New Hampshire Coastal Flood Risk Summary
Part II: Guidance for Using Scientific Projections

NROC Coastal Resilience Networking Session
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NHDES Coastal Program
New Hampshire Coastal Flood Risk Summary

Background & Context

Part I: Science
Released August 2019
https://scholars.unh.edu/ersc/210/

Part II: Guidance for Using Scientific Projections
Released March 2020
https://scholars.unh.edu/ersc/211/
Part II: Guidance for Using Scientific Projections

Step-by-Step Approach

1. Define project goal, type, location, & timeframe(s)
2. Determine tolerance for flood risk
3. Select & assess relative sea-level rise (RSLR)
4. Identify & assess RSLR-adjusted coastal storms
5. Identify & assess RSLR-induced groundwater rise
6. Identify & assess projected extreme precipitation
7. Assess cumulative risk & evaluate adaptation options
Step 1. Define Project Goal, Type, Location, & Timeframes

Step 1.1 | Define the project goal and project type

Step 1.2 | Define and inventory the project area

Step 1.3 | Define the timeframe(s) for the project

Example:

- **Project goal:** Build a new hospital
- **Useful life:** 100 years (2120)
- **Project type:** Site-specific
- **Incremental action point:** 30 years (2050)
Step 2. Determine Tolerance for Flood Risk

Step 2.1 | Identify project characteristics that influence tolerance for flood risk
Step 2.2 | Determine tolerance for flood risk based on project characteristics

The willingness of decision makers to accept a higher or lower probability of flood impacts, based on relevant project characteristics such as:

- project value or replacement cost
- capacity to adapt
- importance for public function or safety
- sensitivity to inundation

Example:
### Step 2. Determine Tolerance for Flood Risk

<table>
<thead>
<tr>
<th>Description</th>
<th>HIGH TOLERANCE FOR FLOOD RISK</th>
<th>MEDIUM TOLERANCE FOR FLOOD RISK</th>
<th>LOW TOLERANCE FOR FLOOD RISK</th>
<th>VERY LOW TOLERANCE FOR FLOOD RISK</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Decision makers have a High tolerance for flood risk to the project</td>
<td>Decision makers have a Medium tolerance for flood risk to the project</td>
<td>Decision makers have a Low tolerance for flood risk to the project</td>
<td>Decision makers have a Very Low tolerance for flood risk to the project</td>
</tr>
</tbody>
</table>

#### POSSIBLE PROJECT CHARACTERISTICS

Tolerance for flood risk will depend on the mix and importance of these project characteristics.

<table>
<thead>
<tr>
<th></th>
<th>HIGH TOLERANCE FOR FLOOD RISK</th>
<th>MEDIUM TOLERANCE FOR FLOOD RISK</th>
<th>LOW TOLERANCE FOR FLOOD RISK</th>
<th>VERY LOW TOLERANCE FOR FLOOD RISK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low value or cost</td>
<td>Low value or cost</td>
<td>High value or cost</td>
<td>Very high value or cost</td>
<td></td>
</tr>
<tr>
<td>Easy or likely to adapt</td>
<td>Moderately easy or somewhat likely to adapt</td>
<td>Difficult or unlikely to adapt</td>
<td>Very difficult or very unlikely to adapt</td>
<td></td>
</tr>
<tr>
<td>Little to no implications for public function and/or safety</td>
<td>Moderate implications for public function and/or safety</td>
<td>Substantial implications for public function and/or safety</td>
<td>Critical implications for public function and/or safety</td>
<td></td>
</tr>
<tr>
<td>Low sensitivity to inundation</td>
<td>Moderate sensitivity to inundation</td>
<td>High sensitivity to inundation</td>
<td>Very high sensitivity to inundation</td>
<td></td>
</tr>
</tbody>
</table>

#### PROJECT EXAMPLES

<table>
<thead>
<tr>
<th>PLANNING</th>
<th>Regulatory</th>
<th>Site-Specific</th>
<th>Corresponding ASCE 24-14.15 Flood Design Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Updating a local master plan  Developing a capital improvement plan</td>
<td>Updating a floodplain zoning ordinance  Updating a subdivision site plan regulation  Updating state alteration of terrain rules</td>
<td>Designing a walking path; Siting a temporary or accessory structure; Upgrading a minor storage facility</td>
<td>1 2 3 4</td>
</tr>
</tbody>
</table>

#### CORRESPONDING ASCE 24-14.15 FLOOD DESIGN CLASS

<table>
<thead>
<tr>
<th></th>
<th>LOWER MAGNITUDE, HIGHER PROBABILITY</th>
<th>2</th>
<th>3</th>
<th>HIGHER MAGNITUDE, LOWER PROBABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>RECOMMENDED COASTAL FLOOD RISK PROJECTIONS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Step 3. Select & Assess RSLR

Step 3.1 | Select RSLR estimate(s) for the project

### Example:

**Useful life:**
100 years (2120)

**Incremental action point:**
30 years (2050)

**Tolerance for flood risk:**
Very Low

**Table:**

<table>
<thead>
<tr>
<th>TIMEFRAME</th>
<th>HIGH TOLERANCE FOR FLOOD RISK</th>
<th>MEDIUM TOLERANCE FOR FLOOD RISK</th>
<th>LOW TOLERANCE FOR FLOOD RISK</th>
<th>VERY LOW TOLERANCE FOR FLOOD RISK</th>
</tr>
</thead>
<tbody>
<tr>
<td>2030</td>
<td>0.7</td>
<td>0.9</td>
<td>1.0</td>
<td>1.1</td>
</tr>
<tr>
<td>2040</td>
<td>1.0</td>
<td>1.2</td>
<td>1.5</td>
<td>1.6</td>
</tr>
<tr>
<td>2050</td>
<td>1.3</td>
<td>1.6</td>
<td>2.0</td>
<td>2.3</td>
</tr>
<tr>
<td>2060</td>
<td>1.6</td>
<td>2.1</td>
<td>2.6</td>
<td>3.0</td>
</tr>
<tr>
<td>2070</td>
<td>2.0</td>
<td>2.5</td>
<td>3.3</td>
<td>3.7</td>
</tr>
<tr>
<td>2080</td>
<td>2.3</td>
<td>3.0</td>
<td>3.9</td>
<td>4.5</td>
</tr>
<tr>
<td>2090</td>
<td>2.6</td>
<td>3.4</td>
<td>4.6</td>
<td>5.3</td>
</tr>
<tr>
<td>2100</td>
<td>2.9</td>
<td>3.8</td>
<td>5.3</td>
<td>6.2</td>
</tr>
<tr>
<td>2110</td>
<td>3.3</td>
<td>4.4</td>
<td>6.1</td>
<td>7.3</td>
</tr>
<tr>
<td>2120</td>
<td>3.6</td>
<td>4.9</td>
<td>7.0</td>
<td>8.3</td>
</tr>
<tr>
<td>2130</td>
<td>3.9</td>
<td>5.4</td>
<td>7.9</td>
<td>9.3</td>
</tr>
<tr>
<td>2140</td>
<td>4.3</td>
<td>5.9</td>
<td>8.9</td>
<td>10.5</td>
</tr>
<tr>
<td>2150</td>
<td>4.6</td>
<td>6.4</td>
<td>9.9</td>
<td>11.7</td>
</tr>
</tbody>
</table>
Step 3. Select & Assess RSLR

Step 3.2 | Assess RSLR impacts to the project

MAPPING SEA-LEVEL RISE

There are many publicly available datasets and visualization tools that can help visualize possible sea-level rise and other coastal flood impacts. The New Hampshire Sea-Level Rise, Storm Surge, and Groundwater Rise Mapper (Sea-Level Rise Mapper) is intended to provide easy access to future coastal inundation scenarios. The Mapper is a screening tool for planning purposes, and sites of interest should be further evaluated with a site-based survey. Data on the Mapper are provided by New Hampshire GRANIT.

ACCESS THE MAPPER: www.tinyurl.com/slrmapper
Step 4. Identify & Assess RSLR-Adjusted Coastal Storms

Step 4.1 | Identify RSLR-adjusted Design Flood Elevation (DFE)
Step 4.2 | Assess RSLR-adjusted coastal storm impacts to the project

Example:

Tolerance for flood risk: Very Low
RSLR estimate: 8.3 feet by 2120
BFE: 8 feet NGVD
RSLR-adjusted DFE = 18.3 feet NGVD
8 feet (BFE) + 2 feet (freeboard) + 8.3 feet (RSLR)
Step 5. Identify & Assess RSLR-Induced Groundwater Rise

Step 5.1 | Identify RSLR-induced groundwater rise for the project
Step 5.2 | Estimate depth to present-day and future groundwater
Step 5.3 | Assess RSLR-induced groundwater rise impacts to the project

Example:

- RSLR estimate: 8.3 feet by 2120
- GWR estimate (from SLR Mapper): 5 feet
- Present-day depth to SHWT: 4 feet

RSLR-adjusted depth to SHWT = -1 feet

4 feet (present-day depth) – 5 feet (GWR estimate)
Step 6. Identify & Assess Projected Extreme Precipitation

Step 6.1 | Account for projected increases in extreme precipitation
Step 6.2 | Assess projected extreme precipitation impacts to the project

### Example:

Tolerance for flood risk: Very Low

Present-day rainfall estimate (24-hour, 10-year event): 4.9 inches

Projected rainfall estimate (24-hour, 10-year event) = 5.9 inches

4.9 inches (present-day estimate) x 1.2

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<table>
<thead>
<tr>
<th>PROJECTED EXTREME PRECIPITATION ESTIMATE =</th>
<th>HIGH TOLERANCE FOR FLOOD RISK</th>
<th>MEDIUM TOLERANCE FOR FLOOD RISK</th>
<th>LOW TOLERANCE FOR FLOOD RISK</th>
<th>VERY LOW TOLERANCE FOR FLOOD RISK</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Best available precipitation data) x (1.15)</td>
<td>(Best available precipitation data) x (1.15)</td>
<td>(Best available precipitation data) x (&gt;1.15)</td>
<td>(Best available precipitation data) x (&gt;1.15)</td>
<td>(Best available precipitation data) x (&gt;1.15)</td>
</tr>
</tbody>
</table>
Step 7. Assess Cumulative Risk & Evaluate Adaptation Options

| Step 7 Table A. Framework of Types of Action to Manage Coastal Flood Risk. |
|---|---|---|---|---|
| **NO ACTION** | **AVOID** | **ACCOMMODATE** | **RESIST** | **RELOCATE** |
| **IN OTHER WORDS, RECOGNIZE RISK AND...** | Don’t change anything! | Prioritize investment out of the water’s way | Live with the water | Keep the water out | Move assets or facilitate migration |
| **DECISION MAKERS MIGHT CHOOSE THIS ACTION CATEGORY BECAUSE...** | | | | |
| **COASTAL FLOOD RISK IS:** | Very Low to Low | Very Low | Moderate | High | High |
| **AND/OR** | | | |
| **TOLERANCE FOR FLOOD RISK IS:** | High | Medium to Very Low | Medium | Low to Very Low | Low to Very Low |

Example:

![Example Image]

Tolerance for flood risk: Very Low
New Hampshire Coastal Flood Risk Summary
Possible Applications

- Property-specific decisions
- Neighborhood scale assessments
- Local plans, regulations, capital investments
- State permitting and best practices

**PROJECT**
For the purposes of this Guidance, the term “project” refers broadly to any private, local, state, and federal planning, regulatory, or site-specific efforts that should consider and incorporate coastal flood risk projections. Examples of applicable private, local, state, or federal projects include, but are not limited to:

**Planning projects**: master plans; hazard mitigation plans; post-disaster redevelopment/relocation/recovery plans; emergency operations and evacuation plans; capital improvement plans; transportation improvement plans; economic development plans; open space plans; etc.

**Regulatory projects**: zoning ordinances; site plan and/or subdivision regulations; wetlands and shoreland regulations; alteration of terrain regulations; waste management regulations; etc.

**Site-specific projects**: new construction and redevelopment or relocation of buildings and structures; road, bridge, culvert construction, maintenance, or relocation; shoreline stabilization projects; wetland restoration; land conservation; etc.
King Tide NH 2020 Contest

November 14-17

Visit nhcaw.org/kingtidenh2020 for all you need to know about how to win and help us prepare for future sea-level rise. Get ready to grab your cameras to capture the King Tide.
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Contact Us

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