Summary

In 2017, the Hampton Roads Planning District Commission updated the Hampton Roads Hazard Mitigation Plan. The City of Norfolk worked with the communities of Virginia Beach, Suffolk, Chesapeake, and Portsmouth in the Southside; the communities of Hampton, Newport News, Poquoson, Williamsburg, James City County, and York County on the Peninsula; and the communities of Isle of Wight County, Smithfield, Windsor, Franklin, Southampton County, Boykins, Branchville, Capron, Courtland, Ivor, and Newsoms in Western Tidewater to develop this plan.

This plan addresses goals and mitigation measures for hazards that Hampton Roads faces and serves as the Flood Mitigation Plan for the City of Norfolk. The region is vulnerable to a wide range of hazards that threaten the safety of residents, and have the potential to damage or destroy both public and private property and disrupt the local economy and overall quality of life. While the threat from hazards may never be fully eliminated, the Hampton Roads Hazard Mitigation Plan recommends specific actions designed to protect residents, business owners, and the built environment.

As part of our continued participation in the Community Rating System (CRS) program, a report of this plan and the progress the City of Norfolk has made in implementing the actions is required annually. It is to be provided to City Council as well as the National Flood Insurance Program, and will be published on the City of Norfolk flood awareness webpage for citizen review. This report will list the goals and objectives of the 2017 Hampton Roads Hazard Mitigation Plan and detail the actions that the City of Norfolk has taken to achieve these goals.
Hampton Roads Hazard Mitigation Plan

Purpose:

• Protect life and property by reducing the potential for future damages and economic losses that result from natural hazards;
• Qualify for additional grant funding, in both the pre-disaster and post-disaster environment;
• Speed recovery and redevelopment following future disasters;
• Integrate existing flood mitigation documents;
• Demonstrate a firm local commitment to hazard mitigation principles; and
• Comply with state and federal legislative requirements tied to local hazard mitigation planning.

Goals and Objectives:

Goal 1: Increase community resiliency by reducing vulnerability to hazards.

• Objective 1.1: Reduce damage to repetitively flooded properties
• Objective 1.2: Protect existing and future development
• Objective 1.3: Protect critical facilities/infrastructure
• Objective 1.4: Maintain government services throughout hazard events
• Objective 1.5: Reduce hazard-related impacts on daily routines
• Objective 1.6: Preserve and enhance benefits of natural areas

Goal 2: Educate the public about hazard vulnerabilities and ways to reduce risk

• Objective 2.1: Encourage property owners to assume responsibility for reducing vulnerability

Goal 3: Strengthen and develop partnerships for mitigating hazard impacts

• Objective 3.1: Integrate mitigation concepts into local and regional government plans, policies and actions
• Objective 3.2: Improve and standardize hazard data collection and mapping
• Objective 3.3: Leverage shared resources in pursuit of funding for hazard mitigation projects
• Objective 3.4: Develop partnerships among local, regional, national, and international organizations
Mitigation Action 1

Maintain and protect the City’s beaches and shorelines using structural means.

Progress: Ongoing

Report:

Multiple projects have been approved, are under construction, or are under design for shoreline protection throughout the city. Projects range from breakwaters, beach nourishment, channel modification, diversions/retention, dams/levees/floodwalls/seawalls, shoreline improvements, and improvements to stormwater management systems/outfalls. Projects of this nature are continuously being reviewed to ensure that the shores and beaches of the city are properly protected. The City has engaged in multiple studies of structural measures to maintain and protect the approximately 144 miles of shoreline and 7.3 miles of beaches.

In 2017 the USACE and City, completed a beach nourishment of the 7.3 Miles of beach, adding 1.2 million cubic yards of sand, raising and widening the beach to 60 feet. The City has utilized NFWF grants to design and is in the process of constructing 12,200 of shoreline restoration, 3.34 acres of wetland creation and 1.44 acres of oyster reef creation. The USACE and City of Norfolk recently completed a 3-year Coastal Storm Risk Management Study and in June 2019 signed a Preliminary Engineering and Design agreement to facilitate the next phase of design work. The study evaluated structural and non-structural methods to protect the City from Coastal Storms. The City finished design on a project in the Ohio Creek Watershed that is a combination of structural and natural features to provide coastal storm protection. The City’s Public Works Department has engaged in numerous projects for outfall extensions and modifications to include the construction of forebays.

![Figure 1. Breakwaters at Willoughby Spit](image)

![Figure 2. Conceptual street intersection Ohio Creek Watershed](image)
Mitigation Action 2

Maintain and protect the City’s beaches and shorelines using natural shoreline protection measures. This action may include Climate Resilient Mitigation Activities (CRMA).

Progress: Ongoing

Report:

This action supports the process of constructing green flood prevention structures. Recognizing that natural protection measures help the shoreline adjust to sea level rise with less intervention, projects have been implemented to restore natural protective functions. These projects include living shorelines and dune planting and stabilization and environmental permitting. Currently, approximately 15,000 feet of shoreline is either under design or in the process of having living shorelines designed or constructed. One such example of a completed project is the Knitting Mill Creek Living Shoreline project, which was completed in the Spring of 2018 and added 550 feet of new living shoreline around the Colonial Place community.

City Council adopted the Green Infrastructure Plan as an appendix to plaNorfolk2030 July 10, 2018. The plan provides a catalog of existing green infrastructure in the City. The plan also details opportunities where green infrastructure can be improved and encouraged in development.

Figure 3. Green shoreline flood prevention structures.

Figure 4. Knitting Mill Creek Living Shoreline Project
Mitigation Action 3

Provide educational outreach and improve communications to residents to increase awareness of vulnerability to multiple hazards. Focus on hurricanes, sea level rise, flooding, nuisance flooding and severe repetitive flood losses.

Progress: Ongoing

Report:

The City Manager’s Office, Office of Emergency Preparedness and Response, Office of Marketing and Communications and the Department of Information Technology have greatly expanded the ability to provide notice to the public by using multiple media sources. These sources include real time updates to the City’s webpage, email distribution lists, Facebook, Twitter and Nextdoor. The City utilizes the emergency notification system Everbridge. This system allows for those who have signed up for the service to be notified by landline and cell phone calls, email, text message, and social media during a time of emergency by the Office of Emergency Preparedness and Response.

Norfolk Emergency Operations Center staff, both Emergency Management and 911, continuously offers and provides all hazard outreach opportunities and activities throughout the City of Norfolk. This effort is geared toward the ‘whole community’ concept which includes the private sector, higher education, residents, non-profit, and the military. The City’s biggest outreach activity is the annual Public Safety Day where city departments and city partners come together to showcase our specific emergency preparedness roles and safety tips to attendees.

The City of Norfolk continues to provide new and innovative ways to share risk to citizens. Norfolk has several stakeholder agencies who have a role to play in flood management and response, and are capable of disseminating flood-related information. Outreach will include presentations to civic organizations, educational institutions, and city events. Methods would include question and answer sessions, recurring television ads, and teaching sessions.

Outreach to floodplain residents and repetitively flooded areas is a part of the community’s CRS program and will continue. This action is also part of the City’s Strategy for Continued Compliance with the NFIP. This recommendation covers a wide range of topics including:

- Hazard Awareness Fairs;
- Development of a medical support registry;
- Education on defined Flood and Surge Zones and information on their meaning.
**Mitigation Action 4**

Provide outreach that increases citizens’ ability to take mitigative actions prior to disaster event. Focus on hurricane preparedness and flood mitigation.

*Progress: Ongoing*

*Report:*

The Office of Emergency Preparedness and Response provides significant outreach to citizens about hazards through the Community Emergency Response Team (CERT) program, civic league meetings, and school presentations. Educational outreach is a key component to raise awareness of the hazards to citizens. The Departments of Public Works, Planning, and Public Utilities continue to provide outreach and awareness to citizens on hazards by providing workshops. Each year the Department of City Planning mails citizens within the Repetitive Flood Loss areas to remind them of the importance of flood insurance and safety.

The Ohio Creek Watershed project has engaged in numerous public Outreach sessions to discuss the methods of protection and how it will affect the community. Part of the outreach includes what steps individuals can play in mitigating the effects through parcel-level green infrastructure at their home. The City has a “Retain your Rain” program focused on parcel level and neighborhood green infrastructure solutions to flooding.

The City of Norfolk continues to update the flooding awareness webpage, accessible from the City’s homepage. The cross-departmental Flood Awareness Committee also provides quarterly updates to citizens as well as to the professional community on the City’s progress on flood mitigation as well as providing an opportunity for dialogue for all interested stakeholders.

Opportunities for outreach should expand to Norfolk Public Schools and colleges to create a culture of understanding of preparedness. Various stakeholder agencies involved in floodplain management may be used to disseminate how-to information. This action is also part of the City’s Strategy for Continued Compliance with the NFIP.

This recommendation covers a wide range of topics including:

- What to do when a public warning is disseminated;
- Flood proofing structures appropriately;
- Wind proofing structures appropriately;
- Property Protection seminars.

*Figure 5. Meeting on flood awareness community outreach initiative.*
Mitigation Action 5

Purchase and install generators or other continuous power sources for critical facilities and infrastructure. This action may include, but is not limited to pump stations, EOC, shelters, underpasses and important traffic signals.

Include critical public facility generator requirements and required connection materials in the USACE Emergency Power Facility Assessment Tool (EPFAT).

Progress: Ongoing

Report:

The Department of Utilities has installed fixed sewage bypass pumps at multiple wastewater pump station locations. The generators and fixed sewage bypass pumps will help maintain critical storm water and wastewater pumping operations during storm events where power may be lost. The City has also received a grant for quick-connect generator that was used to upgrade the Berkley Community Center with upgrades underway. Three additional generators have been obtained and can be deployed by Facility Maintenance to the Berkley Community Center, Bayview Recreation Center, and Norview Recreational Center. Additionally, Norfolk’s Stormwater Program may be able to obtain funding from HMGP grants for some of these site actions.

Having data in the EPFATs database will assist in expediting installations at Norfolk facilities following an event where commercial power is unavailable. The web site also offers a permanent storage location for that information providing the ability to update the information as facility requirements change. The City of Norfolk has submitted two grant applications on the behalf of the Department of Utilities for five standby bypass pumps & two elevations of pump station electrical equipment. The City is also working to procure a new generator for the primary EOC site which includes the 1st Police Precinct and 911 Center.

Figure 6. Flood protection residential generator.
Mitigation Action 6

Continue to implement capital improvements that improve storm water management and control flooding, especially for undersized and out-of-date drainage systems and patterns. This action may include Climate Resilient Mitigation Activities (CRMA).

Progress: Ongoing

Report:

Public Works is continuously reviewing their systems and they are being improved as part of capital improvements. The following significant projects have been completed:

- 12th View St. Outfall Extension
- 11th View St. Outfall Extension
- 4th View St. Outfall Extension
- Chesapeake St. Outfall Extension
- Elnora St. Outfall Extension
- 5th Bay St. Outfall Extension
- Sturgis St. Outfall Extension
- Downtown Pump Station #1 Motor Replacement
- Pump Station #8 (Monticello Avenue) Upgrades – Transfer Pipe & Inlet Modifications
- Sunset Drive Drainage Improvements
- Colonial Avenue & Mowbray Arch Drainage Improvements
- 5th Bay St. Drainage Improvements
- Fairmount Park Phase 13A and 13B
- Halprin Dr. (from Barbara - Reuben Dr to Outfall) System Liner
- 3010 Glen Ave. (between Atterbury & Peterson) System Liner
- 8004 Jerrylee Dr. System Liner
- 7710 Parktown Rd. System Liner
- 5816 Bradley St. System Liner
- Templar Blvd & Carlton St. - Chesapeake Blvd Downstream Drainage Improvements
- Evelyn St & Carlton St - Chesapeake Blvd Downstream Drainage Improvements
- Quincy St - Chesapeake Blvd Downstream Drainage Improvements
- Templar Blvd & Pythian Ave - Chesapeake Blvd Downstream Drainage Improvements
- Catalpa Street & Rolfe Ave Road Raising & Drainage Improvements
- The Hague at Mowbray Arch Structure & Pipe Replacement
- 137 E Westmont Ave - Phase 1 &2 Drainage Improvements.
Mitigation Action 7

Identify and improve critical facilities and infrastructure to minimize flood and wind damage, specifically targeting schools, EOC and emergency shelters. Action may also include placing utility lines underground or preemptive traffic systems for emergency vehicles.

Progress: Ongoing

Report:

The City, in conjunction with Norfolk Public Schools, has recently replaced four public school buildings throughout Norfolk. These new facilities replaced older facilities that did not meet current requirements for stormwater management and, in some cases, flood zone elevation. These new structures meet these requirements and provide safer emergency shelters in times of need. Public Works is continually reviewing possible roadway improvements to assure access to critical facilities during storm and flooding events.

This action may include multiple projects including, upgrading of utilities and emergency connections, as well as improving transportation access to buildings and flood protection of facilities. The Norfolk Emergency Operations Center has utilized grant money to do quick-fix connects at multiple shelter locations and has upgraded an existing emergency shelter on the Southside of the city. All of these facilities now have the capability to quick-plug a generator and have emergency power during an incident. The EOC recently added a second shelter in the Southside, with Berkley Recreation Center and Campostella STEM now being the two shelters in the area. In the meantime, EOC staff ensures in partnership with General Services, on a biannual basis, that the generators are tested and fully functional.
Mitigation Action 8

Protect flood-prone structures through the following ongoing actions:

1. Gather data on individual repetitive flood losses, including improved damage assessments (past and future), insurance claims data, structural features, first floor elevations;
2. Give highest priority to protection of “severe repetitive losses” as defined by the National Flood Insurance Program (NFIP);
3. Target potential properties or clusters of properties for purchase and conversion to public open space; and,
4. Elevate, acquire, relocate or otherwise retrofit structures. This action includes Mitigation Reconstruction projects.

Progress: Ongoing

Report:

The Office of Emergency Preparedness and Response and the Department of Planning currently help property owners apply for grants to elevate structures located within the floodplain using federal Hazard Mitigation Assistance funds. The City is in various processes for the elevation of 24 homes (including 9 repetitive loss and 7 severe repetitive loss), is in the process of acquiring 4 more homes, and is applying for the Mitigation Reconstruction of one home. Over the past few years, the City has helped elevate 49 homes, and has acquired another one.

Following storm and flooding events, the Planning Department provides data to the Federal Emergency Management Agency of damage to private property. This data will be used to provide better analysis of damaged properties for future city outreach and assistance. Staff has begun analysis of properties that have been mitigated or replaced under the current floodplain regulations to assure that the data on repetitive loss properties is up to date and accurate.

Structures insured through the NFIP are often eligible for more grant funds than uninsured structures. The repetitive flood loss areas will inform decisions in these areas. Measures should include parcel scale, neighborhood scale, and watershed scale protection measures. Parcel scale measures include rain barrels, pervious pavers, and rain gardens amongst other best practices.

Figure 7. Homeowner protective measures against flooding.
Mitigation Action 9

Improve post-event damage assessment procedures so that damages, event frequencies, and other data are more readily available for mitigation planning. Identify, train and use volunteers to capture and submit high-water marks to use for flood event mapping and damage assessment.

Progress: Ongoing

Report:

After a storm or flooding event occurs, properties that have received damage are mapped using GIS as part of the damage assessment reporting. Damage assessment training is provided each spring for staff that inspects properties after events.

Public Works uses a new data tracking software of storm events (STORM) for live input of information from the public that is used to provide guidance to city staff of where problems exist during storm events. This system has also been utilized for the reporting of private property for FEMA after events. The Department of Information Technology is currently exploring additional tools to allow for mobile tracking in the field utilizing smart devices.

Figure 8. Flood report image from smartphone flood watch application.
Mitigation Action 10

Implement actions to improve Community Rating System (CRS) classification to at least a Class 8 with a 10 percent discount on most flood insurance policies.

Progress: Completed

Report:

This goal has been completed by the City of Norfolk. In 2018 the City reached a CRS rating of 7, which provides Norfolk residents with a 15% discount on flood insurance premiums. Currently the Department of City Planning has a consultant under contract who is assisting with upgrading the City’s CRS rating further. The consultant has been obtained to guide the City through the process with the goal of receiving a CRS rating of 5, which will provide a 25% discount on flood insurance premiums for property owners.

Figure 9. FEMA Coordinator’s Manual cover page.
Mitigation Action 11

Verify the geographic location of each NFIP repetitive loss property, determine if that property has been mitigated and, if so:
- Record what methods were used to mitigate; and
- Collect evidence and submit completed AW-501 (NFIP Repetitive Loss Update Worksheet) to request removal of the property from the repetitive loss database.

Progress: Ongoing

City staff has been mapping the repetitive loss properties and has been reviewing their current status. A work program is currently being developed to inspect all properties on this list and to field verify any alterations or updates that may allow for properties to be removed from the repetitive loss category.

Staff has been identified to begin the tracking and monitoring of repetitive loss properties. Additional community outreach and assistance opportunities will be shared with the community throughout the coming year (2019/2020). Due to changes in definitions in what constitutes a repetitive loss property, staff must review the new list of properties and determine each property’s status.
Mitigation Action 12

Implement approved project through the National Disaster Resilience Competition (NDRC) HUD grant. This action may include Climate Resilient Mitigation Activities (CRMA) and Mitigation Reconstruction projects.

Progress: Ongoing

The project was approved through the HUD grant program and identified as being innovative and could be replicated in multiple scenarios throughout the United States. Under new guidance, FEMA will now fund hazard mitigation projects that include sea level rise estimates. If CRMA are included, additional benefits from environmental or ecosystem benefits may be included in the benefits cost analysis.

HUD grant requires matching funds from either in kind work or leveraging of existing projects that apply to the drainage area for Chesterfield Heights/Ohio Creek. This action may include Climate Resilient Mitigation Activities (CRMA) and Mitigation Reconstruction projects. The NDRC project design is now completed, with a groundbreaking scheduled for June of 2019. The project utilizes structural and nonstructural flood protection. The project involves several CRMA, including green infrastructure, floodplain restoration, flood diversion, storage, as well as upgrades to water and sewer in the neighborhood. The project will utilize wetlands for storage and attenuation of runoff, green infrastructure for storage and infiltration, and flood diversion.
Mitigation Action 13

Protect historic resources and structures from flooding and sea level rise. Measures should include short-, medium- and long-term solutions. This action may include Climate Resilient Mitigation Activities (CRMA) and Mitigation Reconstruction projects.

Progress: Ongoing

Historic structures throughout the city are located in flood prone areas. Value of historic resources are more than just the value of the structure which adds value to normal mitigation methods. Under new guidance, FEMA will now fund hazard mitigation projects that include sea level rise estimates. If CRMA are included, additional benefits from environmental or ecosystem benefits may be included in the benefits cost analysis.

Initial methods should include updating surveys of listed historic areas and structures. The NDRC (Ohio Creek Watershed) project is intended to be a pilot project for other coastal communities. The project location was chosen in part due to the presence of historic structures. Flood diversion and storage measures will protect these historic resources. Different methods should be explored to preserve and protect structures as well as the generation of guidance that can be approved by FEMA for the protection of these structures and areas that differ from current allowed practices for residential and non-residential structures.

Figure 11. Image of historic residential buildings.

Figure 12. Elevated housing shoreline flood protection.

Figure 13. Diagram depicting flood resistant residential infrastructure.
Mitigation Action 14

Identify and implement resilient strategies throughout the city to provide better watershed, neighborhood and parcel specific flood protection and mitigation. This action may include Climate Resilient Mitigation Activities (CRMA) and Mitigation Reconstruction projects.

Progress: Ongoing

Resilient strategies range from small to larger scale projects. Ability to provide protection to properties at risk with innovative measures are necessary to protect entire city. Under new guidance, FEMA will now fund hazard mitigation projects that include sea level rise estimates. If CRMA are included, additional benefits from environmental or ecosystem benefits may be included in the benefits cost analysis.

The City has instituted several policies that incorporate resilience strategies and green infrastructure measures into a comprehensive plan for protecting the City. Norfolk has implemented a Resilience Strategy, a Green Infrastructure Plan, Vision 2100, and new Zoning Ordinance. The recently adopted Zoning Ordinance requires resilient design either by additional stormwater management and design or by innovative and green construction design.

![SE Virginia sea level rise scenarios](image1.png)

**Figure 14.** Predicted sea level rise over the next 82 years.

![Diagram depicting the effects of sea level rise, and showcasing protective measures such as elevated buildings, sand dunes, and vegetation.](image2.png)

**Figure 15.** Diagram depicting the effects of sea level rise, and showcasing protective measures such as elevated buildings, sand dunes, and vegetation.

![Image depicting vegetation as a protective measure against sea level rise.](image3.png)

**Figure 16.** Image depicting vegetation as a protective measure against sea level rise.