North Haven Thorofare Waterfront Project

Phase 1 Report and Next Steps

photo credit Bill Trevaskis

June 26 and 29, 2024

Project Overview & Meeting Agenda

Problem: The Thorofare Waterfront is our community's economic and transportation hub, but it is under stress.

- **Climate**
- **Transportation**
- **Infrastructure**
- **Economy**

Proposed Solution: Join forces as a community to develop a comprehensive plan to address the problem and obtain needed funds.

Meeting Agenda:

- Overview of the Thorofare Waterfront Project
- **Presentation of Phase 1 Report & Initial Recommendations** by Dan Bannon, Project Engineer, GEI Consultants
- Next Steps

Where are we?

Vision Process

Priority 2: Diversify Economy, Develop Workforce
Priority 3: Environmental Sustainability, Climate Change Impacts

Thorofare Waterfront Project

We are here

- Phase 1 – Data Collection, Assessment, and Analysis
- Phase 2 – Collaboration, Ideas, and Design
- Phase 3 – Implementation

Phase 1 Details: Data Collection, Assessment & Analysis

Timeline: Phase 1

November 2023

Hired GEI Consultants as the lead engineering firm after a competitive, community-informed evaluation process.

Nov/Dec 2023

Thorofare Waterfront Project Kickoff Community Meeting

January 2024

Phase 1 Kickoff: Coordination of Visits and Communication Plans

February 2024

Community Site Visit from GEI to North Haven: Data & Information Gathering from the Community

March 2024

Technical Surveying Process: GEI Subcontracted through Little River Land Surveyors

Town launched TWP Community Survey for additional input, ideas, and concerns

June 2024

Phase 1 Report Due

Community Update Meeting

Project Phases

PHASE 1: BASE PERIOD DATA COLLECTION, ASSESSMENT & ANALYSIS WINTER-SPRING 2024	PHASE 2: PROJECT SCOPING & DESIGN SUMMER 2024 - WINTER 2025	PHASE 3: CONSTRUCTION AND IMPLEMENTATION WINTER 2025 - FALL 2027 & BEYOND
After receiving notice of BRIC Grant, engage initial engineering services and begin conversations with property owners, stakeholders, and the community about the area's key uses, vulnerabilities, and issues. Complete technical and community surveying processes and organize information to inform future design work.	With engineering analysis, technical support, and community input, create a comprehensive, phased, solution that is cost effective, technically feasible, and addresses the anticipated impacts of climate change and sea level rise while meeting other critical community needs.	Work with engineers to hire and oversee a construction firm to execute the design approved during Phase 2. Implement a phased approach, depending on designs, funding, community priority, and other factors.

Phase 1: Completed!

GEI Consultants

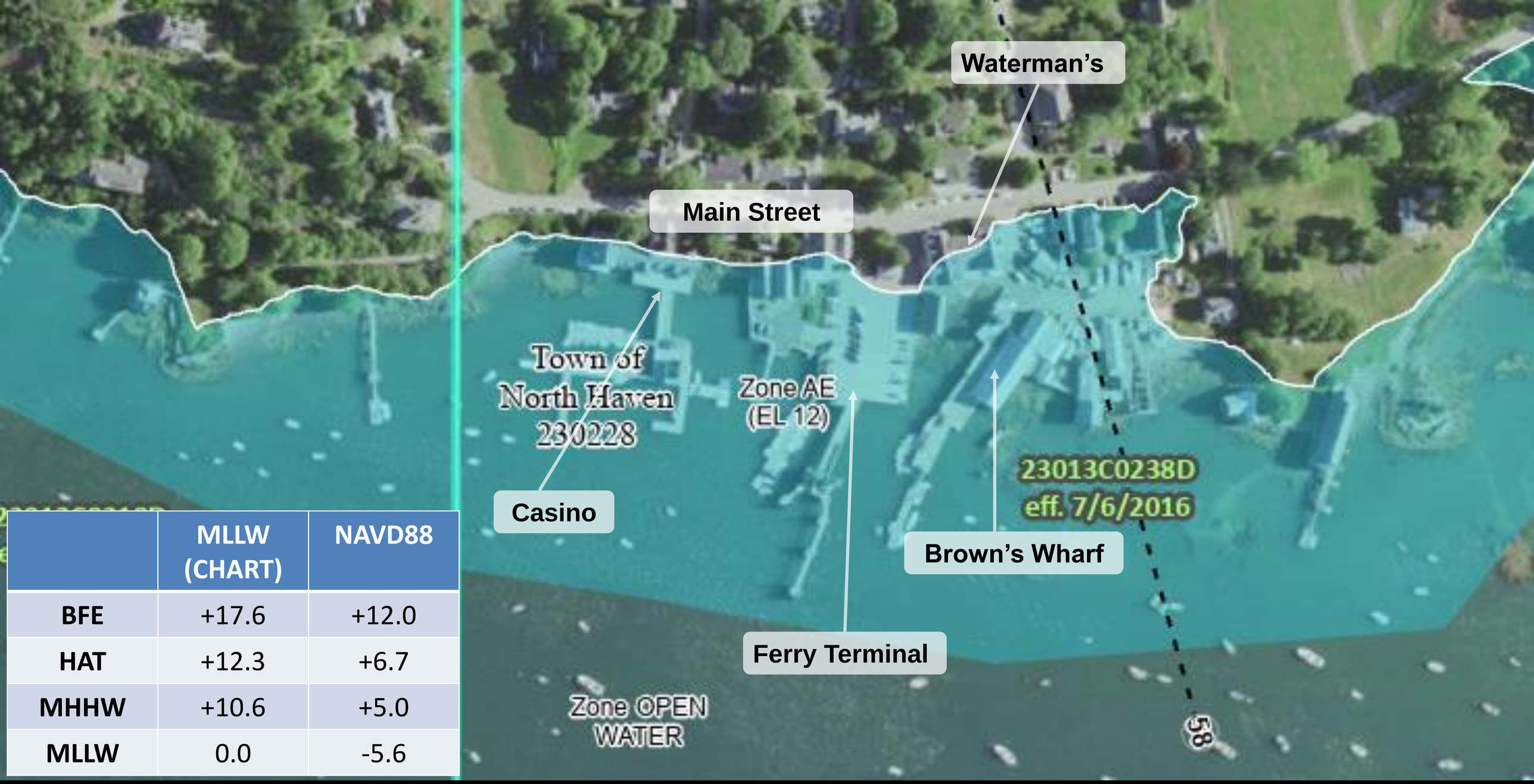
Town of North Haven Thorofare Waterfront Project

June 2024

Outline

1. Introduction
2. Purpose and Need
3. Sea Level Rise Trends and Projections
4. Flood Risk Analysis
5. Adaptation Options
6. Summary of Recommendations
7. Next Steps


North Haven
Thorofare
Waterfront
Image © 2024 Airbus

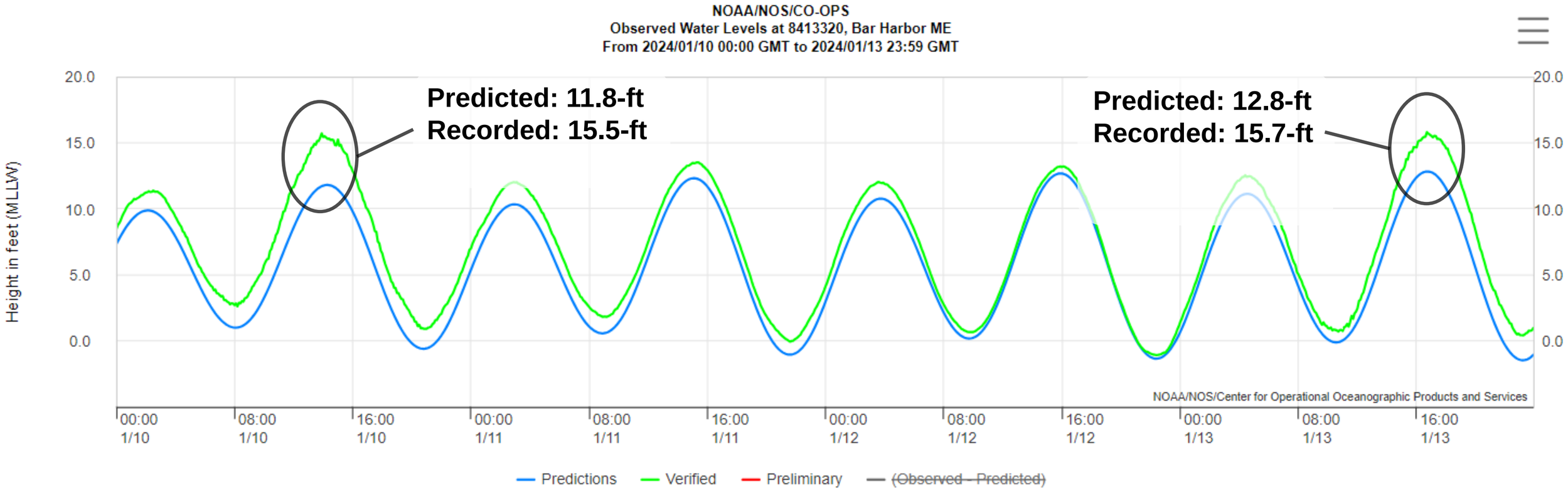


	MLLW (CHART)	NAVD88
BFE	+17.6	+12.0
HAT	+12.3	+6.7
MHHW	+10.6	+5.0
MLLW	0.0	-5.6

January 2024 Storms

Tidal observations below from Bar Harbor station do not include wave action.

Average surveyed elevation of storm high water marks at North Haven = 10.4’ NAVD88 = 16.0’ MLLW



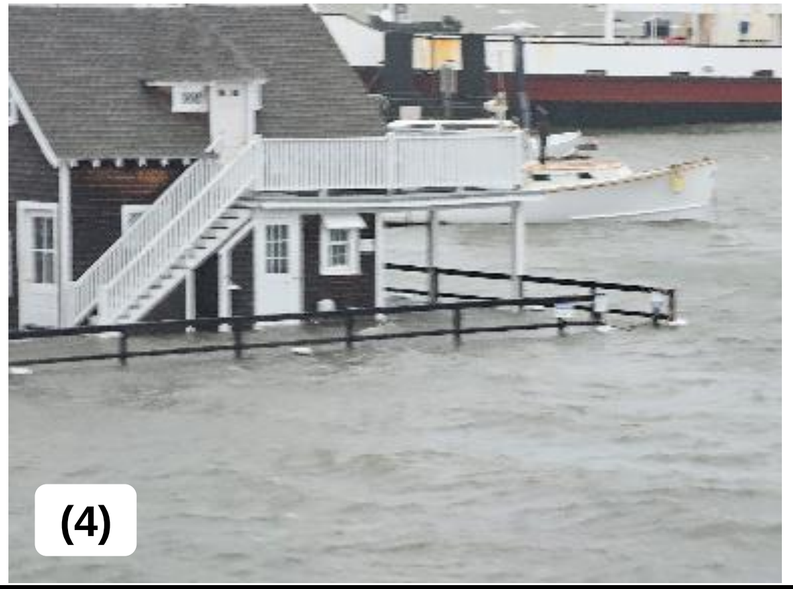
January 2024 Storms

(1) J.O. Brown’s

(2) Hopkin’s Gallery

(3) Casino Pier

(4) Casino Pier Building



February 11, 2024 High Tides

February 11, 2024 High tide
8.0 +/- NAVD88

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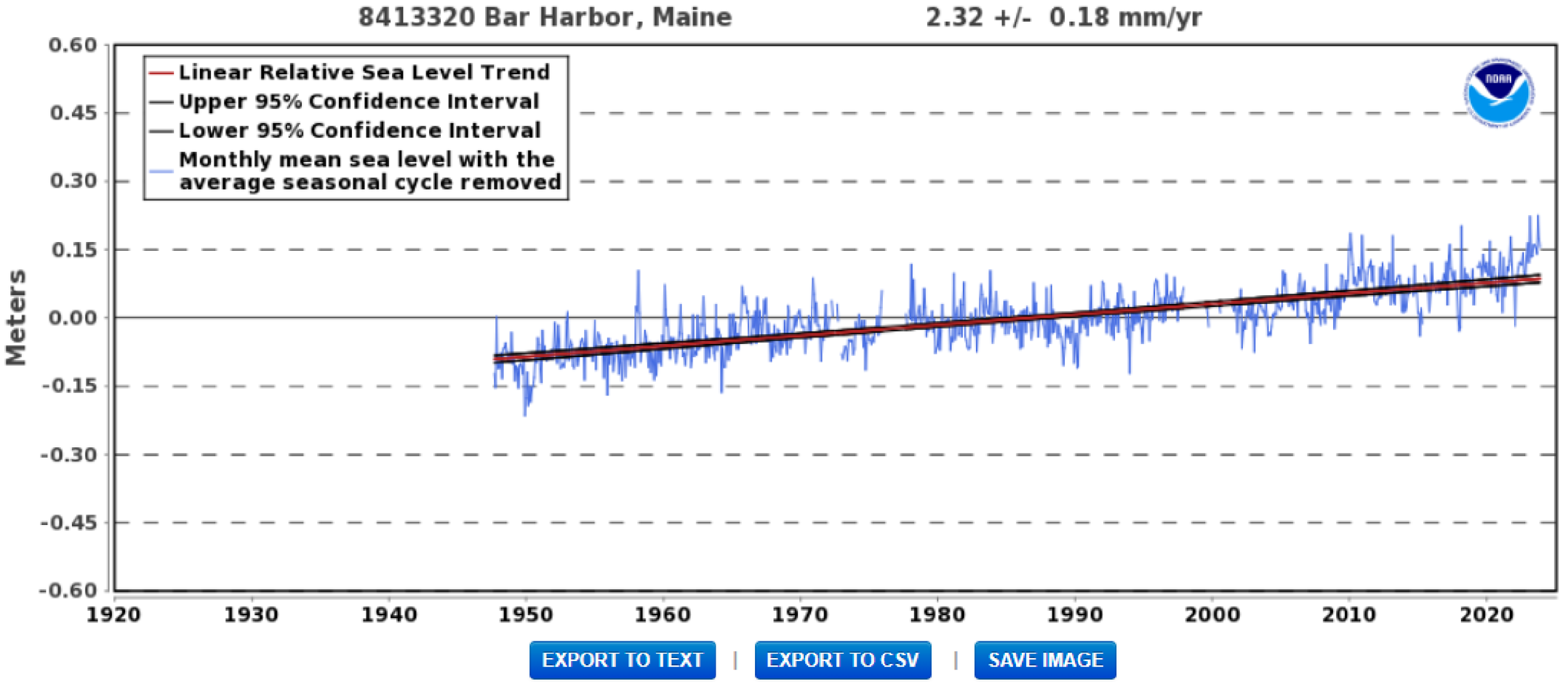
February 11, 2024 High tide
8.0 +/- NAVD88

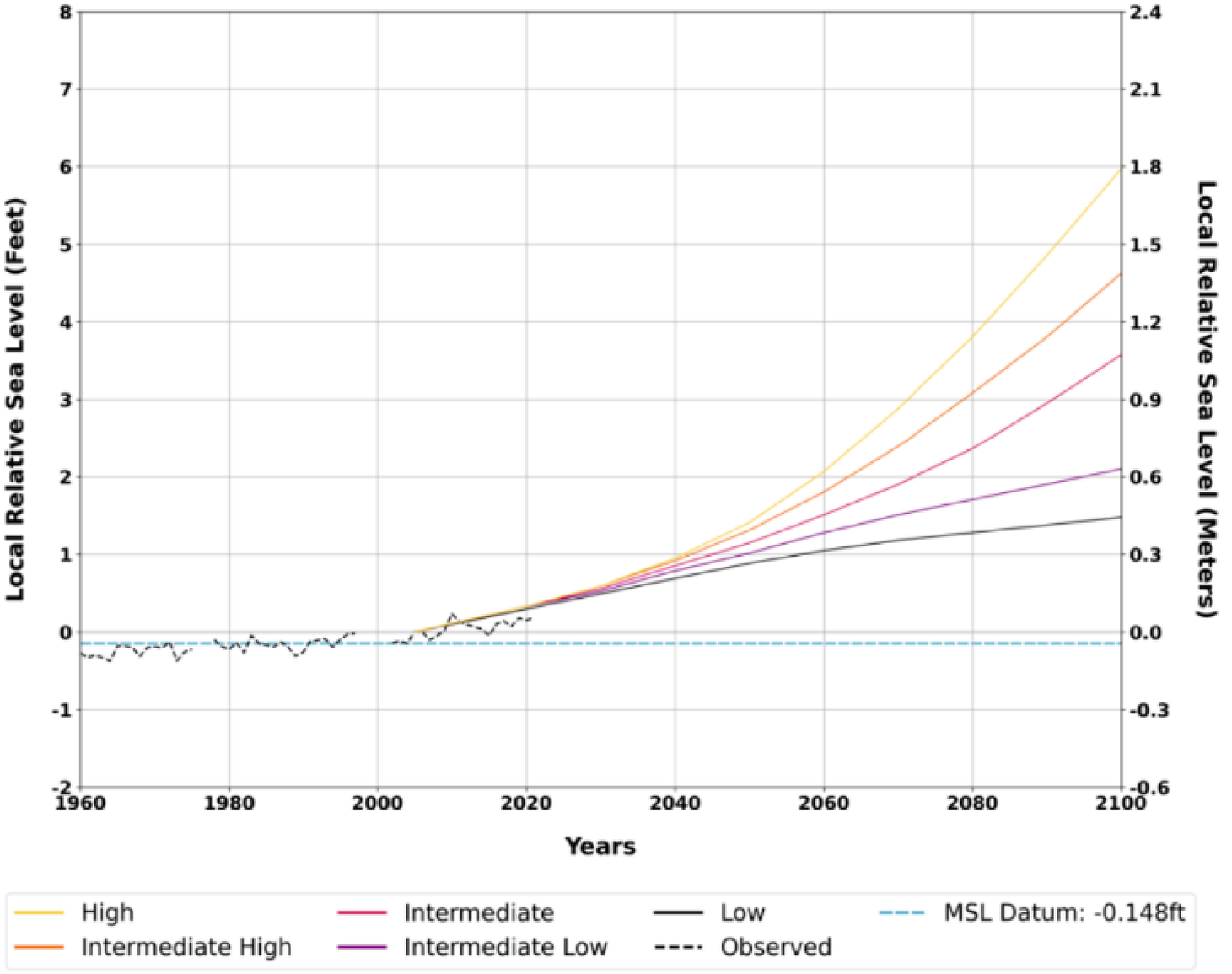
Relative Sea Level Trend
8413320 Bar Harbor, Maine

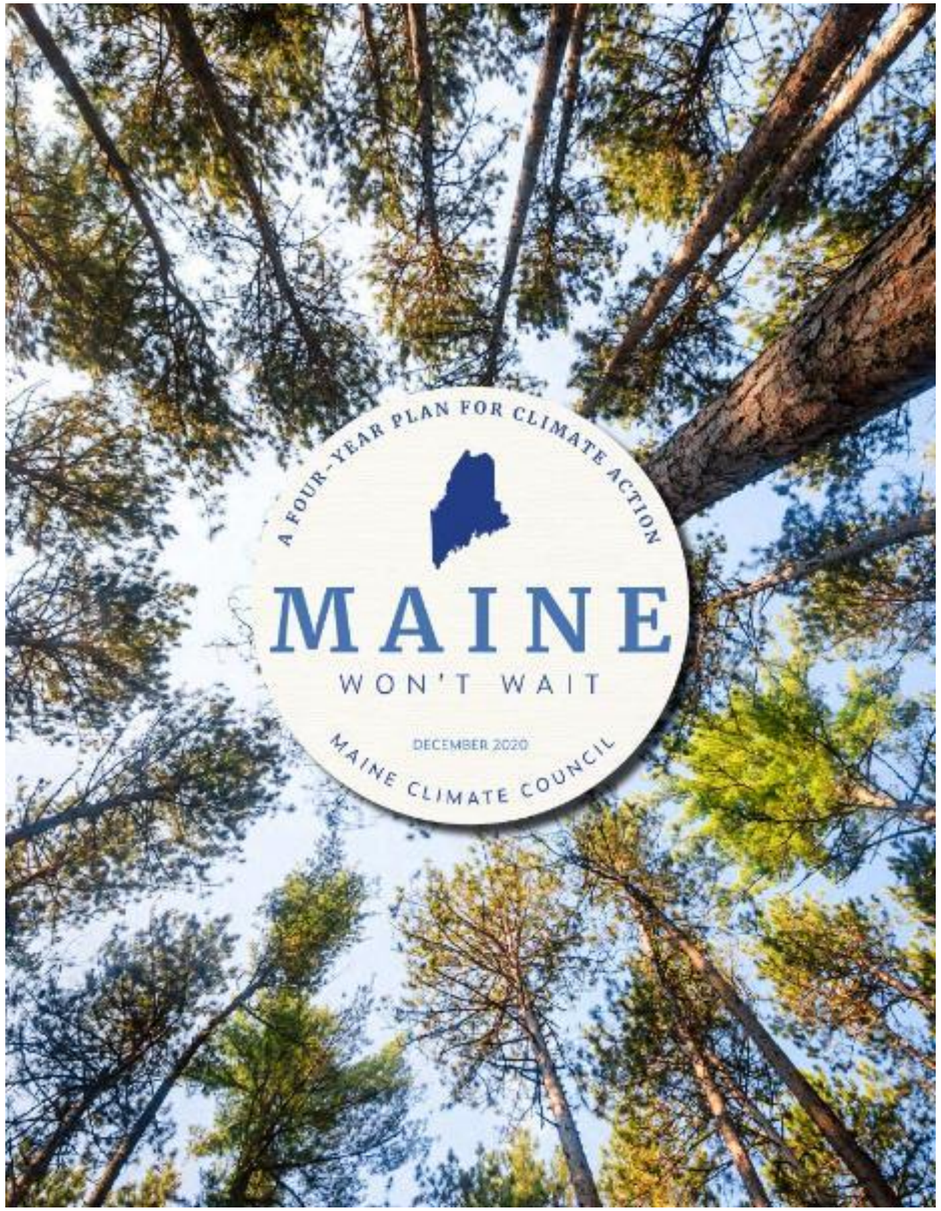


The relative sea level trend is 2.32 millimeters/year with a 95% confidence interval of +/- 0.18 mm/yr based on monthly mean sea level data from 1947 to 2022 which is equivalent to a change of 0.76 feet in 100 years.

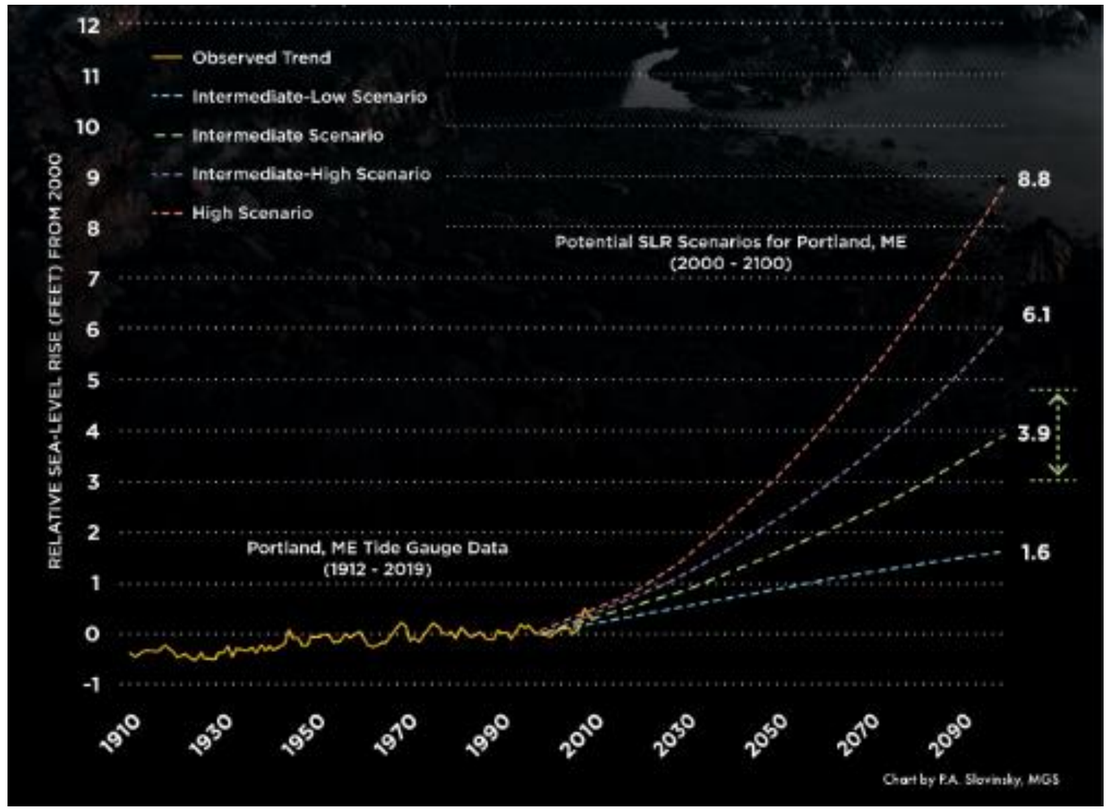
Annual Relative Sea Level Since 1960 and Projections

8413320 Bar Harbor





- Maine Climate Council
- 2020 Report – “Maine Won’t Wait”
- Recommendations for Sea Level Rise
  - Commit to Manage (C2M) Scenario
  - Prepare to Manage (P2M) Scenario



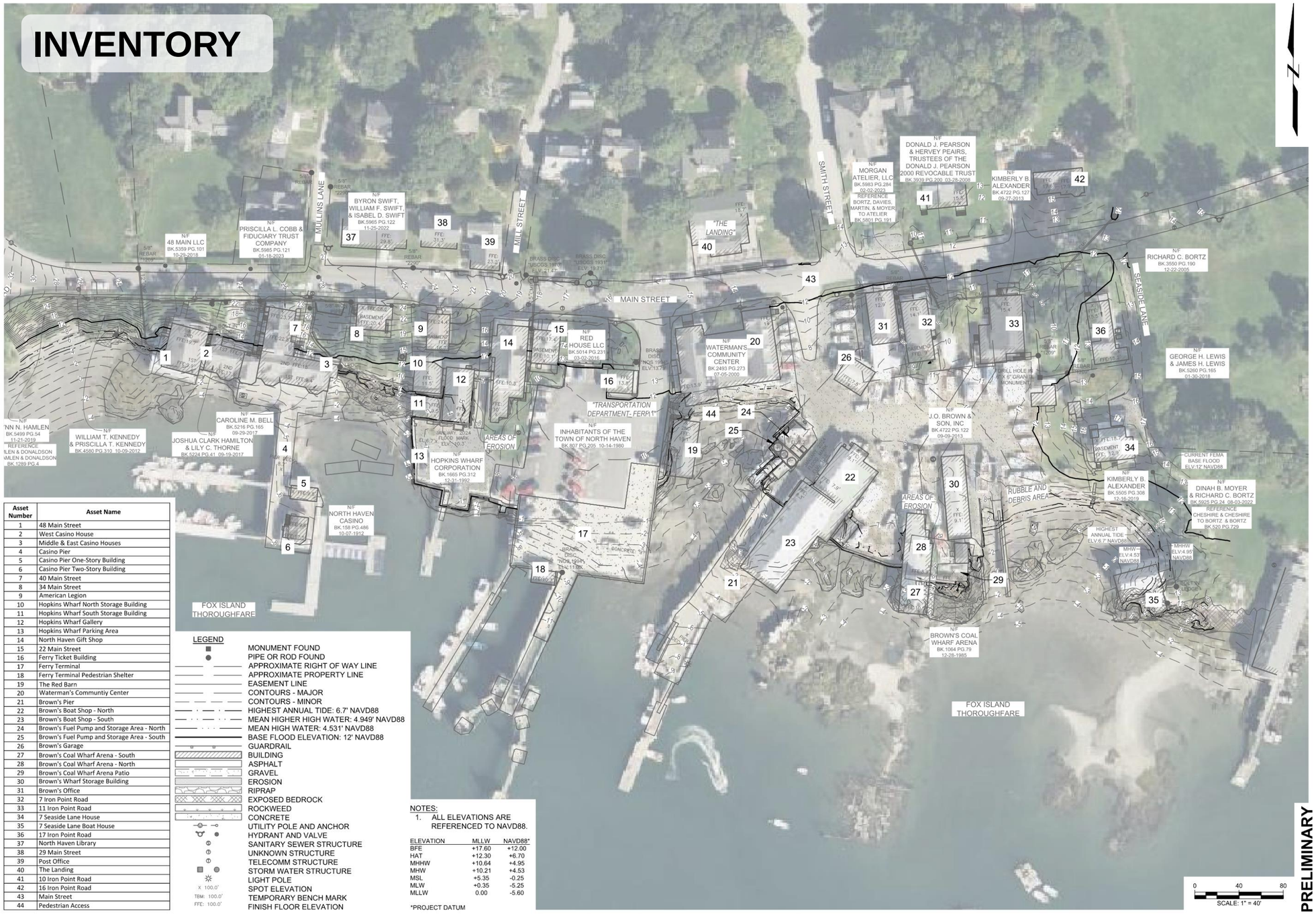
Flood Risk Scenarios

- Scenario Elevation Basis
- Scenario 1 EL 6.7 ft *HAT*
- Scenario 2 EL 8.2 ft *HAT + 1.5 ft (C2M 2050)*
- Scenario 3 EL 10.6 ft *HAT + 3.9 ft (C2M 2100)*
- Scenario 4 EL 12.0 ft *BFE*
- Scenario 5 EL 13.5 ft *BFE + 1.5 ft (C2M 2050)*
- Scenario 6 EL 15.9 ft *BFE + 3.9 ft (C2M 2100)*

Scenario	1	2	3	4	5	6	>6
Elevation (NAVD88)	6.7	8.2	10.6	12	13.5	15.9	>15.9

SCENARIO	Maine Climate Council Commit to Manage SLR		2030			2050		2070		2100						
	Maine Climate Council Prepare to Manage SLR				2030				2050			2070				2100
	Increase in Sea Level *OR* Added Freeboard	0	0.8	1	1.4	1.5	2	2.4	3	3.9	4	5	6	7	8	8.8
REGULATORY ELEVATIONS (Note: Future projections are non-regulatory and for planning purposes only)	BFE + 3-feet Minimum Elevation for Critical Assets per FFRMS	15	15.8	16	16.4	16.5	17	17.4	18	18.9	19	20	21	22	23	23.8
	BFE + 2-feet Minimum Elevation for Non-Critical Assets per FFRMS	14	14.8	15	15.4	15.5	16	16.4	17	17.9	18	19	20	21	22	22.8
	BFE + 1-foot -Minimum FFE for Residential in AE Zone -Minimum Floodproofing EL for Non-Residential Structures in AE Zone -Minimum elevation for mechanical, utility equipment and fuel storage tanks	13	13.8	14	14.4	14.5	15	15.4	16	16.9	17	18	19	20	21	21.8
WATER ELEVATION — STORM EVENTS	Base Flood Elevation (BFE)	12	12.8	13	13.4	13.5	14	14.4	15	15.9	16	17	18	19	20	20.8
		11	11.8	12	12.4	12.5	13	13.4	14	14.9	15	16	17	18	19	19.8
	January 2024 Storm Events	10.4	11.2	11.4	11.8	11.9	12.4	12.8	13.4	14.3	14.4	15.4	16.4	17.4	18.4	19.2
		10	10.8	11	11.4	11.5	12	12.4	13	13.9	14	15	16	17	18	18.8
	1% Stillwater Elevation	9	9.8	10	10.4	10.5	11	11.4	12	12.9	13	14	15	16	17	17.8
		8	8.8	9	9.4	9.5	10	10.4	11	11.9	12	13	14	15	16	16.8
		7	7.8	8	8.4	8.5	9	9.4	10	10.9	11	12	13	14	15	15.8
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
		-2	-1.2	-1	-0.6	-0.5	0	0.4	1	1.9	2	3	4	5	6	6.8
		-3	-2.2	-2	-1.6	-1.5	-1	-0.6	0	0.9	1	2	3	4	5	5.8
		-4	-3.2	-3	-2.6	-2.5	-2	-1.6	-1	-0.1	0	1	2	3	4	4.8
		-5	-4.2	-4	-3.6	-3.5	-3	-2.6	-2	-1.1	-1	0	1	2	3	3.8
	MLW	-5.3	-4.5	-4.3	-3.9	-3.8	-3.3	-2.9	-2.3	-1.4	-1.3	-0.3	0.7	1.7	2.7	3.5
	MLLW	-5.6	-4.8	-4.6	-4.2	-4.1	-3.6	-3.2	-2.6	-1.7	-1.6	-0.6	0.4	1.4	2.4	3.2

INVENTORY



Asset Number	Asset Name
1	48 Main Street
2	West Casino House
3	Middle & East Casino Houses
4	Casino Pier
5	Casino Pier One-Story Building
6	Casino Pier Two-Story Building
7	40 Main Street
8	34 Main Street
9	American Legion
10	Hopkins Wharf North Storage Building
11	Hopkins Wharf South Storage Building
12	Hopkins Wharf Gallery
13	Hopkins Wharf Parking Area
14	North Haven Gift Shop
15	22 Main Street
16	Ferry Ticket Building
17	Ferry Terminal
18	Ferry Terminal Pedestrian Shelter
19	The Red Barn
20	Waterman's Communtiy Center
21	Brown's Pier
22	Brown's Boat Shop - North
23	Brown's Boat Shop - South
24	Brown's Fuel Pump and Storage Area - North
25	Brown's Fuel Pump and Storage Area - South
26	Brown's Garage
27	Brown's Coal Wharf Arena - South
28	Brown's Coal Wharf Arena - North
29	Brown's Coal Wharf Arena Patio
30	Brown's Wharf Storage Building
31	Brown's Office
32	7 Iron Point Road
33	11 Iron Point Road
34	7 Seaside Lane House
35	7 Seaside Lane Boat House
36	17 Iron Point Road
37	North Haven Library
38	29 Main Street
39	Post Office
40	The Landing
41	10 Iron Point Road
42	16 Iron Point Road
43	Main Street
44	Pedestrian Access

LEGEND

- MONUMENT FOUND
- PIPE OR ROD FOUND
- APPROXIMATE RIGHT OF WAY LINE
- APPROXIMATE PROPERTY LINE
- EASEMENT LINE
- CONTOURS - MAJOR
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- HIGHEST ANNUAL TIDE: 6.7' NAVD88
- MEAN HIGHER HIGH WATER: 4.949' NAVD88
- MEAN HIGH WATER: 4.531' NAVD88
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- GUARDRAIL
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- LIGHT POLE
- X 100.0' SPOT ELEVATION
- TBM: 100.0' TEMPORARY BENCH MARK
- FFE: 100.0' FINISH FLOOR ELEVATION

NOTES:

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ELEVATION	MLLW	NAVD88*
BFE	+17.60	+12.00
HAT	+12.30	+6.70
MHHW	+10.64	+4.95
MHW	+10.21	+4.53
MSL	+5.35	-0.25
MLW	+0.35	-5.25
MLLW	0.00	-5.60

*PROJECT DATUM

PRELIMINARY

GEI Consultants
GEI CONSULTANTS, INC.
5 MILK STREET
PORTLAND, ME 04101
(207)797-8901

TOWN OF NORTH HAVEN INCORPORATED JUNE 30 1846 MAINE

THOROFARE WATERFRONT RESILIENCE IMPROVEMENTS
NORTH HAVEN, MAINE

DRAFT

P.E. No.:	13033
Approved:	DJB
Checked:	CHK_BY
Drawn:	ACB
Designed:	DSN_BY
GEI Project	2306107

Attention:
0 1"
If this scale bar does not measure 1" then drawing is not original scale.

NO.	DATE	ISSUE/REVISION	APP
2	4/26/2024	PRELIMINARY REVIEW	DJB
1	1/5/2024	PRELIMINARY REVIEW	DJB

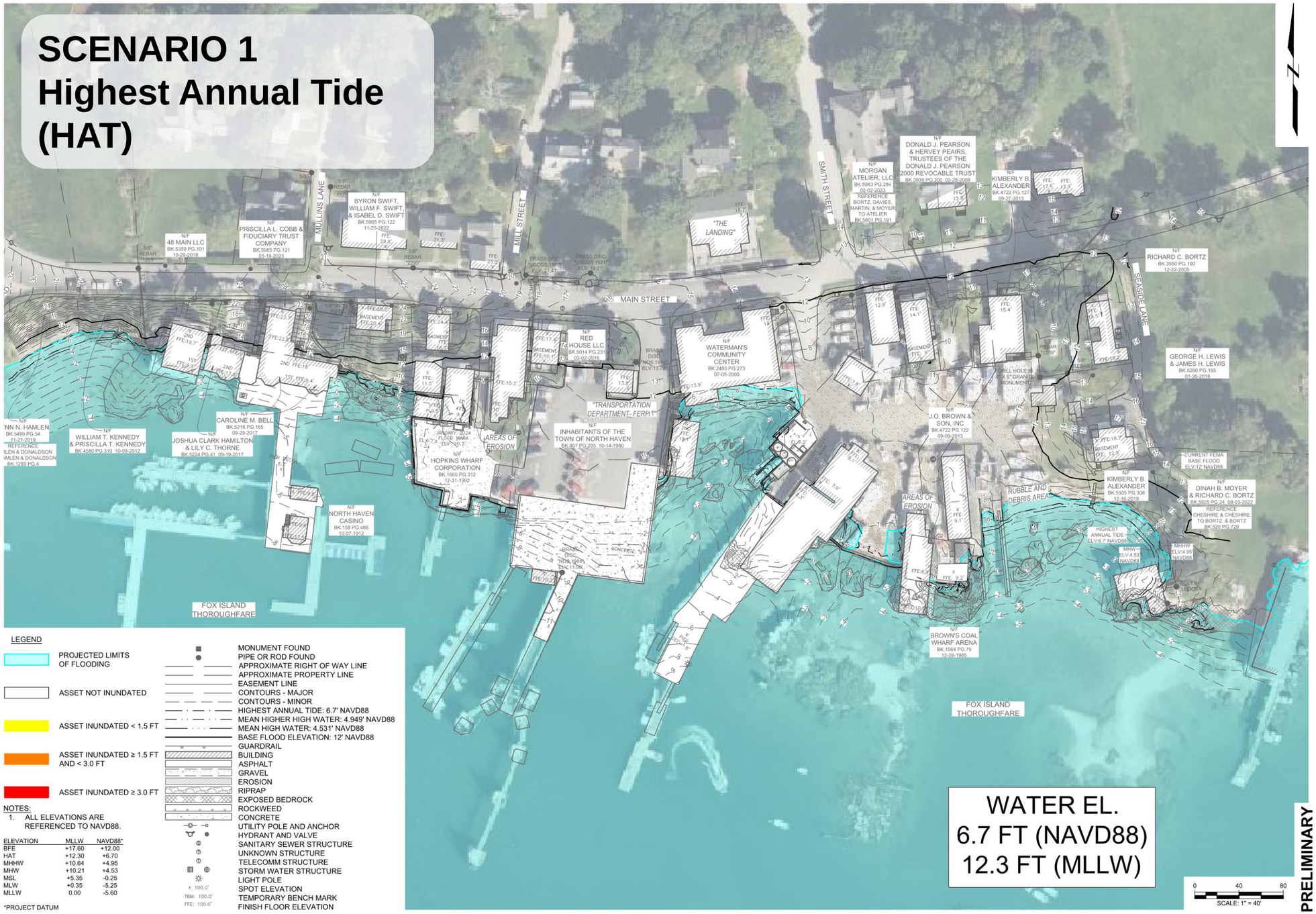
SHEET NAME

ASSET INVENTORY MAP

SHEET NO.

C-001

SCENARIO 1
Highest Annual Tide (HAT)



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- ASSET NOT INUNDATED
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- ASSET INUNDATED ≥ 3.0 FT

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MSL	+5.35	-0.25
MLW	+0.35	-5.25
MLLW	0.00	-5.60

*PROJECT DATUM

WATER EL.
6.7 FT (NAVD88)
12.3 FT (MLLW)

0 40 80
SCALE: 1" = 40'

PRELIMINARY

GEI Consultants
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5 MILK STREET
PORTLAND, ME 04101
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TOWN OF NORTH HAVEN INCORPORATED JUNE 30 1846 MAINE

THOROFARE WATERFRONT RESILIENCE IMPROVEMENTS
NORTH HAVEN, MAINE

DRAFT

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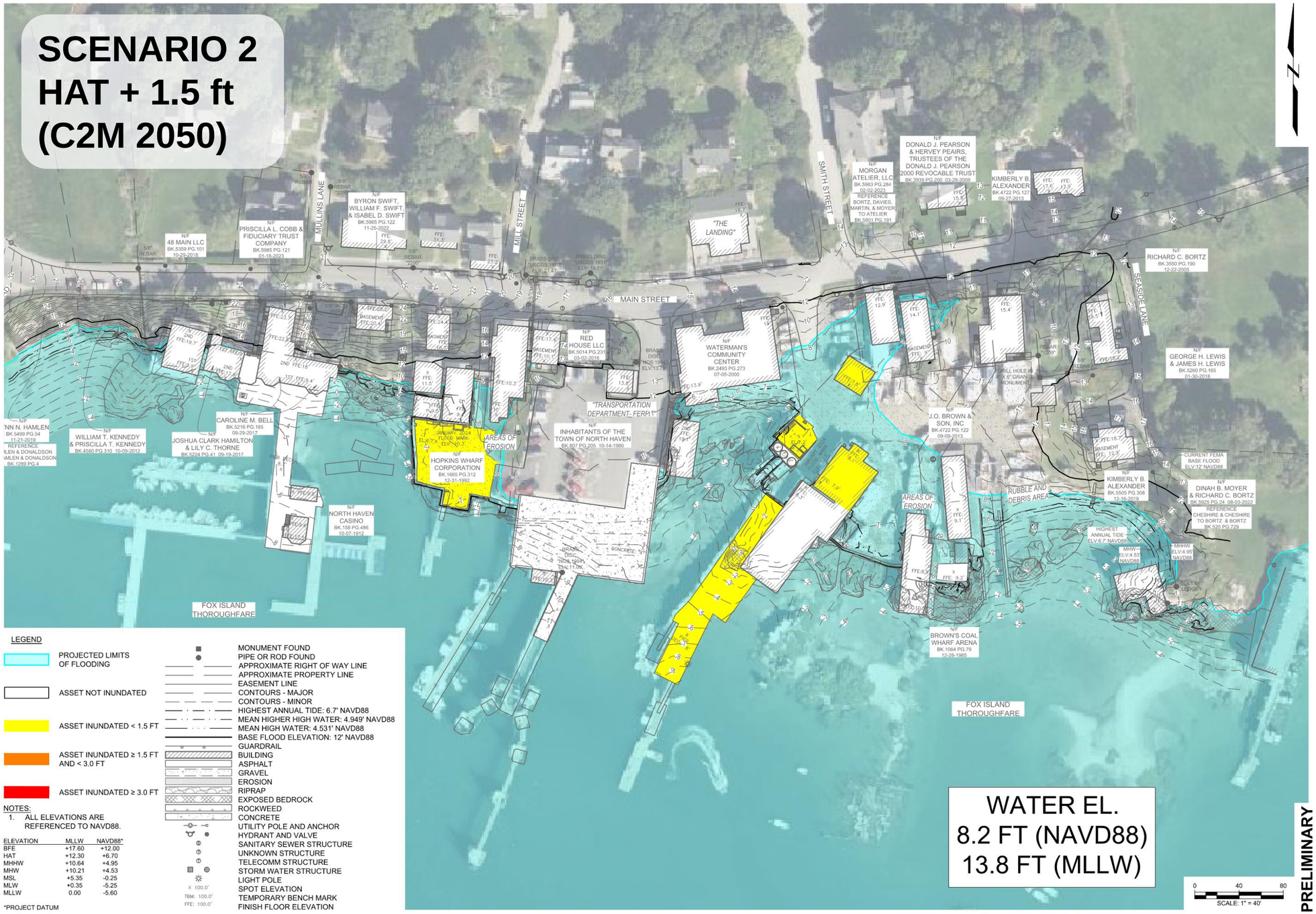
SHEET NAME

WATER EL 6.7 FT (EFFECTIVE HAT)

SHEET NO.

C-002

SCENARIO 2
HAT + 1.5 ft
(C2M 2050)



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*PROJECT DATUM

WATER EL.
8.2 FT (NAVD88)
13.8 FT (MLLW)

0 40 80
SCALE: 1" = 40'

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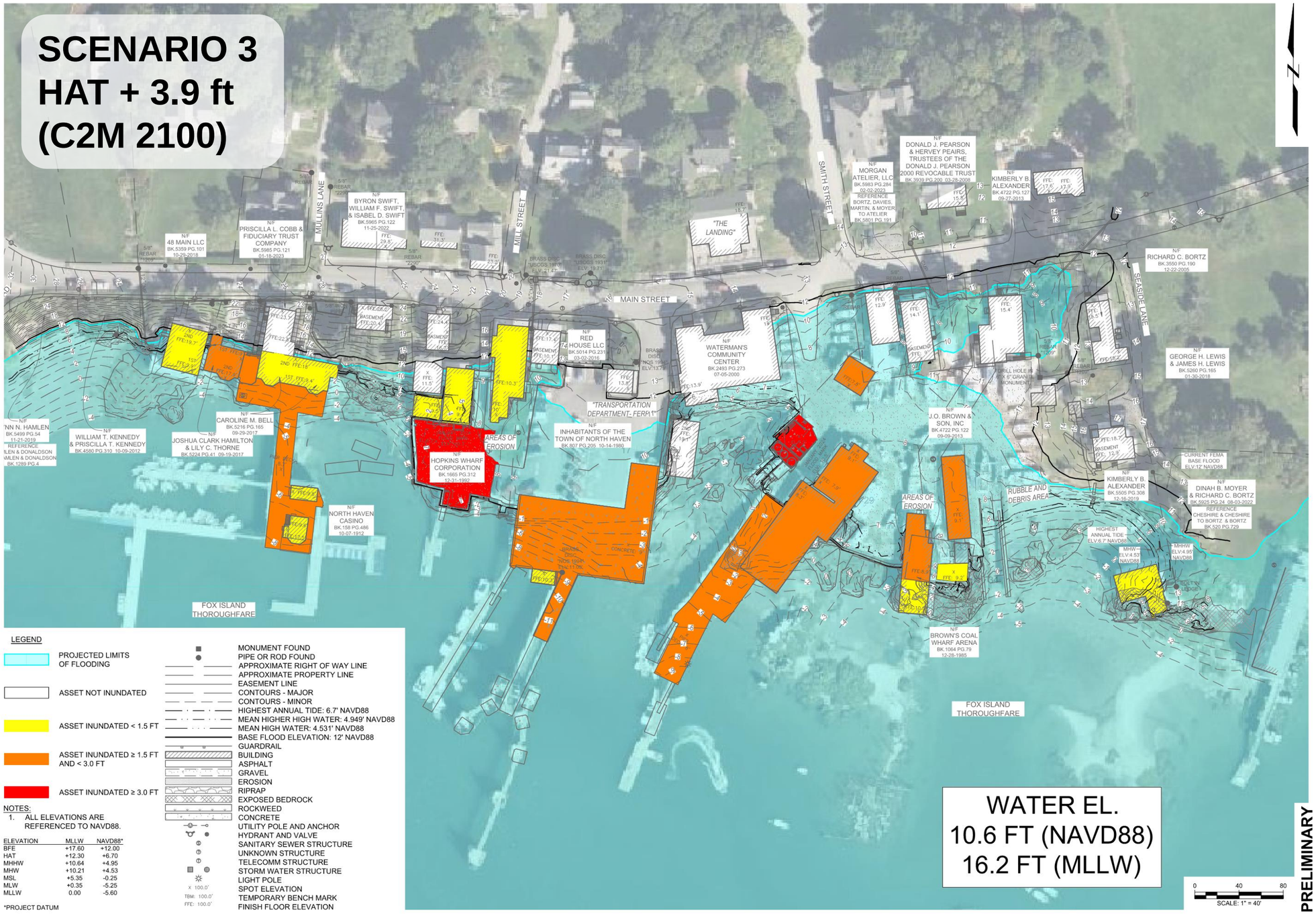
SHEET NAME

WATER EL 8.2 (EFFECTIVE HAT + 1.5 FT)

SHEET NO.

C-003

SCENARIO 3
HAT + 3.9 ft
(C2M 2100)



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MLW	+0.35	-5.25
MLLW	0.00	-5.60

*PROJECT DATUM

WATER EL.
10.6 FT (NAVD88)
16.2 FT (MLLW)

0 40 80
SCALE: 1" = 40'

PRELIMINARY

GEI Consultants
GEI CONSULTANTS, INC.
5 MILK STREET
PORTLAND, ME 04101
(207)797-8901

TOWN OF NORTH HAVEN INCORPORATED JUNE 30 1846 MAINE

THOROFARE WATERFRONT RESILIENCE IMPROVEMENTS
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1	1/5/2024	PRELIMINARY REVIEW	DJB

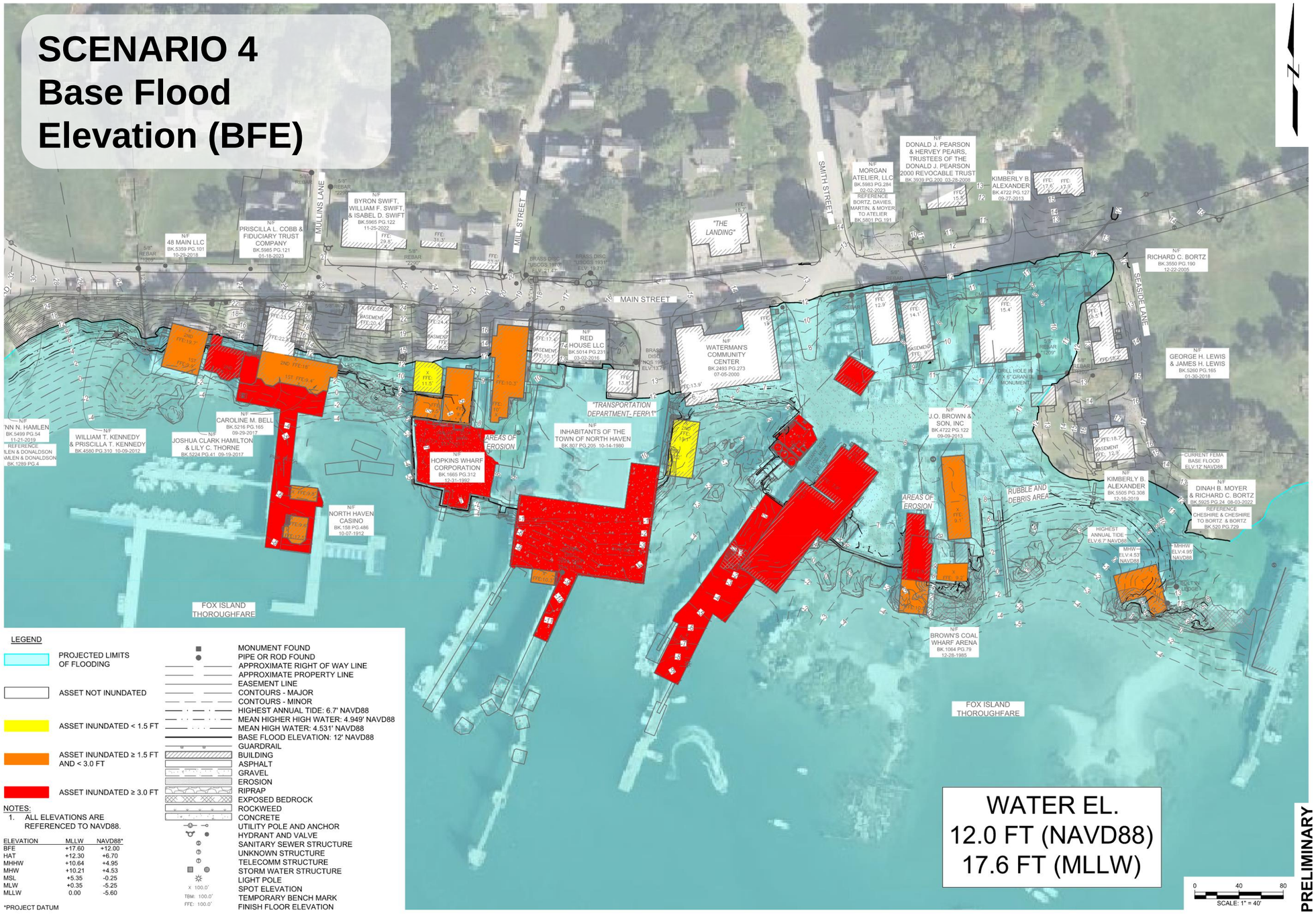
SHEET NAME

WATER EL 10.6 (EFFECTIVE HAT +3.9 FT)

SHEET NO.

C-004

SCENARIO 4
Base Flood Elevation (BFE)



LEGEND

- PROJECTED LIMITS OF FLOODING
- ASSET NOT INUNDATED
- ASSET INUNDATED < 1.5 FT
- ASSET INUNDATED ≥ 1.5 FT AND < 3.0 FT
- ASSET INUNDATED ≥ 3.0 FT

- MONUMENT FOUND
- PIPE OR ROD FOUND
- APPROXIMATE RIGHT OF WAY LINE
- APPROXIMATE PROPERTY LINE
- EASEMENT LINE
- CONTOURS - MAJOR
- CONTOURS - MINOR
- HIGHEST ANNUAL TIDE: 6.7' NAVD88
- MEAN HIGHER HIGH WATER: 4.949' NAVD88
- MEAN HIGH WATER: 4.531' NAVD88
- BASE FLOOD ELEVATION: 12' NAVD88
- GUARDRAIL
- BUILDING
- ASPHALT
- GRAVEL
- EROSION
- RIPRAP
- EXPOSED BEDROCK
- ROCKWEED
- CONCRETE
- UTILITY POLE AND ANCHOR
- HYDRANT AND VALVE
- SANITARY SEWER STRUCTURE
- UNKNOWN STRUCTURE
- TELECOMM STRUCTURE
- STORM WATER STRUCTURE
- LIGHT POLE
- SPOT ELEVATION
- TEMPORARY BENCH MARK
- FINISH FLOOR ELEVATION

NOTES:
1. ALL ELEVATIONS ARE REFERENCED TO NAVD88.

ELEVATION	MLLW	NAVD88*
BFE	+17.60	+12.00
HAT	+12.30	+6.70
MHHW	+10.64	+4.95
MHW	+10.21	+4.53
MSL	+5.35	-0.25
MLW	+0.35	-5.25
MLLW	0.00	-5.60

*PROJECT DATUM

PRELIMINARY

GEI Consultants
GEI CONSULTANTS, INC.
5 MILK STREET
PORTLAND, ME 04101
(207)797-8901

TOWN OF NORTH HAVEN INCORPORATED JUNE 30, 1845 MAINE

THOROFARE WATERFRONT RESILIENCE IMPROVEMENTS
NORTH HAVEN, MAINE

DRAFT

P.E. No.:	13033
Approved:	DJB
Checked:	CHK_BY
Drawn:	ACB
Designed:	DSN_BY
GEI Project	2306107

Attention: 0 1"

If this scale bar does not measure 1" then drawing is not original scale.

NO.	DATE	ISSUE/REVISION	APP
2	4/26/2024	PRELIMINARY REVIEW	DJB
1	1/5/2024	PRELIMINARY REVIEW	DJB

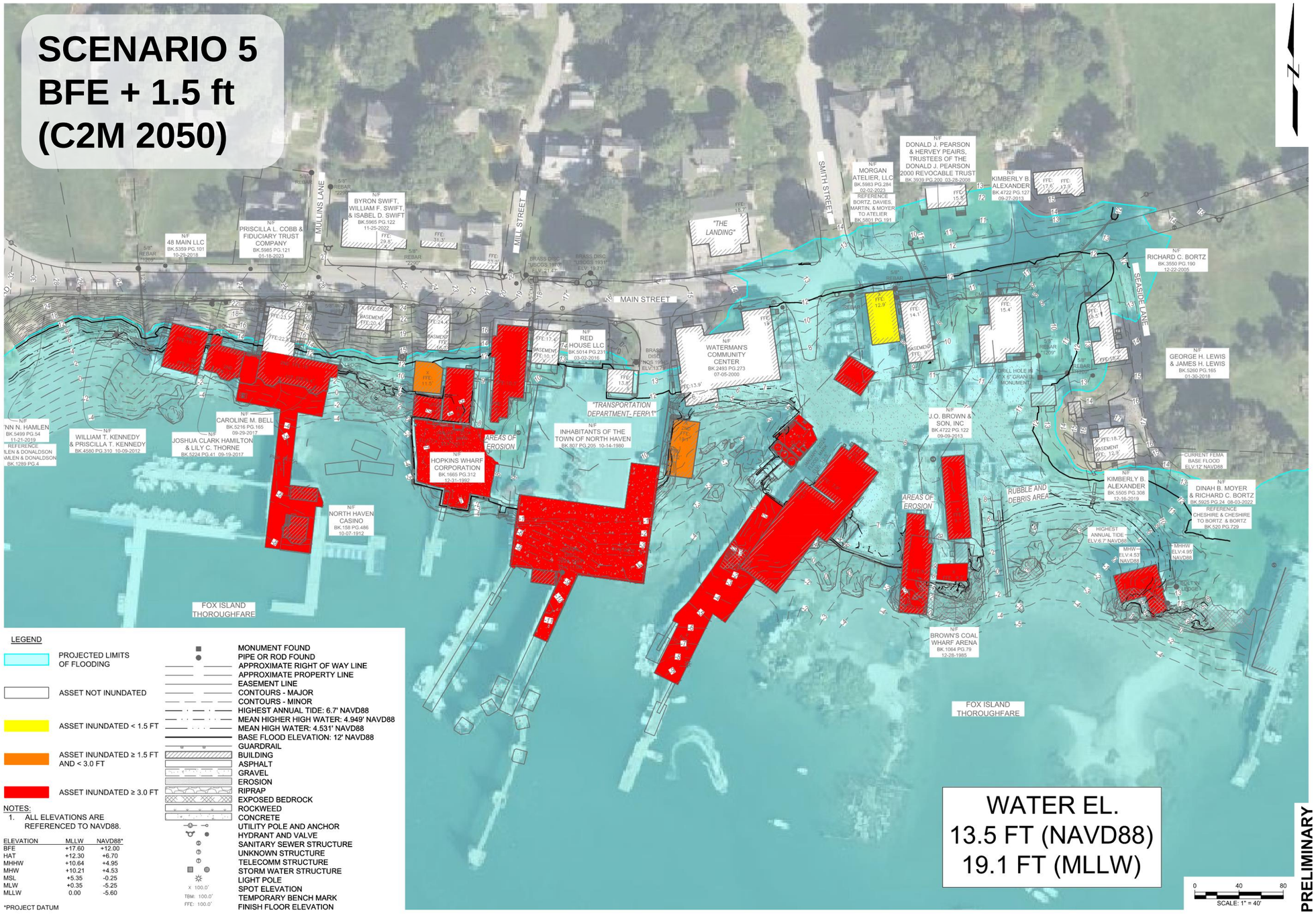
SHEET NAME

WATER EL 12 (EFFECTIVE BFE)

SHEET NO.

C-005

SCENARIO 5
BFE + 1.5 ft
(C2M 2050)



LEGEND

- PROJECTED LIMITS OF FLOODING
- ASSET NOT INUNDATED
- ASSET INUNDATED < 1.5 FT
- ASSET INUNDATED ≥ 1.5 FT AND < 3.0 FT
- ASSET INUNDATED ≥ 3.0 FT

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- PIPE OR ROD FOUND
- APPROXIMATE RIGHT OF WAY LINE
- APPROXIMATE PROPERTY LINE
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- CONTOURS - MAJOR
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- BASE FLOOD ELEVATION: 12' NAVD88
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- BUILDING
- ASPHALT
- GRAVEL
- EROSION
- RIPRAP
- EXPOSED BEDROCK
- ROCKWEED
- CONCRETE
- UTILITY POLE AND ANCHOR
- HYDRANT AND VALVE
- SANITARY SEWER STRUCTURE
- UNKNOWN STRUCTURE
- TELECOMM STRUCTURE
- STORM WATER STRUCTURE
- LIGHT POLE
- SPOT ELEVATION
- TEMPORARY BENCH MARK
- FINISH FLOOR ELEVATION

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MHW	+10.21	+4.53
MSL	+5.35	-0.25
MLW	+0.35	-5.25
MLLW	0.00	-5.60

*PROJECT DATUM

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5 MILK STREET
PORTLAND, ME 04101
(207)797-8901

TOWN OF NORTH HAVEN INCORPORATED JUNE 30 1846 MAINE

THOROFARE WATERFRONT RESILIENCE IMPROVEMENTS
NORTH HAVEN, MAINE

DRAFT

P.E. No.:	13033
Approved:	DJB
Checked:	CHK_BY
Drawn:	ACB
Designed:	DSN_BY
GEI Project	2306107

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NO.	DATE	ISSUE/REVISION	APP
2	4/26/2024	PRELIMINARY REVIEW	DJB
1	1/5/2024	PRELIMINARY REVIEW	DJB

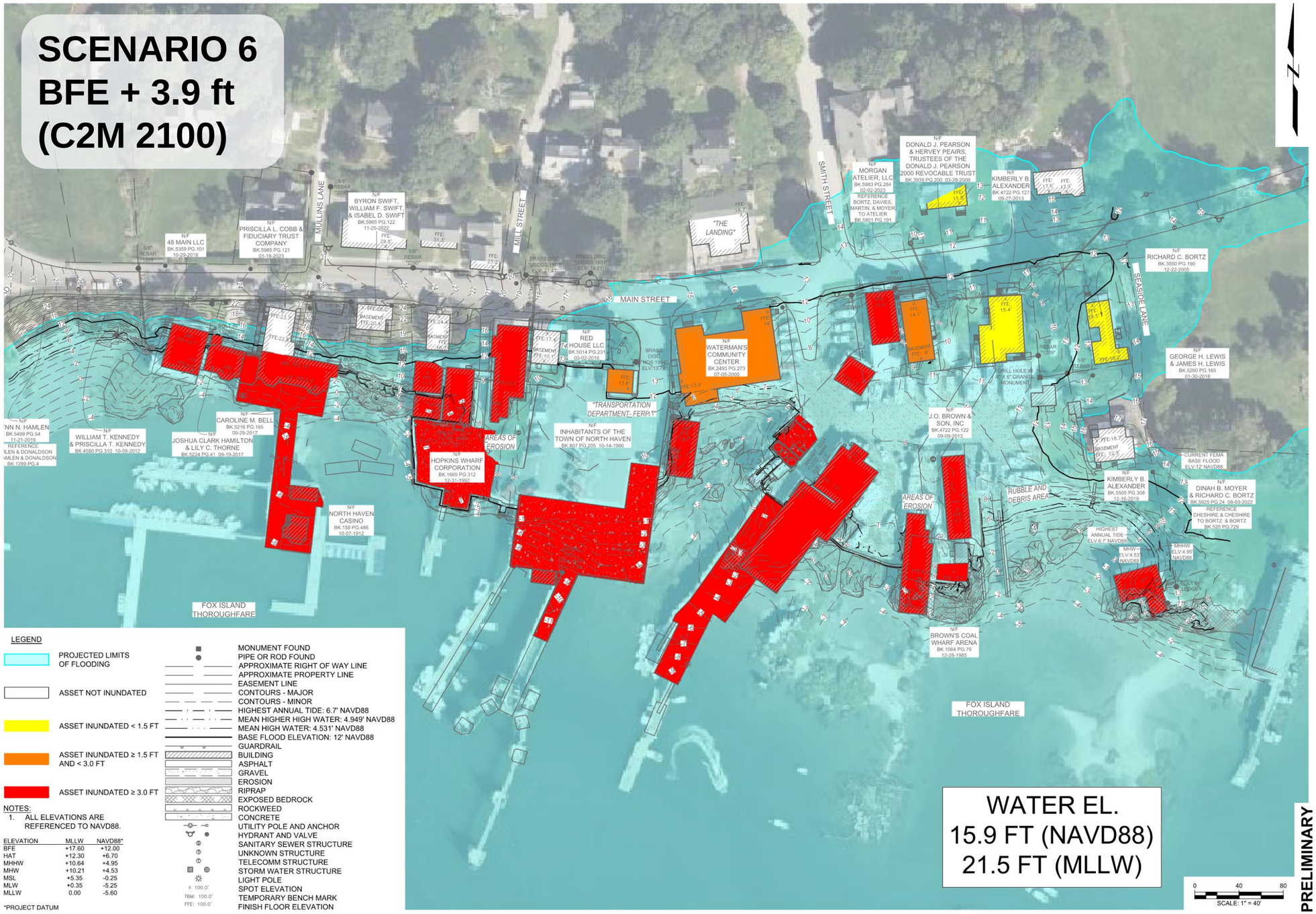
SHEET NAME

WATER EL 13.5 FT (EFFECTIVE BFE + 1.5 FT)

SHEET NO.

C-006

SCENARIO 6
BFE + 3.9 ft
(C2M 2100)



LEGEND

- PROJECTED LIMITS OF FLOODING
- ASSET NOT INUNDATED
- ASSET INUNDATED < 1.5 FT
- ASSET INUNDATED ≥ 1.5 FT AND < 3.0 FT
- ASSET INUNDATED ≥ 3.0 FT

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MHW	+10.21	+4.53
MSL	+5.35	-0.25
MLW	+0.35	-5.25
MLLW	0.00	-5.60

*PROJECT DATUM

WATER EL.
15.9 FT (NAVD88)
21.5 FT (MLLW)

0 40 80
SCALE: 1" = 40'

PRELIMINARY

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5 MILK STREET
PORTLAND, ME 04101
(207)797-8901

TOWN OF NORTH HAVEN INCORPORATED JUNE 30 1846 MAINE

THOROFARE WATERFRONT RESILIENCE IMPROVEMENTS
NORTH HAVEN, MAINE

DRAFT

P.E. No.:	13033
Approved:	DJB
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GEI Project	2306107

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NO.	DATE	ISSUE/REVISION	APP
2	4/26/2024	PRELIMINARY REVIEW	DJB
1	1/5/2024	PRELIMINARY REVIEW	DJB

SHEET NAME

WATER EL15.9 FT (EFFECTIVE BFE +3.9)

SHEET NO.

C-007

Adaptation Strategies

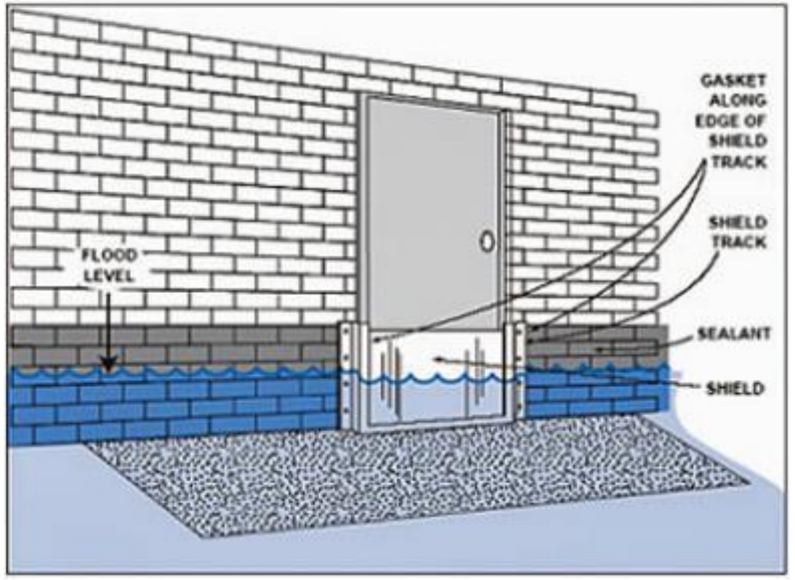
More Risk

Less Risk

Strategy	Do Nothing	Risk Reduction through Management & Operation	Floodproof (Dry / Wet)	Elevate	Retreat
Timescale of Feasibility	Very Short	Short	Moderate	Long	Long
Flood Risk Mitigation Effectiveness	None	Low	Moderate	High	Highest
Short-term cost of implementation	Low	Low	Moderate	High	Low to high
Long-term cost of maintenance and repair	High	High	Moderate	Low	Low
Visual Impact	Low	Low	Low	Moderate	High
Historic Impact	Low	Low	Low	Moderate	High
Social Impact	Low	Low	Low	Moderate	High
Future mitigation potential	Low	Low	Moderate	High	High

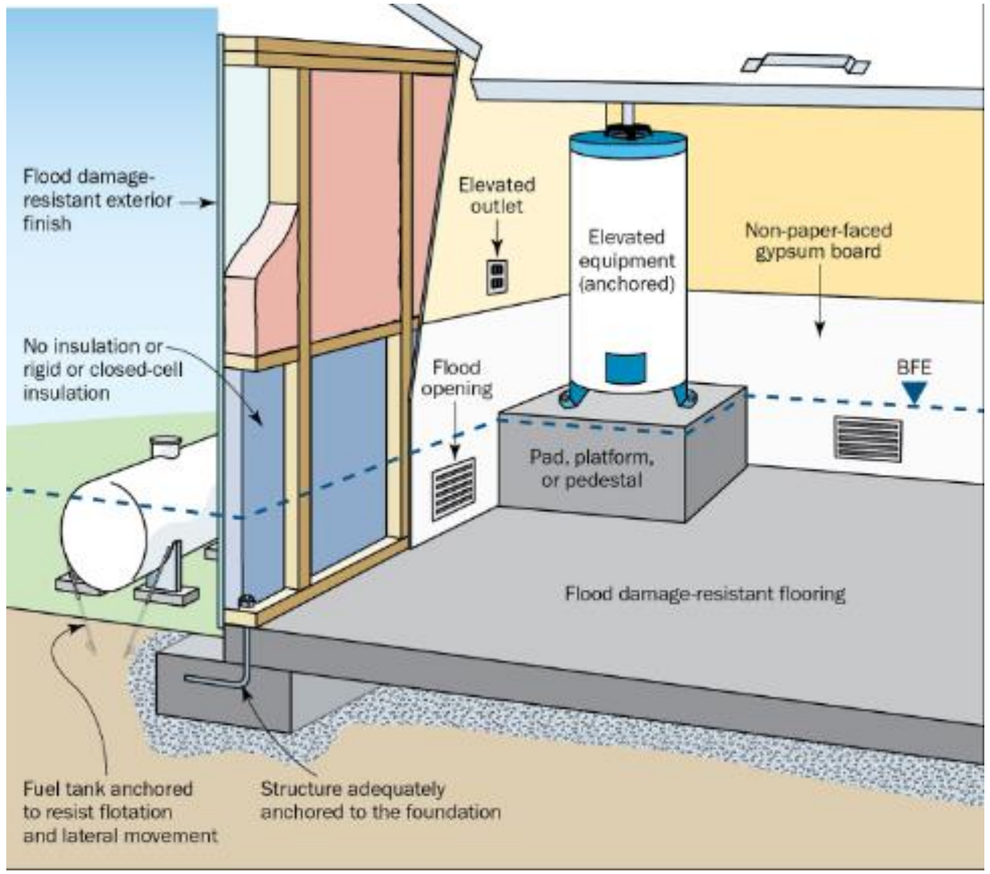
Adaptation Options: Buildings

- Dry Floodproof
  - Flood barriers at building openings
  - Flood resistant construction materials with sealed building envelope
  - Anchor fuel tanks
  - Ensure structure adequately design and anchored to resist uplift and lateral forces from flood exposure
  - Temporary and permanent solutions (engineered flood barriers, sandbags)



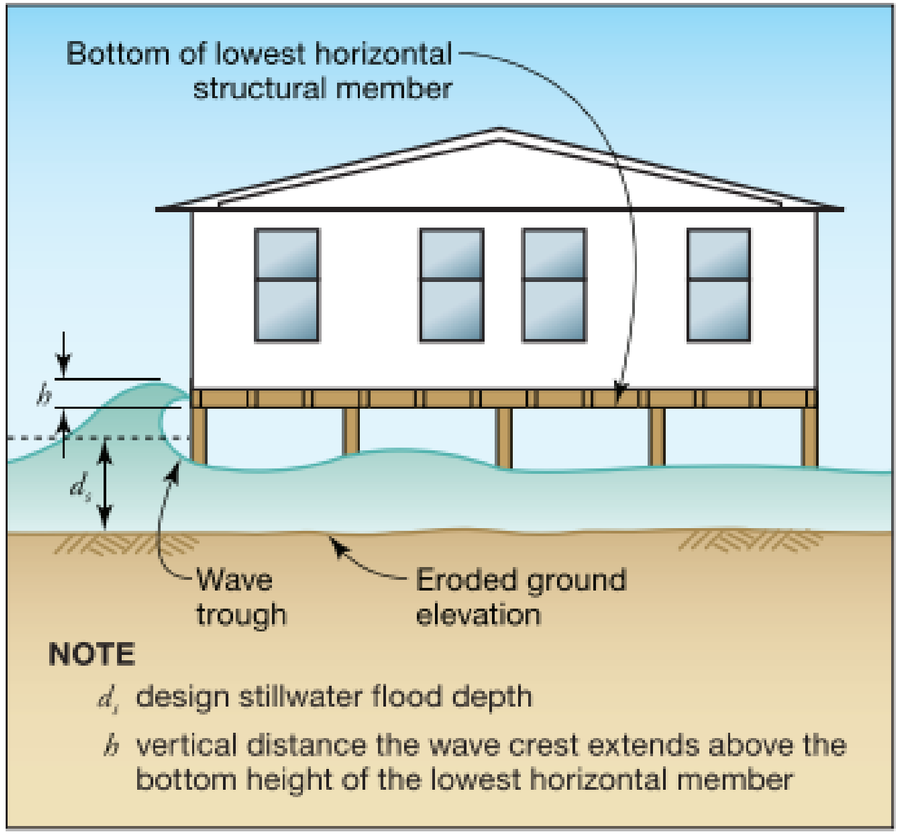
Adaptation Options: Buildings

- Wet Floodproof
  - Flood vents/openings
  - Flood-resistant materials below design flood elevation
  - Elevate utilities and mechanical systems
  - Anchor fuel tanks
  - Elevate and secure internal contents
  - Ensure structure adequately design and anchored to resist uplift and lateral forces from flood exposure



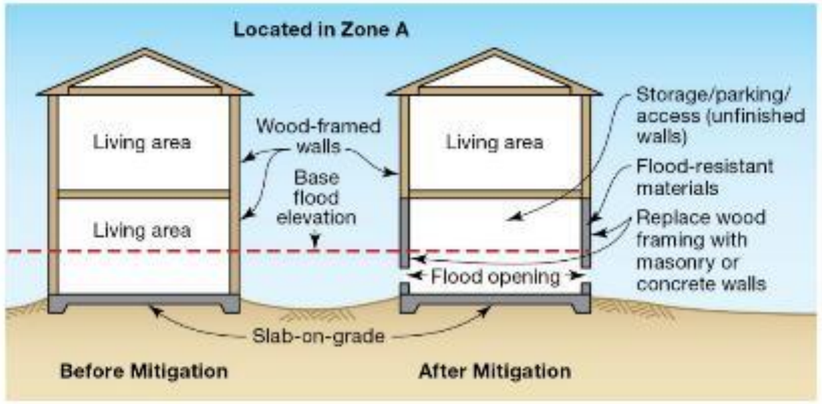
Adaptation Options: Buildings

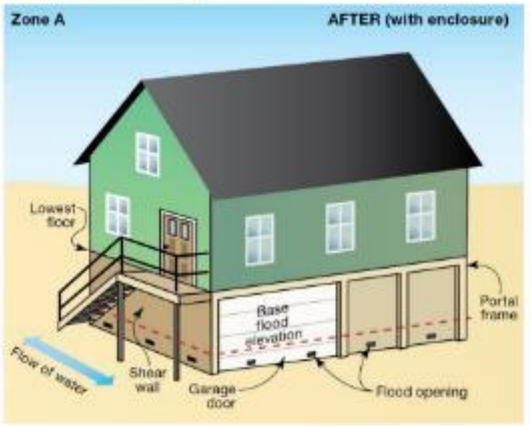
- Elevate
  - Minimum recommended FFE = 13.0 ft
    - *Base Flood Elevation (12.0 ft) + 1.0 ft to comply with North Haven Floodplain Management Ordinance and IRC*
  - *Consider* including additional freeboard as a factor of safety to further reduce risk and account for Sea Level Rise
  - *Consider* designing to V-Zone Standards
    - Elevation based on bottom of lowest horizontal member rather than FFE.
    - Open post or pile foundation



Adaptation Options: Buildings

- First Floor Conversion
  - Lowest occupied floor converted to unoccupied space
    - Flow-through construction
    - Flood resistant materials
    - Elevate utilities and mechanical systems
    - Ensure structure adequately design and anchored to resist uplift and lateral forces from flood exposure
    - Use for storage and other temporary uses
  - Existing second floor becomes lowest occupied floor





Adaptation Options: Buildings

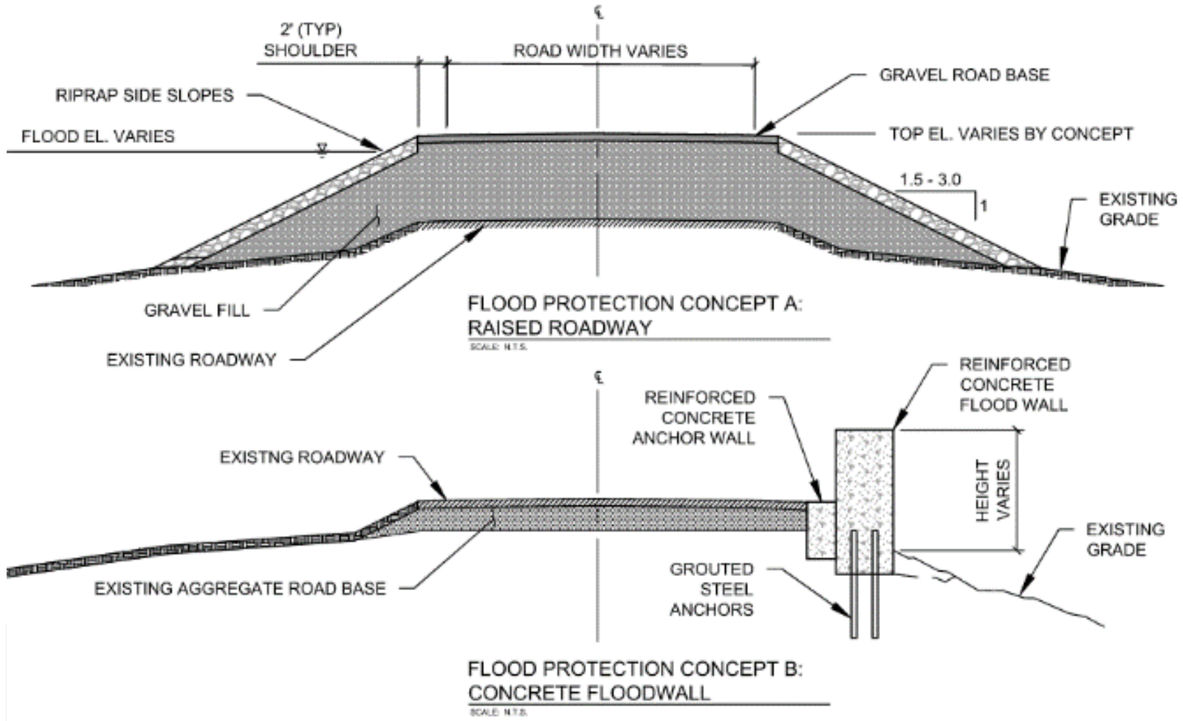
- Conversion of Use
  - Standards vary for residential and non-residential buildings vary
  - e.g. Based on North Haven Floodplain Management Ordinance:
    - Residential Structures must be elevated to FFE = BFE + 1 ft
    - Non-residential structures may be elevated or floodproofed to BFE + 1 ft
  - Conversion of use does not necessarily reduce risk to the structure itself, but does potentially offer greater flexibility and does reduce risk to inhabitants and building contents
- Retreat
  - Structures located within a flood hazard area inherently carry a level of risk
  - Retreat/relocation outside of flood zone can effectively minimize risk
  - Not feasible for uses dependent on direct access to the water
  - Lack of available property area to relocate may limit potential for retreat
  - Where possible, opportunities can exist for restoration of naturalized conditions

Adaptation Options: Piers & Wharves

- Piers & Wharves
  - Piers/wharves tend to be less sensitive to flooding than buildings, some overtopping can be tolerated provided that risk of structural damage is low and impact on usability is limited
  - Increased elevation can present challenges with function, e.g. longer ramps, further distance to load gear onto vessels
  - Generally, the minimum elevation for a pier would be 4 to 6 feet above HAT = 10.7 to 12.7 ft NAVD88
  - It is generally recommended to elevate structures to reduce exposure to flooding within range and constraints noted, as well as strengthen to resist uplift and lateral wave loading
  - Owners may consider the transition to floating structures which are tolerant of changes in sea level

Adaptation Strategies: Roads

- Elevate or protect to above future design elevation
- Per Federal Flood Risk Management Standard: BFE + 2 ft (14 ft) for non-critical & BFE + 3 ft (15 ft) for critical
- Temporary Measures: temporary closure, warning signage and lights
- Identify alternate detour routes



Adaptation Options: Buildings

Asset Number	Asset Name
1	48 Main Street
2	West Casino House
3	Middle & East Casino Houses
4	Casino Pier
5	Casino Pier One-Story Building
6	Casino Pier Two-Story Building
7	40 Main Street
8	34 Main Street
9	American Legion
10	Hopkins Wharf North Storage Building
11	Hopkins Wharf South Storage Building
12	Hopkins Wharf Gallery
13	Hopkins Wharf Parking Area
14	North Haven Gift Shop
15	22 Main Street
16	Ferry Ticket Building
17	Ferry Terminal
18	Ferry Terminal Pedestrian Shelter
19	The Red Barn
20	Waterman's Community Center
21	Brown's Pier
22	Brown's Boat Shop - North
23	Brown's Boat Shop - South
24	Brown's Fuel Pump and Storage Area - North
25	Brown's Fuel Pump and Storage Area - South
26	Brown's Garage
27	Brown's Coal Wharf Arena - South
28	Brown's Coal Wharf Arena - North
29	Brown's Coal Wharf Arena Patio
30	Brown's Wharf Storage Building
31	Brown's Office
32	7 Iron Point Road
33	11 Iron Point Road
34	7 Seaside Lane House
35	7 Seaside Lane Boat House
36	17 Iron Point Road
37	North Haven Library
38	29 Main Street
39	Post Office
40	The Landing
41	10 Iron Point Road
42	16 Iron Point Road
43	Main Street
44	Pedestrian Access

ELEVATION	MLLW	NAVD88*
BFE	+17.60	+13.00
HAT	+12.30	+6.70
MHHW	+10.84	+5.24
MHW	+10.21	+4.53
MSL	+5.35	-0.25
MLW	+0.35	-5.25
MLLW	0.00	-5.60

*PROJECT DATUM

	Asset Information				Flood Risk Analysis Scenario:						Adaptation Recommendations	
Asset Number	Asset Name	Asset Elevation	Use	FEMA Zone	1	2	3	4	5	6	Short-Term	Long-Term
1	48 Main Street	9.9	Residential	AE12	0.0	0.0	0.7	2.1	3.6	6.0	Temporary Measures, Wet Floodproof to Min. EL 13	Elevate and/or first floor conversion
2	West Casino House	9.0	Residential	AE12	0.0	0.0	1.6	3.0	4.5	6.9	Temporary Measures, Wet Floodproof to Min. EL 13	Elevate and/or first floor conversion
3	Middle & East Casino Houses	9.4	Residential	AE12	0.0	0.0	1.2	2.6	4.1	6.5	Temporary Measures, Wet Floodproof to Min. EL 13	Elevate and/or first floor conversion
4	Casino Pier	8.7	Pier/Wharf	AE12	0.0	0.0	1.9	3.3	4.8	7.2	No action. Monitor after storms and repair as needed.	Elevate structure during next major reconstruction
5	Casino Pier One-Story Building	9.8	Accessory Structure	AE12	0.0	0.0	0.8	2.2	3.7	6.1	Temporary Measures, Wet Floodproof to Min. EL 13	Elevate structure during next major reconstruction
6	Casino Pier Two-Story Building	9.6	Accessory Structure	AE12	0.0	0.0	1.0	2.4	3.9	6.3	Temporary Measures, Wet Floodproof to Min. EL 13	Elevate structure during next major reconstruction
7	40 Main Street	22.8	Residential	AE12	0.0	0.0	0.0	0.0	0.0	0.0	No Action	Coordinate with adjacent casino house owners to plan for building elevation changes.
8	34 Main Street	28.2	Residential	AE12	0.0	0.0	0.0	0.0	0.0	0.0	No Action	No Action
9	American Legion	24.4	Non-Residential	AE12	0.0	0.0	0.0	0.0	0.0	0.0	No Action	No Action
10	Hopkins Wharf North Storage Building	11.5	Non-Residential	AE12	0.0	0.0	0.0	0.5	2.0	4.4	Temporary Measures, Wet Floodproof to Min. EL 13	Consider elevating structure for increased resilience
11	Hopkins Wharf South Storage Building	9.5	Non-Residential	AE12	0.0	0.0	1.1	2.5	4.0	6.4	Temporary Measures, Wet Floodproof to Min. EL 13	Consider elevating structure for increased resilience
12	Hopkins Wharf Gallery	9.5	Non-Residential	AE12	0.0	0.0	1.1	2.5	4.0	6.4	Temporary Measures, Wet Floodproof to Min. EL 13	Consider elevating structure for increased resilience
13	Hopkins Wharf Parking Area	6.8	Pier/Wharf	AE12	0.0	1.4	3.8	5.2	6.7	9.1	Elevate and stabilize surface to minimize erosion	Elevate and stabilize surface to minimize erosion
14	North Haven Gift Shop	10.0	Non-Residential	AE12	0.0	0.0	0.6	2.0	3.5	5.9	Temporary Measures, Wet Floodproof to Min. EL 13	Consider elevating structure for increased resilience
15	22 Main Street	17.4	Residential	AE12	0.0	0.0	0.0	0.0	0.0	0.0	No Action	Floodproof basement
16	Ferry Ticket Building	13.8	Non-Residential	AE12	0.0	0.0	0.0	0.0	0.0	2.1	No action	Consider floodproofing, elevation, or relocation
17	Ferry Terminal	9.0	Pier/Wharf	AE12	0.0	0.0	1.6	3.0	4.5	6.9	Adopt management practices to mitigate impacts of flood events	Elevate structure during next major reconstruction
18	Ferry Terminal Pedestrian Shelter	10.3	Accessory Structure	AE12	0.0	0.0	0.3	1.7	3.2	5.6	Floodproof to Min. EL 13	Elevate structure during next major reconstruction of wharf
19	The Red Barn	11.2	Non-Residential	AE12	0.0	0.0	0.0	0.8	2.3	4.7	Floodproof to Min. EL 13	Elevate structure above FDFE
20	Waterman's Communtiy Center	13.9	Non-Residential	AE12	0.0	0.0	0.0	0.0	0.0	2.0	No Action	Floodproof to Future Design Flood Elevation
21	Brown's Pier	8.0	Pier/Wharf	AE12	0.0	0.2	2.6	4.0	5.5	7.9	Adopt management practices to mitigate impacts of flood events, strengthen structure to improve resistance to uplift and wave forces	Elevate structure above FDFE
22	Brown's Boat Shop - North	7.9	Non-Residential	AE12	0.0	0.3	2.7	4.1	5.6	8.0	Floodproof to Min. EL 13	Elevate structure above FDFE
23	Brown's Boat Shop - South	8.3	Non-Residential	AE12	0.0	0.0	2.3	3.7	5.2	7.6	Floodproof to Min. EL 13	Elevate structure above FDFE
24	Brown's Fuel Pump and Storage Area - North	7.2	Fuel	AE12	0.0	1.0	3.4	4.8	6.3	8.7	Elevate/floodproof to Min. EL 13	Relocate, elevate above FDFE
25	Brown's Fuel Pump and Storage Area - South	8.9	Fuel	AE12	0.0	0.0	1.7	3.1	4.6	7.0	Elevate/floodproof to Min. EL 13	Relocate, elevate above FDFE
26	Brown's Garage	7.8	Non-Residential	AE12	0.0	0.4	2.8	4.2	5.7	8.1	Floodproof to Min. EL 13	Elevate structure above FDFE
27	Brown's Coal Wharf Arena - South	10.5	Non-Residential	AE12	0.0	0.0	0.1	1.5	3.0	5.4	Floodproof to Min. EL 13	Elevate structure above FDFE
28	Brown's Coal Wharf Arena - North	8.9	Non-Residential	AE12	0.0	0.0	1.7	3.1	4.6	7.0	Floodproof to Min. EL 13	Elevate structure above FDFE
29	Brown's Coal Wharf Arena Patio	9.2	Non-Residential	AE12	0.0	0.0	1.4	2.8	4.3	6.7	Floodproof to Min. EL 13	Elevate structure above FDFE
30	Brown's Wharf Storage Building	9.1	Non-Residential	AE12	0.0	0.0	1.5	2.9	4.4	6.8	Floodproof to Min. EL 13	Elevate structure above FDFE
31	Brown's Office	12.9	Non-Residential	AE12	0.0	0.0	0.0	0.0	0.6	3.0	Floodproof to Min. EL 13	Increase floodproofing EL or Elevate structure above FDFE
32	7 Iron Point Road	14.1	Residential	AE12	0.0	0.0	0.0	0.0	0.0	1.8	Floodproof basement and improve drainage beneath building	Consider elevating above FDFE
33	11 Iron Point Road	15.4	Residential	AE12	0.0	0.0	0.0	0.0	0.0	0.5	Floodproof basement	Consider elevating above FDFE
34	7 Seaside Lane House	18.7	Residential	AE12	0.0	0.0	0.0	0.0	0.0	0.0	Floodproof basement	Consider increasing floodproofing elevation or elevating structure above FDFE
35	7 Seaside Lane Boat House	9.2	Non-Residential	AE12	0.0	0.0	1.4	2.8	4.3	6.7	Floodproof to Min. EL 13	Elevate structure above FDFE
36	17 Iron Point Road	15.2	Residential	AE12	0.0	0.0	0.0	0.0	0.0	0.7	No action	Consider elevating above FDFE
37	North Haven Library	29.8	Non-Residential	AE12	0.0	0.0	0.0	0.0	0.0	0.0	No action	No action
38	29 Main Street	31.3	Residential	AE12	0.0	0.0	0.0	0.0	0.0	0.0	No action	No action
39	Post Office	23.2	Non-Residential	AE12	0.0	0.0	0.0	0.0	0.0	0.0	No action	No action
40	The Landing	18.7	Non-Residential	AE12	0.0	0.0	0.0	0.0	0.0	0.0	No action	No action
41	10 Iron Point Road	15.8	Residential	AE12	0.0	0.0	0.0	0.0	0.0	0.1	No action	Consider elevating above FDFE
42	16 Iron Point Road	17.6	Residential	AE12	0.0	0.0	0.0	0.0	0.0	0.0	No action	No action
43	Main Street	12.5	Road (Critical Access)	AE12	0.0	0.0	0.0	0.0	1.0	3.4	Adopt management practices to mitigate impacts of flood events	Plan for elevating road to above FDFE, and minimum BFE+3-ft (min. 15.0') to meet FFRMS standards for critical assets
44	Pedestrian Access	6.0	Access (non-critical)	AE12	0.7	2.2	4.6	6.0	7.5	9.9	Adopt management practices to mitigate impacts of flood events	Construct elevated boardwalk to connect elevated sites at Ferry Terminal and J.O. Brown's and limit tidal disruption to access

Next Steps

1. Develop Resilient Thorofare Master Site Plan
    1. Property owner coordination
    2. Consensus building
    3. Detailed design development
    4. Coastal flood modeling
    5. Site investigations
2. Permitting
3. Funding
4. Phased Implementation

FEMA Building Resilient Infrastructure & Communities (BRIC) Grant

THANK YOU!

Questions?

Daniel Bannon, P.E., CFM, BC.PE
Coastal Practice Leader
207.347.2372
dbannon@geiconsultants.com

GEI Consultants

Consulting
Engineers and
Scientists

Next Steps: Funding

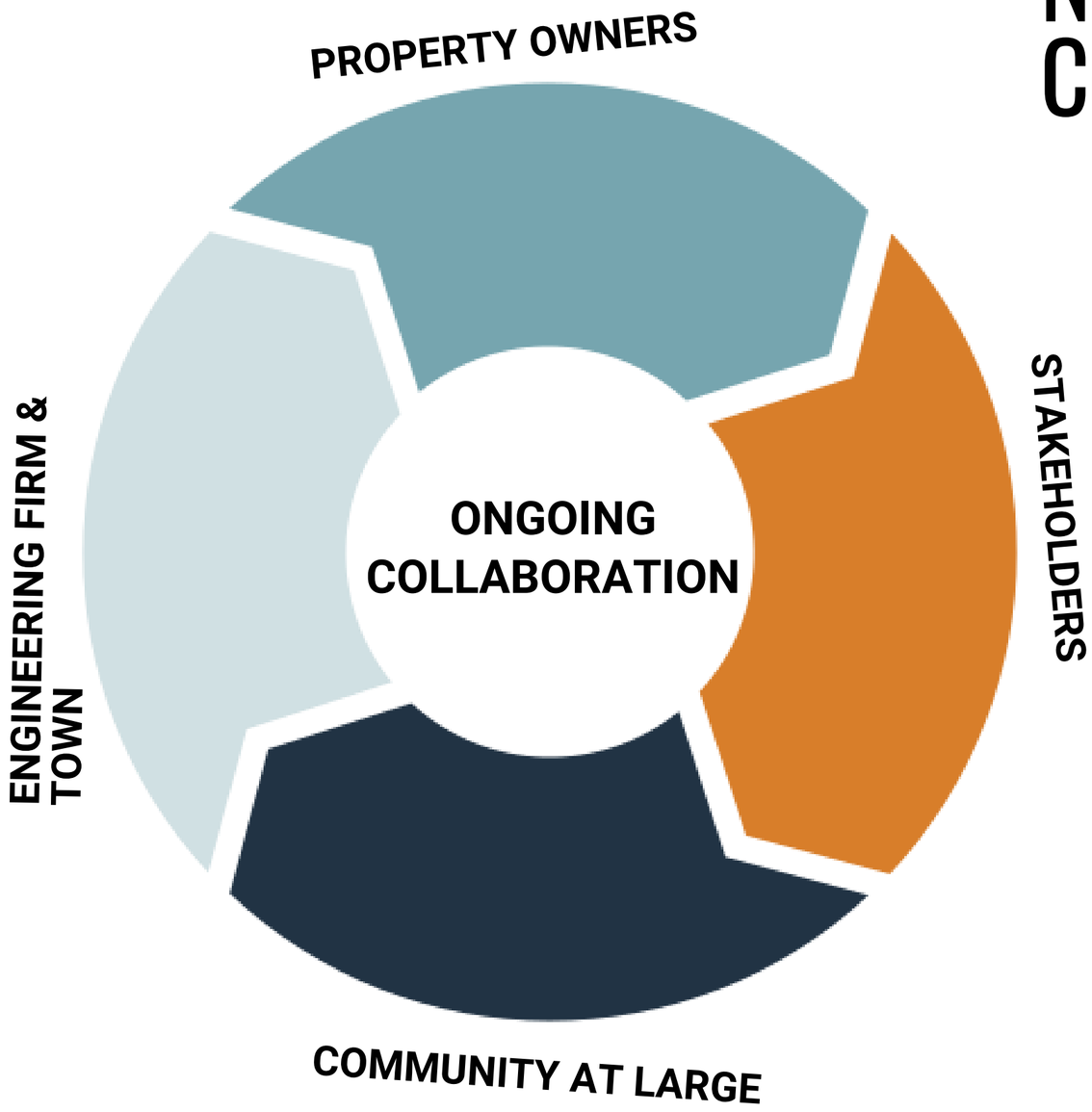
Anticipated Funding:

Phase 1: *Secured a $10,000 ShoreUp grant and Town funds.*

Phase 2: *Awarded a $200,000 FEMA/BRIC project scoping grant.*

- *Apply for additional FEMA Hazard Mitigation funding*
- *Storm Response & Resilience Grants in Maine:*
  - *Working Waterfront Resiliency Grant*
  - *Business Recovery & Resilience*

Phase 3: *Apply for FEMA/BRIC and other construction grants*



Next Steps: Continued Community Engagement

Cycles of Input & Ongoing Communication

- Property Owners
- Stakeholders
- Community
- Repeat

Engagement Goals

- Compromise
- Consensus Decisions
- Transparency
- Community-Wide Communications

Phase 2 Objectives

- Designing & Dreaming
- Considering Creative Feasible Solutions
- Phased Approach
- Diverse Funding Sources
- Additional Professionals

What will we do?
Where will we end up?
That is up to us.

Questions?

Appendix

Community Priorities Alignment


North Haven is a remarkable island community –
resourceful, caring, safe, and inclusive – committed to
sustaining a thriving year-round economy, stewarding our
natural resources, and preserving scenic beauty
for current and future generations.
photo credit Bill Trevaskis

Workforce Development & Economic Diversification

Objective Foster a diverse economy that sustains both a year-round workforce and the human infrastructure (childcare, healthcare, education) needed to support that workforce.

Camoin's Economic Assessment top strategic priority areas:

- Waterfront Infrastructure and Planning
- Flow and Movement of Goods and People

Environmental Sustainability & Climate Change Impacts

Objective Take actions that support environmental sustainability and address the impacts of climate change on the island.

Priority actions to date:

- Completed freshwater resource study
- Received Coastal Community Grant for further study of risk of saltwater intrusion into Fresh Pond
- CRP enrollment and grant application for LED streetlights