



# The New Normal of Flooding in Portsmouth, Virginia:

Perspectives, Experiences and Adaptive Responses of  
Residents and Business Owners in Low-to-Moderate-Income  
Communities

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For more information visit The RAFT website: [raft.ienvirginia.edu](http://raft.ienvirginia.edu)

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## Summary

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This project is a part of a broader initiative - the Resilience Adaptation Feasibility Tool (RAFT) - that addresses the daunting challenges coastal communities are facing related to sea level rise and climate change (more information about RAFT is available here: <https://ien.virginia.edu/raft>).

This aim of this project was to investigate how residents and business owners in low-to-moderate income communities in Portsmouth, Virginia cope with flooding, and to assess implications for how the local government can better engage with residents to better meet their information needs so they can be more resilient to flooding. The report uses two sources of data to assess our current knowledge of the experiences of these residents and business owners and their approaches to flood resilience: (1) the 2015 Adaption Response to Recurrent Flooding study<sup>1</sup> conducted for the City of Portsmouth by Old Dominion University researchers, and interviews conducted in summer 2018 by the current research team. Combined, the findings from the 2015 survey and 2018 interviews suggest that although individual residents and business owners have more severe perceptions of flooding, very few actually invest in private mitigation efforts like purchasing flood insurance.

Vulnerable residents in the low-to-moderate income Portsmouth neighborhoods that are the focus of this project are living in a “new normal.” This “new normal” is a way of life in which residents have learned to adapt to frequent flood events by utilizing their social networks despite facing significant financial constraints. However, this new normal may be in conflict with residents’ efforts to prepare and mitigate the future projections of rising regional sea level rise and nuisance flooding events.

Several themes were identified that provide context to the decision-making processes these residents and businesses employ when dealing with flooding. These include:

- Communication preferences – Residents and business owners primarily rely on their cell phone weather applications for weather alerts and updates; TV (WTKR and Wavy News 10) and radio (FM 102.9 and 95.7) are secondary preferences.
- Critical role of community leaders and social capital – Long-term community leaders act as hubs for disseminating weather and flooding information, as well as hosts who provide critical resources during severe weather events, such as transportation or cooking appliances.
- Knowledge of flood prone areas in Portsmouth – Participating residents are able to readily identify flood prone areas in their communities; they identify the most critical flooding areas around High Street and Effingham Street.
- Previous experience – Participants’ perceptions of flooding are informed by both direct and indirect experiences. While direct experiences (such as damage to homes) influenced their

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<sup>1</sup> The full report for this study is available at:  
<https://www.portsmouthva.gov/DocumentCenter/View/2733/Portsmouth-Adaptation-Response-Parts-1-and-2>

perceptions of flooding broadly, indirect experience (such as word of mouth and hearsay from friends and family members) informed their perceptions of the severity of the problem.

- Mixed perceptions of the confidence and trust in local government – While some participants believe that the government is making progress in alleviating the flooding issues in the city, others express grave concern over the lack of government involvement in the most impoverished communities.

#### Key findings:

- Flooding is perceived as a severe and increasing threat.
- But this perception does not necessarily lead to private mitigation efforts.
- Adaptive actions that are pursued tend to be low cost, non-structural mitigation measures.
- There appears to be a gap in residents' preferred communication mediums and the City's methods.
- There is overlap between the poorest residents and low perception of trust in government, resulting in concerns about procedural equity.
- Business owners are concerned about recurrent flooding resulting in reduced income.

#### Recommendations

- The City may benefit from investing in efforts or programs to make flood risk management resources more accessible to residents and businesses with emphasis on informational campaigns about where residents can find such resources. This overcomes the gap between how the City communicates flooding and resilience, and the mediums and communication avenues that residents and businesses utilize.
- City staff should leverage existing efforts to identify and build trust with community and neighborhood leaders. Residents are more likely to engage in preparedness activities – at a governmental and/or household level – if recommended or advised by trusted community leaders.
- The City has an opportunity to implement innovative ways to communicate and interact with residents and businesses to not only address flooding challenges, but also to increase engagement with and self-efficacy in being more flood-resilient.

This project report is provided to the City of Portsmouth as part of the RAFT implementation. The work was funded by the Virginia Environmental Endowment.

## Project Background: The Resilience Adaptation Feasibility Tool (RAFT)

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This project is a part of a broader initiative that addresses the daunting challenges coastal communities face related to sea level rise and climate change. The Resilience Adaptation Feasibility Tool (RAFT) is a “full service” tool to assist coastal localities increase their resilience, conceived and developed by an academic interdisciplinary collaborative Core Team, led by the University of Virginia Institute for Environmental Negotiation, the William & Mary Law School Virginia Coastal Policy Center, and Old Dominion University/Virginia Sea Grant Climate Adaptation and Resilience Program (for more information: <https://ien.virginia.edu/raft>)

The RAFT attempts to fill a significant gap, the lack of a standard instrument that assesses a locality’s resilience. The RAFT Scorecard is designed to be completed by the independent academic collaborative and provides a comprehensive assessment of the locality’s resilience to flooding while remaining economically and socially relevant. The Scorecard is meant to be comprehensive and measures environmental, economic and social resilience factors. It covers local policy, infrastructure, budgeting, economics, land use, community engagement, community health and wellness, and ecosystems. After the scorecard is delivered to the locality, the RAFT team works with the community to determine action items that can help improve resilience within a year. Then over that year, the RAFT team assists with item implementation and supports the locality in building its resilience capacity.

The City of Portsmouth was selected as a pilot community for the RAFT initiative due to several criteria, including a willingness to participate, demographic diversity, diversity in municipality type, population density, size, stages of comprehensive planning, and vulnerability to coastal flooding. Funding for the RAFT pilot project was from the National Fish and Wildlife Foundation.

## Coastal Vulnerability

Flooding events are increasing in frequency and intensity in coastal communities in the United States. Increased intensity of precipitation and sea level rise are exacerbating flooding, which increases the vulnerability and potential impacts of those who reside near coastal seabords<sup>2</sup>. The National Oceanic and Atmospheric Administration<sup>3</sup> in 2017 reported that there were an estimated \$306 billion in damages due to weather and natural hazards in the United States. The impacts of these coastal flooding events range from damage to homes, individual and community assets, to loss of coastal wetlands<sup>4</sup>. While more severe storms such as hurricanes and nor'easters yield torrential volumes of rain that cause flooding, nuisance flooding is less severe in impact but still causes costly inconveniences. In contrast to more extreme flooding, nuisance flooding is nondestructive but capable of causing substantial socio-economic impacts, business interruption, and public inconveniences such as road closures<sup>5</sup>. These minor yet frequent events are often overlooked. When aggregated over time, nuisance flooding may have similar cumulative economic and social impacts as major or extreme events. This project examines the impacts of and responses to both flooding due to severe events (such as hurricanes, nor'easters, extreme precipitation) and nuisance flooding.



Vulnerable individuals and communities are less able to anticipate, cope with, and recover from hazards such as flooding. As a result, local governments have an important role in the preparedness, mitigation, response, and recovery elements of flood risk management. The city

<sup>2</sup> Church, J. A., & White, N. J. (2006). A 20th century acceleration in global sea-level rise. *Geophysical Research Letters*, 33(1), 1-4.

McBean, G., & Henstra, D. (2003). *Climate Change, Natural Hazards and Cities*. Institute for Catastrophic Loss Reduction.

Nicholls, R. J., & Cazenave, A. (2010). Sea-level rise and its impact on coastal zones. *Science*, 328(5985), 1517-1520.

Solomon, S., Qin, D., Manning, M., Chen, Z., Marquis, M., Averyt, K. B., . . . Miller, H. L. (2007). Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007: Cambridge University Press, Cambridge.

Vitousek, S., Barnard, P. L., Fletcher, C. H., Frazer, N., Erikson, L., & Storlazzi, C. D. (2017). Doubling of coastal flooding frequency within decades due to sea-level rise. *Scientific Reports*, 7(1), 1399.

<sup>3</sup> NOAA Administration (2017). *Billion-Dollar Weather and Climate Disasters*. Retrieved from <https://www.ncdc.noaa.gov/billions/events/US/2017>

<sup>4</sup> Nicholls, R. J., & Cazenave, A. (2010). Sea-level rise and its impact on coastal zones. *Science*, 328(5985), 1517-1520.

<sup>5</sup> Jacobs, Cattaneo, L. R., Sweet, W., & Mansfield, T. (2018). Recent and future outlooks for nuisance flooding impacts on roadways on the US East Coast. *Transportation Research Record*. Published online ahead of print, March 13, 2018. doi: 10.1177/0361198118756366.

Moftakhari, H. R., AghaKouchak, A., Sanders, B. F., Feldman, D. L., Sweet, W., Matthew, R. A., & Luke, A. (2015). Increased nuisance flooding along the coasts of the United States due to sea level rise: Past and future. *Geophysical Research Letters*, 42(22), 9846-9852

of Portsmouth, located in the Hampton Roads region of southeastern coastal Virginia, is one such municipality. This project focuses on understanding how vulnerable communities in Portsmouth – defined as those residing in low- to moderate-income communities – experience and cope with flooding, and how the City can better engage with members of these communities to better meet their information needs so they can be more resilient to flooding.

In recent years, Portsmouth has experienced an increase in flooding events. Recently, the City undertook its comprehensive planning process, which included some public participation activities. However, there was concern that there needed to be continued efforts to engage with residents beyond the planning process and to better capture local knowledge from communities throughout Portsmouth, particularly those communities that lack representation during the city's various planning activities. The primary aim of this research project is to investigate the risk perceptions, experiences, and the adaptive responses of residents and business owners located in low- to moderate-income communities to inform local emergency and floodplain management practices.

## Background: Portsmouth, VA

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Geophysical analyses establish that the Hampton Roads region is highly vulnerable to sea level rise and flooding. Hampton Roads is facing one of the highest rates of sea level rise along the entire east coast with residents already experiencing flooding impacts due to a relative sea level rise about double the global rate and accelerating<sup>6</sup>. Many neighborhoods in the region have also been identified as highly vulnerable based on their socio-demographic characteristics including race, income, and education level<sup>7</sup>.

Portsmouth, Virginia is located in Hampton Roads on the western side of the Elizabeth River. The city has a total area of 47 square miles where 37 square miles are land and 13 square miles are water<sup>8</sup>. The population of the city, according to the 2010 Census was 95,535 and estimated to be 94,572 in 2017<sup>9</sup>. African Americans make up the majority (52%) of the population in Portsmouth, which is high compared to the region's average of 31%<sup>10</sup>. The city's reported median area income is \$44,375, and 18% of the population lives below the poverty line<sup>11</sup>.

The following maps of Portsmouth illustrate the 1% flood risk area and identify three key case study locations where the project interviews took place: a public library, Swanson Apartments, and the intersection of Nashville Ave. and Portsmouth Blvd. Figure 1 overlays the percent of the population living below poverty, figure 2, educational attainment, and figure 3, ethnicity (non-white) make up<sup>12</sup>. The area selected for the interviews was distressed in each of these characteristics.

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<sup>6</sup> Kleinosky, L. R., Yarnal, B., & Fisher, A. (2007). Vulnerability of Hampton Roads, Virginia to storm-surge flooding and sea-level rise. *Natural Hazards*, 40(1), 43-70.

<sup>7</sup> Stafford, S., & Abramowitz, J. (2017). An analysis of methods for identifying social vulnerability to climate change and sea level rise: A case study of Hampton Roads, Virginia. *Natural Hazards*, 85(2), 1089-1117.

<sup>8</sup> From the *American FactFinder* of the U.S. Census Bureau (<http://factfinder2.census.gov/>)

<sup>9</sup> From the *American FactFinder* of the U.S. Census Bureau (<http://factfinder2.census.gov/>)

<sup>10</sup> Data retrieved from: <https://www.portsmouthva.gov/DocumentCenter/View/751/Portsmouth-Demographic-Study-PDF>

<sup>11</sup> From Weldon Cooper Center of Public Service

(<https://www.portsmouthva.gov/DocumentCenter/View/751/Portsmouth-Demographic-Study-PDF?bidId=>)

<sup>12</sup> Data for Figures 1 through 4 were retrieved from: <http://zipatlas.com/us/va/portsmouth.htm#race-distribution> and <http://www.city-data.com/city/Portsmouth-Virginia.html>

Figure 1 — Portsmouth- Percent Below Poverty by Zip Code and Flood Risk

## Portsmouth, Virginia Percent Below Poverty by Zipcode

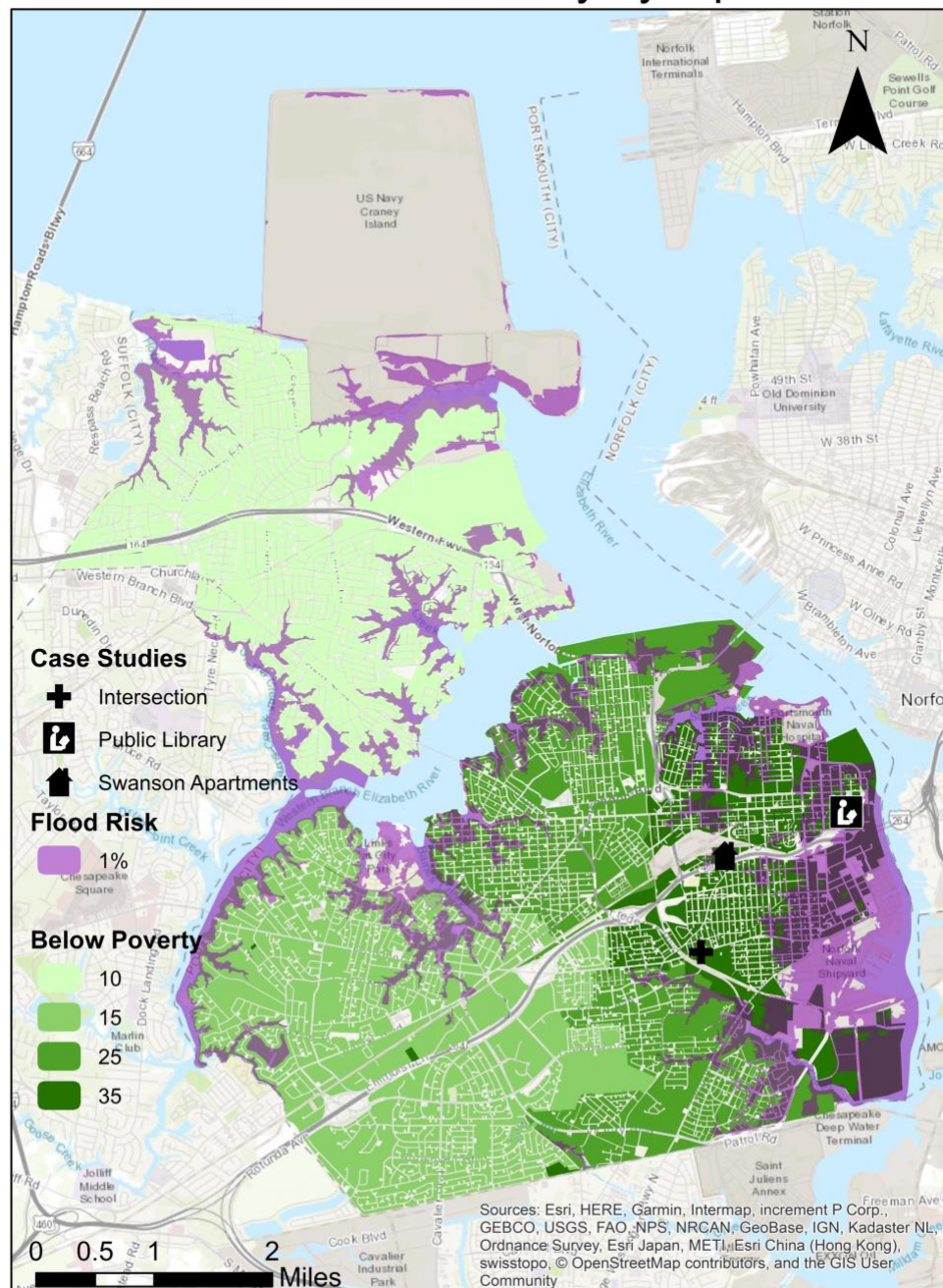


Figure 2— Percent of High School Graduates by Zip Code and Flood Risk

## Portsmouth, Virginia Percent of High School Graduates by Zipcode

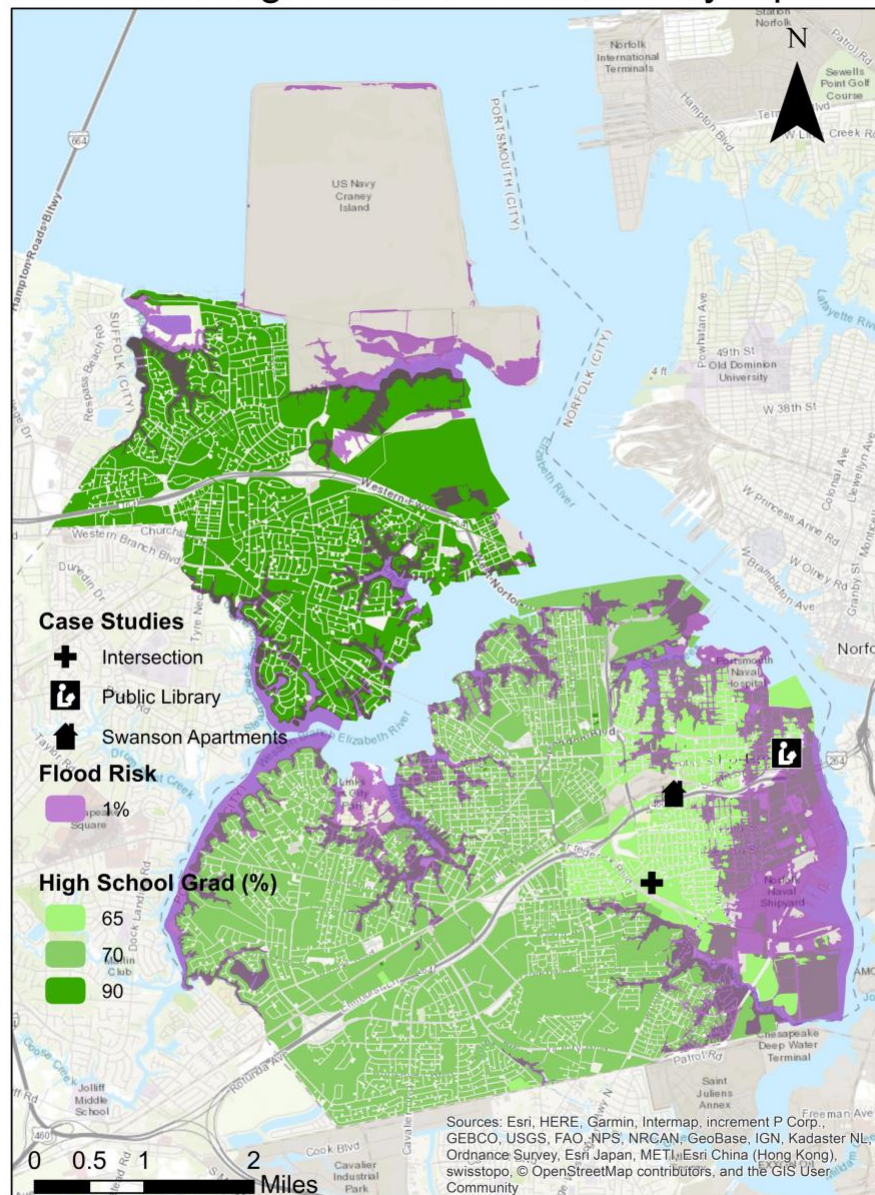
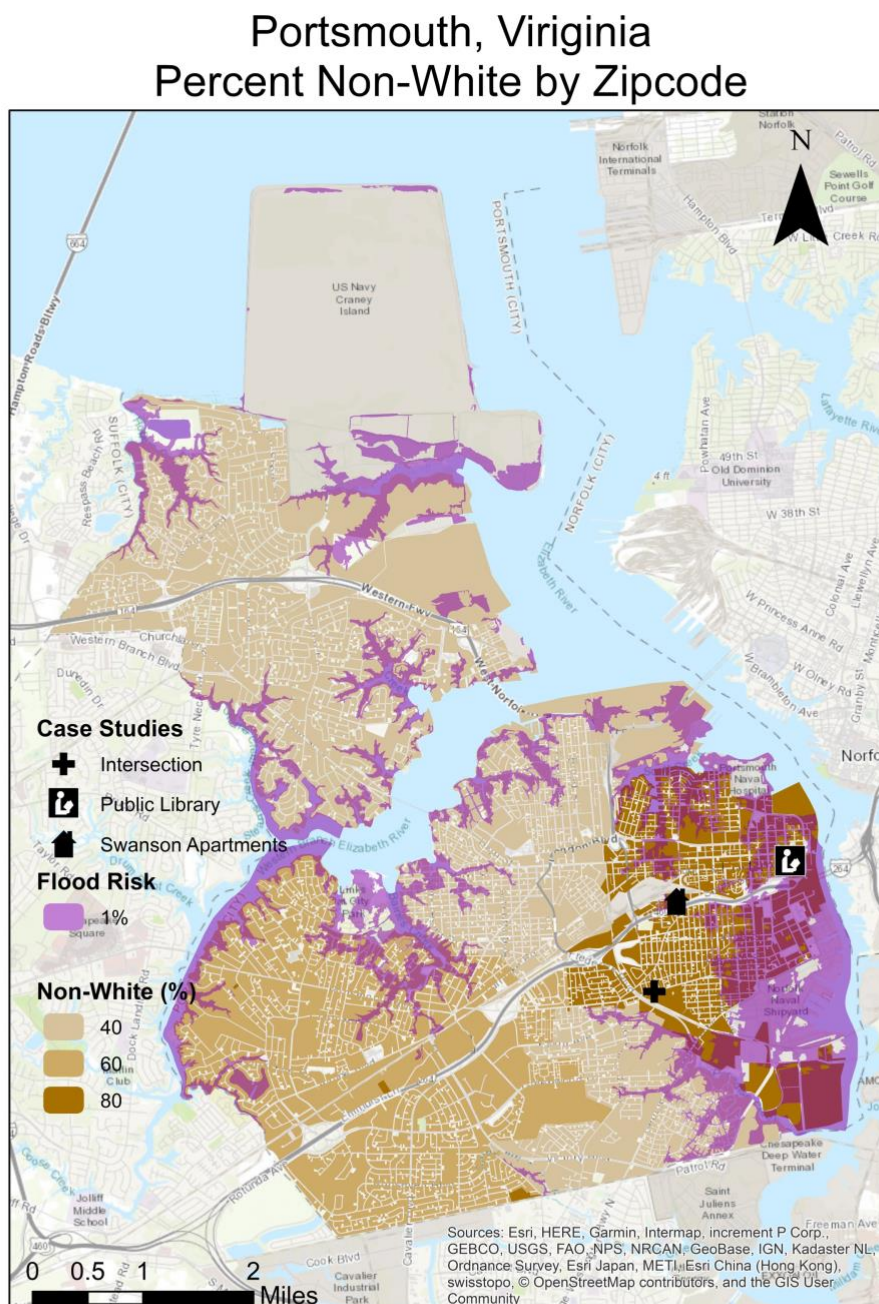


Figure 3— Percentage of Non-Whites by Zip Code and Flood Risk



## Assessing What We Know: Perceptions and Experiences with Flooding

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This project first uses data from a 2015 study of perceptions, experiences, and adaptive actions of Portsmouth residents. This study was conducted by researchers with the Old Dominion University's Virginia Modeling, Analysis, and Simulation Center (VMASC) at the request of the City of Portsmouth. The purpose of this 2015 survey data collection was to generate local knowledge regarding the perceptions and the experiences of residents relating to recurrent flooding<sup>13</sup> and to understand the adaptive actions of residents who experience recurrent flooding. A total of 1,978 households participated in the survey, accounting for roughly 5.4% of the city's household population. The demographic data collected from this survey are presented below, followed by key aspects of residents' perceptions of and experiences with flooding.

### Household Demographics

- Age: 52 years (average)
- Race
  - White – 51%
  - Black – 35%
  - Other – 8%
- Income:
  - \$0-\$10,000 (3%)
  - \$10,001-\$25,000 (11%)
  - \$25,001-\$40,000 (17%)
  - \$40,001-\$60,000 (23%)
  - \$60,000+ (45%)
- Residential tenure in Portsmouth: 17 years (average)
- Type of dwelling
  - Single family/detached house: 91%
  - Townhome: 4%
  - Condo: 4%
  - Duplex: 1%
- Renters/owners
  - Rent: 20%
  - Own/pay a Mortgage: 80%

TENURE  
RACE  
INCOME  
APARTMENT  
AGE  
OWNERS  
PORTSMOUTH

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<sup>13</sup> The full report is available here: <https://www.portsmouthva.gov/DocumentCenter/View/2733/Portsmouth-Adaptation-Response-Parts-1-and-2>

### Perceptions and Experiences

- **Frequency of street flooding:** More than 27% of respondents reported flooding frequency of once a month or more, and nearly 33% report flooding a couple of times a year.
- **Flooding impact on mobility:** Roughly 43% of households reported that a member of their household has been unable to get in or get out of their neighborhood because of flooding within the previous year.
- **Damage or loss to personal property:** Nearly 1 out of every 5 Portsmouth households reported suffering some form of flood-induced personal property loss while residing in Portsmouth.
- **Perception of increased future flooding:** About 66% of households reported that in the next 20 years they expect flooding will increase, 17% expect flooding will stay the same, and 9% expect flooding will decrease.
- **Lack of discussion about sea level rise:** Over 62% of households reported that they have had little to no discussion about sea level rise.

### Adaptive Responses

- **National Flood Insurance Program (NFIP):** Only about 27% of non-renting households reported having NFIP flood insurance.
- **Changes to home:** About 16% of households had made changes to their home to cope with flooding. These changes include: elevating the home, installing drains and flood vents, purchasing generators, installing concrete driveways, replacing flooring, and adding door seals.

### Differences between Low- to Moderate-Income Households and Higher Income Households

The 2015 survey data show that there are significant challenges for households resulting from recurrent flooding. However, there may be differences between low- to moderate-income and higher income households in terms of their risk perceptions, experiences, and adaptive responses. A better understanding of if these differences exist and how they may disproportionately impact low- to moderate-income households was one of the purposes of the current project.

The 2015 data was analyzed to determine if there were differences between low- to moderate-income households and higher income households. Low- to moderate-income households are defined as those earning less than 80% of the median income in the city<sup>14</sup>. Using the 2015 survey data, low- to moderate-income households are defined as those reporting their household income to be below \$40,000.

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<sup>14</sup> Note that low-income households are defined as earning less than 50% percent of the relevant area's median income and moderate-income households are defined as earning between 50% and 80% of the median income.

The analysis reveals that there are indeed significant differences between the two income groups<sup>15</sup> in terms of the frequency in which households experience street flooding, the extent to which their mobility is affected by flooding, their perception of the trend in future flooding, whether they participate in a discussion about sea level rise, and whether they make changes to their homes in response to flooding. Specifically, low- to moderate-income households were more likely to:

- Report more frequent street flooding
- Have challenges with mobility and being unable to get in or get out of their neighborhood because of flooding
- Have more severe perceptions about future flooding trends
- Have discussions about sea level rise in their household
- Make changes or investments to their home as a result of flooding.

An interesting finding is that there were no statistically significant differences between low- to moderate-income households and higher income households in terms of damage or loss to personal property (17% for low- to moderate-income households vs. 19% for higher income households) and having flood insurance (23% for low- to moderate-income households vs. 27% for higher income households).

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<sup>15</sup> Two-tailed independent t-tests were used to test for significant differences between the two groups (low- to moderate-income households and higher income households). An assumption of equal variance across the groups was made; tests of unequal variance indicate the assumption is valid.

## Investigating the Differences: Project Approach

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The 2015 survey data provide basic information about how households vary in their flood perceptions, experiences, and responses to flooding. However, more detail and depth is needed to better understand these differences and their implications for government policies and practices related to enhancing flood resilience. The summer 2018 project was designed to develop this improved understanding of how individuals make sense of their perceptions and experiences, and how they decide whether and how to undertake protective or adaptive actions. This involved in-depth interviews, both in-person and by telephone, that were conducted from June to August 2018.

### Target Population

The target population for the study was households and business owners located in areas identified as (1) low- to moderate-income communities, and (2) in Special Flood Hazard Areas identified by the Flood Insurance Rate Maps. In consultation with City of Portsmouth staff, the research team determined these areas to include the following communities: Cradock, Prentis Park, Southside, Parkview, and Century Homes. The inclusion of business owners was made at the request of the City's floodplain manager to ensure that the project provides a broad, holistic view of the communities.

### Participant Recruitment

Initial contacts were made with potential interview participants via email. Email invitations were sent to civic leagues located within the communities identified as the study area. Contacts were also made with local churches and businesses. Interest in the study was primarily achieved through communication with the neighborhood civic league leaders. Within the first month, ten participants (who were all civic league members) were identified and interviewed via telephone. The project's lead researcher also spent several days conducting in-person interviews in Portsmouth. These were informal interviews where the researcher solicited participants at-random in the field. The in-person interviews began at three separate locations as identified in Figures 1-4: the public library, Swanson Apartments, and the intersection of Nashville Avenue and Portsmouth Boulevard. All three are in high poverty areas, in close proximity to areas that flood, and are predominantly African American.

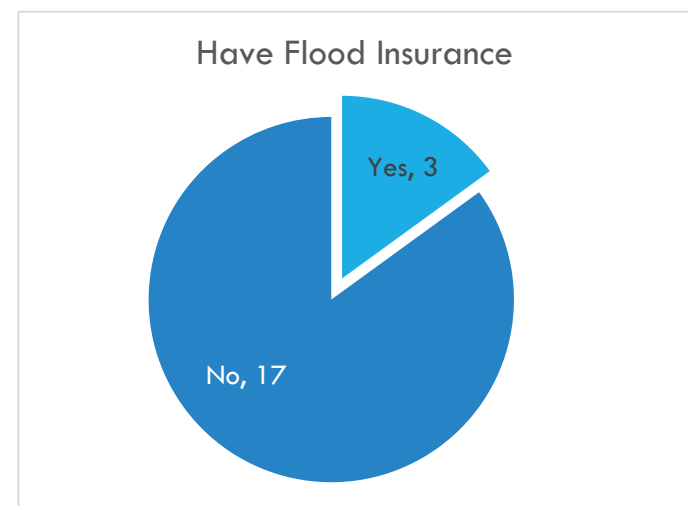
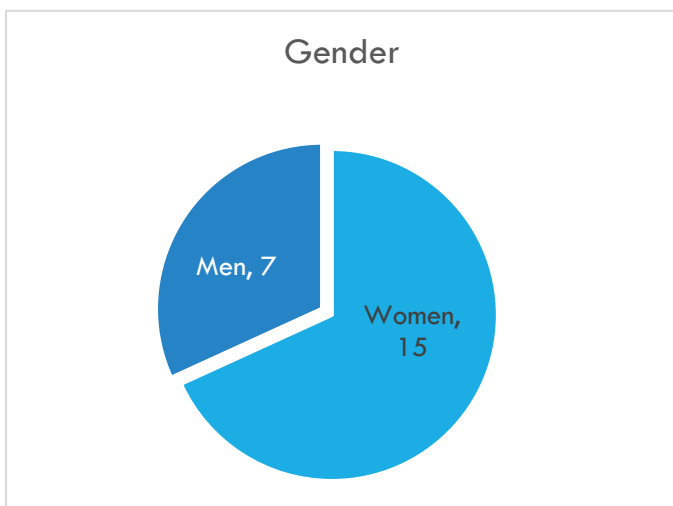
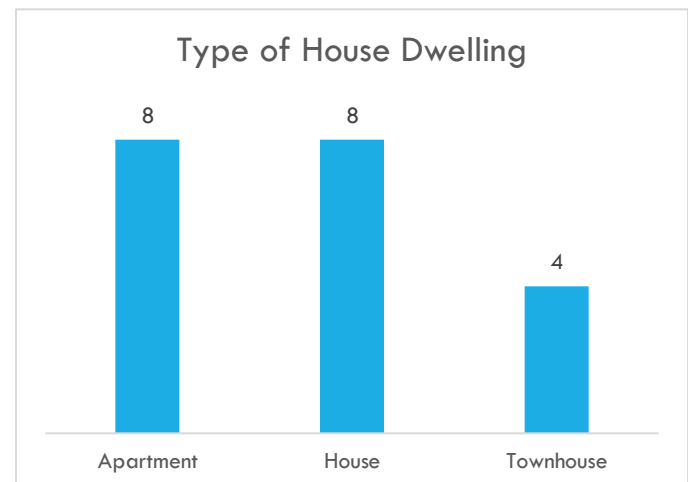
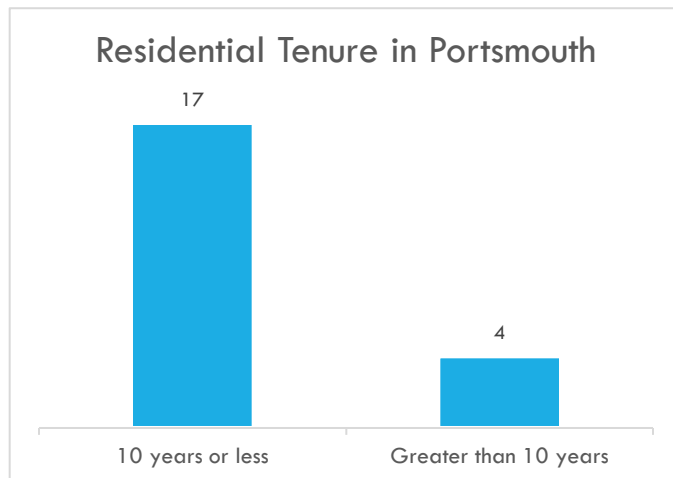
The public library was a center of activity for residents in the surrounding area, and served as a good starting point for informal, on-foot interviews with residents visiting the library. Swanson Apartments is owned and managed by the Public Housing Authority and comprised of a predominantly African American resident population. During the informal interviews with key informants, resident activity was perceived to be high during summer months as residents congregated outside their homes. Given that flood risk perceptions and adaptive responses often differ between renters and owners, the Swanson Apartments was highly representative of renters and provided an opportunity to prime the local knowledge of the community to further understand renters' experiences. The intersection of Nashville Avenue and Portsmouth Boulevard is located in Southside, a neighborhood that is identified as low- to moderate-income

and comprised of predominantly single-family homes. This area was also identified as having experienced chronic flooding. The three starting points were located within Special Flood Hazard Areas.

Altogether, the lead researcher spoke with more than 40 participants. Some interactions directly resulted in interviews, while other provided the research entrée into the neighborhoods and communities, and with connections to other potential interviewees. The hours spent speaking with residents and business owners helped the researcher become better informed about key issues, key areas to recruit participants, and neighborhood and community leaders who could facilitate recruitment.

## Interview Participants

In total, interview information from 23 participants across 15 households and two businesses are included in this project<sup>16</sup>. Below are the participant demographics.



<sup>16</sup> Note that three participants were homeless. They were included in the interviews because they are considered a highly vulnerable population and that information about their perceptions, experiences, and adaptive actions (if any) provide richness to the project.

## Interview Findings

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Several themes were identified after speaking with the interview participants in this project. These broad themes were identified as communication preferences, self-efficacy, and trust and confidence in government.

### Communication Preferences

Participants use various communication mediums to receive weather and flood risk information. These sources include:

- Local TV – WAVY 10, WTKR
- FM radio – 102.9, 95.7, 91.1
- Alerts received on mobile devices such as from the National Weather Service
- Word of mouth – friends, family, loved ones, neighbors, coworkers

Several participants also noted that over the years that they had seen an increase in the number of flood signs around the city. These signs have helped residents avoid flood-prone areas. Also, several participants recalled the sound of sirens during more severe flooding. The sirens have been an indicator of severe weather and have been used by residents to prepare for flooding events.

For more severe flooding events such as hurricanes or tropical storms, the participants relied on the local TV news stations (WTKR and WAVY 10) and mobile alerts. For less severe flooding, participants relied on the radio, mobile alerts and word of mouth.

### Self-Efficacy

When asked about how their ability to protect from or adapt to flooding, there was variation in levels of confidence amongst many of the interview participants. This was partly due to three elements: (1) previous experience with flooding, (2) embeddedness within the community and connection to a trusted local leader, and (3) the costs of adaptive actions.

All participants have had previous experience with nuisance and major flooding within the city. As a result, their experiences have informed their ability to cope with the effects of current flooding. The major storms that were recalled during the interviews were Hurricane Isabel (2003) and Hurricane Matthew (2016). These storm events did not cause flood damage for any of the participants, but these participants did experience inconveniences such as power outages, road closures, food shortages, and reduced wages. Presently, the participants noted that they feel “more prepared” because, as they noted in their own words, they “know what streets to avoid,” “catch flooding before it gets too high,” or “weather the storm until the water recedes.” These reflections were from direct and indirect experiences. Several participants mentioned that they regularly discuss the inconvenience of flooding, particularly during the hurricane season. However, transportation was a concern for those who relied on public transit where delays or the inability to leave their neighborhood affected their ability to go to work.

Several participants have transitioned to elevated homes or apartments that are on the second floor.

An important finding from the interviews is the vital role played by local leaders in enhancing resilience. Individually, some residents who have lived in the community for a long time (20 years or more) have taken leadership roles within their neighborhoods during times of distress. Three interview participants claimed to be the “neighborhood king” or “queen” of their community blocks. These self-proclaimed neighborhood leaders have developed a social network within their communities. This network lends itself to information and resources that other outside the community may not have access to, such as a stockpile of food or neighborhood-specific current information to assess risks. These local leaders have taken on roles as disseminators of information; serving as a hub for electricity, food, and information; and are trusted amongst members of their community to ensure their well-being. Several statements from the participants, provided below, highlight these key roles:

- “When there’s a mess, people come to my house and we fix it”
- “During Hurricane Matthew, everybody came to my house. I already had charcoal, a grill, and a generator to keep the food cold.”
- “In the last storm, I used my canoe to rescue a few folks in the area. Without me, they might have been stranded for a long time.”

Residents engage in discussions of flooding and sea level rise primarily during more severe events across households within their communities. Nuisance flooding events have become normalized, therefore many residents are prepared to be inconvenienced (e.g., lack of transportation, inability to leave or enter their neighborhood, or standing water that attracts high mosquito activity), although the inconveniences often place them at risk for missed wages or increased exposure to mosquito-borne diseases. Discussion amongst residents is perceived to be heightened when weather alerts indicate more severe weather. Discussion amongst business owners regarding flooding and sea level rise were primarily concerned with business continuity. Varying flood events produce scenarios where sales may reduce or clients are not able to be seen. Therefore, proactive behaviors such as deciding whether to send employees home, rescheduling appointments, or continue operations were critical to the viability of the business owners.

Only two residents and one business owner reported having flood insurance. Of the three participants, the residents were long term homeowners (more than 10 years), and the business owner has continued their store operations for more than eight years. One homeowner, a long-term African American woman with a family of three, was required to purchase flood insurance due to the mandated requirement of homeowners that have a loan that is administered through the Federal Housing Administration. The other resident homeowner, a long-term Caucasian woman expressed interest in preserving her home to pass down to her children or great grandchildren. These flood insurance holders seemed to have basic knowledge regarding the utility of private mitigation efforts or investments to protect their homes and reducing their future risks associated with flooding. When asked about these adaptive or protective actions, the participants who did not have flood insurance expressed concerns with the high costs. For

example, one participant stated “I used to have flood insurance, but I canceled it. It became too expensive to maintain.” Another responded with, “somebody talked to me about it before, but I can’t afford it.” The business owner who does not have insurance expressed that she did not have an interest in purchasing flood insurance because she did not own the building.

### Trust and Confidence in City Government

Overall, both residents and business owners interviewed have mixed opinions regarding the city government and how it provides interventions that benefit their communities. Some participants credit the city government with being more responsive, while others perceive the city as not caring about Black neighborhoods and the residents of these neighborhoods.

The following are direct quotes made by participants during the interviews:

- “The city is doing a good job on informing us about what is going on.”
- “The city does what they can.”
- “I believe the new mayor will be more proactive in dealing with flooding.”
- “The people are more responsive.”
- “If it gets bad, we do see the firefighters or police officers going around giving us warnings.”
- “They don’t do anything about the standing water which can make people sick with all the mosquitoes in the area. They carry germs and we don’t want ‘em.”
- “Portsmouth doesn’t know where to build lakes for the water to go into.”
- “The money that the government spends is never going to come into our [Black] neighborhoods.”
- “Portsmouth doesn’t care about black people.”

The comments demonstrate the varied experiences and perceptions of residents and business owners. Some feel as if the city has made progress in their visibility and strategies to mitigate flooding, while others expressed dissatisfaction with the lack of progress made in their neighborhoods.

Concerns over standing water were raised by two participants living in the same neighborhood. These individuals are also caretakers for elderly parents and expressed grave concern about the “dirty” water that settles when it rains. They have cited more mosquito activity when it rains and are afraid that these insects may carry disease. Both individuals noted that they have spoken with city personnel to express their concern but received no feedback. As a result, they both pour diesel fuel in standing water around their house to kill the mosquitoes. These examples illustrate how households have some agency over how they respond to problems, in terms of both communicating with the city and taking actions themselves, but point to the broader problems of perceived lack of responsiveness from the city and how maladaptive solutions (using diesel fuel to kill mosquitoes) can initiate larger environmental problems.

An important finding that speaks to agency, engagement, and participation is related to participation in city planning activities. During the interviews, participants were asked, “Have you participated in city planning activities?” All but two participants responded in the negative.

### Suggestions from Interview Participants

At the conclusion of each interview, participants offered suggestions for how the City could support to mitigate flooding. Currently, several residents have implemented home remedies such as self-digging ditches in front of their homes, purchasing vehicles that have clearances above frequent flooding levels, and relocating to elevated homes. The following are other tactics and statements that were mentioned:

- Installing french drains in the most flood prone areas
- Maintaining the current seawall
- Creating more educational programs and outreach to all communities
- Regularly maintaining of sewer and drainage systems
- Creating subsidized programs that assist residents with purchasing flood insurance

## Reassessing What We Know: Discussion

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The purpose of this project was to explore how Portsmouth's vulnerable communities – defined as those in low- to moderate-income neighborhoods – experience and respond to flooding. Data from the 2015 Adaption Response to Recurrent Flooding Study provided the basis for assessing what is known about residents' perceptions of, experiences with, and adaptive responses to flooding in Portsmouth. Analysis of this survey data revealed distinct differences between low- to moderate-income households and higher income households. These differences in perceptions, experiences, and protective and adaptive behaviors have direct implications on how residents and businesses cope with flooding.

The 2015 survey data were supplemented by interviews with residents in low- to moderate-income communities in summer 2018. The interviews revealed that there is a high sense of awareness regarding the severity of flooding in Portsmouth. However, the perception of flooding as a severe and increasing threat does not lead individuals and businesses to engage in private mitigation efforts such as purchasing flood insurance. Some residents made changes to their homes such as installing grate rails in front of their houses, purchasing high clearance vehicles, or digging ditches in their yard to drain the flood waters. More importantly, interview participants tended to lean towards low cost non-structural mitigation measures.

There is an apparent gap in the residents' preferred communication mediums and the methods for communication used by the City of Portsmouth. Currently, the City's website is the primary mechanism for communicating and disseminating information regarding flooding. In contrast, residents and business owners expressed reliance on local TV and radio stations, mobile alerts, and word of mouth. This communication gap may be a factor contributing to the lack of household discussion about flooding and sea level rise. The City may benefit from investing in efforts or programs to make flood risk management resources more accessible to residents and businesses, with emphasis on informational campaigns about where residents can find such resources. This overcomes the gap between how the City communicates flooding and resilience, and the mediums and communication avenues that residents and businesses utilize.

### Key Findings:

- Flooding is perceived as a severe and increasing threat.
- However, this perception does not necessarily lead to private mitigation efforts.
- Adaptive actions that are pursued tend to be low cost, non-structural mitigation measures.
- There appears to be a gap in residents' preferred communication mediums and the City's methods.
- There is overlap between the poorest residents and low perception of trust in government, resulting in concerns about procedural equity.
- Business owners are concerned about recurrent flooding resulting in reduced income.

Households that were more likely to report having had discussions of flooding were also more likely to make changes to their home as a result of flooding or purchase flooding insurance. This may be reflective of the lack of sociopolitical capital amongst these populations that lead to limited awareness of government activities and educational programming that may be

beneficial. Unless residents are connected within a political network, they may not be aware of the avenues available for them to engage with their city government. The majority of the participants engaged in nonstructural adaptive measures that met the more immediate needs of their livelihood versus purchasing flood insurance. Even when mentioned that flooding is getting worse by some participants, flood insurance was perceived to be of least interest due to lack of resources and unfamiliarity with flood insurance programs. The current gap in communication provides an opportunity for city staff to find new ways to interact and communicate with different audiences in their pre-mitigation efforts to minimize flood risks. Where residents' self-efficacy is low, communicating the right information or providing the right resources can be a way to improve self-efficacy amongst residents.

The interviews revealed that perceptions of the trust and confidence in government are moving in the right direction, although more work needs to be done regarding resident perceptions of government responsiveness. Many low- to moderate income communities have a high representation of Black residents. Racial tensions between the government and historically marginalized communities tend to be high. Some of the participating residents perceive the government as being active within the community due to the increased visibility of city maintenance activities. Other residents, on the other hand, were doubtful that the city considers the well-being of residents in Black communities, as reflected in the distressing living conditions in some of these communities. There is an overlap between Portsmouth's poorest residents and the low perception of trust in government, which has implications for concerns regarding procedural equity. With projections for more severe flooding, residents will largely depend on interventions from their city government to manage the risks associated with flooding. To adequately address these concerns, the city must engage with the most vulnerable residents to ensure that local knowledge is incorporated in planning activities<sup>17</sup>.

Businesses are also affected by the impacts of flooding. The business owners interviewed did not report damage to their facilities, although there were concerns about the financial impacts of flooding. Both business owners cited specific incidents when the effect of recurrent flood events yielded lower income to their businesses. This raised concerns about projections of flooding and how their businesses may be impacted in the future. The economic impact of flooding may yield a decline in business activities. Given concerns regarding poverty in these areas, the City may benefit from investing in mitigation measures now to ensure a consistent and diversified tax base in future years.

#### Recommendations

- Invest in efforts or programs to make flood risk management resources more accessible to residents and businesses, with emphasis on informational campaigns about where residents can find such resources.
- Leverage existing efforts to identify and build trust with community and neighborhood leaders.
- Implement innovative ways to communicate and interact with residents and businesses to address not only address flooding challenges, but also to increase their engagement with and self-efficacy in being more flood-resilient.

<sup>17</sup> Jacobs, F. (2018). Black feminism and radical planning: New directions for disaster planning research. *Planning Theory*, published online ahead of print, March 15, 2018, doi: 10.1177/1473095218763221

It is important to note that a motivating factor for one business to insure its building against flooding (i.e., buying flood insurance) was the business' role in the community as a small market store providing critical access to food supplies. The business owner stated that his decision to buy flood insurance was out of the desire to be able to continue to be in operation and providing food supplies. He noted that many of his clients were elderly or below the age of 18. Although he did not discuss an exhaustive list of reasons of why he purchased flood insurance, his relationships with his customers, connection to the community, and altruistic character has been an asset to the viability and welfare of the community.

Overall, this project provided an in-depth assessment of the perceptions, experiences, and adaptive decision making of households and businesses in low- to moderate-income communities. This project characterizes the "new normal" of vulnerable populations in coastal communities subject to recurrent flooding. This new normal recognizes flooding as a regular and recurring event where most long-term residents and business owners have taken adaptive measures that they can employ within their capacity. These approaches include structural and nonstructural approaches to their home, household, and communities. Participants still face significant challenges with traveling in and out of their neighborhoods, experience loss of wages and productivity, and exposure to potentially dangerous flood waters.

There is a high reliance on social capital within low- to moderate-income neighborhoods. Local community leaders play an essential role, acting as hubs of the social network that provide information and resources. However, these social networks are relatively under-resourced and do not support more effective private mitigation measures such as purchasing flood insurance, elevating property, purchasing high clearance vehicles, or even relocating to less vulnerable areas. City staff should emphasize efforts to identify and build trust with community and neighborhood leaders. Residents are more likely to engage in preparedness activities – at a governmental and/or household level – if recommended or advised by trusted community leaders.

Throughout the interviews, nuisance flooding impacts were mentioned more than flooding impacts associated with more severe weather events such as hurricanes and nor'easters. These challenges present opportunities for the City to address complex sociopolitical and economic disparities that may be in service to residents' and business owners' ability to engage in the preparedness, mitigation, recovery, and response phases of flood risk reduction.

The City of Portsmouth has an opportunity to be innovative in how it designs and implements educational and outreach programs to address the challenges faces by its vulnerable communities and increase their engagement and self-efficacy by introducing new educational and outreach programs. For example, the City could create staff positions that engage in outreach beyond the traditional approaches. These staff members could have a primary assignment within the city's emergency management department but also be involved in ongoing community outreach and trust building efforts. The City could also consider utilizing innovative participatory methods to engage members in resilience-building activities. For example, the Hampton Roads Resilience Region Reality Check, hosted in 2015, is an example of

stakeholder engagement that can facilitate social learning about resilience to flooding and sea level rise while encouraging individual efficacy<sup>18</sup>. Alternatively, the City could consider more interactive, gamified approaches to engagement such as the ASERT (Action-oriented Stakeholder Engagement for a Resilient Tomorrow) approach developed by Old Dominion University researchers<sup>19</sup>.

Although the research results cannot be generalized to every community, the project may lend itself to providing insights for designing citizen engagement strategies or informing policymakers, as resilience practitioners about the nuances different communities are challenged with. In addition to the key research findings, this project report also includes a summary of observations by the lead researcher (in Appendix A).

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<sup>18</sup> Yusuf, J.-E.W., Covi, M., & St. John, B., III. (2015). Hampton Roads Resilient Region Reality Check: Increasing community resilience and capacity to adapt to changes (pp. 26). Norfolk, VA: Urban Land Institute Hampton Roads and Old Dominion University.

[https://digitalcommons.odu.edu/cgi/viewcontent.cgi?article=1006&context=publicservice\\_pubs](https://digitalcommons.odu.edu/cgi/viewcontent.cgi?article=1006&context=publicservice_pubs)

Yusuf, J. E., St. John III, B., Covi, M., & Nicula, J. G. (2018). Engaging Stakeholders in Planning for Sea Level Rise and Resilience. *Journal of Contemporary Water Research & Education*, 164(1), 112-123.

<https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1936-704X.2018.03287.x>

<sup>19</sup> ASERT was developed and tested via a demonstration project in the Little Creek/Pretty Lake neighborhoods of Norfolk and Virginia Beach. ASERT has since been deployed as part of the City of Virginia Beach Comprehensive Sea Level Rise and Recurrent Flooding Response Plan. More information about ASERT is available here: <https://digitalcommons.odu.edu/cgi/viewcontent.cgi?article=1009&context=odurc-presentations>

## Appendix A: Researcher Observations

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This appendix summarizes observations by the lead researcher for this project. These are intended to provide some additional insights from the researcher's field experience conducting interviews with residents and business owners in low- to moderate-income neighborhoods in Portsmouth.

- The researcher's demographics and connection to the community matter. When soliciting local knowledge in minority communities, having a researcher who represents the ethnic group may help in gaining entrée into the community.
- Impromptu, informal interviews with some participating residents took place mostly near or at their homes. These interviews were facilitated by the researcher using a subtle approach when engaging in conversation such as:
  - Wearing relaxed clothing to appear less official, less threatening, and more approachable
  - Beginning the conversation with pleasantries (e.g., "Hey y'all" or "How y'all doin'?")
  - Establishing a connection or purpose (e.g., "My name is Donta, I'm from the area and I go to school at ODU. I want to learn more about the area, do you mind talking with me for a few minutes?")
- The public library was a highly used amenity among residents and provided a good starting point for the on-foot, informal interviews.
- It is important to identify community leaders who can help disseminate information and facilitate connections and relationships. These respected community leaders serve as a gateway to reaching others in the community.
- Homeless participants were key informants and provided interesting and varied perspectives.