City of Portsmouth, NH
Portsmouth, NH
Current Population 21,000
Settled 1623
City of Portsmouth, New Hampshire

COASTAL RESILIENCE INITIATIVE

Climate Change Vulnerability Assessment and Adaptation Plan

April 2, 2013

This project was funded by the Gulf of Maine Council through a grant from the National Oceanic and Atmospheric Administration (NOAA).
Tidal Surge as recorded in Wells, ME at the outset of Hurricane Sandy as shown in photos.
6.8’ Storm Surge
100 Year Coastal Flood Elevation
Climate Change in the Piscataqua/Great Bay Region: Past, Present, and Future

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University of Massachusetts
Boston, Massachusetts
Sea Level Rise Scenarios

MHHW 2100 High
MHHW 2100 Low
MHHW 2050 Low
Elevation (feet above NAVD)

- Mapped - 18.0 Feet
- Mapped - 13.5 Feet
- Mapped - 11.5 Feet
- Mapped - 7.5 Feet

Coastal Flood - High Emissions Scenario
Coastal Flood - Low Emissions Scenario
High Tide - High Emissions Scenario
High Tide - Low Emissions Scenario

100-Year Storm Surge = 6.8 feet
Flood Scenarios Wetland Impacts: Sagamore Creek

7.5 Feet

11.5 Feet

13.5 Feet

18.5 Feet

Flood Depths

0 - 3 Feet

3 - 6 Feet

6 - 9 Feet

9 - 12 Feet

> 12 Feet
City of Portsmouth
Community Coastal Resilience Workshop
May 29, 2013; 5:30-8:00p.m.
Portsmouth Public Library Levenson Community Room
Join a Walking Tour of Flood Risk Areas

October 22, 2013; 4:00-6:30 p.m.
Player’s Ring Theatre on Prescott Park
105 Marcy Street, Portsmouth, N.H.
How will sea level rise and climate change affect Portsmouth? How do we protect our Historic City and avoid future property damage? Good news: Portsmouth was one of the communities selected for a pilot program with $10,000 in funding from the Gulf of Maine Council, through a grant from the National Oceanic and Atmospheric Administration (NOAA). The grant funded a research study, the “Coastal Resilience Initiative” prepared for the City by a team of researchers from the University of New Hampshire and the Buckingham Planning Commission. This detailed, 50-page report provides the starting point for understanding the impacts of climate change and offers a number of possible adaptation measures that the City can take over time to protect private property and public infrastructure. You can view the full report by visiting planportsmouth.com/crl.

Below are key pieces of information that Portsmouth businesses and residents should know.

**DRIVING FORCES:**

**Storm Surge** is an abnormal rise of water generated by intense storms, over above the predicted astronomical tides. This rise in water level can cause extreme flooding in coastal areas, particularly when storm surge coincides with normal high tide.

**Sea Level Rise** is the increase in the average height of the ocean’s surface.
Categories of Recommendations

Zoning Ordinance Overlays
- Floodplain Standards
  - *i.e.* Extended Flood Hazard Overlay District
- Historic District
  - *i.e.* Inventory historic properties
- Setbacks and Buffers
  - *i.e.* Larger buffers adjacent to saltmarsh areas
- Redevelopment Standards
  - *i.e.* Cost benefit analysis of infrastructure improvements
- Shoreland Protection Options
  - *i.e.* Begin discussion and approval requirements for shoreline protection

Master Plan
  - *i.e. include results of coastal resilience study*

Coastal Wetlands
  - *i.e. inventory key conservation parcels to plan for marsh migration*

Public Health
  - *i.e. develop and implement response plans for changing health impacts*

Emergency Management and Hazard Mitigation Planning
  - *i.e. amend hazard mitigation plan and evacuation routes.*
Thank You

For more information:

• City of Portsmouth Planning Department
  Planportsmouth.com/CRI

• NH Coastal Adaptation Workgroup
  nh.stormsmart.org

• Peter Britz, plbritz@cityofportsmouth.com
<table>
<thead>
<tr>
<th>Water Level</th>
<th>Elevations Relative to NAVD (North American Vertical Datum)</th>
<th></th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>Present Day Elevations (feet)</td>
<td>*Future Scenarios (feet)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>2050 Low</td>
<td>2050 High</td>
<td>2100 Low</td>
<td>2100 High</td>
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<tr>
<td>Projected SLR</td>
<td>--</td>
<td>1</td>
<td>1.7</td>
<td>2.5</td>
<td>6.3</td>
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<tr>
<td>MHHW</td>
<td>4.4</td>
<td>5.4</td>
<td>6.1</td>
<td>6.9</td>
<td>10.7</td>
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<tr>
<td>100 Year Flood Estimate</td>
<td></td>
<td>6.8</td>
<td>6.8</td>
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<td>MHHW Flood</td>
<td>11.2</td>
<td>12.2</td>
<td>12.9</td>
<td>13.7</td>
<td>17.5</td>
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## Cost of Adaptation Actions

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Total Capital Costs – Low</th>
<th>Total Capital Costs – High</th>
<th>Total Operating Costs (low)</th>
<th>Total Operating Costs (range)</th>
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<tr>
<td>7.5 feet</td>
<td>$4,370,000</td>
<td>$7,287,000</td>
<td>$0</td>
<td>$2,000 ($30,00 Prescott Park tide barrier)</td>
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<td>11.5 feet</td>
<td>$62,670,000</td>
<td>$66,595,000</td>
<td>$0</td>
<td>$4,000-$70,000 ($120,000 North Mill Pond)</td>
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<td>13.5 feet</td>
<td>$93,650,000</td>
<td>$98,393,000</td>
<td>$0</td>
<td>$7,000-$100,000 ($160,000 North Mill Pond)</td>
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<tr>
<td>18.0 feet</td>
<td>$169,447,000</td>
<td>$178,247,000</td>
<td>$0</td>
<td>$10,000-$140,000 ($250,000 North Mill Pond)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Subarea</th>
<th>7.5 feet</th>
<th>11.5 feet</th>
<th>13.5 feet</th>
<th>18.0 feet</th>
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<tbody>
<tr>
<td>North</td>
<td>$22,667,533</td>
<td>$162,790,228</td>
<td>$180,273,596</td>
<td>$307,903,360</td>
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<tr>
<td>Central</td>
<td>$3,175,938</td>
<td>$61,599,338</td>
<td>$84,880,151</td>
<td>$178,798,579</td>
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<td>South</td>
<td>$5,907,856</td>
<td>$26,393,580</td>
<td>$36,711,040</td>
<td>$58,196,538</td>
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<td>Sagamore</td>
<td>$484,939</td>
<td>$5,134,649</td>
<td>$7,615,214</td>
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<td>Total</td>
<td>$32,236,266</td>
<td>$255,917,795</td>
<td>$309,480,001</td>
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Table 4: Summary of flood impacts based on assessed value per building.