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Project Number: 3611191238

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**Subject: Waterfront Access Site Evaluation, North Haven, Maine
Penobscot Bay Working Waterfront Resiliency Analysis
State of Maine, Department of Marine Resources**

Wood Environment & Infrastructure Solutions, Inc. (Wood) is pleased to provide the Maine Department of Marine Resources (DMR) this report on the evaluation of four potential waterfront access sites in North Haven, Maine (town). This report supplements the findings of Wood's assessment of active working waterfront access sites in nine other communities included in DMR's Penobscot Bay Working Waterfront Resiliency Analysis project. Reports on the other nine working waterfront sites are provided under separate cover. Our work was performed in general accordance with the scope of work and the terms and conditions included in Wood's proposal dated 1 March 2019.

1.0 INTRODUCTION

Wood's original scope of work for DMR's Penobscot Bay Working Waterfront Resiliency Analysis Project included an assessment of the Pulpit Harbor Town Dock in North Haven, Maine relative to vulnerability to flooding under various flood and sea level rise scenarios (refer to **Figure 1**). At the request of the town, DMR requested that Wood alter the scope of work to accommodate an evaluation of the feasibility of developing a new or improved waterfront access at the existing Pulpit Harbor Town Dock and three alternate sites: Issy's Beach, Mullen Head, and the town waterfront along Main Street from Ferry Beach to the wastewater treatment plant (town waterfront); refer to site locations on **Figure 1**. Each location was selected by the town based on availability of town-owned land. The overarching goal of the town is to diversify the island's economy by providing improved waterfront access and associated infrastructure for lobster fisherman, aquaculture and recreational boating. The town has indicated that the following site characteristics are preferred for the proposed waterfront access site:

- Working waterfront access for commercial fishermen, including the ability to drive trap trailers out onto a dock to load and unload traps;
- Access for boats and gear associated with aquaculture operations and related research, such as scallop, kelp, oyster, urchin, and salmon farming;
- Separate floats for recreational/non-commercial users, acknowledging the growing popularity of North Haven as a yachting destination;



- A boat launch ramp for access by commercial and recreational boaters; and
- Vehicle parking nearby that can accommodate cars, trucks and boat trailers.

2.0 SCOPE OF WORK

To meet the town's need for a preliminary review of the four site options, Wood completed the work detailed below.

1. Reviewed readily-available information for the four site options (Pulpit Harbor, Izzy's Beach, town waterfront and Mullen Head), including background information provided by the town relating to:
 - a. Area topography;
 - b. Bathymetry and related boat access;
 - c. Navigational hazards;
 - d. Land ownership and neighboring property owner concerns;
 - e. Storm vulnerability and sea level rise (based on readily-available regional information);
 - f. General road access and available land for parking; and
 - g. Environmental features, such as wading bird habitat and coastal wetlands.
2. Conducted a visit on September 26, 2019 to the prospective sites and participated in a meeting with the Rick Lattimer, Town Administrator, Tammy Brown, Tax Assessor, and Linda Darling, a representative of the Board of Selectmen to discuss Wood's initial findings, and to obtain perspectives of the town regarding the site options.
3. Evaluated the characteristics of each of the four site options and conducted a ranking of each based on relative favorability for several criterion.
4. Prepared this report detailing the objectives, methodology and findings of the preliminary site review.

3.0 FINDINGS

Plans showing coastal features of the four sites are shown on **Figures 2 through 5**. Photos of each of the four sites are included in **Appendix A**. Key site features depicted on the plans include:

- Tax-exempt status (land potentially accessible to the public);
- Site and area topography;
- Road access;
- Underwater cable areas;
- Navigational hazards (e.g., ledges);
- Highest Annual Tide elevation (HAT) plus 1.6 ft of hypothetical sea level rise (SLR)¹;
- Mean Higher High Water (MHHW) and Mean Lower Low Water (MLLW) elevations;
- Demarcation of 6-ft water depth at MLLW for all tide access by most boats;

¹ Based on inundation elevation data published by the Maine Geological Survey for a hypothetical sea level rise of 1.6 ft (https://www.maine.gov/dacf/mgs/hazards/slr_ss/)



- Wading bird habitat;
- Eel grass beds; and
- Coastal wetlands.

Figure 6 shows potential storm surge hazards for a hypothetical category 2 hurricane as mapped by the Maine Geological Survey using the National Oceanic and Atmospheric Administration (NOAA) Sea, Lake, and Overland Surges from Hurricanes (SLOSH) model (<https://www.maine.gov/dacf/mgs/hazards/slosh/faq.htm>). Hurricanes striking Maine are rare, and evaluation of a category 2 event provides a reasonably conservative basis to assess vulnerability of each site location.

3.1 Pulpit Harbor Town Dock

The town currently operates a public dock at Pulpit Harbor with parking for about 7 vehicles, an approximately 150-ft long fixed pier, and two floating docks (**Figure 2**). The town owns less than 1 acre of land at the dock, and leases access to the dock from a non-profit conservation group, the North Haven Conservation Partners (NHCP). The NHCP owns about 3 acres of undeveloped land adjacent, and east of, the town dock. Review of data for this location, including plan details on **Figures 2 and 6**, indicates the following strengths and limitations.

Strengths

- Existing facility which provides public access to harbor;
- Reasonably good line-of-site along Pulpit Harbor Road;
- Existing parking area, though limited spaces, above HAT elevation plus 1.6 ft SLR;
- Reasonable distance to all-tide access for most boats;
- Well-protected harbor with few navigational hazards;
- Low risk of storm impact;
- Existing boat moorings;
- No mapped wading bird habitat or eel grass beds proximate to the dock; and
- Relatively flat, accessible land owned by non-profit group to east with six additional parking spaces along road.

Limitations

- Limited space for parking on town-owned land;
- Narrow stretch of harbor prone to congestion and limited number of moorings for future growth;
- Relatively steep shoreline posing challenges for boat ramp construction; and
- Nearby residential properties with potential for concerns regarding noise, traffic and changes in aesthetics.

3.2 Izzy's Beach

Izzy's beach includes about 0.25 acres of town-owned land currently used for seasonal access by lobster fishermen for loading and unloading lobster traps (**Figure 3**). The site slopes gently to the shoreline,



allowing trailer access for launching, or hauling of trap and other gear to boats at or near high tide. The town has installed wooden bumpers along the south side of the adjacent bridge to help minimize the impact of boat contact with the bridge.

Strengths

- Gently sloping beach head provides public access to harbor for launching or loading gear;
- Shoreline amenable to boat ramp construction;
- Reasonable distance to all-tide access for most boats (about 180 ft from high tide mark); and
- Well-protected harbor with few navigational hazards.

Limitations

- Limited line-of-site along Pulpit Harbor Road;
- Very limited space for parking on town-owned land;
- Mapped wading bird habitat along shoreline;
- Elevation of Town-owned land below HAT plus 1.6 ft SLR (i.e., prone to flooding);
- Vulnerable to high-intensity storm damage; and
- Nearby residential properties with potential concern regarding noise, traffic and changes in aesthetics.

3.3 Town Waterfront

The town waterfront option extends roughly from Ferry Beach to the west, to the WWTP to the east (**Figure 4**) and focuses on town-owned land. This area of shoreline includes town-owned waterfront at Ferry Beach (<0.25 acre), and at the WWTP (about 0.3 acres). The town leases land to the Maine State Ferry Service/Department of Transportation, and about 25 parking spaces are shared by the town and ferry service at the terminal area (about 0.5 acres).

The ferry terminal includes a concrete pier with shared use by the ferry service and town. The pier provides access at or near high tide for boats loading/unloading gear. The town operates a floating dock for boat tie-up on the southwest corner of the concrete ferry terminal pier. The WWTP includes a leased residence, subgrade wastewater treatment tanks, and about 100 ft of waterfront.

Strengths

- Close to town center and amenities;
- Existing town dock with some parking at ferry terminal;
- Concrete deck at ferry terminal with access for gear loading/unloading;
- Reasonable distance to all-tide access for most boats in area of ferry terminal (about 200 ft from high tide mark); and
- Limited extent of coastal wetlands.



Limitations

- Congested town center with limited parking;
- Predominance of privately-owned waterfront land;
- Busy harbor with substantial boat traffic;
- Substantial distance to all-tide access (about 500 ft) and navigational hazards in vicinity of WWTP;
- Town-owned land below HAT elevation plus 1.6ft SLR at ferry terminal (i.e., prone to flooding);
- Vulnerable to high-intensity storm damage; and
- Cable/utility crossing area between Ferry Beach and boatyard east of ferry terminal.

3.4 Mullen Head

The town owns an estimated 200 acres of largely undeveloped land at Mullen Head (**Figure 5**). The property is accessed by a gravel road and includes a dedicated camping area (for use by area residents and guests), picnic tables and barbeque grills, outhouses, and a storage barn for maintenance equipment. The drive from the town center to the shore at Mullen Head is about 4 miles.

Strengths

- Substantial available town-owned land for access and parking;
- Gently sloping shoreline at Banks Cove (Big Beach), picnic area on southeast side of Mullen Head, and other waterfront locations;
- HAT plus 1.6 ft SLR line close to MHHW mark (i.e., low risk of tide-induced inland flooding); and
- Moderate distance to all-tide access for most boats (e.g., about 250 ft from high tide mark at Big Beach and picnic area).

Limitations

- Approximate 4-mile drive to town center;
- Access currently provided over narrow winding and undulating gravel roads;
- Northeast exposure with high risk of impact from storms (e.g., northeasters);
- Mapped wading bird habitat along shoreline east of ferry terminal and in vicinity of ferry beach;
- Mapped eel grass beds in Banks Cove (although eel grass not readily apparent during site visit on September 25, 2019); and
- Navigational hazards in Banks Cove.

4.0 SYNTHESIS

Table 1 provides a qualitative ranking of each of the four waterfront access site options based on the relative strengths and weaknesses for each. A ranking score of 1 to 4 corresponds to a range of highly unfavourable (1) to highly favourable (4). The criteria include proximity to the town center, road access, available acreage, harbor congestion, proximity to all tide access, storm vulnerability, environmental impact and relative cost. The environmental impact criterion considered proximity of the site to mapped wading bird habitat, eel grass and extent of coastal wetlands. The evaluation of relative cost was based on the



Table 1. Waterfront Access Option Ranking

Location	Proximity to Town Center	Road Access	Available Acreage	Harbor Congestion	Proximity of all Tide Access	Storm Vulnerability	Environmental Impact	Relative Cost	TOTALS
Pulpit Harbor	3	3	2	2	3	4	3	3	23
Izzy's Beach	3	2	1	2	3	2	3	2	18
Ferry Landing Beach - WWTP	4	2	1	1	3	2	3	1	17
Mullen Head	1	2	4	4	4	2	3	1	21
Key:	4	Highly favorable							
	3	Moderately favorable							
	2	Moderately unfavorable							
	1	Highly unfavorable							



general complexity of planning, permitting and constructing a proposed waterfront access facility including parking, a launch ramp, and multi-use commercial pier and dock structures; Wood's scope of work did not include an opinion of costs for the four site options.

As shown, the highest ranking alternative was the Pulpit Harbor Town Dock, based on its current use for water access, the existing pier and docks, and dedicated parking, although limited. Improvements to this site would be required to meet the town's goals for a multi-use recreational and commercial facility, including installation of a boat ramp, expanded parking, reconstruction of the pier to accommodate vehicle access and addition of utilities such as water, power and power lifts. Even though this facility ranked highest, it only scored 23 out of a maximum score of 32 due to significant challenges in achieving the town's goals at this location. These challenges include, among others, relatively steep shoreline complicating construction of a boat ramp, lack of town-owned land for parking and access, residential setting, and a narrow harbor which limits available mooring capacity for future growth. The complexity and cost of improving the Pulpit Harbor Town Dock site could be reduced if adjacent land were available to the town through acquisition or land exchange – such as the land owned by the NHCP to the east.

The limitations for each of the four sites and associated ranking indicates no one site is ideal for development to meet the town's goals. Izzy's Beach lacks the available land for parking and access and is very close private residences; the town waterfront is close to village amenities, but lacks land for parking and access and is located in a congested harbor front area; Mullen Head has substantial land, but is complicated by improvements needed to the narrow gravel access road, is vulnerable to storms due to its northeast exposure, and is valued for its scenic coves and beaches.

The town may consider a multi-site solution for improved commercial and recreational waterfront access and facilities. Examples are provided below.

Pulpit Harbor Town Dock: Improvements could enhance recreational boating and limited commercial use experienced at this location. Upgrades for consideration could include:

- Levelling and resurfacing the parking area to improve access and reduce erosion;
- Working with NHCP to identify potential adjacent land for expanded parking;
- Implementing stormwater runoff controls in association with improved landscaping for buffering noise and maintaining scenic quality;
- Coastal slope protection (e.g., riprap)
- Water and power service;
- Expanding the pier width and adding one or more finger docks for added tie up capacity; and
- A mooring layout plan that identifies the optimum number and location of moorings for safety and ease of access.

Town Pier and Dock: Improvements at the pier and town dock on the town waterfront could focus on commercial boating needs based on current heavy use by fishermen and proximity to commercial boatyards, fuel and supplies. Examples of improvements for consideration:

- Expanding the concrete deck for added parking and loading space;
- Water and power service to the pier and dock;
- Adding a power lift for loading/unloading gear; and



- Expanding length and number of floating docks.

Mullen Head: Improvements at Mullen Head could focus on recreational and limited commercial use to help preserve the scenic qualities of this area. Improvements could include:

- A public boat ramp at a suitable location, such as at the picnic area where existing roads and relatively flat access area could accommodate parking and launching;
- Landscaping and associated erosion control and storm water runoff minimization;
- Modest widening and levelling of roads; and
- Water and power service.

5.0 CONCLUSIONS

The Town of North Haven is valued for its unique scenic character, fisheries, and recreational boating opportunities in and around its many harbors, beaches and small islands. The town seeks to maintain the natural beauty of the island, while cultivating thoughtful, beneficial growth for the benefit of the island's residents and visitors. As part of this growth, the town is considering improved commercial and recreational boating facilities. The evaluation presented herein focused on the potential development of improved waterfront access and associated facilities at four sites currently used, or where land is available, for access (e.g., town owned land).

This evaluation indicates that none of the four sites is ideal for meeting the town's goals for a commercial and recreational boating access site, primarily due to the limitation of available land for access and parking (Pulpit Harbor Town Dock, Izzy's Beach and town waterfront). At the one site where land is available, Mullen Head, the northeast exposure of the two coves (Banks and Mullen Cove) pose the risk of high storm impact. Each of the four sites would require environmental permitting and consideration of coastal wetlands and wildlife habitat.

A potential solution to the limitations posed by each of the four site options is to consider improvements to multiple sites, where collectively, the waterfront access goals of the town can be met. For example, improved public access and facilities at the Pulpit Harbor Town Dock and Mullen Head (e.g., picnic area) with a focus on enhancing recreational boating. At the town dock and ferry terminal pier along the town waterfront, improvements could prioritize commercial boating with addition of parking, loading space and power lift equipment.

This evaluation is a preliminary step in helping the town and its community members understand the strengths and limitations of the four site options and provides examples of improvements that the town may consider for meeting the future needs of the island's residents and visitors. Future efforts may include an engineering evaluation and estimation of costs for waterfront access improvements at one or more preferred sites, identification of permitting requirements, and consideration of state and federal funding resources for which the town is likely eligible.



6.0 CLOSURE

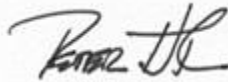
Wood appreciates the opportunity to support the Town of North Haven with this evaluation. Please contact us with any questions or comments.

Sincerely,

Wood Environment & Infrastructure Solutions, Inc.



D. Todd Coffin
Associate Project Manager



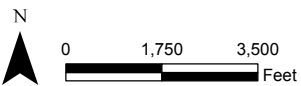
Peter H. Thompson
Principal Project Manager

Attachments: Table 1 – Waterfront Access Option Ranking
Figure 1 – Waterfront Access Site Alternatives
Figure 2 – Pulpit Harbor Town Dock
Figure 3 – Izzy's Beach
Figure 4 – Ferry Beach to WWTP
Figure 5 – Mullen Head
Figure 6 – Storm Surge Hazard – Category 2 Hurricane
Appendix A - Photolog





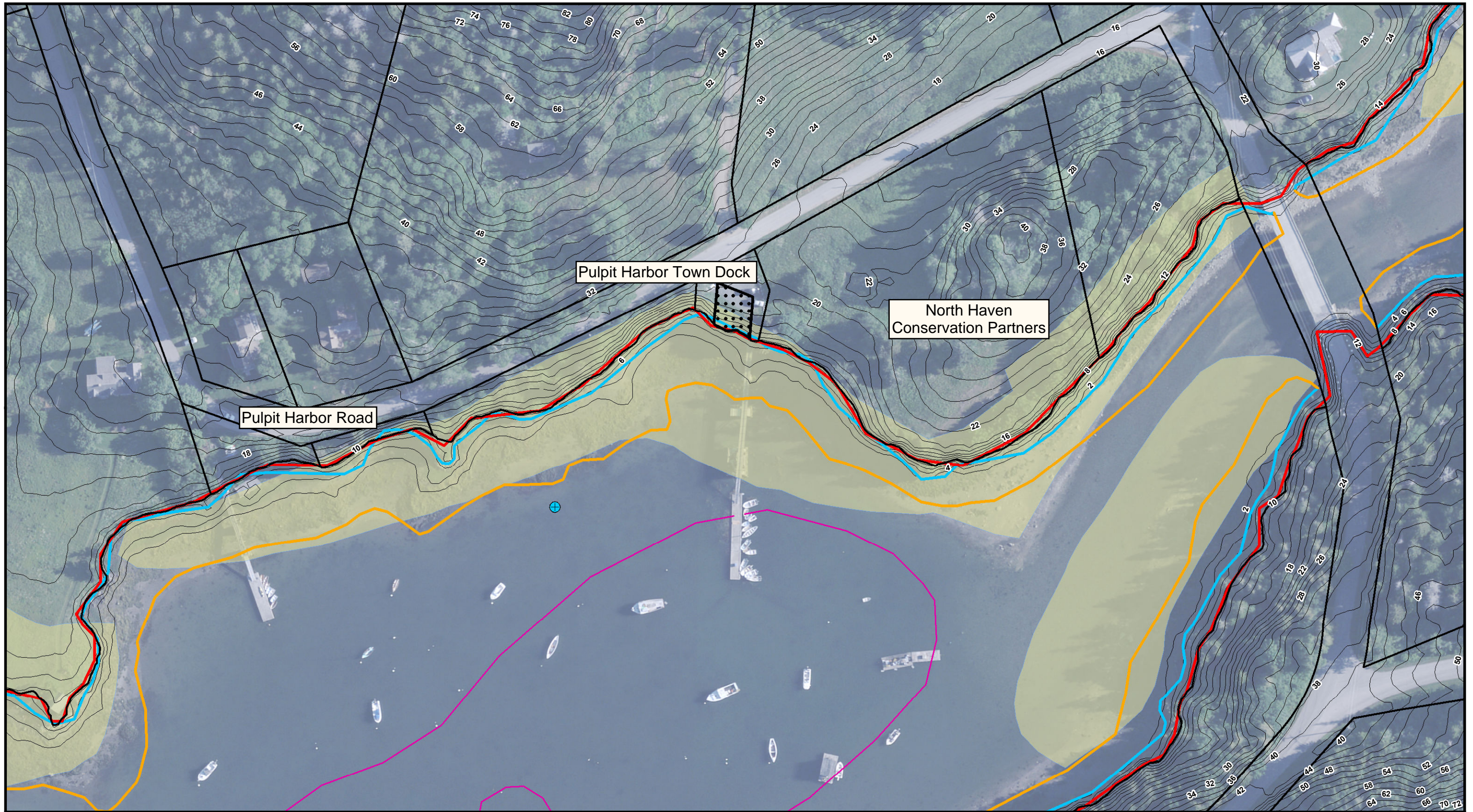
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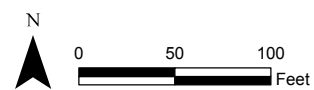
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Figure 1
Waterfront Access Site Alternatives

Waterfront Access Site Assessment, North Haven, Maine
Penobscot Bay Working Waterfront Resiliency Analysis



wood.



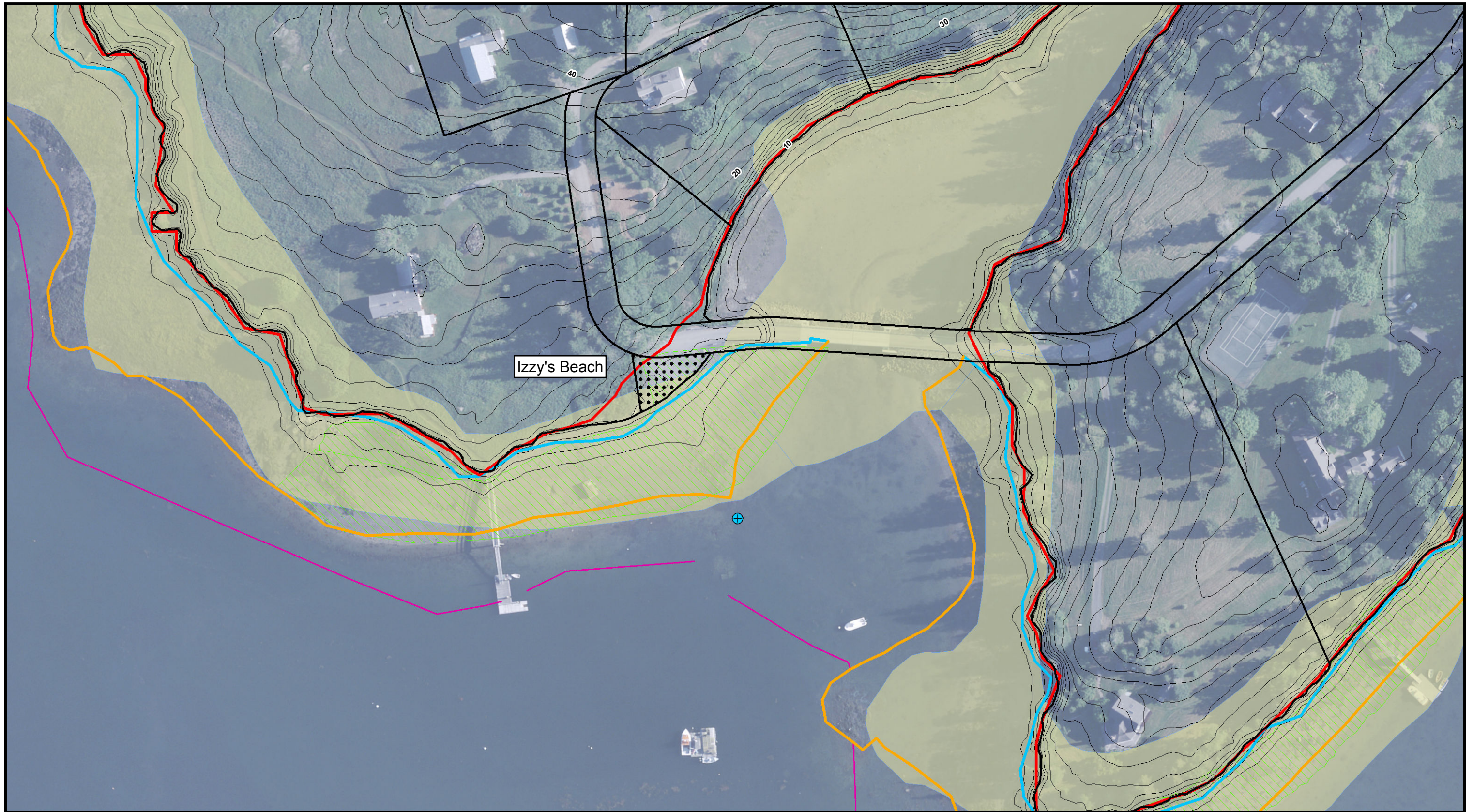
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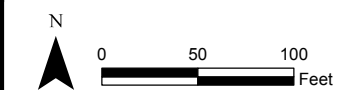
- Highest Annual Tide + 1.6 Feet
- MHHW
- MLLW
- -6 ft MLLW
- Ground Elevation Contour
- Parcel
- Tax Exempt Parcel
- Estuarine and Marine Wetland
- ⊕ Underwater Rock

Figure 2
Pulpit Harbor Town Dock

Waterfront Access Site Assessment, North Haven, Maine
Penobscot Bay Working Waterfront Resiliency Analysis



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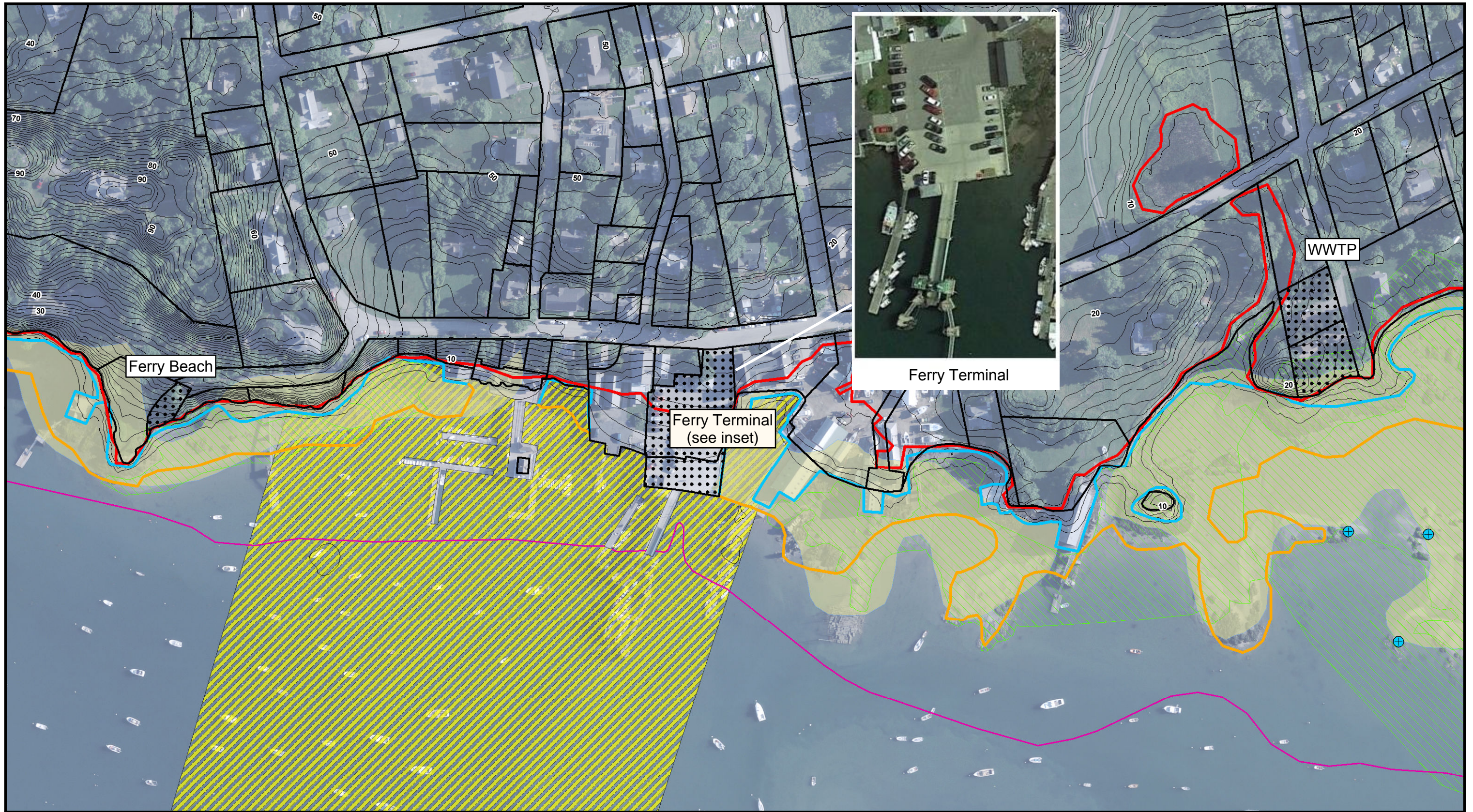


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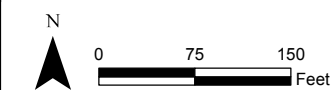
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|----------------------------------|-------------------------------------------|--------------------------------|
| — Highest Annual Tide + 1.6 Feet | ▭ Parcel | ■ Estuarine and Marine Wetland |
| — MHHW | ▣ Tax Exempt Parcel | ⊕ Underwater Rock |
| — MLLW | ▨ Tidal Waterfowl and Wading Bird Habitat | |
| — -6 ft MLLW | | |
| — Ground Elevation Contour | | |
| — Streams surveyed by CAI | | |

Figure 3
Izzy's Beach

Waterfront Access Site Assessment, North Haven, Maine
Penobscot Bay Working Waterfront Resiliency Analysis



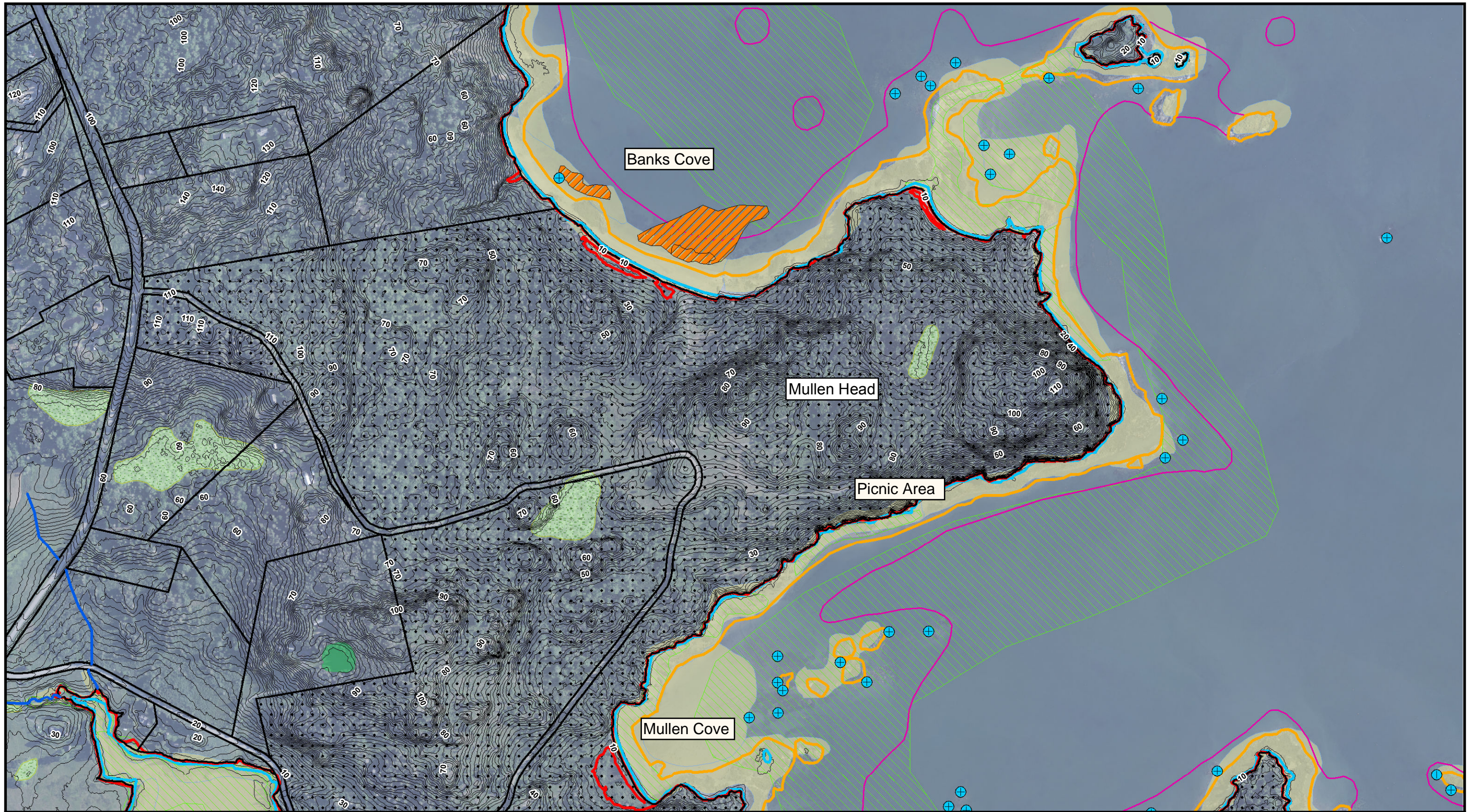
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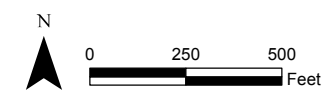
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| — Highest Annual Tide + 1.6 Feet | ▭ Parcel | ■ Estuarine and Marine Wetland |
| — MHHW | ▨ Tax Exempt Parcel | ⊕ Underwater Rock |
| — MLLW | ▨ Cable Area | |
| — -6 ft MLLW | ▨ Tidal Waterfowl and Wading Bird Habitat | |
| — Ground Elevation Contour | | |
| — Streams surveyed by CAI | | |

Figure 4
Ferry Beach to WWTP

Waterfront Access Site Assessment, North Haven, Maine
Penobscot Bay Working Waterfront Resiliency Analysis



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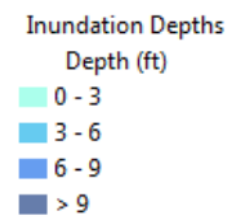
- | | | |
|----------------------------------|-------------------------------------------|-------------------------------------|
| — Highest Annual Tide + 1.6 Feet | ▭ Parcel | ▭ Estuarine and Marine Wetland |
| — MHHW | ▭ Tax Exempt Parcel | ▭ Freshwater Forested/Shrub Wetland |
| — MLLW | ▭ Eelgrass Area | ▭ Freshwater Pond |
| — -6 ft MLLW | ▭ Tidal Waterfowl and Wading Bird Habitat | ⊕ Underwater Rock |
| — Ground Elevation Contour | | |
| — Streams surveyed by CAI | | |

Figure 5
Mullen Head

Waterfront Access Site Assessment, North Haven, Maine
Penobscot Bay Working Waterfront Resiliency Analysis



Legend



MGS SLOSH maps accessed 11/24/19:
<https://www.maine.gov/dacf/mgs/hazards/slosh/index.shtml>



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Figure 6
 Storm Surge Hazard - Category 2 Hurricane

Waterfront Access Site Assessment, North Haven, Maine
 Penobscot Bay Working Waterfront Resiliency Analysis

Appendix A - Photolog





PHOTO 1:

Pulpit Harbor Town Dock, view to southeast.



PHOTO 2:

Town-owned pier at Pulpit Harbor, view to gravel parking area.



PHOTO 3:

Floating dock at Pulpit Harbor Town dock, looking east.



PHOTO 4:

Gravel parking lot at Pulpit Harbor Town Dock, view to east.



PHOTO 5:

Recent addition of parking spaces at owned by NHCP which abuts the town dock to the east.



PHOTO 6:

Izzy's Beach, view to northeast and bridge on Pulpit Harbor Road.



PHOTO 7:

Izzy's Beach, view to southwest and private dock abutting the beach.



PHOTO 8:

Sharp turn in road leading from Izzy's Beach to residence to the west.



PHOTO 9:
Narrow winding road leading to Ferry Beach, view to southwest.



PHOTO 10:
Ferry Beach and adjacent residence, view to northwest.



PHOTO 11:

Ferry Beach, view to southeast and harbor.



PHOTO 12:

Ferry terminal pier and parking to west, view to north and ferry terminal office.



PHOTO 13:

Concrete pier deck at ferry terminal, provides access for loading/unloading gear at or near high tide; commercial wharf in background of photo to east.



PHOTO 14:

Town dock at ferry terminal, view to south.



PHOTO 15:

Town dock, view to northeast and ferry terminal pier.



PHOTO 16:

Ferry terminal ramp south of pier, east of town dock.



PHOTO 17:

East side of ferry terminal pier and ferry dock to south (left side of photo), view to southwest.



PHOTO 18:

Near shore of harbor east-southeast of ferry terminal; stone and wood pilings are remnants of former coal wharf.



PHOTO 19:

Shoreline adjacent to WWTP property, view to southwest and harbor.



PHOTO 20:

Gravel access road and subgrade wastewater treatment tanks at WWTP, view to northwest.



PHOTO 21:

Big Beach at Mullen Head, view to northeast.



PHOTO 22:

Gravel access road leading to Big Beach at Mullen Head.



PHOTO 23:

Shoreline near picnic area, view to south and Mullen Cove.



PHOTO 24:

Picnic area at Mullen Head, view to northeast.