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

NROC Coastal Resilience Networking Session
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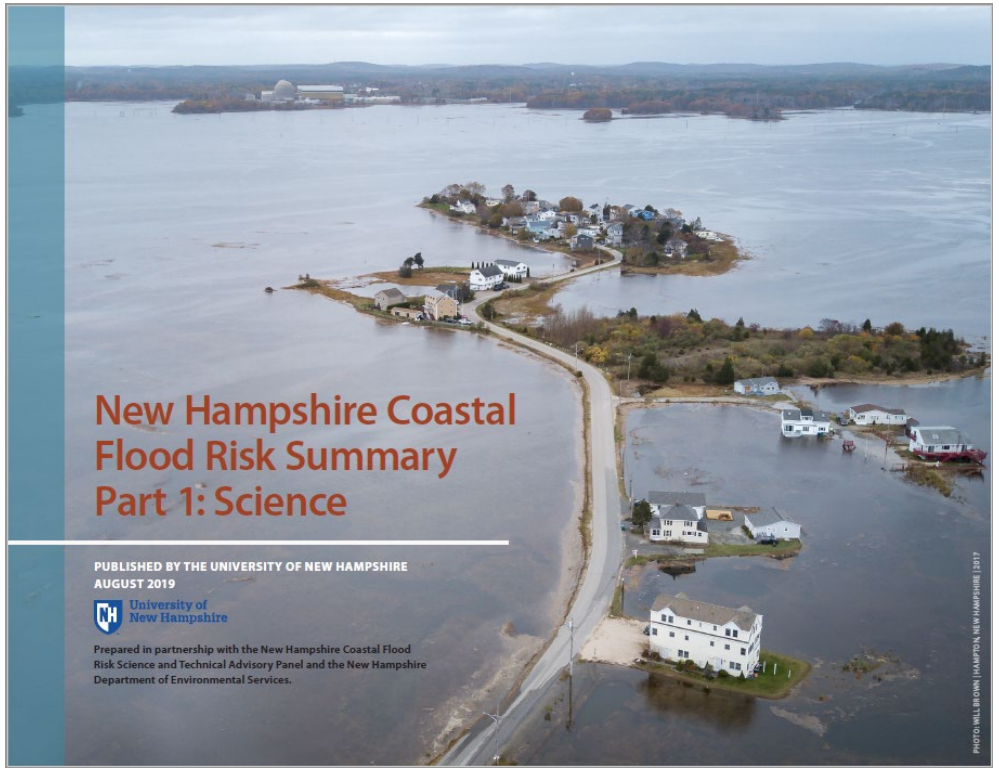
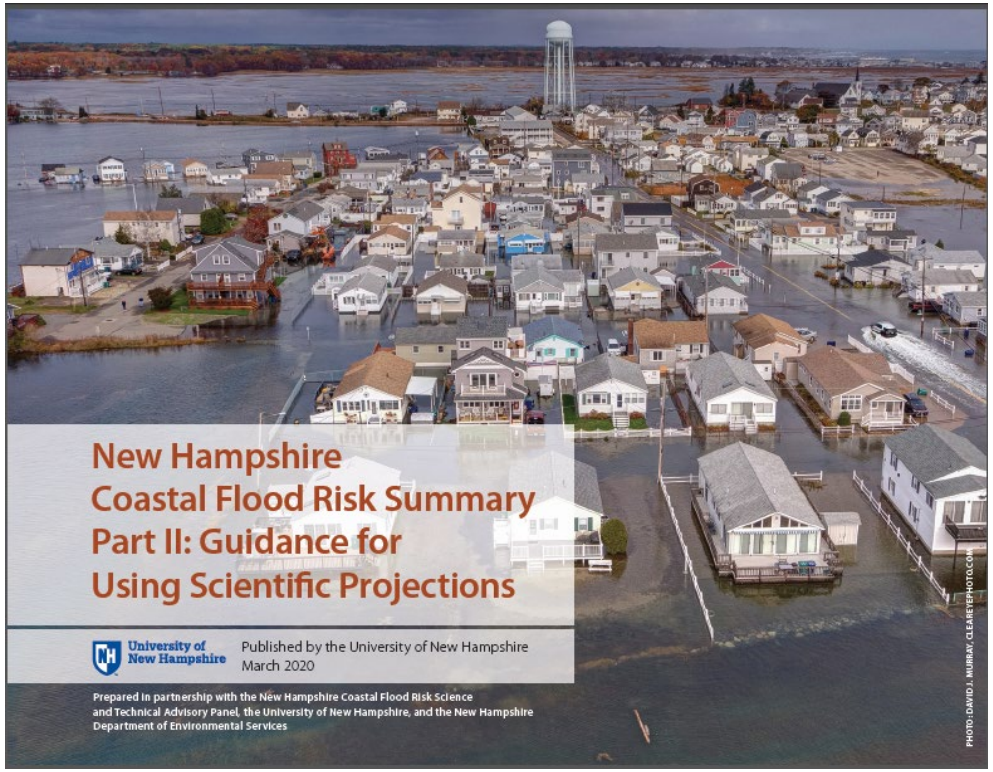
NHDES Coastal Program

New Hampshire Coastal Flood Risk Summary
Background & Context

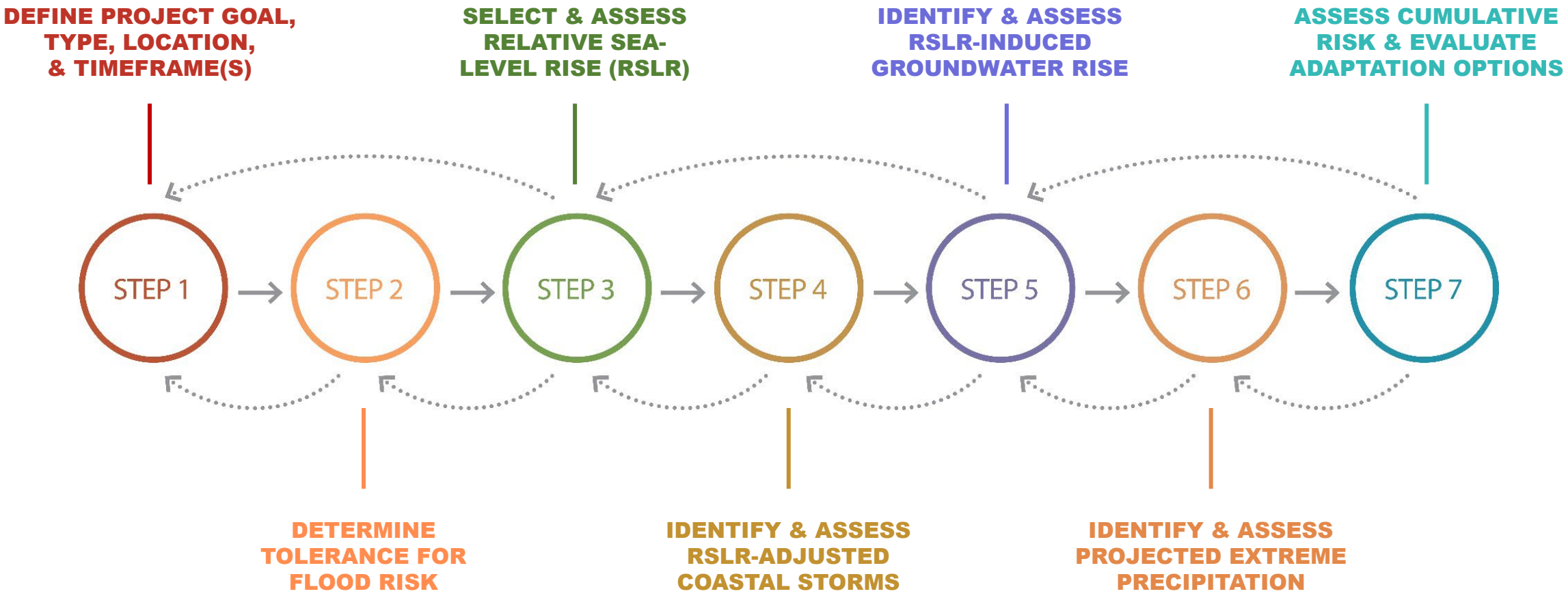


Part I: Science
Released August 2019
https://scholars.unh.edu/ersc/210/



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



Step 1. Define Project Goal, Type, Location, & Timeframes

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.

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

Project type:
Site-specific

Useful life:
100 years (2120)

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

HIGH TOLERANCE
FOR FLOOD RISK

Example:

VERY LOW TOLERANCE
FOR FLOOD RISK

Step 2. Determine Tolerance for Flood Risk

STEP 2 TABLE. FRAMEWORK FOR DETERMINING PROJECT TOLERANCE FOR FLOOD RISK.

		HIGH TOLERANCE FOR FLOOD RISK	MEDIUM TOLERANCE FOR FLOOD RISK	LOW TOLERANCE FOR FLOOD RISK	VERY LOW TOLERANCE FOR FLOOD RISK
DESCRIPTION		Decision makers have a High tolerance for flood risk to the project	Decision makers have a Medium tolerance for flood risk to the project	Decision makers have a Low tolerance for flood risk to the project	Decision makers have a Very Low tolerance for flood risk to the project
POSSIBLE PROJECT CHARACTERISTICS *Tolerance for flood risk will depend on the mix and importance of these project characteristics.*		Low value or cost	Medium value or cost	High value or cost	Very high value or cost
		Easy or likely to adapt	Moderately easy or somewhat likely to adapt	Difficult or unlikely to adapt	Very difficult or very unlikely to adapt
		Little to no implications for public function and/or safety	Moderate implications for public function and/or safety	Substantial implications for public function and/or safety	Critical implications for public function and/or safety
		Low sensitivity to inundation	Moderate sensitivity to inundation	High sensitivity to inundation	Very high sensitivity to inundation
PROJECT EXAMPLES	**PLANNING**	Updating a local master plan Developing a capital improvement plan			
	REGULATORY	Updating a floodplain zoning ordinance Updating a subdivision site plan regulation Updating state alteration of terrain rules			
	SITE-SPECIFIC	Designing a walking path; Siting a temporary or accessory structure; Upgrading a minor storage facility	Replacing a local culvert; Constructing a residential, commercial, or industrial building	Maintaining a school; Siting a community center or recreational facility; Upgrading a wastewater treatment plant	Renovating a hospital or police/fire station; Siting an emergency shelter or response center; Repairing a power station
CORRESPONDING ASCE 24-14[14,15] FLOOD DESIGN CLASS		1	2	3	4
RECOMMENDED COASTAL FLOOD RISK PROJECTIONS		Lower magnitude, Higher probability	← →		Higher magnitude, Lower probability

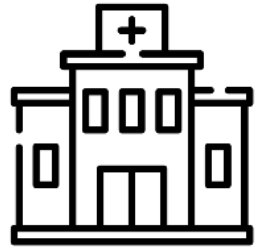
Step 3. Select & Assess RSLR

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

STEP 3 TABLE A. RECOMMENDED DECADAL RSLR ESTIMATES (IN FEET ABOVE 2000 LEVELS) BASED ON RCP 4.5, PROJECT TIMEFRAME, AND TOLERANCE FOR FLOOD RISK.

TIMEFRAME	HIGH TOLERANCE FOR FLOOD RISK	MEDIUM TOLERANCE FOR FLOOD RISK	LOW TOLERANCE FOR FLOOD RISK	VERY LOW TOLERANCE FOR FLOOD RISK
	Plan for the following RSLR estimate (ft)* *compared to sea level in the year 2000*			
	Lower magnitude, Higher probability	←		Higher magnitude, Lower probability
2030	0.7	0.9	1.0	1.1
2040	1.0	1.2	1.5	1.6
2050	1.3	1.6	2.0	2.3
2060	1.6	2.1	2.6	3.0
2070	2.0	2.5	3.3	3.7
2080	2.3	3.0	3.9	4.5
2090	2.6	3.4	4.6	5.3
2100	2.9	3.8	5.3	6.2
2110	3.3	4.4	6.1	7.3
2120	3.6	4.9	7.0	8.3
2130	3.9	5.4	7.9	9.3
2140	4.3	5.9	8.9	10.5
2150	4.6	6.4	9.9	11.7

Example:



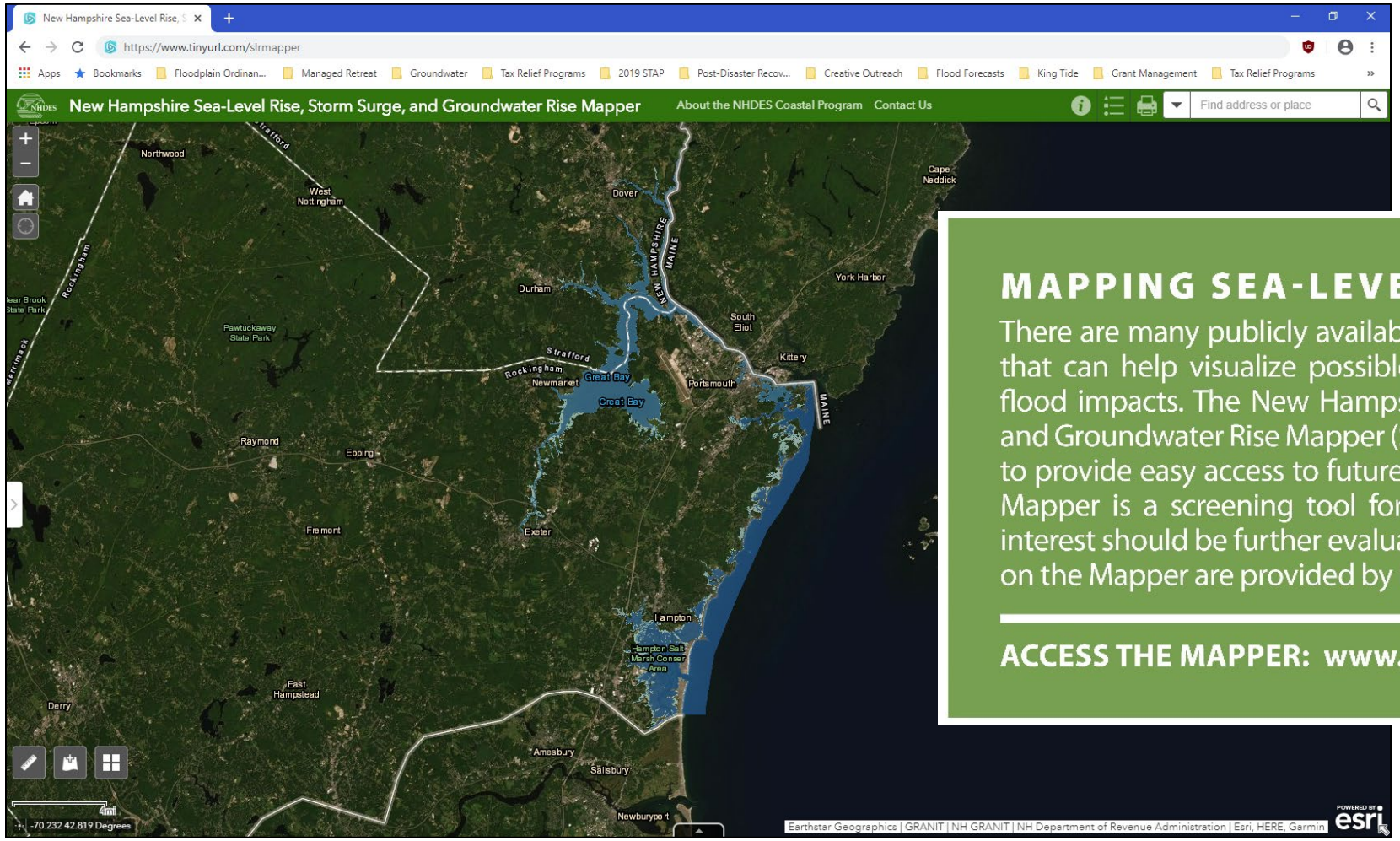
Useful life:
100 years (2120)

Incremental action point:
30 years (2050)

Tolerance for flood risk:
Very Low

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

STEP 4 TABLE. RSLR-ADJUSTED DESIGN FLOOD ELEVATIONS (DFE) BASED ON TOLERANCE FOR FLOOD RISK.

	HIGH TOLERANCE FOR FLOOD RISK	MEDIUM TOLERANCE FOR FLOOD RISK	LOW TOLERANCE FOR FLOOD RISK	VERY LOW TOLERANCE FOR FLOOD RISK
IF PROJECT AREA IS LOCATED IN:	RSLR-ADJUSTED DESIGN FLOOD ELEVATION (DFE =			
A, AO, OR AE ZONE* NOT IDENTIFIED AS COASTAL A ZONE**	[BFE] + RSLR	[BFE + (required freeboard ≥ 1 ft)] + RSLR	[BFE + (required freeboard ≥ 1 ft)] + RSLR	Whichever is greater: [BFE + (required freeboard ≥ 2ft)] + RSLR OR 0.2% annual chance flood elevation + RSLR
VE ZONE*** AND COASTAL A ZONE			[BFE + (required freeboard ≥ 2 ft)] + RSLR	

Example:

Tolerance for flood risk: Very Low
RSLR estimate: 8.3 feet by 2120
BFE: 8 feet NGVD

RSLR-adjusted DFE = 18.3 feet NGVD29
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

STEP 5 TABLE. APPROACHES FOR CALCULATING DEPTH TO RSLR-ADJUSTED GROUNDWATER.

	PREFERRED APPROACH (MAPPED COASTAL COMMUNITY)	**ALTERNATE APPROACH** (UNMAPPED COASTAL COMMUNITY)
	IF PROJECT AREA IS LOCATED IN A MAPPED COASTAL COMMUNITY:	**IF PROJECT AREA IS LOCATED WITHIN 3 MILES OF TIDAL SHORELINE IN AN UNMAPPED COASTAL COMMUNITY:**
RSLR-INDUCED GROUNDWATER RISE =	Refer to Sea-Level Rise Mapper[38] to estimate RSLR-induced groundwater rise	Commit to manage = (RSLR) x (0.33) Be prepared to manage = (RSLR) x (0.66)
DEPTH TO RSLR-ADJUSTED GROUNDWATER =	(Present-day depth to groundwater) - (RSLR-induced groundwater rise)	

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

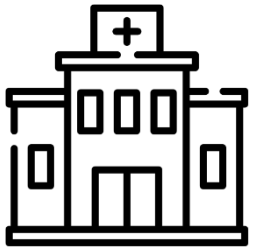
Step 6.1 | Account for projected increases in extreme precipitation

Step 6.2 | Assess projected extreme precipitation impacts to the project

STEP 6 TABLE. APPROACH FOR CALCULATING PROJECTED EXTREME PRECIPITATION ESTIMATES BASED ON TOLERANCE FOR FLOOD RISK.

	HIGH TOLERANCE FOR FLOOD RISK	MEDIUM TOLERANCE FOR FLOOD RISK	LOW TOLERANCE FOR FLOOD RISK	VERY LOW TOLERANCE FOR FLOOD RISK
PROJECTED EXTREME PRECIPITATION ESTIMATE =	**(Best available precipitation data) x (1.15)**		**(Best available precipitation data) x (>1.15)**	

Example:



Tolerance for flood risk: Very Low
Present-day rainfall estimate
(24-hour, 10-year event): 4.9 inches

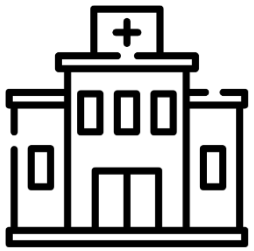
Projected rainfall estimate
(24-hour, 10-year event) = 5.9 inches
4.9 inches (present-day estimate) x 1.2

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:



Tolerance for flood risk: Very Low

New Hampshire Coastal Flood Risk Summary
Possible Applications

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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.

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

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.

New Hampshire Coastal Flood Risk Summary
Contact Us

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