HAT vs HAT
(annual vs astronomical)

In 2018, DEP published a list of highest annual tide

Maine DEP
Highest Annual Tide (HAT) Levels for Year 2018
Maine Coast from Eastport to Kittery

Location	HAT (MLLW) (Tide Table- feet)	HAT (NAVD88) (elev. feet)
Otis Cove	11.8	6.7
Thomaston	11.8	7.3
New Harbor, Muscongus Bay	11.4	6.0
Muscongus Harbor, Muscongus Sound	11.7	6.3
Friendship Harbor	11.7	6.3
Pemaquid Harbor, Johns Bay	11.4	5.9
Jones Neck	11.8	6.3
Waldoboro	12.3	6.8
East Boothbay	11.6	6.1
Walpole	12.0	6.2

HAT vs HAT

(annual vs astronomical)

The Highest Annual Tide for 2025 is also 7.3

StationId: 8415709
Source: NOAA/NOS/CO-OPS
Station Type: Primary
Time Zone: LST_LDT
Datum: NAVD*

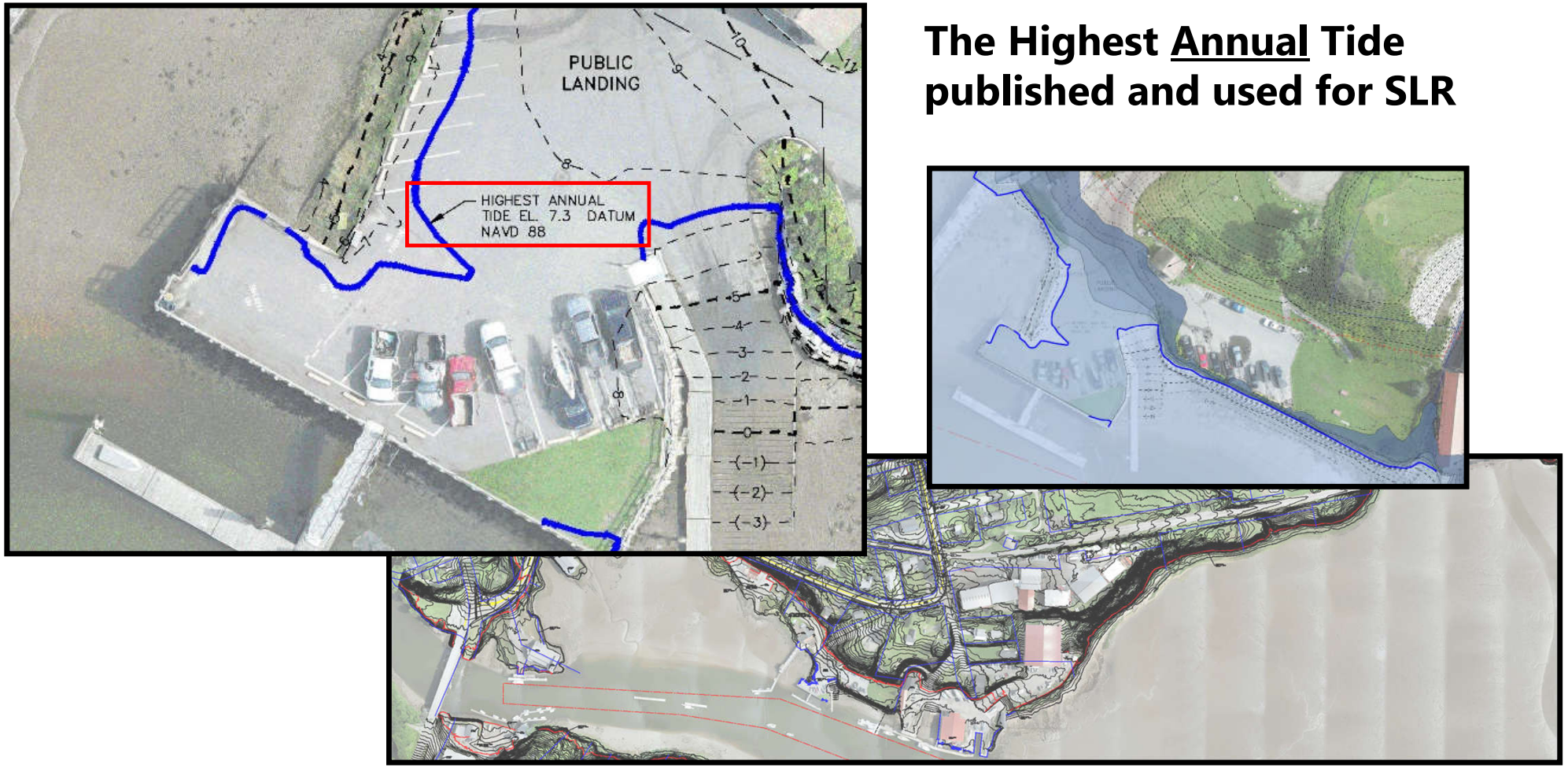
NOAA Tide Predictions

Thomaston, ME, 2025
(44 04.3N / 69 10.9W)
Times and Heights of High and Low Waters

October								November								December							
	Time		Height		Time		Height		Time		Height		Time		Height		Time		Height		Time		Height	
	h	m	ft	cm	h	m	ft	cm	h	m	ft	cm	h	m	ft	cm	h	m	ft	cm	h	m	ft	cm
1	12	14 AM	-3.0	-91	16	01	42 AM	-4.2	-128	1	01	27 AM	-3.5	-107	16	02	01 AM	-3.6	-110	1	12	40 AM	-3.8	-116	16	02	10 AM	-2.8	-85
	06	43 AM	3.1	94		07	59 AM	4.6	140		07	51 AM	4.4	134		08	13 AM	5.0	152		07	03 AM	5.6	171		08	21 AM	4.8	146
W	12	25 PM	-2.2	-67	Th	02	09 PM	-3.5	-107	Sa	01	56 PM	-3.5	-107	Su	02	35 PM	-4.0	-122	M	01	24 PM	-4.6	-140	Tu	02	52 PM	-3.8	-116
	06	51 PM	4.0	122		08	20 PM	5.0	152		08	13 PM	4.6	140		08	44 PM	4.4	134		07	41 PM	4.7	143		09	01 PM	3.8	116
2	01	17 AM	-3.1	-94	17	02	41 AM	-4.1	-125	2	01	19 AM	-3.8	-116	17	02	48 AM	-3.4	-104	2	01	34 AM	-3.9	-119	17	02	55 AM	-2.7	-82
	07	43 AM	3.4	104		08	56 AM	4.9	149		07	39 AM	5.1	155		08	58 AM	5.1	155		07	55 AM	6.1	186		09	05 AM	4.8	146
Th	01	30 PM	-2.5	-76	F	03	08 PM	-3.8	-116	Su	01	52 PM	-4.2	-128	M	03	22 PM	-4.1	-125	Tu	02	21 PM	-5.2	-158	W	03	36 PM	-3.9	-119
	07	52 PM	4.3	131		09	17 PM	5.0	152		08	08 PM	4.9	149		09	31 PM	4.3	131		08	38 PM	4.9	149		09	47 PM	3.7	113
3	02	13 AM	-3.4	-104	18	03	34 AM	-4.1	-125	3	02	09 AM	-4.1	-125	18	03	30 AM	-3.2	-98	3	02	28 AM	-4.1	-125	18	03	38 AM	-2.6	-79
	08	34 AM	3.9	119		09	45 AM	5.1	155		08	27 AM	5.8	177		09	38 AM	5.1	155		08	48 AM	6.6	201		09	46 AM	4.8	146
F	02	28 PM	-3.0	-91	Sa	04	01 PM	-4.0	-122	M	02	45 PM	-5.0	-152	Tu	04	03 PM	-4.2	-128	W	03	17 PM	-5.7	-174	Th	04	15 PM	-4.0	-122
	08	47 PM	4.7	143		10	10 PM	4.9	149		09	02 PM	5.3	162		10	13 PM	4.2	128		09	34 PM	5.2	158		10	28 PM	3.7	113
4	03	02 AM	-3.8	-116	19	04	21 AM	-3.9	-119	4	02	58 AM	-4.4	-134	19	04	07 AM	-3.0	-91	4	03	22 AM	-4.3	-131	19	04	11 AM	-2.6	-79
	09	20 AM	4.5	137		10	31 AM	5.2	158		09	14 AM	6.4	195		10	15 AM	5.0	152		09	41 AM	7.0	213		10	23 AM	4.8	146
Sa	03	21 PM	-3.7	-113	Su	04	47 PM	-4.2	-128	Tu	03	36 PM	-5.6	-171	W	04	38 PM	-4.2	-128	Th	04	10 PM	-6.1	-186	F	04	50 PM	-4.0	-122
	09	38 PM	5.1	155		10	56 PM	4.8	146		09	53 PM	5.6	171		10	51 PM	4.1	125	O	10	28 PM	5.4	165		11	05 PM	3.7	113
5	03	48 AM	-4.2	-128	20	05	02 AM	-3.8	-116	5	03	48 AM	-4.6	-140	20	04	37 AM	-2.8	-85	5	04	15 AM	-4.5	-137	20	04	42 AM	-2.6	-79
	10	04 AM	5.2	158		11	10 AM	5.2	158		10	02 AM	6.9	210		10	47 AM	4.9	149		10	34 AM	7.2	219		10	56 AM	4.9	149
Su	04	11 PM	-4.4	-134	M	05	27 PM	-4.3	-131	W	04	25 PM	-6.1	-186	Th	05	09 PM	-4.1	-125	F	05	02 PM	-6.2	-189	Sa	05	21 PM	-4.0	-122
	10	28 PM	5.4	165		11	37 PM	4.7	143	O	10	43 PM	5.7	174	●	11	25 PM	4.0	122		11	20 PM	5.5	168	●	11	39 PM	3.8	116
6	04	32 AM	-4.5	-137	21	05	37 AM	-3.5	-107	6	04	34 AM	-4.8	-146	21	05	05 AM	-2.7	-82	6	05	07 AM	-4.5	-137	21	05	14 AM	-2.7	-82
	10	47 AM	5.8	177		11	45 AM	5.1	155		10	50 AM	7.2	219		11	17 AM	4.9	149		11	28 AM	7.1	216		11	29 AM	4.9	149
M	04	58 PM	-5.2	-158	Tu	06	01 PM	-4.3	-131	Th	05	14 PM	-8.3	-192	F	05	39 PM	-4.1	-125	Sa	05	54 PM	-8.1	-186	Su	05	52 PM	-4.1	-125
	11	15 PM	5.8	177	●						11	32 PM	5.8	177		11	58 PM	3.8	116										
7	05	15 AM	-4.8	-146	22	12	13 AM	4.5	137	7	05	22 AM	-4.8	-146	22	05	34 AM	-2.7	-82	7	12	12 AM	5.5	168	22	12	12 AM	3.8	116
	11	29 AM	6.4	195		06	06 AM	-3.3	-101		11	39 AM	7.3	223		11	48 AM	4.9	149		06	01 AM	-4.4	-134		05	50 AM	-2.8	-85
Tu	05	44 PM	-5.7	-174	W	12	15 PM	5.0	152	F	06	05 PM	-8.3	-192	Sa	06	11 PM	-4.0	-122	Su	12	20 PM	6.9	210	M	12	03 PM	5.0	152
O						06	32 PM	-4.2	-128												06	47 PM	-5.9	-180		06	27 PM	-4.2	-128

HAT vs HAT

(annual vs astronomical)



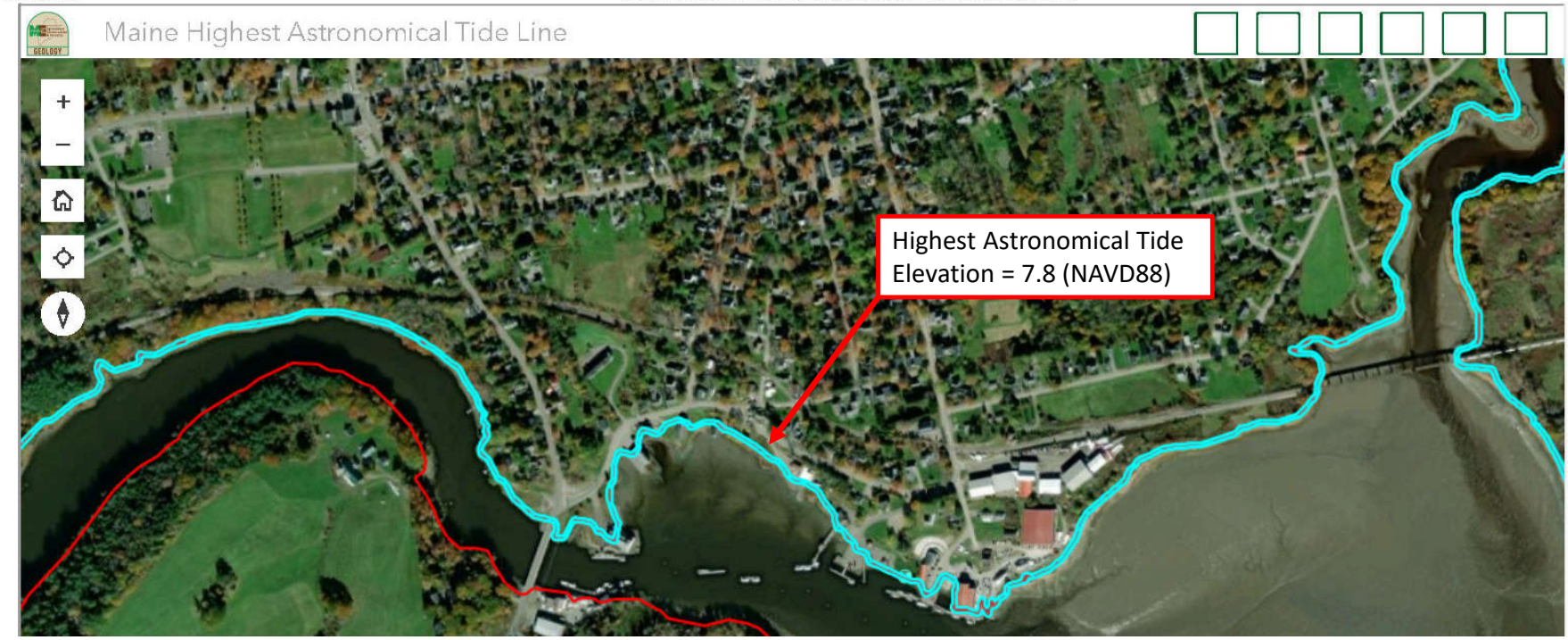
The Highest <u>Annual</u> Tide published and used for SLR

HAT vs HAT

(annual vs astronomical)

In June, DEP changed to Highest Astronomical Tide

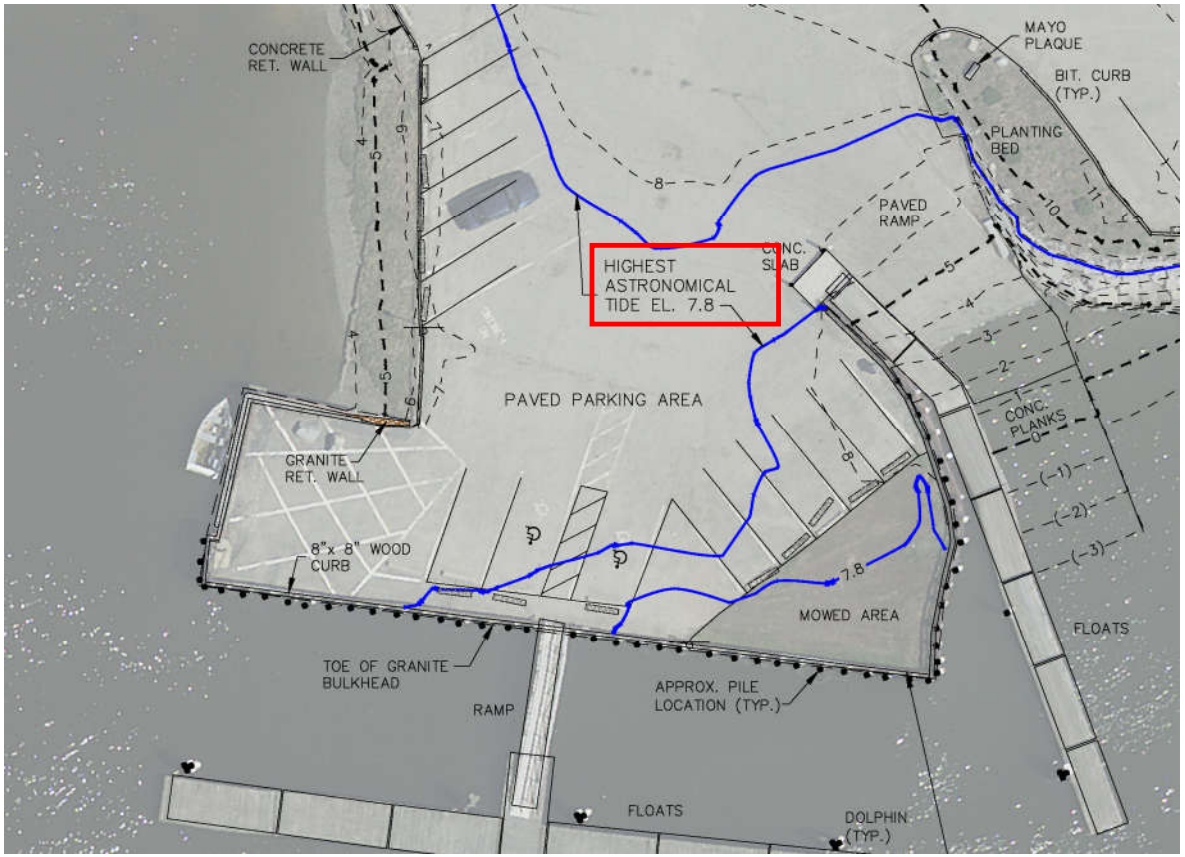
According to NOAA, the Highest Astronomical Tide is the elevation of the highest predicted astronomical tide expected to occur at a specific tide station over the National Tidal Datum Epoch, or NTDE. The Highest Astronomical Tide remains constant over 20-year periods. ln contrast, highest annual tide is the highest predicted tide within one calendar year and changes every year. The difference between the Highest Astronomical Tide and the highest annual tide is variable depending on the location and the year.



HAT vs HAT

(annual vs astronomical)

Public Landing with Highest Astronomical Tide



Projected Water Levels

2025 Water Levels and Key Elevations	
MHHW	5.39
HAT	7.8
SWEL (100 yr)	13

Note: All elevations reference to the NAVD 88 Datum

Projected Sea Level Rise (relative to 2000) from 2024 STS Report		
Year	Intermediate	High
2030	0.58	0.61
2040	0.84	0.96
2050	1.12	1.41
2060	1.45	2.03
2070	1.82	2.82
2080	2.28	3.76
2090	2.83	4.81
2100	3.44	5.88
2110	4.17	7.03
2120	5.09	8.07

Projected Water Levels		*Based on 2024 STS report*				
Year	MHHW (Intermediate)	MHHW (High)	HAT (intermediate)	HAT (High)	SWEL (Intermediate)	SWEL (High)
2030	5.68	5.71	8.09	8.12	13.29	13.32
2040	5.94	6.06	8.35	8.47	13.55	13.67
2050	6.22	6.51	8.63	8.92	13.83	14.12
2060	6.55	7.13	8.96	9.54	14.16	14.74
2070	6.92	7.92	9.33	10.33	14.53	15.53
2080	7.38	8.86	9.79	11.27	14.99	16.47
2090	7.93	9.91	10.34	12.32	15.54	17.52
2100	8.54	10.98	10.95	13.39	16.15	18.59
2110	9.27	12.13	11.68	14.54	16.88	19.74
2120	10.19	13.17	12.6	15.58	17.8	20.78

** Note: Projected sea level rise was pulled from 2024 STS report and applies to the larger region that Thomaston is in.*

Vulnerability Assessment & Risk Evaluation

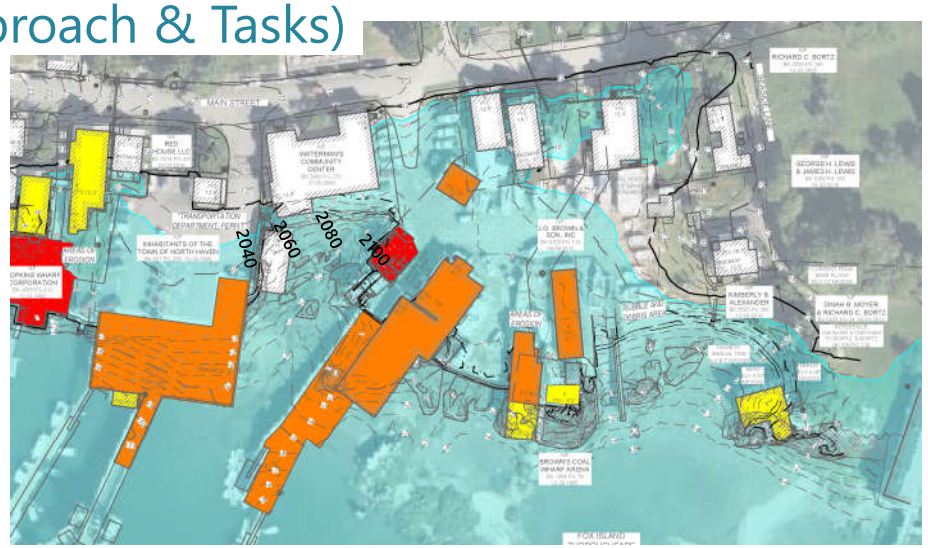
(Summary of Approach & Tasks)

1. Identify key at-risk assets:

- Roads, bridges, & paths (connectivity)
- Marine structures
- Critical buildings
- Drinking water
- Electrical & communication
- Stormwater
- Wastewater
- Natural resources

2. Calculate flood & storm exposure (probability of Inundation):

- Tidal flood days (flood frequency from historical tidal observations (NOAA int. low, int. high, high + SLR)
- Compound flooding: (10-year, 24-hour rainfall event with king tide + SLR)
- Storm tide (storm surge) flooding: FEMA 1% storm event + SLR scenarios



WATER ELEVATION	REGULAR TIDES														
Highest Annual Tide	6.7	7.5	7.7	8.1	8.2	8.7	9.1	9.7	10.6	10.7	11.7	12.7	13.7	14.7	15.5
	6	6.8	7	7.4	7.5	8	8.4	9	9.9	10	11	12	13	14	14.8
MHHW	5	5.8	6	6.4	6.5	7	7.4	8	8.9	9	10	11	12	13	13.8
MHW	4.5	5.3	5.5	5.9	6	6.5	6.9	7.5	8.4	8.5	9.5	10.5	11.5	12.5	13.3
	4	4.8	5	5.4	5.5	6	6.4	7	7.9	8	9	10	11	12	12.8
	3	3.8	4	4.4	4.5	5	5.4	6	6.9	7	8	9	10	11	11.8
	2	2.8	3	3.4	3.5	4	4.4	5	5.9	6	7	8	9	10	10.8
	1	1.8	2	2.4	2.5	3	3.4	4	4.9	5	6	7	8	9	9.8
	0	0.8	1	1.4	1.5	2	2.4	3	3.9	4	5	6	7	8	8.8
	-1	-0.2	0	0.4	0.5	1	1.4	2	2.9	3	4	5	6	7	7.8

Above: Examples showing flood risks from the North Haven Thorofare Waterfront Phase I Resilience & Adaptation Report prepared by GEI for the Town of North Haven, Maine

Vulnerability Assessment & Risk Evaluation

(Summary of Approach & Tasks)

3. Vulnerability Assessment:

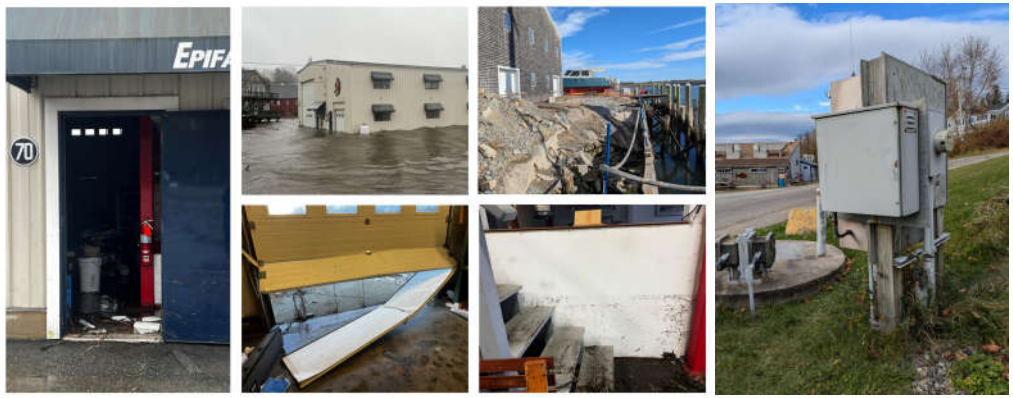
- Flood exposure (rated by the number of flood scenarios impacting asset)
- Sensitivity (qualitative rating based on likelihood for flood & storm damage)
- Adaptive capacity (ability of the asset to adjust to climate change)

Asset	Exposure to 2050 Sea Level Rise [a]		Sensitivity [b]		Adaptive Capacity [c]		Total Score
	Sea Level Rise	Storm Surge	Sea Level Rise	Storm Surge	Sea Level Rise	Storm Surge	
Asset #1	None	None	N/A	N/A	N/A	N/A	0
Asset #2	None	Low (1)	N/A	Low (1)	N/A	High (1)	3
Asset #3	Low (1)	Low (1)	Low (1)	Med (2)	Med (2)	Med (2)	9
Asset #4	Med (2)	Med (2)	Med (2)	High (3)	Low (3)	Med (2)	14
Asset #5	High (3)	High (3)	High (3)	Med (2)	Low (3)	Low (3)	17

Above: Example vulnerability assessment matrix from GUIDANCE FOR INCORPORATING SEA LEVEL RISE INTO CAPITAL PLANNING IN SAN FRANCISCO:ASSESSING VULNERABILITY AND RISK TO SUPPORT ADAPTATION

Vulnerability Assessment & Risk Evaluation

(Summary of Approach & Tasks)



Asset	Damage		Cost (Repair/Replace)		Disruption		Total Score
	Sea Level Rise	Storm Surge	Sea Level Rise	Storm Surge	Sea Level Rise	Storm Surge	
Asset #1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Asset #2	N/A	Low (1)	N/A	Med (2)	N/A	High (3)	6
Asset #3	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)	6
Asset #4	Med (2)	High (3)	Med (2)	High (3)	Med (2)	High (3)	15
Asset #5	High (3)	High (3)	Low (1)	Med (2)	Low (1)	Low (1)	11

Above: Example consequence matrix from GUIDANCE FOR INCORPORATING SEA LEVEL RISE INTO CAPITAL PLANNING IN SAN FRANCISCO:ASSESSING VULNERABILITY AND RISK TO SUPPORT ADAPTATION

4. Risk Evaluation:

- Consequence (rating based on the severity of impacts should the asset fail, incur significant damage; or become unusable; see risk considerations below)

  - **Damage**:
    - Level of damage to the asset
    - Repair or replacement requirements
  - **Disruption**:
    - Potential disruption in service
    - Length of the disruption, i.e., hours, days, weeks?
    - Impacts to public safety

  Cost:
  - Cost to repair or replace the asset
  - Economic (or health and safety) costs associated with a disruption in service
  - Secondary impacts such as costs to the environment and public recreation

Working Waterfront Masterplan StoryMap

Gulf of Maine Research Institute

- **Overview**
  - What is Thomaston’s Working Waterfront Masterplan?
  - What does it include?
  - Why is it important?
  - What locations are included in the masterplan?
- **Upcoming Events**
- **Coastal Hazards Facing Thomaston's Waterfront**
  - What is sea level rise?
  - Current impacts of coastal hazards
  - Future sea level rise and coastal flooding impacts along Thomason's waterfront
- **The History of Thomaston's Working Waterfront**
- **Resources**

Planned Outreach and Suggested Timeline

Gulf of Maine Research Institute

September - Tabling opportunity to set us up for events in fall and winter

- For example: community picnic on Sept 14th

Last week of October - Initial library presentation

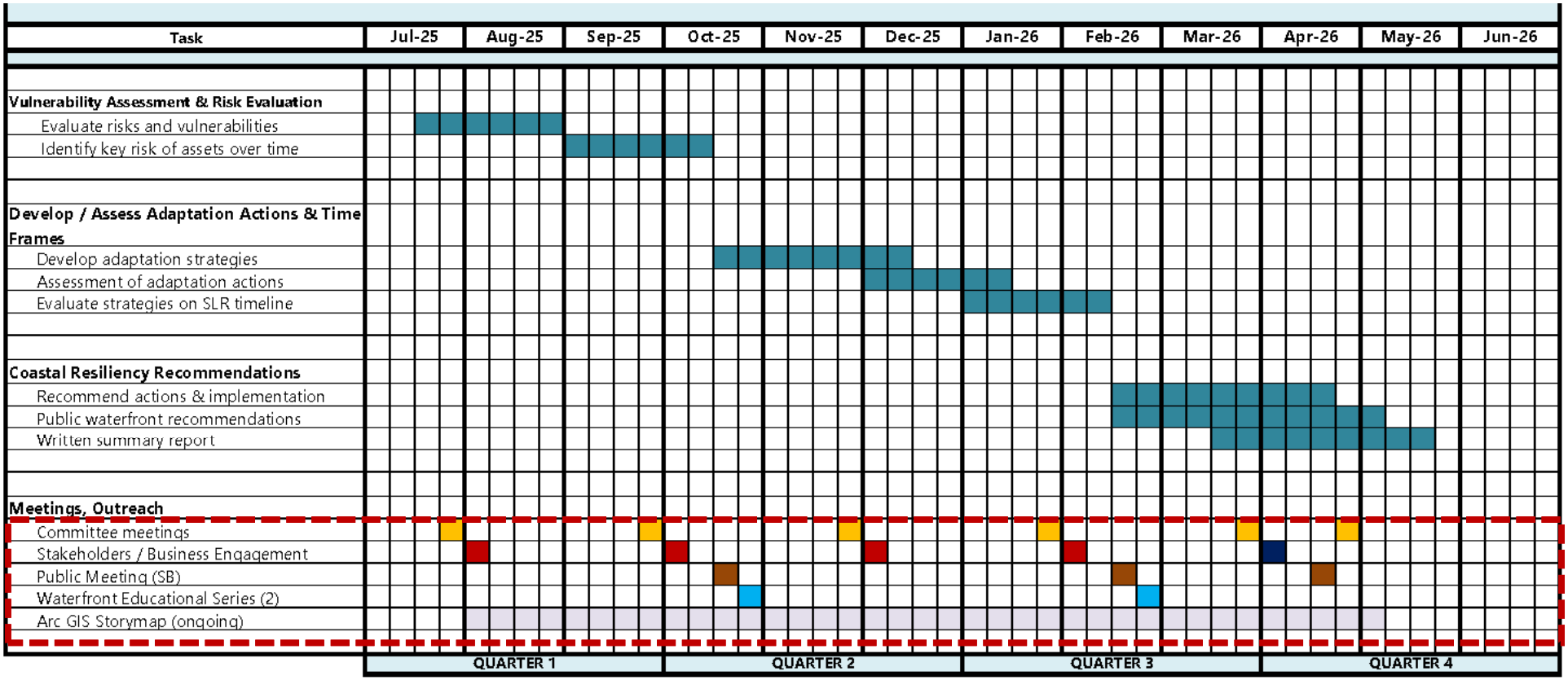
- History, Science, and Navigating Change: Preparing Thomaston's Waterfront for a Warming World

November through January - Maintain momentum through communications outlets, coordinating with the library and other community partners, etc…

Last week of February - Workshop at the library

- The Waterfront of Tomorrow: Let's Plan a Resilient Future Together!

PROJECT SCHEDULE



Stakeholder Outreach (Critical Path)

Committee Meetings

Public Meeting (SB)

Online Outreach (Storymap)

GMRI Community Events

GMRI Funding Workshop (with Committee & Stakeholders)