adopts and amends the Virginia Uniform Statewide Building Code (USBC). The USBC is then adopted by reference by localities and amended as allowed and appropriate. Similar state-local programs cover stormwater management, erosion and sediment control, Chesapeake Bay preservation, and floodplain management.

As noted above, the State Water Control Board permits, regulates, and controls urban and suburban stormwater runoff in connection with its authority to administer the Clean Water Act in Virginia. Part of this program involves the regulation of municipal storm water discharges and permitting of municipal separate storm sewer systems (“MS4s”).\textsuperscript{127} MS4’s are required to obtain permits for their municipal stormwater discharges, and they are required (and localities not required to have permits are authorized) to adopt local Virginia Stormwater Management Programs (VSMPs) to regulate land-disturbing activities.

Similarly, the State Water Control Board has developed and adopted regulations to control soil erosion, sediment deposition, and nonagricultural runoff.\textsuperscript{128} Counties and cities must adopt and administer local Virginia Erosion and Sediment

\textsuperscript{125} See Stilton & Grannis, supra note 3.
\textsuperscript{126} This includes the use of land, buildings, structures, and other premises for . . . flood plain and other specific uses.
\textsuperscript{128} Va. Code § 62.1-44.15:52; 9 VAC 25-840-10 et seq.
Control Programs (VESCPs); towns may adopt their own or remain subject to the appropriate county’s program.129

Further, pursuant to the Chesapeake Bay Preservation Act (CBPA), the State Water Control Board has developed regulations, performance standards, and policies to promote the quality of state waters in Tidewater Virginia, particularly as to the control of sedimentation and other effects of development activities.130 The regulations call for protective measures to be incorporated into local land use planning ordinances.131

Both the state government and local governments have a role in floodplain management. However, the regulations governing local floodplain management programs are more directly influenced by the National Flood Insurance Program and not state regulations per se. As noted above, the VA Department of Conservation and Recreation is required (among other tasks) to develop a flood protection plan for the Commonwealth and to assist localities in managing activities within floodplains.132 This is achieved through the provision of technical assistance and the development of guidance and model ordinances for local consideration and adoption. One feature of local floodplain management programs is the degree to which they can go beyond state recommendations. Specifically, localities are allowed to implement a freeboard requirement that applies to new construction in designated floodplains and in some cases substantial additions or modifications. It is beyond the scope of this primer to provide an in-depth discussion of each locality’s laws, but a representative discussion is provided below for Norfolk, Newport News, and Poquoson.

a. Norfolk

The City of Norfolk’s zoning ordinance is found in Chapter 11 of Norfolk’s municipal code. Norfolk has adopted Virginia’s Uniform Statewide Building Code (USBC) as a comprehensive body of law. Under Section 11.1-4 of the Building Code, the City of Norfolk also establishes “climactic and geographic design criteria” that is unique to Norfolk, VA. The minimum standards for the control of erosion and sediment in the city shall be those standards in the regulations adopted in the State Erosion and Sediment Control Program and in the Virginia Erosion and Sediment Control Handbook. (Section 15-3, Norfolk Code) Lastly, Norfolk recently updated its floodplains ordinance.

b. Newport News

The Zoning Ordinance of the City of Newport News is found under Chapter 45 of the City Code. This includes the City’s Floodplain Development Regulations in Article XXXI, Division 2 of that Chapter (§ 45-3110 through § 45-3125.5). This division creates an overlay district for the City detailing the Flood Plains as required by FEMA. The current regulations require that the level of the lowest floor in any

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131 See 9 VAC 25-830-60.
building must be at an elevation of two feet above the base flood level, which is defined as the 100 year storm (or a storm with a 1% likelihood of occurring in any given year). The City does not as yet have any ordinances that directly address sea level rise. Because Virginia Code Section 15.2-2223.3 went into effect on July 1, 2015, the City will need to address sea-level rise and recurrent flooding as part of its Comprehensive Plan.

c. Poquoson

Poquoson’s Flood Plain ordinances appear in Chapter 42 of its City Code. Poquoson Code § 42-71(c) requires that the lowest floor of any new construction be three feet above the base flood level. As to manufactured or modular buildings, the lowest floor must be one foot above base flood level. Poquoson Code § 42-74(a)(1). And Poquoson has recently adopted a comprehensive plan that takes into account sea level rise.

d. Hampton Roads Locality Table

The following table includes references to primary local ordinances in Hampton Roads covering zoning, Chesapeake Bay Preservation, subdivision of lands, stormwater management, erosion and sediment control, and floodplain management. The locally established freeboard requirement is also included. Except where noted, all references refer to the respective localities’ Code of Ordinances.
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133 EPA has developed a model ordinance for erosion and sediment control at [http://water.epa.gov/polwaste/nps/mol2.cfm](http://water.epa.gov/polwaste/nps/mol2.cfm)
134 “Floodplain management” is defined as the operation of a community program of preventive and corrective measures to reduce the risk of current and future flooding, resulting in a more resilient community. [http://www.fema.gov/floodplain-management](http://www.fema.gov/floodplain-management)
135 Freeboard is a factor of safety usually expressed in feet above a flood level for purposes of floodplain management. "Freeboard" tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed. Freeboard is not required by NFIP standards, but communities are encouraged to adopt at least a one-foot freeboard to account for the one-foot rise built into the concept of designating a floodway and the encroachment requirements where floodways have not been designated. Freeboard results in significantly lower flood insurance rates due to lower flood risk. See [https://www.fema.gov/freeboard](https://www.fema.gov/freeboard)
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II.   Additional Considerations – Planning and Coordination

A. Federal Agency Coordination Issues: As a general matter, this effort is aligned with existing executive order guidance on federal support for planning for the impacts of climate change.

i. Stafford Act, Amended by the Disaster Mitigation Act of 2000.\(^{136}\) Authorizes the President to establish disaster preparedness program that utilizes all appropriate agencies and includes coordination of Federal, State, and local preparedness programs. The President will provide technical assistance to States in developing preparedness programs, assist State and local governments following disasters, and for recovery of damaged public and private facilities.

ii. Posse Comitatus Act.\(^ {137}\) Prohibits direct military assistance for law enforcement purposes.

1. DoD: Statutorily applies to Army and Air Force. By DoD and Department of the Navy policy, this restriction also applies to the Navy and Marine Corps.\(^ {138}\)

2. DHS/USCG: USCG is not subject to or restricted by 18 U.S.C. § 1385.

3. National Guard: Restrictions apply when in federal service. Restrictions do not apply when in state service.

iii. Authorities Allowing Mutual Support Agreements Between Federal Agencies and Local Governments

1. Defense Support of Civil Authorities: DoD Directive 3025.18

2. USCG: 14 U.S.C. § 93\(^ {139}\)

   a. Investigate plans and devices relating to performance of any Coast Guard Function, and cooperate and coordinate such activities with other Government and private agencies.

\(^ {136}\) 42 U.S.C. § 5131, et seq.

\(^ {137}\) 18 U.S.C. § 1385. (“Whoever, except in cases and under circumstances expressly authorized by the Constitution or Act of Congress, willfully uses any part of the Army or the Air Force as a posse comitatus or otherwise to execute the laws shall be fined under this title or imprisoned not more than two years, or both.”)

\(^ {138}\) 10 U.S.C. § 375.

\(^ {139}\) 14 U.S.C. § 93.
b. Accept and utilize, in times of emergency in order to save life or protect property, such voluntary services as may be offered to the USCG.

c. Enter into cooperative agreements with states, local governments to accept and utilize voluntary services for the maintenance and improvement of natural and historic resources.

3. Fiscal Law Concerns: It is beyond the scope of this Primer to provide an in-depth analysis of all the fiscal law limitations associated with the expenditure of federal money, but money appropriated by Congress must be spent consistent with fiscal law principles governing purpose, time, and amount.\textsuperscript{140}

B. \textbf{Environmental Justice}

i. Definition: “Fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations and policies.”\textsuperscript{141}

ii. As always, planners and policymakers will have to be mindful of issues of environmental justice, particularly as they weigh the various options of which areas to defend, where to adapt, and where to retreat.

iii. Executive Order 13,166: Requires federal agencies to examine the services they provide, identify any need for services to limited English proficient persons (LEP), and develop a plan and implement a plan to provide services so that LEP persons can have meaningful access to them.

C. \textbf{Outside Requests for Information}

i. Federal: Freedom of Information Act (FOIA)\textsuperscript{142}

1. FOIA provides the public the right to access records from any federal agency.

\textsuperscript{140} For example, the Purpose Statute states, “Appropriations shall be applied only to the objects for which the appropriations were made except as otherwise provided by law.” 31 U.S.C. § 3101 (a) (2014).

\textsuperscript{141} \textit{Environmental Justice}, U.S. ENVTL. PROTECTION AGENCY, \url{http://www.epa.gov/environmentaljustice/} (last visited Aug. 12, 2015).

\textsuperscript{142} 5 U.S.C. § 552, \textit{et seq.}
a. Generally any person, regardless of citizenship, can make a FOIA request.

b. Each federal agency individually processes its own FOIA requests. The federal agency will respond to requests with a letter, search for the requested information, and determine which parts and records can be disbursed.

c. FOIA does provide for the charging of certain types of fees in some situations, however, a fee waiver may be granted in situations in which the disclosure of the information is in the public interest.¹⁴³

2. Federal agencies are required to disclose information unless it falls in one of nine exemptions. For example:

a. Information that is prohibited from disclosure by another federal law.

b. Trade secrets or commercial or financial information that is confidential or privileged.

c. Information that, if disclosed, would invade another individual’s personal privacy.

d. Geological information on wells.

ii. Virginia Freedom of Information Act¹⁴⁴

1. Public Records to be open to inspection; procedure for requesting records and responding to request; charges; transfer of records for storage, etc.”¹⁴⁵

2. Exclusions: Records relating to public safety, administrative investigations, records of specific public bodies, proprietary records and trade secrets, etc. ¹⁴⁶

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¹⁴⁴ Code of Virginia § 2.2-3700, et seq., http://law.lis.virginia.gov/vacode/title2.2/chapter37/
¹⁴⁶ Va. Code § 2.2-3705. Please see specifics as contained in the statute.
Appendix I

I. Legal Issues: Public Infrastructure Working Group
   A. Chair: RDML (ret.) Ann Philips
   B. Legal Working Group Liaison: Mr. Joe Durant

II. Legal Issues: Private Infrastructure Working Group
    A. Chair: Prof. Carol Considine
    B. Legal Working Group Liaison: Speaker Pollard

III. Legal Issues: Land Use Working Group
     A. Chair: Burrell Saunders
     B. Legal Working Group Liaison: Speaker Pollard

IV. Legal Issues: Public Health Working Group

V. Legal Issues: Citizen Engagement Working Group
   A. Chair: Chris Bonney
   B. Legal Working Group Liaison: Lesa Yeatts, J. Duncan Pitchford
   C. The White House has provided guidance on citizen engagement and key considerations that should be made in a document entitled, “Public Deliberation: A Manager's Guide to Civic Engagement.”
Appendix II: Existing Studies and Bibliography

I. Existing Studies / Bibliography

A. Federal Studies

i. U.S. Army Corps North Atlantic Comprehensive Study Report

ii. Future Federal Adaptation Efforts Could Better Support Local Infrastructure Decision Makers (Government Accountability Office (GAO))

iii. DoD Can Improve Infrastructure Planning and Processes to Better Account for Potential Impacts (Government Accountability Office (GAO)).


v. U.S. Army Corps Strategic Environmental Research and Development Plan (SERDP) Studies

B. State Studies

i. Recommendations of the Secure Commonwealth Panel

ii. General Assembly Commission on Recurrent Flooding

iii. VIMS 2013 Recurrent Flooding Report

iv. 2008 Governor’s Commission on Climate Change Findings and Recommendations


C. Academic Studies and Reports: Georgetown Climate Center

i. Adaptation Tool Kit for Sea Level Rise

ii. Virginia Case Study: Stemming the Tide How Local Governments can Manage Local Flood Risks

147 This is not an all-inclusive list, but serves as a representative sample of some of the studies that the Steering Committee and Working Groups may encounter.
I. Infrastructure Planning Working Group

1. Membership

<table>
<thead>
<tr>
<th>Member Organization</th>
<th>Representative</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Old Dominion University - Office of Research (Volunteer)</td>
<td>Rear Admiral Ann C. Phillips, USN (Retired)</td>
<td>Infrastructure Working Group Committee Chair</td>
</tr>
<tr>
<td>Department of Transportation</td>
<td>Mr. Alan Strasser, Esq.</td>
<td>Attorney, U.S.DOT Representative for Hampton Roads Sea level Rise Pilot, DOT Center for Climate Change</td>
</tr>
<tr>
<td>Naval Facilities Engineering Command Mid-Atlantic</td>
<td>Mr. Bob Magoon</td>
<td>Sustainable Infrastructure Program Manager</td>
</tr>
<tr>
<td>Hampton Roads Sanitation Division</td>
<td>Mr. Rob Martz</td>
<td>Hydraulic Analysis Manager</td>
</tr>
<tr>
<td>Old Dominion University</td>
<td>Mr. Dave Pezza</td>
<td>DEng Candidate, Civil and Environmental Engineering</td>
</tr>
<tr>
<td>City of Virginia Beach</td>
<td>Mr. C. Gregory Johnson</td>
<td>Stormwater Technical Services Engineer</td>
</tr>
<tr>
<td>City of Virginia Beach</td>
<td>Ms. Shanda H. Davenport</td>
<td>Stormwater Technical Services</td>
</tr>
<tr>
<td>City of Newport News (Legal Working Group representative)</td>
<td>Mr. Joe DuRant, Esq.</td>
<td>Deputy City Attorney</td>
</tr>
<tr>
<td>City of Hampton</td>
<td>Ms. Gail Hicks</td>
<td>Lead Stormwater/Water Management Engineer</td>
</tr>
<tr>
<td>Organization</td>
<td>Name</td>
<td>Position</td>
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<tr>
<td>------------------------------------------------</td>
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</tr>
<tr>
<td>Hampton Roads Transportation Planning Organization</td>
<td>Mr. Rob Case, PhD.</td>
<td>Principal Transportation Engineer</td>
</tr>
<tr>
<td>Virginia Department of Transportation</td>
<td>Mr. Eric Stringfield</td>
<td>Hampton Roads District, Lead, Strategic Plans</td>
</tr>
<tr>
<td>US Army Corps of Engineers</td>
<td>Ms. Michelle L. Hamor</td>
<td>Director, Coastal Flooding/Floodplain Management</td>
</tr>
<tr>
<td>Joint Base Langley-Eustis</td>
<td>Ms. Christine Garrett</td>
<td>Chief Base Civil Engineer</td>
</tr>
<tr>
<td>Department of Energy</td>
<td>Ms. Alice Lippert</td>
<td>Senior Technical Advisor, Energy Infrastructure Modeling and Analysis</td>
</tr>
<tr>
<td>Department of Homeland Security</td>
<td>Mr. Rob Mooney</td>
<td>Lead Agent VA South/Central Region</td>
</tr>
<tr>
<td><strong>ADVISORY MEMBERS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hampton Roads Planning District Commission</td>
<td>Ms. Whitney Katchmark</td>
<td>Lead Stormwater Planner</td>
</tr>
<tr>
<td>Virginia Port Authority</td>
<td>Ms. Heather Wood</td>
<td>Strategic Plans/Advisor</td>
</tr>
<tr>
<td>Virginia Army National Guard</td>
<td>LTCOL Elena Scarbrough, USA</td>
<td>Post CDR Camp Pendleton</td>
</tr>
<tr>
<td>Dept. of Health and Human Services</td>
<td>Mr. Harry Mayer</td>
<td></td>
</tr>
</tbody>
</table>
To optimally perform its work, the Infrastructure Working Group would benefit from direct membership of the Cities of Chesapeake, Norfolk, and Poquoson, as well as more active participation by the Hampton Roads Planning District Commission. In Phase 2, the Working Group may need to seek out additional members depending on the final selection of infrastructure test cases for adaptation planning.

2. Deliverables

The Infrastructure Working Group identified Deliverables for its work on the Pilot Project, based on the language in the Charter. These deliverables are presented in the chart below. Note that several Phase I deliverables have due dates during the time period initially projected for Phase 2. This reflects the time spent in assembling the Working Group and securing active participation. Since the Working Group is entirely made up entirely of volunteers, members must accomplish the work with very limited time and resources. In this context the initial projected timeline was more ambitious than was feasible.
<table>
<thead>
<tr>
<th>Phase</th>
<th>Deliverable</th>
<th>Planned Completion Date</th>
<th>Complete</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Ensure appropriate agencies and organizations are represented in the IWG.</td>
<td>Mar-15</td>
<td>Y (Ongoing)</td>
<td>Working Group includes: City representation from Hampton, Newport News and Virginia Beach; Infrastructure representation from the Virginia DOT and HRSD; Other representation from HRPDC, HRTPO, and the US Army Corps of Engineers.</td>
</tr>
<tr>
<td></td>
<td>Address and identify representative studies that address SLR critical infrastructure protection as applicable to the Hampton Roads region. This effort was expanded to include studies done in support of other regional efforts, nationwide, and internationally if appropriate, to glean any supporting information that pertains to this effort</td>
<td>Jun-15</td>
<td>Y (Ongoing)</td>
<td>To date more than 30 studies at the Federal, State, and Local level (including International) have been reviewed by the committee.</td>
</tr>
<tr>
<td></td>
<td>In coordination with the Science Advisory Committee, identify appropriate Sea level rise scenarios to be used in coordination with Phase II of the Pilot effort upon which to base Phase II infrastructure adaptation planning efforts.</td>
<td></td>
<td></td>
<td>This was added when the Working Group identified that specific identification of Sea Level Rise Scenarios was an additional deliverable that would be essential to the IPP effort.</td>
</tr>
<tr>
<td></td>
<td>Identify appropriate modeling and simulation tools or planning processes for use in Phase II of the Pilot.</td>
<td>Aug-15</td>
<td></td>
<td>Any use of models or other tools that required funding is likely not possible given the time remaining in the pilot and the current absence of funding. However, there are many such models or study work already complete, in particular at the Federal level, that can be updated, or validated at minimal cost to the agency owner that may be possible should the need arise during Phase II of the study effort.</td>
</tr>
<tr>
<td></td>
<td>In coordination with the Private Infrastructure Advisory Committee, identify critical infrastructure for the Hampton Roads region that is best suited for Phase II adaptation planning.</td>
<td></td>
<td></td>
<td>Task was changed to identifying critical infrastructures suitable for Phase II planning, defining that suitability within the IWG, and then as a part of Phase II planning, identifying critical dependencies and interdependencies for that infrastructure. A full identification and ranking of critical infrastructures in the Hampton Roads region is beyond the scope of this Pilot effort.</td>
</tr>
<tr>
<td></td>
<td>Identify dependencies and interdependencies between public and private infrastructure that directly impact adaptation planning.</td>
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<td></td>
<td>Identify best practices for SLR adaptation by federal, state, local authorities</td>
<td>Sep-15</td>
<td></td>
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<tr>
<td></td>
<td>Develop detailed Plan of Action and Milestones for Phase II of the Pilot Project to affect adaptation planning to address SLR impact on our selected infrastructure/s</td>
<td></td>
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</tr>
<tr>
<td>I</td>
<td>Determine restrictions and limitations, be they administrative, managerial, jurisdictional or legal, to regional adaptation planning, and, formulate recommendations, in coordination with the Legal Working Group and other working groups and committees to address /resolve/modify those restrictions</td>
<td>Jan-16</td>
<td></td>
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<tr>
<td></td>
<td>Formulate recommendations (resiliency requirements) for whole of government and community infrastructure planning</td>
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<tr>
<td>II</td>
<td>Develop Plan of actions and milestones (POAM) for Phase II of the Pilot Project to affect adaptation planning to address SLR impact on our selected infrastructure/s</td>
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<td></td>
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<tr>
<td></td>
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<td>Identify best practices for SLR adaptation by federal, state, local authorities</td>
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<td></td>
<td>Formulate recommendations (resiliency requirements) for whole of government and community infrastructure planning</td>
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</tbody>
</table>
3. Additional Resources

The Working Group identified a ‘Toolbox’ of useful resources for adaptation planning. This Toolbox will be expanded over Phase 2 as appropriate.

- National Climate Assessment and USACE SLR/SLOSH/Surge models are readily available online and easily reconfigurable for the novice user.
- FHWA models used in the GC II study are also largely available online, however, the specific selection criteria model selected for use by the IWG is not and had to be reconstructed by a committee member for use.
- National Institute of Standards has a detailed SLR planning document under review.
- Sea Level Change Curve Calculator at [www.corpsclimate.us/ccaceslcurves.cfm](http://www.corpsclimate.us/ccaceslcurves.cfm).

4. Knowledge Gaps/Research Needs

The following are areas of information or tools which will need to be developed in order to optimally do the work of adaptation planning in Hampton Roads:

- While governmental agencies regularly conduct scenario-based vulnerability assessments, to date there has been no comprehensive effort to quantify such assets and vulnerabilities at a regional scale. Many efforts that do exist occur on the project-level, and are not well documented. This lack of cost data was cited in the Risky Business report conducted by Former Treasury Secretary Hank Paulson and Mayor Michael Bloomberg. Stating that the critical question is, “[h]ow much economic risk do we face from climate change?”, Risky Business highlighted the critical need to “add reliable financial data to the science.” Augmenting governmental models with private data, including the quantification of residential and commercial real estate and using insurance and actuarial methodologies, would fill an important gap and bolster existing tools available to government decision makers, industry and the public. It would also enhance the Pilot’s ability to engage with the private sector asset holders, who seek more risk-based data and can help generate and verify government models based on their industry-specific expertise. In addition, it will also aid in framing a process for resolving dispute that will inevitably in the planning process.

- Some of the costs and benefits that need to be evaluated over varying time scales include:
  - The potential range of asset loss in the designated region, given the readily-available data on the regional assets;
  - Replacement costs and costs of mitigation and adaptation measures to enhance resiliency (e.g., engineering costs); and
• Other costs and impacts may, however, be more difficult to quantify, but these need to be considered as criteria. The following non-quantifiable regional impacts will be factored in:
  o Military preparedness and national security requirements for roadways serving the military’s Strategic Highway Network (STRAHNET) and non-STRAHNET-intermodal facilities used for military cargo movement;
  o Emergency response needs, including evacuation routes, and need for health care services required by sensitive populations;
  o Public access and mobility to residential, commercial, and recreation areas; and
  o Future transportation planning in support of regional economic development.

• Subsidence Overflight Survey. This work will provide a much higher resolution understanding of the subsidence element of relative sea-level rise in the Hampton Roads region and correspondingly more precise risk assessment for particular infrastructure assets.

Citation: Risky Business, Rodium Group (2014): http://riskybusiness.org/.

5. Committee Protocols/Operational Lessons Learned

• IWG Committee Chair writes minutes and agendas for IWG meetings. Passing that responsibility to one or more committee members has not proven effective as attendance varies. Some committee members have been able to work specific tasks to support committee goals, including spreadsheet development, and speaker support. In addition, committee members have been forthright in sharing work that their parent organizations are doing to address the impacts of SLR on their prospective agencies/cities/ municipalities.

• The Committees’ and Working Groups’ lack of understanding of expectations for the Pilot goals and objectives in Phase II expressed in the Key Findings in the Infrastructure Working Group’s section of the Phase I Report may be inevitable given that the pilot is not being convened by a governmental body, making governmental stakeholders difficult to manage. And while Senator Kaine and Judge Hill have provided leadership at the federal government level, not all agencies have fully participated in the pilot to date. The level of required effort in Phase II, will undoubtedly increase compared to Phase I,
and it is important for governmental leaders to become more engaged to ensure their staff are actively participating in the process.

- It is understood that the time and fiscal restrictions of this pilot project will limit some of what the Working Group plans to accomplish. The Working Group’s goal is to make proposals that can most reasonably be addressed within the time and resource constraints, as thoroughly as possible, while meeting the spirit and intent of the project.
J. Land Use Working Group

1. Membership

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burrell Saunders</td>
<td>Urban Land Institute - Hampton Roads</td>
</tr>
<tr>
<td>Dan Bell</td>
<td>UU: HR Executive Director</td>
</tr>
<tr>
<td>Peter Van Dyke</td>
<td>NASA Langley</td>
</tr>
<tr>
<td>John Peterson</td>
<td>Terry Peterson Company</td>
</tr>
<tr>
<td>Bill Hughes</td>
<td>Harvey Lindsey Real Estate</td>
</tr>
<tr>
<td>Barry Yeakle</td>
<td>Virginia Beach Director of Strategic Growth Areas</td>
</tr>
<tr>
<td>Bob Baldwin</td>
<td>Portsmouth Planning</td>
</tr>
<tr>
<td>Sharon Baxter</td>
<td>DEQ: VCZMP</td>
</tr>
<tr>
<td>Maril Raford</td>
<td>FEMA Region 3</td>
</tr>
<tr>
<td>Mel Graham</td>
<td>Saugameh LLC</td>
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<tr>
<td>Elizabeth Dietzmann</td>
<td>Hampton Group</td>
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<tr>
<td>H. Speaker Pollard</td>
<td>Williams Mullen</td>
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<tr>
<td>Brian Ballard</td>
<td>NAVFAC Mid-Atlantic</td>
</tr>
<tr>
<td>Bob Magison</td>
<td>NAVFAC Mid-Atlantic</td>
</tr>
<tr>
<td>Wei Yousef</td>
<td>GDU, Professor, Public Service</td>
</tr>
<tr>
<td>Marty M.</td>
<td>GDU, PhD Candidate, Public Administration &amp; Urban Policy</td>
</tr>
<tr>
<td>Christine Morris</td>
<td>City of Norfolk</td>
</tr>
<tr>
<td>Joshua Behr</td>
<td>GDU</td>
</tr>
<tr>
<td>Matt Smith</td>
<td>City of Hampton</td>
</tr>
<tr>
<td>George Hearnwood</td>
<td>City of Norfolk</td>
</tr>
<tr>
<td>Ken Somerset</td>
<td>City of Poquosan</td>
</tr>
<tr>
<td>Whitney Molnara</td>
<td>City of Virginia Beach</td>
</tr>
<tr>
<td>Jill McPhee</td>
<td>HR/PDC</td>
</tr>
<tr>
<td>Brian Burk</td>
<td>Hampton Federal Liaison</td>
</tr>
<tr>
<td>Martin Mayer</td>
<td>GDU, PhD Candidate, Public Administration</td>
</tr>
</tbody>
</table>
2. Planning Document Flow Chart
Building Coastal Places
Pilot Land Use Group
ULI HAMPTON ROADS

COASTAL LAND USE STRATEGIES

GOALS
• Raising Awareness
• Defining the Approach
• Exploring the Value Proposition
• Advancing the State of Practice and Policy

I. UNDERSTANDING
II. EXPLORING

WATER DEPENDENT LAND USES

PORTS
RESIDENTIAL

BUSINESS
GOVERNMENT

RESORTS

NON-WATER DEPENDENT LAND USES

RESIDENTIAL

HEALTH CARE

BUSINESS

EDUCATION

GOVERNMENT

STRATEGIES

Short - Mid - Long Term

LOCATIONS
INFRASTRUCUTRE
EXISTING FACILITIES
TRANSPORTATION

NEW FACILITIES

EXISTING FACILITIES

EXISTING INFRASTRUCTURE

EXISTING TRANSPORTATION

NEW FACILITIES

REGIONAL MAPPING EXERCISE
Asset/Liabilities/Opportunities
Natural Protected Areas

SELECT SIX STUDY AREA

HIGHEST VULNERABILITY WORKSHOP

HISTORIC HIGH DENSITY
ex: Hampton

RESORT
ex: Shore Dr.
Oceanview

INDUSTRIAL WATERFRONT
ex: NIT/NOB

TO BE DETERMINED

LOWEST VULNERABILITY WORKSHOP

HIGH DENSITY
ex: VB Town Center/OFCC

RESIDENTIAL
?

BUSINESS
?

TO BE DETERMINED

REPORTS
I. ESTABLISH A PARTNERSHIP

III. DISCOVERY

III. DISCOVERY

IV. RECOMMENDATIONS

A. LAND USE GROUP

INFORM BY WORKSHOPS

PREPARE A REPORT

A. LAND USE GROUP

INFORM BY WORKSHOPS

PREPARE A REPORT

NEW COMMUNITY DEVELOPMENT PARADIGM

REGIONAL RELIANCE R.C. 2016

Short Term

Mid Term

Long Term

EXAMPLES

EXAMPLES

EXAMPLES

- New form of property risk assessment
- Identify lower vulnerability land use pattern shifts and incentives
- Awareness
- Build info./data center
- etc.

- Identify lower risk, less vulnerable land areas and create future sga with development incentives
- Identify flood prone area solutions
- Education
- etc.

- Identify areas where relocation or abandonment will be required
- Adaptable buildings
- Waterfront of the future
- etc.

V. ONGOING

PROCESS

RAISING AWARENESS

DEFINING THE APPROACH

GOALS

- Raising Awareness
- Exploring the Value Proposition
- Defining the Approach
- Advancing the State Of Practice And Policy

GOALS

Center for Building Successful Coastal Places

Building Coastal Places

Pilot Land Use Group

ULI HAMPTON ROADS

COASTAL LAND USE STRATEGIES

deliverable*
K. Citizen Engagement Working Group

1. Membership

<table>
<thead>
<tr>
<th>Individual</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chris Bonney</td>
<td>Hampton Roads Center for Civic Engagement</td>
</tr>
<tr>
<td>Michelle Covi</td>
<td>ODU/Virginia Sea Grant</td>
</tr>
<tr>
<td>Skip Stiles</td>
<td>Wetlands Watch</td>
</tr>
<tr>
<td>Burt St. John</td>
<td>ODU- Dept of Communications and Theater Arts</td>
</tr>
<tr>
<td>Wie Yusef</td>
<td>ODU- School of Public Service</td>
</tr>
<tr>
<td>Liz Smith</td>
<td>ODU- Academic Affairs</td>
</tr>
<tr>
<td>Erica Holloman</td>
<td>Southeast CARE Coalition</td>
</tr>
<tr>
<td>Angela Harris</td>
<td>Southeast CARE Coalition</td>
</tr>
<tr>
<td>Joe Cook</td>
<td>Sierra Club</td>
</tr>
<tr>
<td>Cathy Lewis</td>
<td>CIVIC Leadership program</td>
</tr>
<tr>
<td>Carolyn Caywood</td>
<td>League of Women Voters</td>
</tr>
<tr>
<td>Mike Kuhns</td>
<td>Peninsula Chamber of Commerce</td>
</tr>
<tr>
<td>Suzanne Puryear</td>
<td>The Planning Council</td>
</tr>
<tr>
<td>Denise Thompson</td>
<td>City of Norfolk</td>
</tr>
<tr>
<td>Barbara Mann</td>
<td></td>
</tr>
<tr>
<td>Gail Nicula</td>
<td>ODU- School of Public Service</td>
</tr>
<tr>
<td>Julia B. Hillegass,</td>
<td>Hampton Roads Planning District Commission</td>
</tr>
<tr>
<td>Susan Maples-Luellen</td>
<td>Virginia Institute of Marine Science</td>
</tr>
<tr>
<td>Tim Cole</td>
<td>Virginia Beach Schools</td>
</tr>
<tr>
<td>Pam Northham</td>
<td>Lynnhaven River NOW</td>
</tr>
<tr>
<td>Christina Deconcini</td>
<td>World Resources Institute, DC</td>
</tr>
</tbody>
</table>

**from Legal Working Group**

<table>
<thead>
<tr>
<th>Individual</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Veronica Meade</td>
<td>Senior Assistant City Attorney City of Hampton</td>
</tr>
<tr>
<td>Duncan Pitchford</td>
<td>Attorney General Office</td>
</tr>
</tbody>
</table>

2. Phase I Accomplishments

FEMA Tabletop Exercise:

A day-long exercise was organized on December 2, 2014, designed to simulate the effects of sea level rise and climate change for participants' children, and grandchildren. The exercise was led by the National Security Council, with support from the FEMA National Exercise Division, along with community partners who have roles, responsibilities or expertise relating to climate adaptation, hazard mitigation and resiliency planning efforts.
Participants were grouped into tables representing topics such as legal interests, business concerns, environmental awareness and academic expertise, where they used a scenario tailored to the region to develop plans and procedures for mitigation, based on projected storm levels in the years 2040 (targeting participants’ children) and 2080 (targeting participants’ grandchildren).

**Working Group collaborated with Urban Land Institute (ULI) on the first Resilient Regional Reality Check.**

See report below.

**WHRO Superintendents Briefing**

Public school district Superintendents from the region met at WHRO studios in August 2015 and were briefed on the mission of the Pilot Project and the science behind sea level rise. Superintendents were eager to participate in the Project and be integrated into the planning process.

3. **Deliverables**

The major deliverable of the Citizen Engagement Working Group for Phase I was the coordination of an engagement event to identify community priorities. This was met by the ULI Resilient Region Reality Check in March 2015, and the report on its findings below.

For Phase II, two deliverables have been identified to date: 1) A description and analysis of the community networks in Hampton Roads, and 2) a community engagement effort to build resilience with Southeast Newport News Community (funded by EPA and in cooperation with the Virginia Coastal Policy Center of William and Mary School of Law).

4. **Report from Resilient Region Reality Check**
Hampton Roads Resilient Region Reality Check
Increasing community resilience and capacity to adapt to changes

March 17, 2015
Old Dominion University

A Program by the Urban Land Institute Hampton Roads and Old Dominion University

Authors:
Juita-Elena (Wie) Yusuf, Michelle Covi, Burton St. John III
Old Dominion University

Report Date: June 2015
Executive Summary

The Hampton Roads Resilient Region Reality Check event was held on March 17, 2015 at Old Dominion University. The event was built on three key themes: a region-wide, multi-sectoral, and whole-of-community approach that is oriented toward actions to address SLR and flooding. This event was a collaboration between the Urban Land Institute Hampton Roads (HRULI), Old Dominion University (ODU), and the Community Engagement Working Group of the Hampton Roads Sea Level Rise Preparedness and Resilience Intergovernmental Planning Pilot Project.

The overall goals of the event were to (1) capture the perceptions of the Hampton Roads community on their risks associated with sea level rise, (2) engage stakeholders in discussion within and across different stakeholder groups; and (3) assess the willingness, at a regional level, to address SLR-related issues and prepare for the coming changes.

Approximately 130 residents and stakeholders across government, non-profit, business, and civil society sectors within the Hampton Roads region participated in the event. The event focused on encouraging discussion concerning three items: (1) how flooding affects citizens, (2) what can citizens do about flooding, and (3) what resources are needed to address flooding? For each question, participants were also asked to discuss and identify two regional priorities.

From these discussions, six key themes arose:
1. The impacts of sea level rise and flooding are multi-faceted;
2. Sea level rise and flooding need to be incorporated into planning and decision making;
3. Land use planning plays an important role in building resilience;
4. Regional collaboration and regionally-adopted solutions are needed;
5. Financial and non-financial resources are needed;
6. Civic engagement and outreach are important.

In an end-of-the day prioritization activity, all attendees were asked to rank order the top priorities, selecting from a list of discussion items that had surfaced during this event. Across attendees, the following top priorities appeared (in rank order):
1. Pursue regional collaboration;
2. Revise zoning and land use;
3. Pursue public education/outreach;
4. Reduce carbon emissions;
5. Pursue natural solutions (e.g. coastal engineering, wetlands preservation).

Additionally, the results of a post-event survey point to how the event helped participants broaden their perspectives and understanding of flooding and SLR. These results show that the event had some effect on individual efficacy, as participants reported higher levels of knowledge about sea level rise risks and impacts coupled with greater willingness to pay taxes and fees to build community resilience. However, there was little impact on participants’ perception of the community’s willingness to take action.

Follow-up engagement efforts should build on the momentum from the Resilient Region Reality Check 2015 event. While these engagement efforts should continue to emphasize the whole-of-community perspective, a regional emphasis and an action orientation, further efforts should focus on bridging different stakeholders’ perspectives. Greater emphasis should also be placed on bringing under-represented groups into the conversation and to the decision-making table.
Introduction

Virginia has one of the highest rates of relative sea level rise (SLR) on the East Coast, and the Hampton Roads region ranks 19th in the world in the value of assets ($84.6 billion in current assets and $581.7 billion in future assets) exposed to increased flooding associated with both storm surges and tidal flooding.1

This report describes the results and outcomes of the Hampton Roads Resilient Region Reality Check event held on March 17, 2015 at Old Dominion University (ODU). Approximately 130 residents and stakeholders across government, non-profit, business, and civil society sectors within the Hampton Roads region participated in the event. The event was built on three key themes: a region-wide, multi-sectoral, and whole-of-community approach that is oriented toward actions to address SLR and flooding. This event was a collaboration between the Hampton Roads Urban Land Institute (HRULI) and ODU.

The overall goals of the Resilient Region Reality Check 2015 event were to (1) capture the perceptions of the Hampton Roads community on their risks associated with sea level rise, (2) engage stakeholders in discussion within and across different stakeholder groups; and (3) assess the willingness, at a regional level, to address SLR-related issues and prepare for the coming changes.

Background

Resilience for Hampton Roads
Resilience refers to the ability to recover, or the ability to adapt to the consequences associated with an instance of failure or systemic breakdown.ii The Urban Land Institute (ULI) approaches resilience as the inherent qualities or capability of organizations and communities to recover quickly and resume their activities after natural catastrophes. As such, it encompasses a wide variety of strategies that seek to respond to vulnerabilities or to adapt to recent or anticipated risks.
Resilient communities, then, are ones with the ability to persist in the face of acute disruptions and chronic stresses. In order to thrive in the face of challenging issues, resilient communities assess their risks, mitigate impacts, and plan for longevity by adapting, evolving, and making wise investments. In a rapidly changing world, individuals, organizations, and regions must anticipate potential catastrophic events while also responding to current conditions. To create regional resilience, residents, businesses, organizations, as well as government have to work together to create the capacity to respond and even transform themselves.

The Hampton Roads region faces a significant and growing threat to life, property and prosperity due to increasing sea level rise. Rising waters exacerbate the effects of storms, which has resulted in increasing flood events that threaten lives and property. Even tidal cycles cause flooding in areas of Hampton Roads. Nuisance flooding (i.e., smaller flooding incidents) happens about nine times each year and are expected to increase to 182 events per year by 2045.iii A study by the Hampton Roads Planning District Commission (HRPDC) estimates that, by 2100, sea level rise could result in direct economic costs at between $12 and $87 billion, with up to 877 miles of roads in the region permanently or regularly flooded.iv

Researchers and environmental groups in Hampton Roads have recognized the threat of sea level rise to natural resources, such as wetlands, since at least 2005. In 2008, the Commission on Climate Change, when charged by the governor with assessing impacts to the Commonwealth of Virginia, recognized that sea level rise was the biggest threat to coastal regions. Since 2010, the HRPDC and the Hampton Roads Transportation Planning Organization (HRTPO) have studied the impact of sea level rise on regional infrastructure. Since 2012, over 20 reports by the Army Corps of Engineers, Core Logic, HRPDC, the City of Norfolk, the City of Hampton, the Virginia Institute for Marine Science, and other organizations have articulated the risk to the region from sea level rise and associated flooding as well as explored potential solutions.v

To build resilience, however, all sectors of the whole community must be engaged in the process of building capacity. By engaging the community, including representatives from all levels of government, academia, non-governmental organizations, the private sector and citizens, we can better understand and bridge the different needs and priorities. This understanding is also crucial for determining how different stakeholders can (and will) contribute to improving regional resilience. Encouraging an authentic, action-oriented dialogue with the community can empower local action that can strengthen cohesion and resilience from the neighborhood level all the way up to the regional level.
Since 2010, ODU has recognized sea level rise and flooding as a focus area for research. At that time, ODU initiated the Climate Change and Sea Level Rise Initiative to facilitate networking in research and engagement. Since 2012, ODU and HRPDC, through funding from Virginia Sea Grant, have held quarterly Adaptation Forums. These Adaptation Forums involve meetings with municipal staff, researchers, private sector engineers, and staff from area non-profits and non-governmental organizations (NGOs) to share the latest scientific research and lessons learned in responding to local flooding impacts. ODU is also partnering with the City of Norfolk and the non-profit Green Infrastructure Center on constructing shoreline restoration projects and providing green infrastructure training programs. In 2014, ODU initiated the Mitigation and Adaptation Research Institute (MARI) that focuses on practice-relevant knowledge for solution-oriented research.

Also in 2014, the Hampton Roads Sea Level Rise Preparedness and Resilience Intergovernmental Planning Pilot Project (also referred to as the Pilot Project) was initiated at ODU. Its mission was to develop an intergovernmental planning organization to effectively coordinate the sea level rise preparedness and resilience planning of government agencies and the private sector, taking into account the perspectives and concerns of the citizens in the region. The Pilot Project included several working groups, including the Citizen Engagement Working Group, which was specifically charged with creating a partnership between governmental agencies and citizens and other stakeholders to plan for, and adapt to, the challenges of sea level rise.

Recognizing synergistic efforts and building on a successful Hampton Roads Reality Check in 2013, ULI Hampton Roads collaborated with ODU, MARI and the Citizen Engagement Working Group of the Pilot Project to develop a new program to address gaps in the resilience efforts in the region. The Resilient Region Reality Check 2015 was designed to identify the foundation for building capacity to adapt to changes and increase community resilience by bringing together government, NGOs, the private sector and citizens into a community conversation about flooding, the most apparent and severe impact of climate change in the region.
A Whole-of-Community Stakeholder Engagement Process
The engagement process for the Resilient Region Reality Check 2015 event was designed to allow for (1) in-depth conversation among stakeholders with similar backgrounds, and (2) the wider sharing of ideas across the broad spectrum of stakeholder groups. Three key themes underpinned the engagement approach. First, it adopted a multi-sectoral, whole-of-community framework to ensure inclusivity and diversity of stakeholders. This whole-of-community approach, developed by the Federal Emergency Management Agency (FEMA), emphasizes the value and importance of strengthening existing relationships and channels of communication between the full array of community stakeholders, including local, regional and state governments; non-governmental, faith-based and non-profit organizations; the private sector industry; educational, healthcare and other institutional stakeholders; and individuals, families and communities. Second, the focus was on prioritizing actions to address sea level rise and flooding, including identifying feasible solutions and assessing multi-sectoral willingness to act. Third, the emphasis was on engagement on a regional basis, rather than on a city-by-city basis.

The event was structured around facilitated discussion of three key questions and identification of top two priorities from each discussion. These facilitated discussions took place at tables with participants organized to ensure similarity in sectors or interests. The table discussions were followed by instantaneous reporting of discussion outcomes to the larger group of all participants. This “report out” format was designed to allow for information sharing and cross-pollination of ideas. The discussions and report outs were followed by an action prioritization activity to determine the activities that participants believed to be regional priorities for addressing sea level rise and flooding.
Resilient Region Reality Check

HRULI leadership and ODU experts developed the original concept for the Resilient Region Reality Check in August of 2014 based on a gap identified in whole-of-community engagement in resilience planning. The overall goal of the event was to (1) capture the perceptions of the Hampton Roads community on their risks associated with sea level rise, (2) engage stakeholders in discussion within and across different stakeholder groups; and (3) assess the willingness, at a regional level, to address SLR issues and prepare for the coming changes. The event was envisioned as a facilitated discussion among stakeholders representing diverse sectors of the regional community.

A steering committee was assembled that included representatives from ODU, HRULI, HRPDC, local government emergency management, and private sector business. The steering committee met during the fall 2014 months to flesh out details and logistics of the event. A planning team developed the overall program and established a strategy to identify and recruit participants representing diverse groups. The list of Steering Committee and Planning Team members is included in the Appendix.

The event’s program included an education and information component in the form of presentations on key issues related to regional resilience. Brenden McEnearney, ULI’s Director of Resiliency provided an overview of the ULI Resilient Cities Program. The program also included a presentation on the status of the Pilot Project.

Participants

Resilient Region Reality Check participants were recruited from a broad spectrum of stakeholder groups spanning multiple sectors. These included representatives of neighborhood and civic league organizations; federal, state, and local governments; nonprofit, non-governmental or faith-based organizations; regional planning organizations; and businesses such as real estate, construction, tourism, utilities, and transportation. Individual residents were also invited to participate. The full list of organizations that registered to participate is included in the Appendix.
Approximately 130 stakeholders participated in the event. These participants were assigned to tables of 10 participants, organized by similar sector and interests. The table groupings were: government planners; government emergency managers; infrastructure managers; real estate businesses; tourism and waterfront businesses; civic leagues; environmental NGOs; and civic engagement NGOs. Due to logistical constraints several mixed tables were also formed.

Each table was assigned a discussion facilitator and note taker. These table facilitators and note takers were recruited from ODU faculty and graduate students, the CIVIC Leadership Institute and HRULI leadership. Table participants were tasked with discussing their perceptions of sea level rise and its associated risks, actions and solutions for addressing flooding due to sea level rise, and resource needs to support action.

### Discussion Tables
- government planners
- government emergency managers
- infrastructure managers
- real estate businesses
- tourism and waterfront businesses
- civic leagues
- environmental NGOs
- civic engagement NGOs

### Resilient Region Reality Check Program
Participants were given three questions to discuss. These questions were: (1) How does flooding affect you? (2) What should we do about flooding? Which actions are most effective? and (3) What resources are needed to address flooding? For each question, participants were also asked to discuss and identify two regional priorities. Specifically, participants were asked to identify: (1) the top two flooding issues that are of most concern; (2) the top two most effective actions; and (3) what two resources are most needed and how they could be acquired.

These 30-minute table discussions were followed by immediate sharing of the two key points from the discussion. Each table was given two minutes to report out and share the key points from their discussion. This approach allows for leveraging of sector-specific knowledge while ensuring sharing and cross-pollination of ideas across multiple sectors.
Participants were also given the opportunity to provide direct input, via a prioritization activity, on their individual priorities for taking action to address sea level rise and flooding. In this prioritization activity, participants were provided a list of the action items resulting from the second discussion question of “What should we do about flooding?” Each participant was given five sticker dots to use to vote for the actions he/she would most want to support or see resources used for.

**Discussion Questions and Priorities Identification**

<table>
<thead>
<tr>
<th>Question 1: How does flooding affect you?</th>
<th>Priorities 1: Which issues are of most concern?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 2: What should we do about flooding?</td>
<td>Priorities 2: Which actions are most effective and why?</td>
</tr>
<tr>
<td>Question 3: What are the resources needed to address flooding issues? How should we pay?</td>
<td>Priorities 3: Which resources are most needed and how could they be acquired?</td>
</tr>
</tbody>
</table>

**Initial Perceptions Regarding Sea Level Rise and Flooding**

Participants for the Resilient Region Reality Check were asked to register in advance and complete a short survey. These survey questions provide insight into participants’ initial perceptions of sea level rise and flooding.

Survey results point to four key issues regarding sea level rise and flooding:

1. There are high levels of agreement that the impacts of flooding will be felt personally and regionally;
2. Most stakeholders feel knowledgeable about flooding risks and impacts;
3. There is some agreement that the community will take the actions necessary to deal with flooding and also some agreement on individual-level willingness to pay more in taxes or fees to make the community more resilient to flooding;
4. But, there is ambivalence about community and individual willingness to take actions necessary to address flooding and being more resilient.

**Flooding Impact**

- 90% agree that the region will be severely impacted by flooding
- 90% agree that they will be personally impacted by flooding

**Willingness to Address Flooding and Building Resilience**

- 47% agree that their community will take necessary actions
- But 31% have no opinion about community willingness
- 63% are willing to pay more in taxes or fees to make the community more resilient
- But 32% have no opinion about individual willingness
Survey questions:
PERSONAL IMPACT: I am likely to be impacted by flooding within the next 50 years.
REGIONAL IMPACT: Hampton Roads will be severely impacted by flooding within the next 50 years unless action is taken.

Survey question:
I feel knowledgeable about the risk of impact of flooding and future flooding to Hampton Roads.
Survey question:
My community will take the action necessary to deal with flooding in the next 50 years.

Survey question:
I am willing to pay more in taxes or fees to make my community more resilient to flooding.
Results
Several themes emerged from the table discussions, report outs, and prioritization activity. First, participants highlighted that the impacts of sea level rise and flooding are multi-faceted. These include economic, quality of life, mobility, health, and equity impacts. Second, there is general agreement that sea level rise and flooding needs to be incorporated directly into planning and decision making at a regional level. Third, land use planning plays an important role in building resilience. In addition, there is widespread consensus that regional collaboration and regionally-adopted solutions are necessary to effectively address sea level rise and flooding. Participants also acknowledge that resilience requires a commitment of both financial and non-financial resources. Finally, the importance of educating and informing the public, civic engagement, and outreach was consistently emphasized.

Key Results
1. Impacts of sea level rise and flooding are multi-faceted
2. Sea level rise and flooding need to be incorporated into planning and decision making
3. Land use planning plays an important role in building resilience
4. Regional collaboration and regionally-adopted solutions are needed
5. Financial and non-financial resources are needed
6. Civic engagement and outreach are important

Question: How does Flooding Affect You?
Economic-related impacts were the most commonly identified by the majority of participants. Twelve out of the thirteen tables identified economic impacts as one of the top two flooding impacts. Several groups highlighted specific economic concerns such as property loss—especially damage to real estate and vehicles. Loss of property value in homes and the resulting impacts on the housing market were cited by two of the groups as primary areas of concern.

One group highlighted the interconnectedness of social, economic, and ecological impacts as an area of concern. Complex economic issues and linkages to other impacts were discussed at many of the tables. For example, questions of social equity and quality of life issues were connected to worries about the potential for the local economic situation to decline. Some tables discussed the dependence of the local economy on the Navy and the ports, and subsequently the need for their facilities and infrastructure to develop resilience. In addition to talking about flooding from large storm events, such as hurricanes, participants also discussed the effect of nuisance flooding on the region and that smaller storms can cause the area to shut down.
Transportation was also recognized by a majority of the tables as being impacted by flooding in Hampton Roads. Many of the participants had personal experiences of disruption to their lives or isolation in an area due to flooding on roads. This is reflected in comments such as “everyone gets stuck” and “Shore Drive is impossible to get to when there is flooding.” Concerns included work continuity, family concerns (especially if schools are inaccessible), and life safety issues related to the inability of first responders to travel to those in need.

Another issue identified as a top concern was the resilience of broader infrastructure including roads, bridges, building, and utilities. Planning horizons and costs associated with improving and maintaining infrastructure in an area that frequently floods were also raised. One participant noted, “Why would you plan so short – plan more on a 200 year schedule – makes bonds cheaper too… planning out more is better because the problem won’t just stop after 50 years.” Linking to the issue of infrastructure, one group identified public health impacts as a top concern. Participants in this group cited examples such as the backup of sewer systems into homes and flooded homes becoming toxic.

A related concern identified by one group of participants was “recognizing what is feasible.” This group thought that it is important to recognize and acknowledge how residents think about their home, despite the changing conditions. As noted by one participant in this group, “It is in the resident's mind--especially those who have been staying here for long—and they want to know what the city is doing about it as they want to stay and moving is not an option that is in their mind. People here love the water.”

Many comments collected from the table discussions reflected the general perception that stakeholders are committed to the idea of making the region an area where people want to live, but flooding is affecting decisions about how and where to live in the community. Several participants expressed the opinion that “people need to change their mindset,” and that the region needs to consider sea level rise and future flooding potential in many aspects of planning and city management.
Question: What Should We Do About Flooding? Which Actions are Most Effective?

The second table discussion asked each group to identify actions to address flood conditions or flood risk within the region. The most effective actions identified by the participants included generalized approaches and specific actions that could be taken by individual residents, governments, or other entities. Consistent across these different actions was the idea that land use planning is the most effective way to build resilience in the region. Among the generalized approaches, several groups mentioned regional collaboration and consistency in planning strategies, zoning, and other infrastructure decisions.

Specific actions under the regional collaboration umbrella included having a comprehensive policy and plan that is a joint effort across all jurisdictions in the region. One group outlined an idea that would include the development of a Regional Resiliency Council formed from local city representatives and a Resiliency Certification program to give credibility and measure success. Participants generally perceived that regionally developed strategies and actions have the potential to be more widely adopted. Another suggested strategy for a regional approach calls on the Army Corps of Engineers to develop a regional resilience plan. Suggestions for regional land use included encouraging or requiring some level of consistency in specific areas such as building codes and standards, and having stronger working relationships between the HRPDC and the localities. Consistent messaging and information across the region was also identified as being important for creating a regional mindset for addressing sea level rise. In addition to strategies and actions, participants also identified barriers to regional action. One specific challenge was the current inability to blend funding sources to enable leveraging of federal investments.

Specific tools of land use planning, such as changes to zoning policies, restricting development, and creating regional building standards, were outlined by several groups as effective actions. For example, one participant noted that “government installations could be relocated and replaced with ones that address flooding issues.” Other land-use-specific strategies were also identified. Strategic, managed retreat from areas that experience flooding was also suggested. In addition, one participant group thought that the region should use “natural boundaries to absorb the impacts of water” and another commented that we should “design and adapt to where the water wants to go.”

Public education, civic engagement and outreach was another broad area that was raised by more than one group. Some of the outreach strategies highlighted were to create more citizen emergency response teams and increase the number of flooding signs. One group suggested homeowner education and another suggested that there is a need to “change the culture of Hampton Roads to help manage the fear of flooding because when people are educated, they are less likely to panic.”

“There is a consensus building that this is a serious issue and the only way to move forward on a solution is through regional collaboration.”

- Participant comment in post-event survey
Question: What Resources are Needed to Address Flooding?
The third table discussion focused on the resources needed to address flooding. Participants were asked to identify the most needed resources and, if possible, describe how these resources could be acquired. While techniques to finance many of the solutions previously described were one focus of discussion, another focus was on highlighting the need for non-financial resources.

Participants agree that investments in mitigation and adaptation were needed from local, state, and federal governments, in addition to from the private sector. Among the mechanisms identified by participants for funding flood mitigation and sea level rise adaptation projects were public-private partnerships, a carbon tax, a regional greenhouse gas initiative, cost-sharing programs, loans for mitigation projects, grants, and preferential taxes.

There was a wide range of non-financial resources identified by participants, including information sharing networks, a cross-regional communications task force, political will, education about climate change issues, apolitical messaging, marketing resources, and youth civic engagement. Training was suggested for several groups including professionals, government staff, and elected officials. Other resources needed were incentives for builders and cities to develop in high-density areas rather than high-risk areas, pre-planning for post-disaster construction, a comprehensive regional resilience plan, and a new policy that prioritizes adaptation over protection.

Activity: Prioritizing Action
The table discussions were followed by a prioritization exercise. Each participant was given five votes to prioritize the actions he/she identified as most effective for addressing flooding and sea level rise, and increasing resilience. The actions that participants were asked to prioritize were identified during the table discussions.

Consistent with table discussions, regional collaboration was identified as a high priority action. This action received the most votes (15%) from participants. Similarly, two other issues and actions that arose from table discussions – zoning/land use and public education/outreach – were also considered high priorities. Interestingly, reducing carbon emissions, the only mitigation strategy raised during table discussions, was also identified as a high priority action.

Top 5 Priority Actions
1. Regional collaboration to attract funding
2. Revise zoning and land use
3. Public education/outreach
4. Reduce carbon emissions
5. Natural solutions (e.g. coastal engineering, wetlands preservation)
<table>
<thead>
<tr>
<th>Individual Priorities for Actions to Address Flooding and SLR</th>
<th>Votes (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Management</strong></td>
<td></td>
</tr>
<tr>
<td>Regional collaboration to attract funding</td>
<td>56 (15%)</td>
</tr>
<tr>
<td>Public education/outreach</td>
<td>48 (13%)</td>
</tr>
<tr>
<td>Improve emergency planning</td>
<td>19 (5%)</td>
</tr>
<tr>
<td>Pursue federal funding</td>
<td>2 (1%)</td>
</tr>
<tr>
<td><strong>Land Use and Zoning</strong></td>
<td></td>
</tr>
<tr>
<td>Revise zoning and land use</td>
<td>51 (13%)</td>
</tr>
<tr>
<td>Regional building standards</td>
<td>31 (8%)</td>
</tr>
<tr>
<td>Elevate building and utilities</td>
<td>6 (2%)</td>
</tr>
<tr>
<td>Harden infrastructure</td>
<td>6 (2%)</td>
</tr>
<tr>
<td><strong>Strategic</strong></td>
<td></td>
</tr>
<tr>
<td>Strategic managed retreat</td>
<td>19 (5%)</td>
</tr>
<tr>
<td>Create competitive economic strategy for flooding and sea level rise</td>
<td>15 (4%)</td>
</tr>
<tr>
<td><strong>Technical Solutions</strong></td>
<td></td>
</tr>
<tr>
<td>Natural solutions (e.g. coastal engineering, wetlands preservation)</td>
<td>41 (11%)</td>
</tr>
<tr>
<td>Living with water designs</td>
<td>37 (10%)</td>
</tr>
<tr>
<td>Improved mapping/models</td>
<td>8 (2%)</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td></td>
</tr>
<tr>
<td>Reduce carbon emission</td>
<td>42 (11%)</td>
</tr>
<tr>
<td>Non-flood priorities</td>
<td>1 (0%)</td>
</tr>
<tr>
<td>FEMA buyouts</td>
<td>1 (0%)</td>
</tr>
</tbody>
</table>

**Conclusions and Next Steps**

Discussion during the Resilient Region Reality Check event pointed to six key themes revolving around (1) multi-faceted impacts of sea level rise and flooding; (2) sea level rise should be an essential component in planning and decision making; (3) land use planning should play a key role; (4) the need for regional collaboration and regional solutions, (5) the need for financial and non-financial resources, and (6) the importance of pursuing civic engagement and outreach. General consensus among participants along these themes indicate a strong starting point for continuing the whole-of-community, action-oriented conversation about addressing SLR and flooding.

Following the event, participants completed a post-event, evaluation survey. Responses to the post-event survey show that the Resilient Region Reality Check has, to some extent, increased participants' level of knowledge regarding the risks and impacts of flooding. While there was minimal change in participants' perceptions that the community will take the actions necessary to address flooding, there was greater willingness, post-event, among participants to pay more in taxes or fees to make the community more resilient to flooding.
Results indicate that the event appears to have had an effect on individual efficacy, in that participants reported higher level of knowledge about sea level rise risks and impacts coupled with greater willingness to pay taxes and fees to build community resilience. However, at a more aggregate, community-wide level, there was little impact on participants’ perception of the community’s willingness to take action. This result further highlights the need for communicating and educating the public via civic engagement and outreach efforts.

“It was very eye opening to hear the views and concerns from others.”

“[The value of the event was] being allowed to participate and make input to our table's discussion and conclusions”

-Participant comments in post-event survey
The post-event survey also points to how the Resilient Region Reality Check event helped participants broaden their perspectives and understanding of flooding and SLR. For example, almost 98% of participants responding to the post-event survey agreed that the event helped them understand the perspectives of different stakeholders from multiple sectors (government, business, non-profits, and the community) and more than 90% agreed that it helped them appreciate these different perspectives. Almost 89% agreed that the event helped them 1) understand shared concerns about flooding and SLR, and (2) understand the challenges the region faces in becoming resilient.

Responses to the post-event survey also provide some initial ideas for moving ahead with continued region-wide conversation about addressing flooding and SLR. Participants identified several program elements as being valuable, including:

1. The inclusive whole-of-community approach allowed stakeholders and stakeholder groups to participate in the conversation about and process for addressing SLR and flooding;
2. The whole-of-community dialogue approach allowed for face-to-face conversations with others in the community interested in SLR and flooding;
3. The table discussion and report outs provided a venue for hearing different perspectives;
4. The table discussion, report outs, and prioritization activity generated action-oriented information.

The Resilient Region Reality Check surfaced, among participants, the recognition that different stakeholders have different perspectives which makes addressing the problems of flooding and SLR difficult. Furthermore, much of the discussion also focused on the need for regional cooperation. This regional theme arose consistently throughout the table discussion and report outs. One of the key issues that will need to be addressed moving forward is how to meet the need for a regional approach to addressing SLR and flooding.
Getting to Regional
Event participants noted the importance of a regional approach but also raised barriers and challenges to regional collaboration. For example, one group noted that we currently have “7 localities running their own ship,” while another identified that overcoming turf and territory issues would be a major challenge. However, there exist several regional organizations with varying levels of authority, different coordinating roles, and varying levels of involvement across the different local governments in the Hampton Roads region. These regional entities include the HRPDC, HRTPO, the Hampton Roads Sanitation District, Hampton Roads Transit, and the recently-created Hampton Roads Transportation Accountability Commission (HRTAC).

At one end of the spectrum, some participants identified that there currently is a mechanism for regional planning in the form of the HRPDC. At the other end of the spectrum, other participants suggested local government consolidation as one possible way to ensure a regional solution to important issues such as sea level rise and flooding. Participants also pointed to HRTAC as an example of a regional organization with specific authority to make decisions at a regional level. When asked about incentivizing regional coordination and collaboration, one group discussed how the availability of regional funds might be a method to encourage regional cooperation and regionally-focused actions. As one group noted in its discussion, “it comes down to money.” Another group suggested creating a regional tax that would support mitigation and adaptation efforts on a regional basis. In a similar vein, there was some discussion about having federal- or state-mandated regional coordination that is tied to funding. In one group discussion, participants noted that the federal government requires regional transportation planning to receive federal funding.

Lessons Learned and Next Steps
The Resilient Region Reality Check 2015 showed that it is possible to bring stakeholders from across the whole community together in an inclusive conversation about the impacts of sea level rise and flooding, and facilitate discussion of strategies, actions, and resources to increase resilience. As evident from participant feedback in the post-event survey, the event’s framework, which was based on a whole-of-community, region-wide, and action-oriented approach, was quite successful at engaging a wide range of stakeholders and focusing their attention on actions needed to address sea level rise and flooding as a region.
The event structure facilitated in-depth dialog among stakeholders with similar background and interests while allowing for information sharing and cross-pollination of ideas across the wider group of participants. Discussion during the event and responses to the post-event survey indicate that the event was successful at surfacing different stakeholders’ perspectives and perceptions, and engaging them in discussion primarily within stakeholder groups. However, while some participants noted that they appreciated being able to hear the perspective of other stakeholder groups, the event’s structure did not provide much opportunity for in-depth information sharing and exchange across different stakeholder groups.

Follow up engagement efforts will want to build on the momentum from the Resilient Region Reality Check 2015 event. These engagement efforts should continue to emphasize the whole-of-community perspective, the regional emphasis, and the action orientation. However, the follow-up events might want to focus on bridging different stakeholders’ perspectives. This bridging focus will be important to move the conversation to the community level, rather than on an individual level. The Resilient Region Reality Check 2015 event was successful in increasing individual efficacy, but did not have much impact on perceptions about the community’s willingness to take action. In addition, while invitations to participate in the Resilient Reality Check were sent to a wide range of stakeholder groups, some groups remained under-represented. Greater emphasis will need to be placed on bringing these under-represented groups into the conversation and to the decision making table.
Appendix A: Steering Committee and Event Team Members

Steering Committee
Dan Bell, Urban Land Institute Hampton Roads
Joseph Bouchard, Virginia Coastal Coalition
Michelle Covi, Old Dominion University and Virginia Sea Grant
Randy Keaton, Hampton Roads Planning District Commission
Elizabeth Kersey, Office of the President, Old Dominion University
Cathy Lewis, Office of Community Engagement, Old Dominion University
Karen Meier, Office of Community Engagement, Old Dominion University
Hans-Peter Plag, Mitigation and Adaptation Research Institute, Old Dominion University
James Reddick, City of Norfolk
Burrell Saunders, Urban Land Institute Hampton Roads

Event Team
Dan Bell, Urban Land Institute Hampton Roads
Michelle Covi, Old Dominion University and Virginia Sea Grant
Tamorah Park Farinholt, Office of Community Engagement, Old Dominion University
Cathy Lewis, Office of Community Engagement, Old Dominion University
Karen Meier, Office of Community Engagement, Old Dominion University
Burton St. John III, Dept, of Communication and Theatre Arts, Old Dominion University
Wie Yusuf, School of Public Service, Old Dominion University
Appendix B: Stakeholder Organizations Participating in the Resilient Region Reality Check

<table>
<thead>
<tr>
<th>Burgess &amp; Niple</th>
<th>NAVFAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Busch Gardens</td>
<td>Navy Region Mid-Atlantic</td>
</tr>
<tr>
<td>Care Coalition</td>
<td>Newport News Department of Planning</td>
</tr>
<tr>
<td>CDM Smith</td>
<td>NOAA</td>
</tr>
<tr>
<td>Central Business District Association</td>
<td>Norfolk Environmental Commission</td>
</tr>
<tr>
<td>Chesapeake Bay Foundation</td>
<td>Norfolk Planning Commission</td>
</tr>
<tr>
<td>Chrysler Museum of Art</td>
<td>Olde Towne Civic League</td>
</tr>
<tr>
<td>City of Chesapeake</td>
<td>Port of Virginia</td>
</tr>
<tr>
<td>City of Hampton</td>
<td>PortsmouthCityWatch.org</td>
</tr>
<tr>
<td>City of Norfolk</td>
<td>Resilient Virginia</td>
</tr>
<tr>
<td>City of Poquoson</td>
<td>Resort Advisory Commission</td>
</tr>
<tr>
<td>City of Virginia Beach</td>
<td>S.L. Nusbaum Insurance</td>
</tr>
<tr>
<td>CIVIC Scholars Program</td>
<td>Saunders+Crouse Architects</td>
</tr>
<tr>
<td>County of Isle of Wight</td>
<td>Sierra Club--Virginia Chapter</td>
</tr>
<tr>
<td>Cox, Kliwer &amp; Company, P.C.</td>
<td>Southeast Care Coalition</td>
</tr>
<tr>
<td>Downtown Norfolk Council</td>
<td>Terry Peterson Company</td>
</tr>
<tr>
<td>E.V. Williams</td>
<td>TGC</td>
</tr>
<tr>
<td>Elizabeth River Project</td>
<td>Tidewater Builders Association</td>
</tr>
<tr>
<td>FEMA Region 3</td>
<td>Town-n-Gown</td>
</tr>
<tr>
<td>Hampton Roads Center for Civic Engagement</td>
<td>Trinity Analysis &amp; Development Corp.</td>
</tr>
<tr>
<td>Hampton Roads Planning District Commission</td>
<td>U.S. Department of Energy</td>
</tr>
<tr>
<td>Hampton Roads REALTORS® Assoc.</td>
<td>USACE, Norfolk District</td>
</tr>
<tr>
<td>Kemperly &amp; Company</td>
<td>USEPA</td>
</tr>
<tr>
<td>Langley AFB</td>
<td>Vector Real Estate Advisors</td>
</tr>
<tr>
<td>League of Women Voters</td>
<td>Virginia Beach Economic Development</td>
</tr>
<tr>
<td>Lynnhaven River NOW</td>
<td>Virginia Beach Public Schools</td>
</tr>
<tr>
<td>McNeilan &amp; Associates</td>
<td>Virginia DEM</td>
</tr>
<tr>
<td>NAACP</td>
<td>Virginia DEQ</td>
</tr>
<tr>
<td>Natural Event Mitigation Advisory Committee (NEMAC)</td>
<td>Virginia Eastern Shorekeeper</td>
</tr>
<tr>
<td></td>
<td>Virginia Natural Gas</td>
</tr>
<tr>
<td></td>
<td>Virginia Tidewater Consortium for Higher Education</td>
</tr>
<tr>
<td></td>
<td>Virginia Veterans Creations</td>
</tr>
<tr>
<td></td>
<td>Wetlands Watch</td>
</tr>
<tr>
<td></td>
<td>Wheeler Real Estate Investment Trust, Inc.</td>
</tr>
<tr>
<td></td>
<td>Williams Mullen</td>
</tr>
<tr>
<td></td>
<td>Work Program Architects</td>
</tr>
</tbody>
</table>
Appendix C: Participant Pre-Event Survey
When participants registered for the Resilient Region Reality Check, they were asked to complete a pre-event survey that included the following questions.

I am likely to be impacted by flooding within the next 50 years.
   Strongly Disagree
   Disagree
   No Opinion
   Agree
   Strongly Agree

Hampton Roads will be severely impacted by flooding within the next 50 years unless action is taken.
   Strongly Disagree
   Disagree
   No Opinion
   Agree
   Strongly Agree

I feel knowledgeable about the risk of impact of flooding and future flooding to Hampton Roads.
   Strongly Disagree
   Disagree
   No Opinion
   Agree
   Strongly Agree

My community will take the action necessary to deal with flooding in the next 50 years.*
   Strongly Disagree
   Disagree
   No Opinion
   Agree
   Strongly Agree

I am willing to pay more in taxes or fees to make my community more resilient to flooding.
   Strongly Disagree
   Disagree
   No Opinion
   Agree
   Strongly Agree
Appendix D: Participant Post-Event, Program Evaluation Survey

Following the Resilient Region Reality Check event, participants were asked to complete a post-event, program evaluation survey. Of the approximately 130 attendees, 45 participants opted to complete a post-event evaluation survey. Of those, 32% were from government, 16% from private industry, 11% from NGOs, 25% from academic institutions, and 16% were citizens.

The post-event, program evaluation survey included the following questions.

<table>
<thead>
<tr>
<th>The program met my expectations.</th>
<th>The program helped me understand shared concerns about flooding and SLR.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>Disagree</td>
<td>Disagree</td>
</tr>
<tr>
<td>No Opinion</td>
<td>No Opinion</td>
</tr>
<tr>
<td>Agree</td>
<td>Agree</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The program helped me understand the perspectives of different stakeholders from government, business, non-profits, and the community.</th>
<th>The program helped me understand the challenges the Hampton Roads region faces in becoming resilient to flooding and SLR.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>Disagree</td>
<td>Disagree</td>
</tr>
<tr>
<td>No Opinion</td>
<td>No Opinion</td>
</tr>
<tr>
<td>Agree</td>
<td>Agree</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The program helped me appreciate the perspectives of different stakeholders from government, business, non-profits, and the community.</th>
<th>It was easy to participate.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>Disagree</td>
<td>Disagree</td>
</tr>
<tr>
<td>No Opinion</td>
<td>No Opinion</td>
</tr>
<tr>
<td>Agree</td>
<td>Agree</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The theme and focus was appropriate.</th>
<th>What was the most valuable part of the event for you?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>Disagree</td>
<td>Disagree</td>
</tr>
<tr>
<td>No Opinion</td>
<td>No Opinion</td>
</tr>
<tr>
<td>Agree</td>
<td>Agree</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>
Evaluation respondents were overwhelmingly positive about the value of the program with only a few neutral comments and no negative comments about the program, theme or the achievement of program goals.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neither Agree Nor Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>The program helped me understand the perspectives of different stakeholders from government, business, non-profits, and the community</td>
<td>50.0%</td>
<td>47.7%</td>
<td>2.3%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>The program helped me appreciate the perspectives of different stakeholders from government, business, non-profits, and the community</td>
<td>43.2%</td>
<td>47.7%</td>
<td>9.1%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>The program helped me understand shared concerns about flooding and SLR</td>
<td>43.2%</td>
<td>45.5%</td>
<td>11.4%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>The program helped me understand the challenges the Hampton Roads region faces in becoming resilient to flooding and SLR</td>
<td>43.2%</td>
<td>45.5%</td>
<td>11.4%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>
References


For example:


For more information about the Adaptation Forums, go to https://www.odu.edu/research/initiatives/ccslni/2013

For more information about the Mitigation and Adaptation Research Institute, go to http://www.mari.odu.edu

For more information about the Hampton Roads Sea Level Rise Preparedness and Resilience Intergovernmental Planning Pilot Project, go to http://www.centerforsealevelrise.org

For an overview of the Reality Check 2013 event, go to: https://www.youtube.com/watch?v=vWxoCaAXuRE&feature=youtu.be.


The Hampton Roads Transportation Accountability Commission (HRTAC) was created by state legislation in 2014 with the specific task of managing the Hampton Roads Transportation Fund revenues for the Hampton Roads region, including decision about regional transportation resources and investments. For more information about HRTAC, go to http://www.hrtac.org/
L. Public Health Working Group

1. Membership

With the Public Health Working Group only having been created on April 29th, the process of identifying and inviting potential members is still under way. Even at this early stage, however, it is evident that interest in the new Working Group is very high in the Hampton Roads public health community. Thus far, individuals from area health departments, the Medical Reserve Corps, academic public health programs, and other organizations have agreed to participate. By fall 2015, the Working Group is expected to have a full roster of members and a first, full meeting will be held.

Among the other organizations being invited to participate are additional area health departments, public health units serving the armed forces, and organizations with expertise in such areas as environmental health, public health emergency preparedness and response, industrial hygiene, health behavior/health promotion, epidemiology, and health/environmental risk communication.

2. Deliverables

<table>
<thead>
<tr>
<th>Phase</th>
<th>Deliverable</th>
<th>Planned Completion Date</th>
<th>Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Create a Public Health Working Group, April 2015</td>
<td>Apr-15</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Select Working Group Chair, April 2015</td>
<td>Apr-15</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Begin Identifying and Inviting Potential Members, May-June 2015</td>
<td>Jun-15</td>
<td>Y</td>
</tr>
<tr>
<td>II</td>
<td>Complete formation of Public Health Working Group</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hold first in-person meeting of Working Group</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analyze public health issues as they pertain to sea level rise in Hampton Roads</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interface with other Pilot working groups</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Identify ways to incorporate public health issues in the work and projects of the Pilot</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Involve and engage the public health community in the work of the Pilot</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Develop a mechanism to enable public health MPH students to gain experience in sea-level rise projects and activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Identify special areas of expertise that public health can contribute to the Pilot</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Begin to develop project proposals such as drills, workshops, or other solutions building tools to address these issues locally and in a way that may serve as a model for other communities</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### M. Private Infrastructure Advisory Committee

#### 1. Membership

<table>
<thead>
<tr>
<th>Member Organization</th>
<th>Representative</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMEC Environmental &amp; Infrastructure</td>
<td>Andrew Hadsell, PE, CFM</td>
<td>Senior Associate Engineer, Unit Manager</td>
</tr>
<tr>
<td>Building Constructive Solutions, LLC</td>
<td>Stuart (Pete) Perritt</td>
<td>President</td>
</tr>
<tr>
<td>Clark Nexsen</td>
<td>Jeff Fisher, PE, SE</td>
<td>Structural Engineer</td>
</tr>
<tr>
<td>FEDEX Trade Networks</td>
<td>Lisa Quintero</td>
<td>Supervisor - Transportation</td>
</tr>
<tr>
<td>Fort Monroe Authority</td>
<td>John Gillespie</td>
<td>Director of Heritage Assets &amp; Historic Preservation Officer</td>
</tr>
<tr>
<td>Hampton Roads Association for Commercial Real Estate</td>
<td>Ann Crenshaw</td>
<td>President</td>
</tr>
<tr>
<td>Hampton Roads Realtors Association</td>
<td>Amy Rhodes</td>
<td>Past Chairman</td>
</tr>
<tr>
<td>Hampton Roads Realtors Association</td>
<td>Ron Lovell</td>
<td>Local Government Affairs Director</td>
</tr>
<tr>
<td>Huntington Ingalls, Newport News</td>
<td>Bob Fallon</td>
<td>Director of Facilities</td>
</tr>
<tr>
<td>Moffatt &amp; Nichol</td>
<td>Maura Boswell</td>
<td>Coastal Engineer</td>
</tr>
<tr>
<td>Norfolk &amp; Portsmouth Belt Line Railroad</td>
<td>Donna Coleman</td>
<td>Vice President</td>
</tr>
<tr>
<td>Old Dominion University</td>
<td>Carol Considine</td>
<td>Associate Professor</td>
</tr>
</tbody>
</table>
Additionally, the following organizations were identified as important stakeholders in the area of Private Infrastructure in Hampton Roads which should eventually be a part of the Advisory Committee in order to best inform the work of the Committee and to fully engage the stakeholders. The process of inviting and integrating these organizations is ongoing.

- Cox Communications
- Norfolk International Airport
- Colonial Pipeline
- Norfolk Southern (representative retired and was not replaced)
- CXS
- UPS
- Elizabeth River Crossing
- Figg Bridge Company
- Financial Services
Virginia Ship Repair Association

Columbia Natural Gas (pipelines in Hampton Roads)

2. Deliverables

The Private Infrastructure Committee identified Deliverables for its work on the Pilot Project. These are presented in the chart below:

<table>
<thead>
<tr>
<th>Phase</th>
<th>Deliverable</th>
<th>Planned Completion Date</th>
<th>Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>1. Identify restrictions and limitations (administrative, managerial, jurisdictional or legal) to private/public SLR preparedness infrastructure planning.</td>
<td>May-15</td>
<td>May-15</td>
</tr>
<tr>
<td></td>
<td>2. Identify critical private infrastructure for the Hampton Roads region.</td>
<td>May-15</td>
<td>May-15</td>
</tr>
<tr>
<td>II</td>
<td>3. Identify dependencies and interdependencies between public and private infrastructure for projects selected for analysis.</td>
<td>Feb-16</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Identify best practices for SLR adaptation by industry sector.</td>
<td>Feb-16</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Identify actions being taken by private infrastructure and planned solutions for possible emergencies related to sea level rise.</td>
<td>Feb-16</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. Formulate recommendations (resiliency requirements) for privately owned infrastructure.</td>
<td>Feb-16</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7. Dominion Power has expressed a need to update critical service list requirements for the Hampton Roads Regions. This includes the local cities and federal facilities and should focus on priorities for emergency services, government function, etc. In addition, there is a need to develop a communication matrix that includes access to updated technology between energy providers and local cities and federal facilities.</td>
<td>May-16</td>
<td></td>
</tr>
</tbody>
</table>

The restrictions and limitations identified in Deliverable 1 are presented in Key Findings in the Private Infrastructure section of the main body of the IPP Phase 1 report. Critical private infrastructure identified in Hampton Roads (Deliverable 2) is represented in the membership, both current and planned, of the Private Infrastructure committee.
3. Additional Resources

A review of best practices from US and International sources found that individual industries were developing their own sets of best practices and updating industry regulations and recommendations to reflect these. The Committee has gathered together several of these resources in the following list:


- “Air Insulated Substation Design for Severe Climate Conditions, B3.31”, 2014, CIGRE publication.

- “Before And After The Storm”, January 2013, Edison Electric Institute.


- “Resilient Business”. May be accessed at http://www.resilientbusiness.co.nz/

- Prepare My Business, may be accessed at http://www.preparemybusiness.org/planning

4. Committee Protocols/Operational Lessons Learned

The Private Infrastructure committee meets monthly, limiting meetings to a one hour time duration. Agendas are developed to keep committee members abreast of status of overall Pilot progress and to move the committee forward to meeting deliverable requirements.
Information flow within the committee is most efficient via e-mail. While ODU has provided “Box” access for committees, many private companies will not allow access to these online portals from workplace computing devices.
N. Science Advisory Committee

1. Membership

Unlike most Committees and Working Groups within the Pilot, the Science Committee doesn’t have organizations as members. There are members from organizations but in many cases they are not acting as representatives of their organization. Members’ organizations are listed below in that context.

<table>
<thead>
<tr>
<th>Science Committee Member</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Larry Atkinson – Co-Chair</td>
<td>ODU</td>
</tr>
<tr>
<td>Carl Herschner – Co-Chair</td>
<td>VIMS</td>
</tr>
<tr>
<td>Molly Mitchell</td>
<td>VIMS</td>
</tr>
<tr>
<td>Russell DeYoung</td>
<td>NASA/Langley</td>
</tr>
<tr>
<td>John Edwards</td>
<td>Weston Solutions</td>
</tr>
<tr>
<td>Mark Bennett</td>
<td>USGS</td>
</tr>
<tr>
<td>John Boon</td>
<td>VIMS</td>
</tr>
<tr>
<td>Ben Hamlington</td>
<td>ODU</td>
</tr>
<tr>
<td>Hans-Peter Plag</td>
<td>ODU</td>
</tr>
<tr>
<td>Mark Bushnell</td>
<td>CoastalObsTechServices LLC</td>
</tr>
<tr>
<td>Tal Ezer</td>
<td>ODU</td>
</tr>
<tr>
<td>John Marburger</td>
<td>Navy</td>
</tr>
<tr>
<td>Noel Baker</td>
<td>NASA/Langley</td>
</tr>
<tr>
<td>Kate Bosley</td>
<td>NOAA/NOS/COOPS</td>
</tr>
<tr>
<td>Regina Poeske</td>
<td>EPA</td>
</tr>
<tr>
<td>John Murray</td>
<td>NASA/Langley</td>
</tr>
<tr>
<td>Patrick Taylor</td>
<td>NASA/Langley</td>
</tr>
<tr>
<td>William Sweet</td>
<td>NOAA/NOS</td>
</tr>
<tr>
<td>Dave Jones</td>
<td>Storm Center</td>
</tr>
<tr>
<td>Brad Ball</td>
<td>NASA/Langley</td>
</tr>
<tr>
<td>Heather Kirkering</td>
<td>Sea Connections Consulting</td>
</tr>
<tr>
<td>David Burdige</td>
<td>ODU</td>
</tr>
<tr>
<td>Mike Aslaksen</td>
<td>NOAA/NGS</td>
</tr>
<tr>
<td>Willy Reay</td>
<td>VIMS</td>
</tr>
<tr>
<td>Gerhard Kuska</td>
<td>MARACOOS</td>
</tr>
</tbody>
</table>

2. Summary Narrative – Science Committee Observations and Realizations from Phase 1

The Pilot Science Team was formed to provide science information to the other teams in the Pilot and to determine needs and gaps in information. This short narrative summarizes some of our findings and realizations.
Interaction –

- The Science Team evolved quickly as the Pilot started up to be a mechanism for interaction among the many governmental, academic and other entities that had a role in the science of increased flooding because of sea level rise.
- We found that there were many issues such as subsidence that involved several different local, state and federal agencies and they needed to talk.
- The NOAA CO-OPS office has coordinated bi-weekly teleconferences among the group that will continue to be our main mode of interaction.
- Meetings with a specific focus (e.g. subsidence rates or new water level gauges) provide a second way the group organizes.

Federal Agencies –

- The Federal agencies have both the intellectual and material assets and the stewardship mandate to help regions such as ours plan for the future. But they have to deal with many regions – not just Hampton Roads thus the Pilot is a test bed for them.
- The Federal Science agencies (NASA, USGS, NOAA) all are very active in sea level rise science in not only Hampton Roads but globally.
- Because of their strong interest anything done in this region or any region in the US will by necessity include federal scientists of those three and other agencies.
- Most non-Federal governments will want to refer to Federal government reports as the authoritative reference for actionable information on relative sea level rise rates.
- Federal agencies are now developing new sea level rise rates for many regions including ours.

Commonwealth of Virginia –

- A committee of the Commonwealth has detailed VIMS to provide estimates of sea level rise rates and other information related to recurrent flooding.

Future of the Science Team

- It is obvious that continued coordination of science activities related to the Pilot is necessary.
- A more formal structure for the Science Team should be developed for the second year of the Pilot. This could include the ongoing regular telecoms.
- The science team needs to interact with the other teams to understand better their needs.
3. Science Committee Newsletters

1. Hampton Roads Pilot Science Team Update March 2015

This is an update on activities relevant to the Science Committee of the Hampton Roads Intergovernmental Planning Project.

   a) Science Committee Info
   Science committee info can be found at [LINK](#). Everyone has permission to upload and download.

   You can also use this to send email to all the group.

   The current roster is there as well as our draft ‘terms of reference’.

   We also have documents stored there and please upload any you think relevant. Don’t worry about where to put stuff or tagging: I’ll take care of that.

   As a reminder here is our Purpose, Scope and Deliverables.

   b) Purpose and Scope
   The Science Advisory Committee is responsible for providing the Executive Steering Committee with critical information based on relevant scientific research of interest to the Hampton Roads Pilot project. Topics will include information on global mean sea level rise, local relative sea level rise, vertical land motion, dynamical ocean change, ocean fingerprinting, extreme water levels, decision frameworks, risk management, and uncertainty management in addition to any other scientific inquiries made by the Executive Steering Committee.

   c) Deliverables:

   By 1 August 2015, the committee will provide the following:

   • Review and summarize the latest science on sea level rise rates and projections relevant to the Hampton Roads region
   • Review all scientific literature relating to decision making, for the purpose of adaptation to sea level rise, in an environment of deep uncertainty.
   • Make recommendations to the Executive Steering Committee on which method(s) are most applicable to the needs of the Hampton Roads community and the goals of the pilot project.
Following are two activities.

Contact Mark Bennett mailto:mrbennet@usgs.gov

A. DEVELOPMENT OF A LAND SUBSIDENCE MONITORING PLAN, HAMPTON ROADS PLANNING DISTRICT

Problem

Land subsidence contributes to rising water levels in the Hampton Roads Planning District (HRPD)\(^1\). Since 1930, relative sea-level has risen 14.5 inches in the HRPD, the highest rate on the US Atlantic Coast\(^2\). More than half of relative sea-level rise in the HRPD is attributable to land subsidence\(^1\). Land subsidence in the HRPD can be at least partly controlled or mitigated if land subsidence patterns and rates are better known and resources managed appropriately. But very little subsidence monitoring has taken place over the past 20 years in the HRPD. This proposed study will determine the best options for subsidence monitoring and estimate costs and requirements.

Objectives

Objectives of the study are to describe land subsidence monitoring options and produce a ranked list of options with associated costs that Hampton Roads Planning District Commission can use to guide decisions about investment in land subsidence monitoring.

1. Describe available techniques and methods for measuring land subsidence in the HRPD
2. Inventory existing monitoring data, infrastructure, and ongoing data collection efforts
3. Organize meetings of a stakeholder group of public officials and scientists
4. Develop a matrix ranking monitoring options according to data needs
5. Develop cost estimates for the most promising monitoring options

Workplan and Schedule

The workplan consists of 5 work components to be completed over a 10 month period (Table 1).

1. **Describe techniques and methods for measuring land subsidence** - Various methods are available to measure land subsidence, each producing different data and having different benefits, costs, and uncertainties. These methods will be described in terms of their capability to meet HRPDC needs.
2. **Inventory existing monitoring activities, infrastructure, and data** - A USGS expert (Michelle Sneed) will be flown from California to HRPD to assess two abandoned extensometers for possible rehabilitation. Benchmarks from a 1970s geodetic survey will be field scouted to assess suitability for a resurvey. InSAR satellite data availability and processing errors will be assessed.
3. **Organize stakeholder advisory group** - A stakeholder advisory group will be organized to aid communication between scientists and public officials who will use the subsidence data. Officials will learn about subsidence monitoring and scientists will learn about public use of subsidence data.

4. **Rank monitoring options according to data needs** – Rankings will be developed in coordination with the stakeholder group to guide future decisions about investment in subsidence monitoring.

5. **Estimate monitoring option costs** – Preliminary scopes of work and preliminary budgets will be developed for each of the monitoring options.

**References**


**B. TIDE GAGE INSTALLATION**

The USGS is currently in the process of installing 12 tides gages utilizing Hurricane Sandy Supplemental Funding. Three of these stations will be operated at NOAA, National Ocean Service standards. The others will be operated at USGS standards. Information from all of the installed gages will be available real-time through the USGS website.

A map showing the installation sites follows.
NASA Langley is proposing 3 survey deployments of the NASA G3 aircraft flying a SAR to measure subsidence in June and December 2-15 and June 2016. The team comprises people from NASA Langley, NASA JPL, ODU, VIMS, NOAA and USGS. More soon on this exciting news.

Contact John Murray mailto:john.j.murray@nasa.gov
f) **NOAA/NOS Inundation and DOC Assessments**

Contact [mailto:William.Sweet@noaa.gov](mailto:William.Sweet@noaa.gov)

**NOAA Quicklook inundation dashboard** - I am helping NOAA NOS and COOPS develop a coastal "quicklook" inundation dashboard for Norfolk/Chesapeake region to help track and give near-term predictions of recurrent tidal flooding. We also want to have a set of "landmarks" that are publicly well known to help visualize impacts. We will move out on this in tandem with the Pilot's work as we can as to be responsive to needs.

**DOD Assessment** - DOD assessment lead by John Hall (SERDP program) where we are developing regional/local SLR projections and extreme event probabilities for 1200+ coastal DOD assets. The latter part is sort of tricky (extremes) since we are just using a global tide gauge network. Working on some regionalization approaches as to spatially characterize common responses. Analysis and write up hopefully complete by summer with a federal document following. John M. on the Pilot's science group is also involved. Results from this should help populate some tools for the Norfolk area.
Molly Mitchell and Carl Hershner at VIMs are tasked with preparing a new sea level rise report for the Climate Commission and their draft report is due the end of March. Tal Ezer, Ben Hamlington, John Boon and Larry Atkinson met Molly them March 3. They hope to have time to get the draft out to this group before submission. Regardless this report will be an important document for the pilot and other activities in the region.

Contact – Molly Mitchel mailto:molly@vims.edu
h) **ODU GPS Subsidence Installation**

Hans-Peter Plag is contracting with Mark Bushnell to install a cGPS sensor system at the Sewells Point NWLON site. Dr. Plag plans to install several more of these GPS systems locally. The Sewells Point system should be online by Summer 2015.

Contacts Hans-Peter Plag [hpplag@odu.edu](mailto:hpplag@odu.edu) and Mark Bushnell [mark.bushnell@noaa.gov](mailto:mark.bushnell@noaa.gov)
### Members of the Science Advisory Committee

Note – the membership is open. We might anticipate an executive committee when the need arises to rapidly respond to requests from the Pilot Project leadership.

<table>
<thead>
<tr>
<th>Science Advisory Committee</th>
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<tbody>
<tr>
<td>Larry Atkinson</td>
<td>ODU</td>
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<td>Carl Hershner</td>
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<td>Mike Aslaksen</td>
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<td>Willy Reay</td>
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2. June 2015 Update of the Hampton Roads Intergovernmental Planning Pilot Project Science Advisory Committee

a) Subsidence

Subsidence causes approximately one-half the sea level rise in the region. The rates are highly variable from place to place as are the causes. It has become recognized that getting better understanding of subsidence is both necessary and, fortunately technically possible.

b) Subsidence Advisory Group

A land subsidence monitoring advisory group has been formed under the leadership of Jack Eggleston at USGS. The purpose of the group is “to get federal science agencies into discussion with those who have a need for land subsidence data. Agencies with a need for data include local planning agencies (HRPDC for example) state agencies (eg VADEQ), other federal agencies (eg Navy, FWS), private organizations, and others. Getting direct feedback on what is needed at the ground level can be a big motivation for federal agencies to step up the plate and fund expensive data gathering efforts.” Contact Jack at jegglest@usgs.gov for more information.

c) NASA Interferometric SAR Data

A NASA led proposal to fly airborne Synthetic Aperture Radar was not funded until it is determined if the existing satellite SAR data meets regional requirements. Funding to support an interferometric analysis of the extant Terra-SAR X, and ALOS-2 data is being sought now. John Murray (john.j.murray@nasa.gov) and Mike Aslaksen (mike.aslaksen@noaa.gov) are POC’s.

d) VIMS report to Governor’s Commission

Carl Hershner (carl@vims.edu) and colleagues are

“Responding to a request from the Governor’s Climate Commission to provide a continuing forecast of sea level rise that can be used for state and local government planning. To that end we have determined to use the National Climate Assessment scenarios as the basis of our long-range forecasts. We are currently - and we intend to continue in the future - modifying these scenarios by incorporating local subsidence into the future trends. At present we have modified our original guidance by updating the scenarios to incorporate USGS average subsidence rate for the entire region. This is generally fine, given the overall uncertainty in the scenarios, but we aspire to a forecast that is spatially more highly resolved. This will require determination of subsidence rates that are appropriate for all parts of the region - and that will require measurements that cover the entire region so we are not extrapolating from only a few direct or derived measurements.
We hoped - and still hope - that NASA SAR (from airplane overflights and/or satellites) may provide a dense and comprehensive monitoring of subsidence. But that capability is apparently years off in the best of circumstances, and we are told this monitoring will have some detection limits (about 3 mm/yr) that may obscure much of the range of variations we currently believe exist in the area (1 to 4+mm/yr).

So we are actively investigating other options which apparently include direct measures of subsidence with extensometers, and GPS enhancements of water level monitoring stations. In either of these cases, the regional coverage of these measurement options is currently limited.

This means we have several primary questions to answer in the near future:

1. what are the available options for detection of subsidence?
2. what are the options for expanding the geographic coverage of this monitoring (and who can and will do this)? and
3. what is the most appropriate spatial parsing of detected subsidence rates for modification of sea level rise projections?

We are motivated to seek your collaboration in all of this, and to strive for some consensus in the answers to the preceding questions, because one of the principal problems we currently face in advising local and state government officials is the plethora of "official" opinions about future climate change outcomes. We would very much prefer to be providing guidance that is the result of collaboration between state and federal experts so we will not be confronting multiple opinions/conclusions going forward.”

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e) NOS Activity

From William Sweet (william.sweet@noaa.gov)

NOAA CO-OPS is currently designing an “inundation dashboard” which will track water level conditions (initially) relative to local flood impact “datums” established by the NWS WFO associated with minor (aka nuisance), moderate and major levels (see above info under NWS section). Historical “scorekeeping” will allow comparison of exceedances per month and year to climatologies as to compliment the local living memory of recurrent flooding events. Additional local elevation thresholds defined at well-recognized and flood-vulnerable “landmarks” and “nuisance level” definitions per group’s outcomes will be added and tracked as well. The dashboard will look to integrate with the NWS AHPS system and VIMS TideWatch as to provide an ensemble for forecast for potential recurrent flooding not necessarily associated with a storm.
f)  

**NWS Activity**

From Jeff Orock (jeff.orrock@noaa.gov) supplied the following:

You may already be aware or the ensemble approach to surge and water level forecasting under development for the ETSS model (called P-ETSS). I believe the same may be planned for ESTOFS. On a daily bases NWS Wakefield ingests tidal/surge forecasts including surge from ESTOFS, ETSS, and CBOFS. Forecasters also use Tidewatch. Applying the various models and some level of local expertise forecasters develop a total water level forecast for both Sewells Point and CBBT updating the forecast 4 times per day. This is done within the Graphical Forecast Editor pulling in digitized data from the models. This is a type of ensembling approach forecast. We post these forecasts online to AHPS. We include the forecasts on a tide briefing page which compares the NWS forecast in the upper left to other various models on one page. See


Click on the “X” under the FORECAST column to get to the tide forecast page the each individual gage.

On this page the NWS forecasts are in the upper left, ETSS upper right, Tidewatch lower left and CBOFS lower right. You can click on the upper let forecast to go to the APHS page for the gage.

My hope is in the near future we find a way to merge the NOS dashboard with NWS AHPS. We have a NOAA funded student this summer to help us with this.

g)  

**Weekly Coordination Call**

Audra Luscher (audra.luscher@noaa.gov) is coordinating a weekly telecom as a way for all of us too coordinate activities. Here is an example of the agenda for an upcoming telecom:

- Discuss the definition of Nuisance Flooding - Billy Sweet will review a few methodologies for identifying and defining a nuisance flood event (will send out a couple slides).
- Nuisance Flood Forecasting
- Discuss the VA TideWatch program
- Review the difference between NOAA and VA products that affect the generation of accurate forecasts (i.e. difference in the time period used to generate the tidal constituents driving the tide level predictions).
- Identify coordination opportunities in the VA local “benchmarking” of water levels against local flooding conditions (issue of tidal datums that are aging and increasingly irrelevant for current conditions).
• NOAA address VAs concern with tidal datums that are aging and increasingly irrelevant for current conditions
• Touchbase on the addressing gaps by not having the NASA SAR overflight for land subsidence.

People typically on the call include: Audra Luscher - NOAA Federal – organizer, Galen Scott - NOAA Federal, William Sweet - NOAA Federal, Ellen Mecray - NOAA Federal, Marcia Berman marcia@vims.edu, Darlene Finch - NOAA Federal, Paul Bradley - NOAA Federal, Larry Atkinson latkinso@odu.edu, Molly Mitchell molly@vims.edu, Carl Hershner carl@vims.edu, Doug Marcy - NOAA Federal, Lindy Betzhold - NOAA Affiliate, William Brooks - NOAA Affiliate, Mike Aslaksen - NOAA Federal, Willy Reay wreay@vims.edu, Danielle Nagele - NOAA Affiliate, David Kidwell - NOAA Federal, Michelle Covi mcovi@odu.edu, Jeff Orrock - NOAA Federal, Philippe Hensel - NOAA Federal, Russell Jackson - NOAA Federal

\textit{h) Ocean Circulation and SLR}

There continue to be important science papers coming out on the effects of ocean circulation on sea level rise in our region. I (Larry) try to keep track of these on \url{http://coastalslr.blogspot.com/} and specifically for papers \url{http://coastalslr.blogspot.com/p/chronology-of-coastal-slr-papers.html}

\textit{i) Membership of the Science Advisory Committee}

The membership is open to anyone interested -

Those currently on the mailing list include: Larry Atkinson, Michelle Covi, Emily Steinhelber, Mark Bushnell, Carl Hershner, Molly Mitchell, Russell De Young, Mark Bennett, John Boon, Hans-Peter Plag, Tal Ezer, John Marburger, Noel Baker, Kate Bosley, Regina Poeske, William sweet, Dave Jones, Heather Kerkering, David Burdige, John Murray, Mike Aslaksen, Willy Reay, Matt Fisher, Patrick Taylor, Mark Luckenbach, Gerhard Kuska, Liz Smith
0. **Senior Advisory Group**

1. **Membership**

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<tr>
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<td>Former Mayor, Newport News</td>
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<td>Bill Bell</td>
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<td>Bruce Bradley</td>
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<td>J. Robert Bray</td>
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<td>Dana Dickens</td>
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<td>Deborah Dicroce</td>
<td>Executive Director, Hampton Roads Community Foundation</td>
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<td>Dwight Farmer</td>
<td>Former Executive Director, HRPDC</td>
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<td>Ret. USACE, Norfolk District Commander</td>
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<td>Jody’s Popcorn</td>
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