Adaptive Planning for Flooding and Coastal Change in Virginia:
Legal and Policy Issues for Local Government
Plenary Session, Friday, September 13, 2013, 9:30 a.m.-10:30 a.m.
College of William & Mary—School of Education
Discussion being held in "Matoaka Woods Room"
Moderator: Dr. Carl Hershner, VIMS

Format: Mayors Fraim, Sessoms, and Ward are each scheduled to offer 15 minutes of remarks w/ a PowerPoint presentation followed by 15-20 minutes of facilitated Q&A.

(SLIDE 1)

Thank you Dr. Hershner for that kind introduction and for your leadership at the Virginia Institute of Marine Science. It's obvious all of you have worked very hard in preparation for hosting this event.

I am happy to be joined on this panel by my friends the Mayor of Virginia Beach, Will Sessoms, and the Mayor of Hampton, Molly Ward.

The overall goal of this conference is to provide a forum for local governments and coastal stakeholders can come together to

identify the specific issues they have encountered in attempting to meaningfully address the continued threat of coastal flooding.

We are also here to ask for your assistance in responding to what I believe to be one of the greatest threats to our Commonwealth and that is recurrent coastal flooding—a threat we no longer can afford to ignore.

So it is more than a pleasure, it is, in fact, an honor to be with you today to talk about what Norfolk is specifically doing to respond…we do have a few ideas that we would like to share with you as to the kinds of assistance and resources that are desperately needed to equip our independent cities with the tools that are needed to implement effective measures for preventing what we all know is coming in the foreseeable future.

But I have to confess . . . I was a little surprised by the invitation to speak to such a distinguished group of experts. After all, there's not much I could tell YOU about the technical reasons as to why my city floods so severely.

What Dr. Hershner did not mention to you in his introduction is that I was an English major in college and have spent my professional career as an attorney. What I think I can do, though, is share with you some thoughts about how today's recurrent coastal flooding challenges are playing out at the local government level and, more specifically, how they are affecting the City of Norfolk.

From the perspective of serving nearly 28 years on city council, it's been my experience that concerns about recurrent flooding have required increasingly greater amounts of the city's time and resources.

Environmental laws and regulations now affect everything from planning, development and construction projects to drinking water systems, solid waste disposal and beach and shoreline protection.

In response, Norfolk has embraced not just the need to be a good environmental citizen, but the goal of being a recognized leader among urban core cities in achieving environmental sustainability and reducing our carbon footprint while also addressing our recurrent flooding challenge. And we're achieving this in a number of ways along with our efforts to address recurrent coastal flooding.

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To date we have restored and created 15 acres of wetlands on our own initiative and with partners such as the Chesapeake Bay Foundation, the Elizabeth River Project, Old Dominion University and the citizen-led Lafayette Wetlands Partnership. More are planned.

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We plant 800 to 1000 street trees annually, and have recently planted five tree groves through a program designed to boost our tree canopy from 33% to 40% - the amount recommended for cities east of the Mississippi River.

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We have invested $200 million dollars over the past 20 years to upgrade our sanitary sewer and storm drain systems and continue to invest in those projects.

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We invested $8 million dollars to transform a former 53 acre landfill into an award winning nine-hole Scottish links public golf course.

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We have led the effort to establish a regional light rail mass transit system for Hampton Roads with The Tide, a $315 million dollar investment. It's the first light rail system in the

Commonwealth and we are the smallest city in the Country to construct such a system.

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We are purchasing hybrid vehicles for our City fleet, and new municipal facilities and school buildings are being designed and built to meet LEED standards.

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We also operate a large and complex water system that provides drinking water to 850,000 people in South Hampton Roads, including the U. S. Navy.

It consists of eight reservoirs and four wells. It also draws water from the Nottoway and Blackwater Rivers, and extends 90 miles west of Norfolk to Lake Gaston.

Water is pumped by Virginia Beach from Lake Gaston to our western reservoirs in the Suffolk area, and from there it is pumped to our water treatment plants.

(SLIDE 9 –MERMAID)

Together, these are important and effective responses to environmental challenges, and they are moving us closer to achieving a sustainable environment. However, by far the most serious environmental challenge confronting Norfolk today is the growing frequency, extent and duration of flooding in our city.

To understand the dimensions of this problem it is helpful to know a little bit about my hometown.

Today, Norfolk is a city of 63 square miles and is 97% developed. We are bounded by the Chesapeake Bay on the north, the Elizabeth River on the west and south and by the city of Virginia Beach on the east. Norfolk is the business, financial, cultural, educational and medical center of the Hampton Roads region.

We are home to the world's largest Naval Base, the North American headquarters of NATO and to Virginia's largest and busiest port facility – Norfolk International Terminals.

Our topography includes 144 miles of shoreline comprised of the beaches of Ocean View, property along the Elizabeth and Lafayette Rivers as well as shoreline property surrounding several in-town reservoirs built in the early part of the 20th century.

However, Norfolk is situated on a low-lying physiographic region . . . nearly all the city is below 15 feet of elevation, and drainage gradients are limited as we are so flat. So, while water is our most abundant resource, it is also the source of our humble sea port city's greatest challenge.

(SLIDE 10)

Norfolk was founded in 1682 as a port town on 50 acres of land on the banks of the Elizabeth River. As you see from the map, the town was nearly an island and it remains so today. As the city grew in size and population, it was a common practice to create buildable land by filling waterways and lowlands.

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To demonstrate, this map superimposes Norfolk's original 50 acres – represented by the yellow outline - over an aerial photograph of downtown. In the 16 and 1700s, what is now our Triple -A baseball stadium, Waterside Drive, Town Point Park and everything in front of the MacArthur Center was part of the Elizabeth River.

I hope it is an obvious point, but building over filled waterways and marsh land was a perfect formula for conditions that now contribute significantly to our flooding problems. To illustrate, let me offer two quick examples.

The benchmark for measuring floods in South Hampton Roads is the 1933 Chesapeake-Potomac Hurricane which produced a 9.8 foot storm surge in Norfolk.

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This photo shows flooding along Granby Street in the middle of Norfolk's downtown after the worst of the storm had passed and prior to the construction of our downtown seawall.

(SLIDE 13)

This next photo is from the 1962 Ash Wednesday storm and shows storm surge flooding downtown. In the 18th century this area was Town Back Creek, a navigable stream that was eventually filled and built on.

(SLIDE 14)

Flooding from this punishing nor'easter was enough to move the City to apply for federal funding to build a seawall.

It was completed in the early 1970s. It has worked just as intended, preventing storm surge flooding in the lower part of downtown, but not flooding from heavy downpours.

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More recently, Hurricanes Isabel in 2003 and Irene in 2011 caused near record levels of storm surge flooding, and caused significant residential and commercial property damage in Norfolk and across Hampton Roads.

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But what had been episodic flooding events in the past has become a regular –But I won't say normal - occurrence.

Every tropical system and nor'easter that runs up the coast causes flooding problems for us.

In fact, four of the seven most significant tidal events in the past 80 years have happened in just the last 10 years.

We have also recorded more flooding during heavy rainfall due to the volume of water exceeding the capacity of the storm drain system. This flooding is even worse during coastal storm events.

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And we are now experiencing regular flooding in some parts of the city during lunar high tide cycles – something unheard of just several years ago.

To make the point more clear, if the moon cycle is at or near full moon, and we experience even a moderate amount of precipitation, Norfolk floods.

And it's not just an inconvenience, but major city roadways become unusable due to the deep standing water on our roads preventing passage.

Naturally we wanted to know whether this was coincidence or if something else was going on. What we found was alarming.

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We learned that since 1930 relative mean sea level at Sewells Point in Norfolk has risen 14.5 inches . . . that sea level rise in Hampton Roads has been the greatest of any location on the East Coast . . . and that the rate of sea level rise is projected to continue increasing.

Mid-range predictions for the future rate of sea level rise in Hampton Roads call for a 2 to 4 inch increase per decade. Doing the math, that equates to over three feet in the next 100 years.

But that's not all we learned. Along with rising sea levels, the ground is also sinking.

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Hampton Roads sits in the nation's largest known geologic impact crater and this area is sinking – or settling. This phenomenon is being aggravated by groundwater withdrawal, glacial rebound and reclaimed land.

The Chesapeake Bay Program's Scientific and Technical Advisory Committee estimated the average rate of subsidence (*sub-sigh-dence*) in Hampton Roads to be .57 inches per decade.

It is for these reasons that the National Oceanic and Atmospheric Association warned that Norfolk and Hampton Roads ranks second only behind New Orleans as being at greatest risk from sea level rise for a metro area its size anywhere in the country. Compounding this, we are one of the top 5 most vulnerable U. S. cities to hurricanes.

Future projections of long term impacts of relative sea level rise call for more frequent and severe flooding . . . flood insurance being required for more properties and at higher cost . . . more disruptions to our transportation network . . . a reduction in suitable land for development . . . loss of wetlands and wildlife habitat . . . and businesses and residents may need to make a strategic retreat back from threatened shorelines.

(SLIDE 20)

Now . . . I'm not going to veer into a causality conversation that might cause a stir. But whatever the cause, it doesn't change the fact that we are dealing with a growing problem that needs to be addressed. So, what are we doing about it?

Over the past two and a half years, we've developed a comprehensive approach to address flooding across the entire City that incorporates a four-pronged strategy to organize priorities and actions.

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They are: Plan, Prepare, Mitigate and Communicate, which we do regularly. No other priority receives as much attention as solving our flooding challenges.

Our "Plan" area is where we organize city planning, regulatory activities, study and analysis and modeling and simulation.

"Prepare" is focused on emergency preparedness, education, certification and training. It is emergent in nature, and develops our tools for dealing with storm events.

"Mitigate" includes infrastructure development and other techniques for remediation and resiliency.

And in "Communicate" we focus on citizen outreach, partnerships, events and online resources.

The key to implementing this strategy rests with a cross departmental committee that meets on a bi-weekly schedule.

The fact is that no other issue in the city receives as much attention by a team of executives, managers and technical staff.

We understand that to be successful we must get outside of our individual disciplines - be they planning, engineering, finance, communications or project management – and work together.

(SLIDE 22)

So let me tell you what we have been doing about it.

As part of our planning efforts, we have engaged in a multi-year effort to evaluate coastal flooding hazards, identify mitigation options and develop a phased approach for implementing the options.

During 2008 and 2009, the City began a tide gauge monitoring program to determine the relationship of water levels between tidal

tributaries in the City and the long term tidal station operated by NOAA at Sewells Point.

The results were used to define water levels throughout the City for a range of tidal return periods.

From that data, a GIS-based model was developed to predict coastal flooding extents and depths throughout the City.

Based on those predictions, a range of flood mitigation concepts were identified that include policy, education, changes to building codes, elevating buildings and roadways and new infrastructure such as flood walls.

Subsequent studies performed by the Dutch firm, Fugro Atlantic, helped identify specific mitigation alternatives for each flood prone area of the City.

In addition to tidal flooding we must also deal with precipitation flooding from intense rainfall. To address this aspect of our flooding problem we have evaluated storm water drainage infrastructure, reviewed more than 250 water drainage sheds, aggregated them into 84 planning districts and ranked infrastructure needs by drainage shed.

Our "Plan" activities are not only focusing on protecting properties with engineered solutions, but also at providing protection on a site by site basis through our zoning ordinances.

We are also now requiring new construction within high risk flood zones to meet heightened standards and substantial improvements to existing properties will require the entire structure to be brought into compliance.

With these additional regulations, houses will be built to anticipate flooding for 100 years instead of just 30 years.

"Prepare" activities include the establishment of a citizen Community Emergency Response Team, certification as a StormReady Community and development of web-based tools to enable real-time communication and status reports between city departments and external partners before, during and after a storm event.

Additional technology has been deployed to provide real time monitoring for storm water and wastewater pump systems and tidal gauges that can be managed remotely from our Emergency Operation Center.

And just a couple of months ago we launched an iOs app that enables citizens to provide photo reports from mobile devices through our service request tracker program.

Mitigation – or actions to hold back the water and reduce flooding – is the most critical part of our strategy.

Norfolk is presently investing $7 million annually for such projects as storm water system upgrades, elevating streets and shoreline protection.

We've installed approximately 3000 water-tight manhole cover inserts in low lying areas to prevent flood waters from entering the sanitary sewer system.

We are raising the electrical components and wet well tops at sanitary sewer pump stations in flood prone areas, and in some cases completely relocating sewer pump stations.

Lastly, our "Communicate" activities include citizen outreach, collaboration with our institutional, governmental and corporate partners, mailing inserts and a robust website that provides a wealth of information to help citizens understand the impacts of flooding and the complexities of the issue.

What I've just shared are highlights from the many activities in our strategy.

Let me now speak to one very important identified need. It is, in fact, the most important.

Norfolk undertook a series of consultant studies that began in 2008 and continuing through this past year produced a variety of mitigation options.

Due to the extensive amount of shoreline in Norfolk, not surprisingly most of them involve infrastructure such as tide gates and seawalls. The combined cost for the necessary storm water upgrades and flood barrier systems is estimated at over

(SLIDE 23)

ONE BILLION DOLLARS. Let me say that again, one billion dollars. We have met with our congressional delegation and we

have been to the White House where we met with officials of the Office of Management and Budget to advise them we will be seeking flood mitigation funding – probably in the amount of one billion dollars – in an upcoming federal budget.

(SLIDE 24)

As one of Virginia's most fiscally stressed cities, that amount is obviously more than we could ever expect our citizens to bear alone, particularly because of the nationally important strategic assets we host. And that leads to the last point of my remarks

The need for partnerships and policy changes is well past due at all levels of government . . . so we are seeking to change that.

One key partnership we've established is with Dutch government officials. We learned from them that mitigation and investment are vital.

But we also learned that if we are to survive as a coastal community, we will have to live WITH the water. This living WITH water philosophy is inherent to the Netherlands because much of the country is below sea level.

We need to consider what that approach will look like here based on the predicted increase in relative sea level rise.

Over the past two years, we have collaborated with our regional planning district commission, our universities and others to gain a better understanding of the flooding we are experiencing and what tools we should consider to deal with it.

While we think we're doing pretty well locally, we are frustrated by the lack of urgency at the State and Federal levels.

We are not the only community facing sea level rise. Hurricane Sandy's impact on New Jersey and the New York City area is sufficient evidence of that.

The problem is real . . . it has been well documented . . . We have to deal with it. Studies published last year in the peer-reviewed journal *Environmental Research*, and an accompanying report by Climate Central, looked at people who live in homes within three feet of high tide. They found that nearly 4 million people across the country live in areas vulnerable to flooding from rising seas.

Last year, at the request of the City of Norfolk, the Virginia General Assembly commissioned a study by the Virginia Institute for Marine Science. Its results confirmed what we already knew - that recurrent flooding is a significant issue in Virginia coastal communities, and one that is predicted to grow worse over the next 20-50 years.

The study was reported to the General Assembly in January and has recently been taken up by the Commonwealth Secure Panel, which our good friend Senator John Watkins plans to discuss with you further, later in the day.

The Secure Commonwealth Panel will begin to focus attention on this issue and organize the State in a cross-disciplinary fashion as we have done so there can be one place for us to go for help.

Similarly, at the federal level, we find ourselves continually competing with other localities for the modest amounts of funding available for flood control infrastructure.

We need only look at any number of recent hurricanes to understand investment in mitigation provides a better return than the costs of storm recovery. Our own downtown floodwall proves the point.

What we need now is a full commitment by state and federal government to develop strategies, policies and funding sources to address flooding and sea level rise and to do so now. I ask everyone here to join me in advocating for this response.

For Norfolk and for Hampton Roads – and for the Commonwealth - the most pressing issue for the 21st century is going to be dealing with sea level rise.

Everyone in this room knows that comprehensive, cross-disciplined and, yes, intergovernmental strategies are needed to address precipitation and tidal flooding.

So, too, are enhanced communication and collaboration efforts to increase awareness about our flood prone areas for our residents and for our policy makers.

Norfolk has been recognized by the *New York Times*, the *Washington Post* and Public Television as a national leader for its

efforts in flood prevention and planning. But none of us will achieve what is necessary by going it alone.

The sober conviction the Norfolk Council and Administration have come to realize after fully considering the complexity of the dilemma and the expense of necessary solutions absolutely will require significantly enhanced partnership at every level of government, higher education institutes, etc.

The only way we will succeed in meeting one of the most challenging issues of our time is by working together.

We need your thoughts and your advice.

We need you to join with us.

We need you to work with us.

We need your help.

The water is coming.

Thank you for your time and attention and for your participation in this symposium.