Appendix B
Report of GEI Consulting
Waterfront Elements
Cohasset Harbor Plan
Cohasset Harbor, Massachusetts

Submitted to:
Town of Cohasset
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and
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# Table of Contents

## Executive Summary

<table>
<thead>
<tr>
<th>1. Harbor Vessel Dynamics</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Existing Vessels</td>
<td>1</td>
</tr>
<tr>
<td>1.1.1 Commercial Vessels</td>
<td>1</td>
</tr>
<tr>
<td>1.1.1.1 Current Vessels</td>
<td>1</td>
</tr>
<tr>
<td>1.1.1.2 Current Facilities</td>
<td>1</td>
</tr>
<tr>
<td>1.1.1.3 Facility limitations</td>
<td>1</td>
</tr>
<tr>
<td>1.1.1.4 Facility Conditions and Needs</td>
<td>2</td>
</tr>
<tr>
<td>1.1.2 Emergency Vessels</td>
<td>3</td>
</tr>
<tr>
<td>1.1.3 Recreational Vessels</td>
<td>4</td>
</tr>
<tr>
<td>1.1.3.1 Current Vessels</td>
<td>4</td>
</tr>
<tr>
<td>1.1.3.2 Mooring Fields</td>
<td>4</td>
</tr>
<tr>
<td>1.1.3.3 Drafts</td>
<td>4</td>
</tr>
</tbody>
</table>

## Harbor Infrastructure

<table>
<thead>
<tr>
<th>2. Cohasset Harbor</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 Description</td>
<td>5</td>
</tr>
<tr>
<td>2.1.2 Existing Structures</td>
<td>5</td>
</tr>
<tr>
<td>2.1.2.1 Parker Avenue</td>
<td>5</td>
</tr>
<tr>
<td>2.1.2.2 Cohasset Harbor Marina, Parker Ave</td>
<td>6</td>
</tr>
<tr>
<td>2.1.2.3 Cohasset Maritime Institute and Cohasset Center for Student Coastal Research</td>
<td>7</td>
</tr>
<tr>
<td>2.1.2.4 Cohasset Sailing Club</td>
<td>7</td>
</tr>
<tr>
<td>2.1.2.5 Fishermen’s Dock - Government Island, Lighthouse Lane</td>
<td>7</td>
</tr>
<tr>
<td>2.1.2.6 Mill River Marine Railway Facility, Border Street</td>
<td>8</td>
</tr>
<tr>
<td>2.1.2.7 Atlantica Restaurant Facility, Border Street</td>
<td>8</td>
</tr>
<tr>
<td>2.1.2.8 Town Landing, Border Street and Lawrence Wharf</td>
<td>9</td>
</tr>
<tr>
<td>2.1.2.9 Town Pier, Margin Street</td>
<td>9</td>
</tr>
<tr>
<td>2.1.2.10 Cohasset Yacht Club, Howard Gleason Road</td>
<td>9</td>
</tr>
<tr>
<td>2.1.2.11 Harbor Seawalls and Shoreline Protection</td>
<td>9</td>
</tr>
<tr>
<td>2.1.2.12 Mooring Fields</td>
<td>10</td>
</tr>
<tr>
<td>2.1.2.13 Navigational Channels</td>
<td>11</td>
</tr>
<tr>
<td>2.1.2.14 Harbormaster Facilities</td>
<td>11</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Dredging</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2.1 Existing Dredging</td>
<td>12</td>
</tr>
<tr>
<td>2.2.1.2 Review of NOAA Charts, USACE Survey and Electronic Navigation Chart Data</td>
<td>12</td>
</tr>
<tr>
<td>2.3 Recommended Dredging</td>
<td>12</td>
</tr>
<tr>
<td>2.3.1 Regulatory Requirements</td>
<td>13</td>
</tr>
</tbody>
</table>
3. Harbor Improvements

3.1 Mixed Use/Pier Facility
3.2 Dredging
3.3 Seawalls and Jetties
3.4 Boat Ramp
3.5 Recommended Additional Studies

4. Environmental Issues

4.1 Harbor and Waterfront Constraints Evaluation
4.1.1 FEMA - Flooding
4.1.2 Sea Level Rise and Flood Frequency Evaluation
4.1.2.1 Data Sources
4.1.2.2 Patterns in Flooding Days
4.1.2.3 Patterns in Single- and Multi-Year Risk
4.1.2.4 Expected Flood Elevations Given Sea Level Rise
4.1.3 Adaptation Actions
4.1.3.1 Action Types
4.1.3.2 The Need for Hydrologic Modeling
4.1.3.3 Planning Opportunities
4.1.3.4 Overlay Zones
4.1.3.5 Additional Considerations

4.2 Waterfront/Coastal Environmental Regulatory Requirements
4.2.1 Municipal Approvals
4.2.1.1 Massachusetts Wetlands Protection Act and Cohasset Wetlands Bylaw – Order of Conditions
4.2.1.2 Site Plan and Special Permit
4.2.2 Commonwealth of Massachusetts Approvals
4.2.2.1 Chapter 91 Waterways License
4.2.2.2 Chapter 91 Waterways Permit
4.2.2.3 Section 401 Water Quality Certification
4.2.2.4 Massachusetts Endangered Species Act “Take” Determination
4.2.2.5 Massachusetts Coastal Zone Management Consistency Review
4.2.2.6 Massachusetts Environmental Policy Act Review
4.2.3 Federal Approvals
4.2.3.1 U.S. Department of the Army Permit

5. Potential Grants and Funding Opportunities

5.1 Commonwealth of Massachusetts Coastal Grant Programs
5.1.1 MA Seaport Economic Council
5.1.2 Executive Office of Energy and Environmental Affairs
5.1.2.1 Dam, Levee and Seawall Repair and Removal: Application for Funding – Design and Permit Grant
5.1.2.2 Dam, Levee and Seawall Repair and Removal: Application for Funding – Construction Finance Grant
5.1.3 Department of Housing and Economic Development 39
   5.1.3.1 MassWorks Dredging Program 39
   5.1.3.2 MassWorks Infrastructure Program 39

6. Literature Cited 41

Figures
1. Fishing Conveyor Belt System 2
2. Parker Avenue Boat Ramp 6
3. Coastal Flooding Pattern 19
4. Single Year Risk of Flooding Above 5 ft 20
5. Multi-Year Risk of Flooding Above 5 ft 21
6. Sea Level Rise Scenarios 22
7. Sea Level Rise - Moderate Flood 22
8. Sea Level Rise - Major Flood 23

Appendices
A. Site Photos

SBM:RB:bdp
Executive Summary

In 2018, GEI Consultants, Inc. contributed to Harriman Associates’ efforts in coordination with the Massachusetts Office of Coastal Zone Management (CZM), to develop a Harbor Plan for Cohasset Harbor in Cohasset, Massachusetts. GEI conducted site visits of the harbor from both the water and land to observe the conditions of the existing waterfront infrastructure and gain an understanding of current and future uses of the harbor. GEI also reviewed the Harbor Committees’ notes from development meetings with the commercial fishing fleet as well as other publicly available studies and reports such as the Massachusetts Department of Conservation and Recreation (MA DCR) Coastal Hazards Study and U.S. Army Corps of Engineers (USACE) survey reports. These meeting notes and studies, along with GEI’s site visits, served to guide identification of the need for repairs, improvements, and dredging.

Considerations and recommendations in this report address potential improvements for harbor activities including moorings, boat ramps, commercial and recreational fishing, boating, dredging, boardwalks, permitting, and other elements relevant to development of the Cohasset Harbor Plan. Considerations additionally focus on issues of sea level rise and storm surge. Possible flood frequencies are evaluated, and potential adaptation actions are articulated, including changes to the Town’s planning and zoning documents.
1. Harbor Vessel Dynamics

1.1 Existing Vessels

Cohasset Harbor is home to a variety of vessels that range from commercial fishing to small and large recreational boats. The harbor provides a safe anchorage for local boaters to safely moor their boats. Vessels around the harbor use the Town-managed moorings and slips provided by private facilities, totaling approximately 550 berths within the harbor. Additionally, the harbor is home to private sailing and boating centers that have small boats including car topped boats and sail boats.

1.1.1 Commercial Vessels

1.1.1.1 Current Vessels

Of the 210 boats on the Town moorings, only 19 are commercial vessels (according to the list supplied by the Town); berths for the vessels range from 20 to 45 ft with drafts up to 6 ft.

1.1.1.2 Current Facilities

Current commercial fishing facilities provide small floats and gangway access for fishermen to transfer catch and materials to and from their vessels. There are four sites that commercial fishermen actively use in the harbor:

- Parker Avenue Boat Ramp*
- Fisherman’s Dock – Government Island
- Town Landing – Border Street
- Lawrence Wharf – Border Street
- Town Pier – Margin Street

*Parker Avenue is not known as a commercial facility, however during our site visit we witnessed it being used by commercial fishermen.

1.1.1.3 Facility limitations

The four sites each have small floating timber docks with gangway access. The sites typically have fewer than three designated parking spaces, except Government Island, which has approximately 15 designated parking spots. The waterfront facilities do not provide ample vessel docking areas because the floats are typically limited to three or fewer vessels at a time. Fishermen’s Dock at Government Island has the longest available dockage, at approximately 90 ft. However, currents at this location can make docking difficult.
None of the facilities provides a lift system for vessel supply and transfer of bait and catch. Most of the gangways provide split pathways for carts and walking; these pathways are narrow and limit the amount of material that can be transferred at one time.

1.1.1.4 Facility Conditions and Needs

Existing facilities currently provide little dockage for loading or offloading of the 19-vessel commercial fleet. The Government Island facility is the main facility for commercial fishermen, providing the most parking space and electric power. The secondary facility used by the commercial fleet is the Town Pier on Border Street. This facility provides a small amount of parking and dockage but does not provide electric power. Current plans are for power to be restored on this pier in spring 2019 (it has been active in the past).

Per discussions with the harbormaster, as part of the capital plan, the Town will install a conveyor belt system at the Government Island Pier to help load and offload vessels. A system similar to this is shown in the image below. This type of system provides mechanical transfer of materials between the floats and land. An alternative to this would be a hoist or davit, however this would require boats to approach the site along the seawall where current water depths are not sufficient at lower tides.

![Fishing Conveyor Belt System](image)

Fig. 1. Fishing Conveyor Belt System

Representatives of the commercial fleet have been requesting support from the Town for upgrades to existing facilities. A list of their suggested improvements includes:

- Extension and reconstruction of the pier at Government Island with a conveyor system and hydraulic lift designed to ease the loading and unloading of bait, traps, rope, and equipment necessary for operations – these must be usable at all tides.

- Construction of a new pier suitable for direct vehicle/vessel loading and unloading between piers at the Cohasset Sailing Club and Parker Ave.
• Installation of a designated dinghy dock for commercial mooring holders.
• Reconfiguration of the floats at Government Island to accommodate more boats.
• Installation of a marine fueling station on Government Island, with credit card capability.
• Provision of water and electric service year-round at all commercial docks.
• Introduction of trash receptacles, dumpsters, and an oil reclamation station.
• Reconfiguration of Town Landing to include conveyor/hoists and addition of more floats to the NW (towards the inner cove area).
• Addition of security cameras with live video access via smart phones.
• Creation of a designated area for bait coolers, usable by all fishermen.
• Creation of a draft plan detailing future dredging needs.
• Performing a mooring field study to determine if reconfiguration of the mooring fields could create more moorings and moorings for larger vessels.
• Creation of a harbor webpage where harbor users can view current communications about and activities in the harbor.
• Establishment of dates for deployment and retrieval of floats and docks each spring and fall.

Several of these recommendations are included in the Town’s 2019 budget and are consistent with other recommendations in this report.

In general, based on: 1) these requests from representatives of the commercial fleet, 2) review of existing landside facilities, and 3) condition of harbor structures observed during site investigations, the harbor currently provides inadequate support for commercial fishermen. A broad review of costs for some of these improvements is provided in Section 3.

1.1.2 Emergency Vessels

The Harbormaster maintains three vessels as part of the emergency fleet. These include a 17 ft and a 21 ft work boat and the primary response vessel, which is a 25 ft Parker Walkaround. The emergency fleet is typically moored in the harbor and accessed via dinghy because sufficient space is not available at the Government Island Road facility.
Having the main response vessels not immediately at the facility could create delays in emergency response times, especially in winter months when emergency response vessels are located on the other side of the harbor and the harbor may have ice or other impediments.

While the harbormasters serve the public and are either working or are on-call most of the time, additional first responders’ emergency response vessels may need to be considered as an aid in the multitude of emergency scenarios that can occur on or near the waterfront. Additional response vessels from other agencies could include fire, police, environmental enforcement, or state police.

1.1.3 **Recreational Vessels**

1.1.3.1 **Current Vessels**

Current vessels range from 13 to 60 ft in length. Most vessels viewed during the harbor visit were recreational vessels in the smaller end of this range, typically less than 25 ft in length.

1.1.3.2 **Mooring Fields**

Existing mooring fields are configured to provide sufficient depths for boats in the harbor, and moorings are generally aligned in a grid pattern with minimal overlaps. However, per discussions with the Harbormaster, mooring requests face a waiting list of over 500. The harbor could thus benefit from a mooring study to determine potential increases in the number of moorings. This effort would need to include an evaluation on currents in the harbor that limit the ability to rearrange the mooring fields or increase mooring density.

Also, several areas in the harbor are difficult to navigate because there are no marked channels or fairways (except the USACE channel to access the harbor). A mooring study could thus also help identify appropriate vessel passageways.

1.1.3.3 **Drafts**

The Town’s current list of vessels using the harbor does not provide draft requirement information associated with each boat. Typical draft requirements for recreational vessels of the sizes currently in the harbor would be from 6 to 8 ft. Based on information provided by the Town, there are no vessels in the harbor that require a draft greater than 6 ft, including recreational motor, sail, and commercial vessels.
2. Harbor Infrastructure

2.1 Cohasset Harbor

2.1.1 Description

Cohasset Harbor is situated on the eastern shore of the Massachusetts coastline between the towns of Hull and Scituate. The harbor entrance off the Atlantic Ocean faces north with an SSW channel into Cohasset Cove per the USACE charts, properly known as Cohasset Harbor. The entrance channel is charted to be 90 ft wide with a depth of 7 ft at Mean Lower Low Water (MLLW). The Harbor consists of four main sections: Cohasset Harbor, Cohasset Cove, Government Island, and Bailey’s Creek.

The western and southern shorelines are developed land with mixed uses, while the eastern shoreline is mostly beach and vegetated land areas.

Photographs of Harbor infrastructure elements are provided in Appendix A.

2.1.2 Existing Structures

2.1.2.1 Parker Avenue

Parker Avenue provides access to the waterfront along the southern shoreline, and the road ends at the only boat ramp in the harbor (image below). Shorelines immediately east and west of the ramp are protected by rip rap. Cohasset Harbor Marina, described in more detail below, is located east of the ramp and has floats. West of the ramp, a small timber pier supports a gangway and floating docks usually occupied by dinghies used for accessing moored vessels.

At lower tides the ramp is not suitable for use with trailered boats because the bottom of the ramp does not extend far enough below the water surface into the harbor. There is gravel beyond the bottom of the ramp, which showed minor washout at the time of the site visit.
The timber pier associated with the boat ramp provides adequate space and access to the timber floats via the gangway. The gangway is of walkable width and adequate length to provide a suitable slope at low tide. Both the pier and gangway were in satisfactory condition at the time of the site visit.

At the time of this report the Town had procured an engineering firm to begin redesign of the ramp. Current plans are to redesign within the same footprint, however expansion of the ramp is under consideration based on potential uses. Other improvements are discussed in Section 3 of this report.

2.1.2.2 Cohasset Harbor Marina, Parker Ave

Cohasset Harbor Marina is a private facility located along the southern shore of Bailey Creek. The Marina supports a gangway to provide access to timber floating docks. The facility consists of approximately 750 linear ft of floating docks, which provide 67 slips. Outshore of the Marina, boats are moored within Bailey Creek.

At the time of the GEI site visit, the docks had been removed for winter storage. The timber pier used to access the floats was in fair condition. We recommend the pier undergo a detailed inspection for needed repairs. There were mooring piles along the shoreline for anchoring the floats that appeared to be in satisfactory to excellent condition.
2.1.2.3  **Cohasset Maritime Institute and Cohasset Center for Student Coastal Research**

The Cohasset Maritime Institute (CMI) and Cohasset Center for Student Coastal Research (CSCR) are two centers providing access to the waterfront adjacent to the Parker Avenue ramp facility. CMI provides rowing and other waterfront activities to the community and CSCR provides opportunities for students to explore and study the watershed and coastal environment. Both groups use the Parker Avenue boat ramp for water access. Parking for these groups is constrained due to the relatively small size of the lots. Further discussion of these properties is included in the overall Harbor Plan.

2.1.2.4  **Cohasset Sailing Club**

The Cohasset Sailing Club (CSC) is located at the end of Lighthouse Lane. There is a walking bridge between the CSC and CMI. The CSC is protected by stacked stone seawalls with water access via a ramp to timber floats. Based on aerial imagery the center provides additional dinghy access to boats within the harbor. The Center has approximately 300 linear ft of available berthing along the floats. The Center’s water access is very limited; the channel near the floats is the only access into Bailey’s Creek and is only 80 ft wide. The area immediately outshore of the floats was dredged in 2017 by the USACE.

At the time of the site assessment, the floats were bottom-moored, and no pilings were present. The floats were in satisfactory condition and appeared well-maintained. The seawall in front of the building was in satisfactory condition with minor deterioration and some voids observed at the bottom of the wall. The highwater mark appeared to be about 1 ft below the wall. This small amount of freeboard would likely result in overtopping during extreme high tides.

2.1.2.5  **Fishermen’s Dock - Government Island, Lighthouse Lane**

The Commercial Fishing Pier at Government Island Road is adjacent to the sailing club and provides commercial access to the water for fishing and other commercial vessels. The dockage also provides the Harbormaster a means of keeping an emergency vessel near the office. This location has the largest area for parking to support commercial vessels in the harbor.

To the west of the site, draining of the tidal watershed at low tides creates a high flow inshore of the rock ledge. The area around the pier has numerous rocks exposed only at low tides. Photos of these rocks are provided in Appendix A. They present a hazard to boaters who may be new to the harbor or experience operational issues with their vessels. The obstructions are made more dangerous by strong currents that exist around the facility.

At the time of the site assessment, the floating docks were in satisfactory condition with heavy duty bumpers on the berthing face. The docks were sufficiently long for two vessels
to dock at the same time. The two gangways were in satisfactory condition. The commercial pier is a filled structure with stacked stone walls that appeared to be recently repointed. The lower sections of the wall had repairs that had been completed with concrete.

2.1.2.6 Mill River Marine Railway Facility, Border Street

The Mill River Marine Railway facility is located along Border Street on the southern shoreline of Cohasset Harbor, west of the Commercial Pier and rock waterfall. The facility includes the Cohasset Lobster Pound and a small marine railway. While the railway may be usable, it was in poor condition at the time of the site visit. Many of the timber elements below water (exposed at low tide) were cracked or split and no longer function properly.

The shoreline along the railway facility is protected by a stone seawall to the north and west, and the east wall consists of rock ledge along the waterfall. The walls were in satisfactory condition and the concrete foundation elements appeared to be in satisfactory condition.

There is also a sluiceway under the Mill River building that was previously used for hydropower. The structure was not evaluated during this project, but inspection should be considered during future improvements of the property.

2.1.2.7 Atlantica Restaurant Facility, Border Street

The Atlantica restaurant facility is located on the southern shore of Cohasset Harbor outshore of Border Street. The facility includes two restaurants, the Atlantica, and Olde Salt House. The shoreline consists of a variety of construction types including rip rap slope with a seawall, rock ledge, and stacked stone walls. The Atlantica restaurant is supported on pier foundations and has floating docks for guest docking and dock/condominium combinations.

At the time of the site visit, the concrete piers and timber pilings were in fair to satisfactory condition. The stacked stone walls exhibited some loss of mortar between stones below the high tide mark. The revetment supporting the parking lot showed evidence of movement and settlement between stones and between the stones and top wall. The parking area exhibited several locations of settlement and voids under the asphalt. There were also several holes in the pavement that appear to warrant immediate repair inshore of the seawalls.

The western portion of the Atlantica restaurant facility is used by the Olde Salt House and includes the filled area adjacent to the Town Pier at Border Street. The seawall on the west side of the filled structure had a previous failure and was repaired with a dumped stone slope. The other seawalls in this location were in fair condition and are discussed further in Section 2.1.2.11.
2.1.2.8 Town Landing, Border Street and Lawrence Wharf

The Town Landing on Border Street is a filled structure with stacked stone seawalls. Below it is a small floating dock facility referred to as Lawrence Wharf. It is approximately 50 ft long, accessed by a gangway, and provides a loading area for commercial fishermen and access to dinghies used to access boats moored in the harbor. An additional set of timber floats (approximately 60 ft) is also accessed by a gangway from the Landing. These facilities have three parking and loading areas available along the Border Street.

At the time of the site assessment, seawalls in this area were deteriorated with missing mortar and loose stones. The seawall around the Town landing itself was in better condition, with mortar in place and no loose stones. The east side of the embayment East of Lawrence Wharf appeared to have a previous wall failure where rip rap had been placed. These seawalls are discussed further in Section 2.1.2.11.

2.1.2.9 Town Pier, Margin Street

The Town Pier on Margin Street consists of a timber pile supported timber pier and floating docks. The docks are accessed via a ramp at the end of the pier. The pier extends approximately 75 ft into the harbor and has a “T” at the end providing additional space. The floating docks extend another 80 ft from the pier into the harbor with a “T”-shaped dock system providing space for dinghies that are accessed by a 30-ft gangway. The property does not have parking facilities.

The pier was in satisfactory condition at the time of the site visit. The outshore footings on concrete block foundations showed minor cracking and deterioration. The timber docks were in satisfactory condition. The floats were bottom-moored, and the gangway was pinned to keep the float in alignment. The gangway was in satisfactory condition.

2.1.2.10 Cohasset Yacht Club, Howard Gleason Road

The Cohasset Yacht Club is located on the north western shore of the harbor near the harbor entrance. The Yacht Club has a pile-supported building and floating dock system providing dockage for approximately 150 boats, including slips, club boats, and dinghy slips. The shoreline around the Yacht Club is marsh with limited shoreline protection. The Yacht Club has a small marine railway to the west that appears to be actively used by the club. At the time of the site visit, the building and foundation appeared to have recently been replaced. The timber docks were generally in satisfactory condition.

2.1.2.11 Harbor Seawalls and Shoreline Protection

Seawalls around the harbor consist mainly of stacked stone walls. Based on the MA DCR Coastal Hazards Study of structures within the harbor, seawall conditions range from poor to good (MA DCR, 2013).
At the time of the site assessment, several of the structures showed signs of previous repairs and ratings ranged from fair to satisfactory. The Border Street seawall was generally in satisfactory condition, however there were several small to large settlement points behind the wall. This had most likely been caused by fine sediments being flushed from behind the wall. The section between the Atlantica and Cohasset Harbor Inn was in better condition than the section between the Atlantica and the Mill River Facility.

Seawalls around the Town Landing were in better condition than the seawall at Border Street, however they exhibited minor material loss and settlement. East of the Town Landing, at “Bates Wharf,” there was evidence of a seawall failure and dumped stone repair. Based on aerial imagery this was estimated to have occurred in 2017.

The jetty on the west side of the harbor (Ballermine Estate) and the breakwater on the east were in satisfactory condition with minimal stone movement noticed. The top of the structures were noted to be at the approximate high tide mark, which would allow some waves to proceed over and into the harbor during storm events. The harbormaster noted that the structures are overtopped when tides exceed +12 ft, however Town properties historically have not typically incurred damage; these patterns are discussed further in Section 4.1.

The harbormaster also noted that in storm events the maximum typical wave that enters the harbor during storm events is about 5 ft. This size wave could potentially cause damage to smaller watercraft near the mouth of the harbor. The moorings are anchored by concrete/stone block and typically have not experienced damage in storm conditions.

2.1.2.12 Mooring Fields

The mooring fields within the harbor are split into three general areas according to the shape of the harbor. Because of intricate water flows within the harbor, moorings have historically been configured to maximize available space while reducing potential for vessels to collide. The estimated number of moorings below are estimated based on aerial imagery; exact numbers may vary.

Cohasset Harbor

Cohasset Harbor is the largest of the three mooring fields, with approximately 90 moorings. While it provides access to other two, the mooring field layout does not appear to be well defined or provide a designated channel. At the time of the site visit, the moorings appeared to be configured in a grid without overlaps, taking up more space than necessary within the harbor. The harbor has a path down the center, however there was no defined navigational channel with markers at the time of the site visit.
Cohasset Cove

Cohasset Cove has approximately 30 moorings, including some double moorings with a float. The extent of the mooring field is limited by available water depth. At the time of the site visit, moorings appeared to be maximized for current drafts. Floating docks are used to double up mooring positions, but additional water draft would enable a more defined mooring configuration.

Bailey Creek

The Bailey Creek section of the harbor was accessed through the Government anchorage, which has approximately 30 moorings. Mooring locations in this area are arranged to provide access through narrow channels. The area in front of the Cohasset Harbor Marina may be able to be redesigned to maximize available space, but limited drafts restrict options. The mooring configuration could potentially benefit from a double-ended mooring system to prevent vessels from colliding and allow for additional vessels.

2.1.2.13 Navigational Channels

Cohasset Harbor was accessed via the USACE channel that runs in a northeast/southwest orientation and is maintained by the USACE. In 2017, the USACE performed survey of the federal project including the entrance channel and basins. Based on the findings, dredging was performed to reduce some shallowed sections of the harbor and provide safe access into Cohasset Harbor.

Since the USACE performed the maintenance dredging, the channel and harbor has experienced minimal siltation. The channel should be monitored for siltation as part of the overall dredge evaluation.

2.1.2.14 Harbormaster Facilities

The Harbormaster facility is located off Lighthouse Lane and while it has waterfront access, there was no designated waterfront dockage for the Harbormaster response vessel. The Harbormaster’s office is located at the inshore limit of the parking lot for the Commercial Pier and does provide good visibility of the harbor.

The existing facility limits the ability to have designated waterfront access for emergency response (i.e., for the Harbormaster to respond, personnel must currently motor to the response boat via the work boat, increasing response time). A facility upgrade that allows emergency vessels to dock at the Harbormaster’s office could thus shorten emergency response time. Providing additional dockage in this manner could also be a potential economic benefit for the Town, with transient dockages or other short-term uses.
2.2  Dredging

Cohasset Harbor extends to the south to Cohasset Cove via an 8-ft-deep channel. Cohasset Cove consists of approximately 30 acres of water sheet at low water, per Google Earth imagery. Cohasset Cove consists of 4 anchorages according to the USACE project plans:

- 7 ft depth Cohasset Harbor Anchorage – 18.0 acres
- 6 ft depth Cohasset Cove Anchorage – 3.9 acres (near Town landing)
- 6 ft depth Government Island and Cove Anchorage – 3.3 acres (near Harbormaster Office)
- 6 ft depth Bailey Creek Anchorage – 5.4 acres (near Cohasset Harbor Marina)

2.2.1.1 Existing Dredging

The harbor has not had major dredging performed recently, however it appears to be in need of additional dredging to meet existing needs. The USACE performed minor dredging of the entrance channel and across from Government Island in 2017. No other dredging is currently proposed.

2.2.1.2 Review of NOAA Charts, USACE Survey and Electronic Navigation Chart Data

Electronic Navigation Charts (ENC) from the National Oceanic and Atmospheric Administration (NOAA, 2018) and as seen in Navionics Software (Navionics, 2018) show depths in Cohasset Cove vary greatly. Data show the harbor has depths of 6-7 ft within the main anchorage and <4 ft in a majority of the remaining harbor, including the dredged anchorage near Cohasset Harbor Marina. Some portions are <2 ft deep at low water and therefore unusable by most boat traffic.

It was noted by the Town that there is a possible issue with sediments building up in areas around the sewer treatment outflow and that dredging may be needed to resolve the issue.

2.3  Recommended Dredging

According to the USACE, the harbor has four anchorages, inclusive of the three anchorages noted above, which are to be dredged to between 6 and 7 ft in depth (USACE, 2018), two of which had dredging performed in 2017. These are the channel outshore of the Cohasset Sailing Center, including a portion of the anchorage to the north, and main Cohasset Channel. While these areas have been deepened to allow vessel traffic, the remainder of the harbor needs dredging to continue to facilitate use of existing infrastructure.
In the review of soundings from the 2017 survey, approximately 150,000 cy of sediment is estimated to be in need of removal to reach the target depths of the federal project with a 1-ft over-dredge.

### 2.3.1 Regulatory Requirements

To perform additional dredging within the harbor the Town would need to request regulatory approvals from the following agencies:

- USACE
- MA DEP Ch 91
- MA DEP Water Quality
- Massachusetts Environmental Policy Act (MEPA)
- Town Conservation Commission (Notice of Intent)

As part of the permitting process, the Town should review the material testing results with the USACE. This will help understand potential opportunities to secure USACE dredging and disposal approvals. Disposal options may include upland disposal at landfills, offshore disposal, and beneficial reuse on nearby beaches if materials are clean enough.
3. Harbor Improvements

Cohasset Harbor is a generally well-protected harbor providing moorings for over 500 boats and serving as home to two sailing centers and a private marina. The town maintains two filled pier structures with floating docks, a timber pier with dinghy dock access, and moorings throughout the harbor. While the facilities appear to meet existing needs, several structures warrant typical maintenance and repairs. Additionally, potential harbor improvements should be considered ranging from dredging to construction including upgrading, expanding, or creating new piers or additional floats and moorings.

Existing uses are mainly recreational (roughly ten percent of current users are commercial). Existing Town facilities are generally in satisfactory condition and provide waterfront access. Through discussions with the Town it was determined that while there are several access points within the harbor for commercial and recreational waterfront uses, existing facilities need improvement to meet both existing and anticipated future needs of the harbor. These include dockage for the recreational boaters and upgrades to the commercial fishing facilities.

3.1 Mixed Use/Pier Facility

A mixed-use facility such as a town-owned pile supported pier could provide many economic benefits and a balance of commercial and recreational uses. A new facility could provide deeper draft loading abilities with cranes or hoists and convenience utilities including water, power, and sewer in addition to increased dockage and ADA boat access. Major improvements resulting in enlarged structures, increased floats, or mixed-use facilities should be studied further to identify appropriate shapes, sizes, and configurations. To understand if a mixed-use facility may be feasible for Cohasset Harbor, a more detailed analysis of economic impacts would need to be performed. Two potential locations for a mixed-use facility include Government Island and the Town Landing at Border Street. In our opinion the Government Island facility would provide better accommodations for the Harbormaster, easier access to the water, more ample parking, and would require fewer upland improvements.

Construction of a mixed-use facility could range from $3 million to $10 million depending on final design requirements. The broad range on this estimate is due to unknown size of the facility, foundation requirements, and utility considerations at the site. The Fishermen’s improvements (see Section 1.1.1.4) could be incorporated into this structure including the hoist or conveyor system, fueling facility, water and electrical service, trash and oil reclaim services, security cameras, and designated use areas for fishermen, while also serving the general public with Harbormaster dockage and other features noted above. Efforts to secure
funding for this work could potentially be aided by providing additional emergency response vessels and support to the waterfront.

3.2 Dredging

Based on results of the survey performed by the USACE in 2017, an estimated 150,000 cy of dredging could be required to restore to historic depths and limits and maximize use and benefits of the harbor, including potentially allowing additional moorings to be installed.

3.3 Seawalls and Jetties

Several seawalls in the harbor need repair to limit further deterioration of roadways behind them. At the time of the site visit, many of the seawalls had sinkholes or settlement inshore of the wall in the walkways and roads/parking lots. These should be repaired to stem deterioration and limit significant future damages. Parking for the Atlantica restaurant had many sections along the backside of the revetment/seawall where the asphalt had voids below and required repair. An investigation of the cause of damage should be considered to stop or minimize the future deterioration.

All seawalls should be evaluated as part of an in-depth study to determine the scope of required repairs and the appropriate amount of protection against sea level rise and storm surge events, which, in combination and over time, can be expected to create increasing likelihood of inundation in Town (see Section 4.1.2 for an evaluation of flood frequencies and likelihoods given the combination of these threats, and Section 2.1.2.11 for additional review of seawall issues). In particular, the jetty on the west side of the harbor and the breakwater on the east side (at the entrance of the harbor) may be too low in elevation to provide a desired degree of protection. The Town has been investigating both structures to determine if work conducted on them in the past was within the authorized construction limits. An in-depth resiliency study by an engineering firm could contribute to these efforts.

3.4 Boat Ramp

The Parker Avenue boat ramp is the only ramp in the harbor. At the time of this report the Town had procured an engineering firm to begin redesign of the ramp. Current plans are to redesign the structure within the same footprint with the potential of expanding the length or modifying the slope to allow use throughout the tidal range. Other improvements may include:

- Widening the ramp, if property ownership lines allow.
- Installation of floats along the sides for easier access to boats and vehicles.
- Identification of designated dinghy ramping for CSCR and CMI boats.
- Dredging the bottom of the ramp to provide sufficient depths at low tides.
3.5 Recommended Additional Studies

Based on our overall review of existing facilities and uses of the harbor, we recommend the following additional studies:

- In-depth seawall investigation and repair design $75,000
- In-depth harbor study and mooring analysis $60,000
- Updated hydrographic surveys and dredge analysis $25,000
- Feasibility study and concept design for a mixed-use facility $40,000

Performance of work similar to the above would enable order of magnitude of construction cost estimates of the potential harbor improvements.
4. Environmental Issues

4.1 Harbor and Waterfront Constraints Evaluation

4.1.1 FEMA - Flooding

FEMA flood mapping for Cohasset Harbor depicts the harbor within several different flood elevation regions (FEMA, 2018). Most areas are within VE zones, which are susceptible to wave conditions exceeding 3 ft in height. The FEMA maps are based on the North American Vertical Datum of 1988 (NAVD88), which is approximately 5.2 ft above Mean Low Water. The entrance area of the harbor has the highest flood elevation at +18 ft NAVD88 (+23 ft MLW) and the lowest at +10 ft NAVD88 (+15 ft MLW).

4.1.2 Sea Level Rise and Flood Frequency Evaluation

This evaluation of sea level rise and flooding trends in Cohasset is intended to augment results from the Municipal Vulnerability Program (MVP) initiative conducted in Cohasset during 2017 and 2018, and to enhance the Cohasset Municipal Harbor Plan. Using data summarized by the Metropolitan Area Planning Commission (MAPC, 2018), the MVP effort included general evaluation of: 1) Amounts of sea level rise that might be expected under different scenarios; 2) Trends in sizes and numbers of rainfall events that might be expected to occur as the climate changes; and 3) Expected changes in size over time (1961 – 2084) of a 10-year, 24-hour storm (MAPC, 2018).

The MAPC effort did not discuss patterns in flooding days that have been experienced or probabilities of different sized flooding events under the identified sea level rise scenarios. This information could be useful in making infrastructure upgrade decisions and addressing other issues implied by the Cohasset Municipal Harbor Plan. Fig. 3 below provides histograms showing:

1. Numbers of flooding days per decade that have been experienced in Cohasset since 1955.

2. Single-year risk and multi-year risk of flooding in Cohasset above 5 ft., in terms of percent likelihood.

3. Water levels (in ft) in Cohasset when considering sea level rise alone and with mild, moderate, and major flood levels in addition. These histograms are also provided for slow, medium, fast, and extreme sea level rise scenarios.
4.1.2.1 Data Sources

Sea level rise scenarios used for this evaluation were published by the NOAA in 2017 (Sweet et al., 2017) for use in the 2018 U.S. National Climate Assessment. The data portal used for creating the below plots was Surging Seas Risk Finder; data sources, assumptions and limitations are the same as elaborated on the website for this tool (Climate Central, 2018). The tool gives corresponding local projections also provided by NOAA, which vary due to local factors such as rising or sinking land also referred to as uplift and subsidence. Low, middle, and high sea level rise scenarios give a range of possible local outcomes (17th, 50th and 83rd percentiles) given each main scenario. The reference tide gauge used was located 15 miles from Cohasset in Boston Harbor.

4.1.2.2 Patterns in Flooding Days

Recent research indicates that human-caused global warming has driven the majority of observed 20th century global sea level rise (e.g., Kopp et al., 2017). A higher sea level baseline translates to more and bigger floods from the highest tides and storms. The Risk Finder tool used in this evaluation builds on these observations with analytic methods that show the impact human-caused sea level rise has had on past flood counts (Strauss et al., 2016). The stacked bar graph below, tailored for Cohasset, displays the total number of days each decade in which observed water levels exceeded the “minor flood” threshold, defined locally by emergency managers and the Weather Forecasting Offices of the National Weather Service (NWS). These occurrences are split between floods high enough to have exceeded this threshold regardless of human-caused sea level rise (blue), and those smaller, more frequent events that would have stayed below the threshold if such sea level rise had not happened (orange). Overall height of the bars indicates observed changes in frequency of flooding days for Cohasset (whether considering trends in observed sea level rise to be climate-linked or not). The data helped evaluate past and current vulnerability to coastal flooding.
4.1.2.3 Patterns in Single- and Multi-Year Risk

For planning purposes going forward it is important to consider patterns in single- and multi-year risk as well as the likelihood of different flooding events under a range of sea level rise scenarios. Each person, committee, or department making infrastructure investment decisions may have different levels of individual or collective risk tolerance, so this type of information can enhance conversations about trade-offs and whether any particular capital investment is a good idea and if so, whether the same investment might become a bad idea at an identifiable point in the future. Several ways of presenting this information are below.

Concepts inherent in the Risk Finder tool are relevant to this analysis. For example, “water level” is understood to comprise different combinations of sea level rise, tide and storm surge. Therefore, water level values should not be seen as necessarily reflecting sea level rise or flooding alone. Also, local sea level projections incorporate global factors such as melting glaciers and ice sheets, combined with local effects such as sinking land. From a measurement point of view, water level means elevation above the local high tide line, instead of the standard elevation value found on most maps. Technically, the tool uses elevation above local “Mean Higher High Water” – the average of the higher high water height of each tidal day observed over the National Tidal Datum Epoch. For U.S. places, this is taken across the most recent national “tidal epoch” from 1983 to 2001, centered on 1992. Because this is a national standard and for consistency, sea level projections and flood levels are referenced to local high tide lines in 1992. Also note that sea level rise projections in most recent analyses only evaluate trends out to 2100. Although the Risk Finder tool extends projections to 2200, the below plots only go to 2120, rounding to a full century from the present.
Single-year Risk of Flooding Above 5 ft.

Fig. 4 below shows single-year risk of flooding above 5 ft. The y-axis shows the risk or percent likelihood of at least one flood within each year shown, under slow, medium, fast, and extreme sea level rise projections. Each bar in the histogram can be interpreted as an estimate of risk; for example, the fourth bar in the “fast rise” series shows that for the year 2050 and any year in the ten-year period of 2046 – 2055, the estimated likelihood of a flood of 5 ft or more above the current high tide line in any given year is 58%.

Multi-year Risk of Flooding Above 5ft

Fig. 5 below shows multi-year risk of flooding above 5 ft. The y-axis shows the risk or percent likelihood of at least one flood from 2016 through each year shown, under slow, medium, fast, and extreme sea level rise projections. Each bar in the histogram can be interpreted as an estimate of risk; for example, the second bar in the “extreme rise” series shows that from the years 2016 - 2030, the estimated likelihood of a flood of 5 ft or more above the current high tide line in any given year is 76%.
4.1.2.4 Expected Flood Elevations Given Sea Level Rise

Besides the risk calculations as above, planners and infrastructure managers are often also concerned about water levels themselves. In many cases they know the elevations of door sills and other openings that provide access for water to enter critical facilities and could benefit from having projections of expected water levels under different sea level rise and storm surge scenarios. There are numerous ways to present this type of information; one is below. The information could be of assistance in Cohasset to help decide when certain capital investments to protect the Town might be appropriate or conversely, when investments would no longer be appropriate.

Again, data in these plots are based on NOAA’s most recent calculations for slow, medium, fast, and extreme amounts of sea level rise (Sweet et al., 2017), are relative to a 1992 baseline, and were created using the Risk Finder tool. The first plot shows water levels with localized sea level rise projections where there is no flooding. The second shows water levels with the same sea level rise scenarios where there is also a moderate flood, which has a roughly 10% chance of occurrence in any given year. The third shows water levels with the same sea level rise scenarios where there is also a major flood, which has a roughly 1% chance of occurrence in any given year.
**Waterfront Elements**
Cohasset Harbor Plan
Cohasset Harbor, Massachusetts
February 8, 2019

**Water Levels Under Projected Sea Level Rise Scenarios**

![Graph showing water levels under projected sea level rise scenarios.](image)

**Fig. 6. Sea Level Rise Scenarios**

**Water Levels Under Projected Sea Level Rise Scenarios Plus a Moderate Flood**

![Graph showing water levels under projected sea level rise scenarios plus a moderate flood.](image)

**Fig. 7. Sea Level Rise - Moderate Flood**
4.1.3 **Adaptation Actions**

4.1.3.1 **Action Types**

Increases in sea level can be expected to present Cohasset with the need to adapt some buildings and infrastructure. Adaptation actions generally fall in three categories: fortify, accommodate or strategically relocate.

- **Actions that fortify** use hard or soft structures to prevent water from reaching community assets. Such armoring can be “hard” as with seawalls or bulkheads or “soft” as with geotextile tubes (giant fabric sandbags designed to be replaced after large storms).

- **Actions that accommodate** include modification of community assets to reduce the impact of water. They can reduce damage from storm surge but generally do not protect against sea level rise. Accommodation acknowledges that structures will become wet; actions are taken to make them more resilient such as elevation or using construction methods that allow water to pass through the first floor.

- **Actions that strategically relocate** include moving existing structures, people and land-uses away from areas at high risk of flooding to a new location to eliminate the potential risks. Once the structure is removed, these locations can be designed to allow wetlands, beaches and other coastal habitats to naturally migrate landward.
Actions to consider in Cohasset may be parcel-specific (e.g., wet- and dry-floodproofing or elevating buildings and critical infrastructure), area-wide (e.g., reinforcing or extending bulkheads) or infrastructure-specific (e.g., upsizing culverts, raising roads, or constructing barriers to modify the flow of water in areas of anticipated flooding). They can also be structural or focused on policy and planning reform. The following sections describe more specific candidate actions and discuss them in relation to availability of data showing where water in Cohasset may go under different environmental futures.

4.1.3.2 The Need for Hydrologic Modeling

As part of Cohasset’s MVP initiative, in 2018 the Town worked with MAPC to provide a two-day Community Resilience Building Workshop. The series was an overview of the impact of climate change on critical infrastructure, facilities, services, and areas. It helped identify key vulnerabilities and actions that may increase resiliency in Cohasset (MAPC, 2018). Note however that most of the recommended actions were broad, such as “Account for future sea level rise in Town permits and planning” and “Ensure harbor structures provide improved protection.” Some recommendations were specific to particular assets and do highlight the need for particular actions, such as “Elm Street sewage treatment plant: address infiltration through manhole covers and consider the need for a wall or other protection for the plant,” but overall the suggested actions simply point in a general direction for future activity.

In large part this is a result of the unavailability of detailed hydrologic information indicating where flood waters in Town may go. In other words, for resiliency planning efforts to have strong utility they often need to rely on sound underlying analysis of likely future hydrodynamic conditions to which a jurisdiction wishes to adapt. Although the Cohasset MVP process did use sea level rise projections to inform discussions, the combination of sea level rise evaluations and storm surge frequency analysis can be more robust.

Many coastal communities in Massachusetts that are engaging in the MVP program develop their workshops in reference to the Boston Harbor Flood Risk Model (BH-FRM) created by the Massachusetts Department of Transportation and the Federal Highway Administration (Massachusetts Department of Transportation, 2015; c.f. Beverly, City of, 2018). The model made probabilistic estimates for risk of flooding events of various sizes, taking into account riverine flows, tides, waves, wind, storm surge, and wave set-up, and under several sea level rise scenarios. It also included calculations of exceedance probabilities for water surface elevations from the various storm events both in the present and under sea level rise scenarios modeled in the years 2030 and 2070. This provides towns a useful starting point to evaluate which portions of town or pieces of critical infrastructure are more or less likely to experience flooding under a range of possible scenarios.

Clear steps Cohasset can take are therefore to work with the BH-FRM data as a basis for understanding possible impacts from flooding and then structuring more detailed
recommendations for adaptation action. This basis would make it possible for the general recommendations in the Cohasset MVP report such as “Raise all seawalls” to become more geographically and structurally tailored to risks the Town is facing. The steps would also be consistent with other recommendations in the Cohasset MVP report including “Analyze the vulnerability of the sewer pump stations,” “Study roads and bridges subject to flooding,” and “For Sandy Cove and other low-lying areas: research and install appropriate drainage systems.”

Even without using the BH-FRM data, however, additional categories of adaptation action could be evaluated that have potential to increase Cohasset’s resilience in the face of sea level rise and storm surge. These could include beach nourishment and/or planting of additional dune vegetation at Bassing Beach and creation of salt marsh habitat or shellfish beds that have the potential to absorb wave energy. Other actions are detailed below, both in the planning realm and regarding practical steps with buildings and utilities that could be taken immediately.

Another step is to ensure that in developing recommendations the focus is not only on minimizing direct impacts of flooding but also on other aspects of community structure. That is, adaptation in Cohasset should be conducted in a manner that simultaneously protects natural resources and recreational spaces, enhances resilience of Cohasset’s utility sector (as in Section 4.1.3.4 below), connects with forward-looking development incentives (as in Section 4.1.3.4 below), addresses issues of social equity and cohesion, and positively engages the public. GEI recommends that each of these categories of issues be carefully integrated into preparation of Cohasset’s Municipal Harbor Plan.

4.1.3.3 Planning Opportunities

Finally, Town planning documents should be updated to reflect possible changes in the environment including geometry of the coastline and frequency and intensity of storm surge events. Some questions the Cohasset Municipal Harbor Plan will address are focused on relatively short-term outcomes, such as specifying details about fishing piers, mooring fields, etc. These still need to be addressed, but we suggest the Plan will benefit from also considering longer-term changes and needs. GEI recognizes that the draft Cohasset Master Plan of 2003 (Cohasset, Town of, 2003) is currently being updated and may incorporate some of the items discussed here. Because many elements of harbor infrastructure are particularly vulnerable to sea level rise and storm surge, the Municipal Harbor Plan is another opportunity to address these vulnerabilities. For example, the breakwater at Bassing Island is in need of evaluation and possible upgrades to ensure it is ready for a range of possible sea level rise scenarios (see Section 3.3 for additional commentary on this).

Updating Town planning documents in the manner described above would be a change from how most planning efforts in Cohasset have developed in the last 15 years. For example, the draft Cohasset Master Plan of 2003 provided detailed discussion about zoning, dimensional
requirements, development capacity and other elements of the regulatory context at the time. Similarly, the 2003 Plan discusses waterfront access as a critical area for action but does not reference a changing coastline over time and whether this might negatively impact public access to the waterfront at some of the sites discussed.

Additional Cohasset planning documents since 2003 have intended to foster development but also make no reference to a changing environment, sea level rise or storm surge. These include “Transit-Oriented Development Overlay District Special Permit Rules and Regulations of the Planning Board of the Town of Cohasset, Massachusetts,” (Cohasset, Town of, 2006b) “Large Home Review Rules and Regulations of the Town of Cohasset, Massachusetts” (Cohasset, Town of, 2013), and “Rules and Regulations Governing the Subdivision of Land, Cohasset, Massachusetts (Cohasset, Town of, 2016). They are also as recent as the “Village Business District Design Guidelines” (Cohasset, Town of, 2017a), even though many of the sites discussed may be underwater at high tide within the next several decades (if not daily, then possibly on a semi-annual basis when astronomical high tides occur). One document, “Residential cluster development district special permit rules and regulations” (Cohasset, Town of, 2006a), does require identification of which parts of the proposed site are within a FEMA 100-year flood zone, but the requirement is not different from other simple steps in the “Analysis of Site” portion of the permitting process such as documenting topography and trees over 8 inches in diameter.

Because the threats of a changing coastline are not addressed in these Town planning documents, adaptation actions are also not discussed, including specification of new regulations that may become necessary to preserve the desired characteristics of assets in Town – for economic development purposes or otherwise. With each document of this nature a possible consequence is created, of developing in areas particularly vulnerable to economic loss or developing in a manner that does not take those risks into account (such as with adequate floodproofing, elevation adjustment, structural support, etc.). It is also a possible consequence that could be largely eliminated in Cohasset’s planning documents going forward if risk from environmental change is more fully integrated into various planning procedures. Therefore, in devising planning regulations it is advisable that dimensional and other requirements be structured in a flexible manner to allow evolution over time if high tide levels change markedly.

The purpose of this report is not to speculate about chances that new high tide levels or storm surge intensities will occur or when; these issues are discussed in Section 4.1.2 and could be evaluated further through use of data from the BH-FRM. Nor is the purpose to suggest that earlier planning efforts were inadequate; at the time of writing of several of them, threats of storm surge and rising sea levels may have been thought to be more remote than at present. Rather, per the intent of GEI’s Scope of Work with Harriman, it is to assist with beginning to reform the City of Cohasset’s municipal planning documents so that they no longer assume a stationary future.
With increases in collected tide gauge data, storm surge records and modeling efforts like the BH-FRM, now is a good time to ensure that going forward, the broadest possible number of Cohasset’s municipal planning documents adequately reflect what is understood about these threats. Doing so also provides a chance to 1) ensure that earlier recommendations are not lost when environmental conditions change, and new planning frameworks are required or initiated, and 2) bridge the gap between sustainability-oriented intentions of master planning documents and implementation-oriented intentions of documents that direct economic or waterfront development.

Taking these steps would additionally help harmonize potentially divergent planning initiatives in Town. For example, it is clear the Town wishes to integrate development of the harbor with development the of the Cohasset Business District, to “increase the use and enjoyment of both areas of town in a way that increases business activity for all” (Cohasset, Town of, 2017b). Without working to have Town planning documents explicitly and carefully use knowledge about possible trends in sea level rise and storm surge, this integration is likely to remain difficult.

4.1.3.4 Overlay Zones

Planning mechanisms to consider for this type of incorporation include incentive-based and flood-fringe overlay zones, which have been used by numerous other municipalities to provide an alternative set of uses and development standards. For example, the Nantasket Beach Overlay District in Hull, MA provides incentives to encourage mixed use redevelopment for commercial and multi-family property at scales and densities appropriate for the type of community, capable of revitalizing local economic development and able to protect people, property and resources (Schechtman and Brady 2013, Hull, Town of, 2014).

The District incentivizes flood-resilient measures that could be considered in Cohasset, including:

- A rebate of $500 on building permit fees for inclusion of increased building floor elevation in the building design.
- Taller buildings may be permitted by the Planning Board to be elevated beyond the prescribed height limit.

To receive the incentives, candidate projects must include flood-resilient features such as:

- The lowest floor or story does not contain habitable space.
- Mechanical, electrical, and HVAC equipment is not located on the lowest floor.
- Generators are located on the roof or upper stories.
• Projects include "green building" components to the greatest extent possible such as energy-efficient design, use of alternative energy sources such as solar, onsite stormwater retention and layouts that promote walking and connections to public transport.

• Projects include underground utilities and floodproof electrical transformers.

Other municipalities use overlay districts to establish minimum design standards for construction in flood-prone areas. Districts of this type could additionally be considered for implementation in Cohasset. For example, Woodstock, NY has a Flood-Fringe Overlay District (Woodstock, Town of, 2014) where all land in the 100-year flood zone as mapped by FEMA plus additional lands designated by the Town Board (lands in the “fringe” of the flood zone) are subject to construction standards, including that structures:

• Are anchored and designed to prevent flotation, collapse or lateral movement due to floodwater-related forces.

• Use flood-resistant construction materials and utility equipment.

• Provide adequate drainage to reduce flood hazard exposure.

• Locate and construct public utilities and facilities to minimize or eliminate potential flood damage.

• Design all water supply and sanitary sewage systems to minimize or eliminate floodwater infiltration or discharges into floodwaters.

• Locate on-site sewage systems (e.g., septic tanks) to avoid damage to or contamination from them during flooding.

• Elevate the lowest floor of new residential construction (or during substantial improvement to existing construction) to at least 1 ft above BFE.

• Elevate or floodproof the lowest floor of all non-residential construction (or during substantial improvement to existing construction) to at least 1 ft above BFE, including utilities and sanitary facilities.

4.1.3.5 Additional Considerations

Although other regulatory approaches could be used to help manage future development in areas vulnerable to impacts of sea level rise and storm surge (such as rolling development restrictions that move landward as the tide line moves landward, or simply strengthening building codes by requiring additional adaptation strategies; EPA, 2017), we believe the zoning ordinance may be the most flexible tool.
In developing overlay districts of the types described, consideration should be given to amounts of exposure in different parts of the district. For example, some areas adjacent to the shore may have no sea walls and be more vulnerable to moderate levels of flooding, while other areas may have substantial sea walls and be less vulnerable to the same levels of flooding. Additional detail on suggested structure of overlay districts tailored to the impacts of sea level rise can be found in an Expert Review Report on the topic from the Georgetown Climate Center (2011). Among other elements, it provides language for a model zone that distinguishes between land with sensitive natural resources and land that could continue to be developed, and includes sub-districts with differential setbacks, structure elevations and sizes.

Political acceptability of each of these possible regulations should also be considered; outreach to private landowners in proposed future development areas may be appropriate or necessary as part of developing the overlay district(s).

4.2 Waterfront/Coastal Environmental Regulatory Requirements

Implementation of the various elements identified within the Cohasset Harbor Plan will be subject to obtaining of regulatory approvals at the municipal, state, and federal levels. Specific regulatory authorities from whom permits are likely to be required include the Cohasset Conservation Commission, the Massachusetts Department of Environmental Protection (MADEP), and the USACE. Depending on the size and sensitivity of specific construction activities, additional approvals may be required from the Massachusetts Office of Coastal Zone Management (CZM) and the Massachusetts Executive Office of Energy and Environmental Affairs – MEPA Office.

4.2.1 Municipal Approvals

4.2.1.1 Massachusetts Wetlands Protection Act and Cohasset Wetlands Bylaw – Order of Conditions

An Order of Conditions from the Cohasset Conservation Commission is required for activities to be conducted within the Harbor, along its shoreline, and within 100 ft of the Harbor shoreline pursuant to the provisions of the Massachusetts Wetlands Protection Act (M.G.L.c. 131, s. 40) and the Cohasset Wetland Bylaw. This approval process is initiated with the filing of a Notice of Intent (NOI) in compliance with MADEP Regulations 310 CMR 10.30 and the Cohasset Wetlands Regulations of August 24, 2001. The NOI consists of a completed WPA Form 3, project plans at appropriate scale, a project description identifying the activity’s compliance with performance standards specified for each affected wetland resource area in the above-referenced Regulations, a town-certified list of abutting property owners and owners of property located within 100 ft of the property upon which the activity is to be conducted, a copy of a completed abutter notification form, and an affidavit...
certifying that the abutter notification was sent to each property owner included on the town-certified list on a specified date.

Within 21 days of receipt of a complete NOI, the Cohasset Conservation Commission will hold a public hearing on the proposed work. Within 21 days of the closure of the public hearing the conservation commission will issue an Order of Conditions specifying the conditions under which the activity may proceed. An Order of Conditions may be appealed to the MADEP within 10 days of its issuance by the applicant, any abutter, any 10 residents of the town, any person aggrieved by the Order, or the MADEP itself. If appealed, the MADEP will issue a Superseding Order of Conditions. The final Order of Conditions (initial or Superseding) must be recorded at the Norfolk County Registry of Deeds. Upon completion of the authorized work, a Certificate of Compliance must be obtained from the conservation commission.

The time allowed under the Order is three years for completion of the project but can be extended upon submission and approval by the Commission prior to its expiration date.

4.2.1.2 Site Plan and Special Permit

Depending on the activity proposed and its location, a site plan approval and/or special permit from the Cohasset Planning Board and/or Zoning Board of Appeals may be required pursuant to the provisions of the Cohasset Zoning Bylaw (Cohasset Bylaws Chapter 300). Additionally, and as a prerequisite to the issuance of a Chapter 91 Waterways License (see Commonwealth Approvals), the Planning Board must be notified of any pending License application.

4.2.2 Commonwealth of Massachusetts Approvals

4.2.2.1 Chapter 91 Waterways License

A Waterways License is required for any structure that is permanently installed (e.g., piers, mooring piles, bulkheads, revetments, etc.) outshore of the historic High-Water-Line (HWL) pursuant to the provisions of M.G.L.c. 91. A complete License application consists of a completed form, notifications to the planning board and code enforcement officer, and a set of plans and sections prepared in compliance with the rules and regulations for recording at the Norfolk Registry of Deeds. Upon receipt of notice from the MADEP, the applicant must publish a Legal Notice of the filing in a newspaper of local distribution and distribute copies of the Legal Notice and application plans to specified commonwealth agencies, all property abutters, board of selectmen, planning board, conservation commission, and zoning board of appeals. Within 60 days of issuance, the Waterways License must be recorded in the Norfolk County Registry of Deeds or it is no longer valid. The time allowed under the License is 5 years for project completion, but this may be extended upon submission and approval by MADEP prior to its expiration date.
4.2.2.2 Chapter 91 Waterways Permit

A Waterways Permit is required for the dredging of materials from within the harbor pursuant to the provisions of M.G.L.c. 91. This Permit is issued in combination with a Section 401 Water Quality Certification (see below). A complete application includes a completed Combined Application for Waterways License/Permit and 401 Water Quality Certification, together with a plan and section of the proposed dredging activity.

4.2.2.3 Section 401 Water Quality Certification

A Water Quality Certification from the MADEP is required for the placement of fill material into, and/or the dredging of material from, the waters of the Commonwealth of Massachusetts. For the purposes of this permitting program, dredging is defined as the “removal or repositioning of sediment or other material from below the elevation of mean high tide (HTL).” This approval is required pursuant to the provisions of Section 401 of the Federal Clean Water Act and is a prerequisite to the issuance of a Department of the Army Permit pursuant to the provisions of Section 404 of the same Federal statute.

A complete application includes a completed Combined Application for Waterways License/Permit and 401 Water Quality Certification, together with a plan and section of the proposed dredging activity, the results of sediment sampling with chemical and gradation analysis, and a description of methods to be used to mitigate the potential resuspension and discharge of sediment within the waterway. For projects involving a minimal amount of dredging (i.e., cumulative area of dredging ≤5,000 square ft and volume of dredging <100 cy), the final Order of Conditions issued pursuant to the provisions of the Massachusetts Wetlands Protection Act serves as the Section 401 Water Quality Certification.

For dredge projects, the WQC establishes conditions to minimize impacts at the site of dredging and approval for any upland disposal or beneficial reuse of the dredged material. When dredged material is to be disposed in offshore waters, the dredge disposal is under the USACE/EPA requirements for sampling, testing, and disposal including the likely requirement for biological testing – see Federal Approvals below.

4.2.2.4 Massachusetts Endangered Species Act “Take” Determination

Activities proposed to take place within “estimated habitat of rare wildlife” and/or “priority habitat of rare species” are subject to review of the Massachusetts Division of Fish & Wildlife, Natural Heritage and Endangered Species Program (MNHESP) for a determination of “Take/No Take.” If it is determined that the activity will result in a “Take” of a Massachusetts Endangered Species Act (MESA)-protected species, a Conservation & Management Permit from the MNHESP will be required. The “Take” determination can be completed during the review of a Notice of Intent (NOI) filed pursuant to the provisions of the Massachusetts Wetlands Protection Act, provided the information required for this
A determination review is submitted with the NOI to the MNHESP along with a fee payment ($300 for a project involving disturbance of less than five acres). Determinations are typically completed within 30 days of an NOI-submitted request.

To determine if the activity will occur within an estimated habitat, the applicant must review the current version of the Massachusetts Natural Heritage Atlas, a document periodically updated by the MNHESP. Contents of the current atlas are available for viewing online using the MassGIS mapping tool OLIVER. The data are found within the Conservation/Recreation file under Natural Heritage Data.

### 4.2.2.5 Massachusetts Coastal Zone Management Consistency Review

Activities to be conducted within the “coastal zone” of the Commonwealth that are subject to the regulatory review of a Federal agency are reviewed for their consistency with the policies of the Massachusetts Coastal Zone Management Program. Typically, this review is triggered under certain conditions including when an individual Department of the Army Permit (see below) is required for the activity. Review is initiated by the applicant preparing a “Consistency Statement” describing the activity’s consistency with the policies for submission to the Massachusetts Office of Coastal Zone Management (MCZM). The MCZM responds to this Statement with a finding of either concurrence or nonconcurrence with the Statement. In the case of nonconcurrence, the applicant will be required to revise the activity to bring it into consistency with policies of the program.

### 4.2.2.6 Massachusetts Environmental Policy Act Review

Any project conducted with Commonwealth funds and/or requires issuance of a permit or approval from a Commonwealth agency is subject to provisions of MEPA (M.G.L.c. 30, s. 62-62H). Those projects that are subject to MEPA and exceed specific review thresholds are further subject to the review procedures specified at 301 CMR 11.00. The objective of MEPA review is to ensure that all Commonwealth agency actions, including permitting actions, are undertaken in a manner that avoids or minimizes, to the maximum extent practicable, damage to the environment. Accordingly, no Commonwealth agency action may be taken until they have been found to be in compliance with MEPA review requirements.

In the case of activities to be conducted within Cohasset Harbor, the MEPA thresholds most likely to be applicable include:

- Alteration of more than 2 acres of designated priority habitat.
- Alteration of a coastal dune or bank.
- Alteration of 1,000 square ft or more of salt marsh.
• New fill or structure in a FEMA-mapped velocity zone.
• Expansion of a fill or structure in a FEMA-mapped velocity zone.
• Alteration of 0.5 acres of wetlands.
• Dredging of 10,000 cy or more of material.
• Construction/reconstruction/expansion of a solid fill structure of 1,000 or more square ft of base area.
• Construction/reconstruction/expansion of bottom-anchored structure of 2,000 or more square ft of base area.

The exceeding of any of the above thresholds will trigger the filing of an Environmental Notification Form (ENF) with the MEPA Office of the Secretary of EOEEA. Following a public review of the ENF, the secretary will issue a Certificate stating whether any further review (e.g., Environmental Impact Report) will be required. The review of an ENF requires between 30 and 45 days. The applicant is required to publish a Legal Notice in a newspaper of local distribution prior to the filing of an ENF.

4.2.3 Federal Approvals

4.2.3.1 U.S. Department of the Army Permit

A Department of the Army Permit from the USACE is required for the placement of structures within the navigable waters of the United States (pursuant to Section 10 of the Rivers and Harbors Act of 1899) and for the discharge of dredged or fill materials into “waters of the United States,” including adjacent wetlands (pursuant to Section 404 of the Federal Clean Water Act). For the purposes of Section 10, USACE jurisdiction extends to the elevation of mean high water (MHW). For the purposes of Section 404, USACE jurisdiction extends to the elevation of the high tide line (HTL).

A responsibility of the USACE is the coordination of the application with other federal agencies including EPA, National Marine Fisheries Service (NMFS), US Fish & Wild Life, etc., as well as historical agencies when required. No filing fees are associated with this application.

The USACE has issued General Permits (GPs) for most activities in Massachusetts requiring a Department of the Army Permit. The GPs authorize activities the USACE has generally found to have only minimal individual and cumulative adverse environmental impacts on waters of the United States. Should an activity be authorized pursuant to the terms and conditions of a GP, authorization by individual permit will not be required. In very limited circumstances, authorization under a GP can be secured by the filing of a simple Self-
Verification Form with the USACE New England District. In most instances, authorization
can only be secured through the filing of a Pre-Construction Notification (PCN). Following
an interagency review of the PCN, the USACE issues a determination of whether the activity
is authorized under one or more GPs. Within the PCN approval, additional requirements
may be imposed, i.e. a CZM Consistency Review. Activities that cannot be authorized or
approved under the terms and conditions of a GP must be authorized through the issuance of
an individual permit.

Activities that must be authorized through the issuance of an individual permit are subject to
more extensive application review than those authorized under a GP. Additional filing
requirements for an individual permit application include an essential fish habitat (EFH)
assessment to be reviewed by the National Marine Fisheries Service and a Coastal Zone
Management Consistency Statement to be reviewed by the Massachusetts Office of Coastal
Zone Management. In addition to these reviews, the USACE must determine that issuance of
the individual permit is “in the public interest.” The public interest review requires
consideration of a broad range of potential project impacts on environmental and social
conditions and issues.

In addition to interagency consultations with environmental agencies, the USACE also must
consider impacts of an activity on significant cultural and historic resources. This task is
accomplished through consultations with State Historic Preservation Officers (SHPO) and,
where applicable, Tribal Historic Preservation Officers (THPO). To ensure appropriate
consultation with these officers, the USACE requires applicants to notify them of any PCN
or individual permit application at the time of filing. Should a SHPO or THPO express
concerns regarding the activity, the applicant will be required to resolve those concerns
before the USACE will issue its authorization of coverage under a GP or issue of an
individual permit.

All authorization decisions issued by the USACE will include specific conditions under
which the authorized activity is to be conducted. Such conditions may include time of year
(TOY) restrictions specifying those time periods during which the activity may not occur, a
variety of restrictions on construction means and methods, and both monitoring and reporting
requirements.

Regulatory approvals from the USACE are required for the offshore disposal of dredge
material. Disposal occurs at pre-approved disposal sites under conditions established by the
USACE and the EPA, which dictate the testing and approval requirements. Testing of
dredge material going to the Mass Bay Disposal Site generally requires biological testing in
addition to physical and chemical testing. Disposal at the other offshore site requires cleaner
material and the requirement of biological testing is based on the physical and chemical
testing results.
We recommend reviewing the recent USACE dredge projects’ sampling and testing plans to determine the geographic limits of this testing and what testing would additionally be required to dredge more of the Harbor.
5. Potential Grants and Funding Opportunities

5.1 Commonwealth of Massachusetts Coastal Grant Programs

5.1.1 MA Seaport Economic Council

The Seaport Economic Council helps coastal communities develop and improve local assets to facilitate economic growth. The Seaport Council serves all 78 of Massachusetts’ diverse coastal communities and helps each to use their unique economic assets to grow the economy and unlock job creation. The Council also awards grants to create jobs and build resilience to climate change. Dredge projects are not eligible under this grant program.

The Governor of Massachusetts, Charlie Baker, recently signed economic development legislation that includes an additional $50 million in authorization for the Seaport Economic Council. Seaport Economic Council grants will be awarded on a competitive basis and will offer flexible funding to empower communities to bring forward the best ideas and projects for cultivating and stimulating the maritime economy and job growth.

Generally, five types of grants will be encouraged and prioritized with maximum awards of about $1 million. Most grants, however, are anticipated to be much smaller. Successful grant applications should seek funds for capital expenses rather than operating expenses.

1. Innovation Grants: Innovation Grants function as a resource to invest in innovative ideas and projects that promote job creation and economic growth in the maritime sector. This sector includes: shipping and trade, marine science and technology, coastal recreation and tourism, ocean-based clean energy initiatives, and the seafood industry.

2. Grants to Public Education Institutions: Grants for public education institutions range from fostering awareness of coastal assets and maritime traditions of the Commonwealth to investing in transformative public/private collaborations. Public educators from pre-K through higher education are eligible for this grant.

3. Local Maritime Economic Development Planning Grants: It is recognized that coastal communities vary in size and scope from deep-water port cities to small beach towns. These grants provide capacity for coastal communities to explore their unique advantages and generate economic development plans that help them realize their full potential, grow jobs, and maximize the maritime economic sector for their community.
4. Maritime Economic Sector Strategy Grants: Section 3 of the Executive Order governing the Seaport Economic Council articulates the Commonwealth’s role in promoting and growing the maritime economic sector and it is anticipated that from time to time investments will be made to fulfill this charge.

5. Supportive Coastal Infrastructure Project Grants: Infrastructure grants are available when, to fulfill the job or economic growth potential within a coastal community, investments may need to be made in coastal infrastructure to achieve these aims. Best available science and information regarding potential threats to coastal communities from sea level rise and extreme weather events will be used to evaluate and improve the sustainability and resilience of projects in which the Council invests.

Matching funds of 20% of overall project funding request is necessary. Acceptable sources of matching funds include the municipality, federal grants, private funds or contributions by partner organizations.

5.1.2 Executive Office of Energy and Environmental Affairs

In support of Governor Baker’s Executive Order 569, “Establishing an Integrated Climate Change Strategy”, the Dam and Seawall Removal or Repair Program provides financial assistance to plan and implement repairs to key infrastructure that provides storm damage protection and flood and erosion control. Projects may also remove unneeded infrastructure to increase resilience or establish natural protection solutions. Communities that have completed a Municipal Vulnerability Preparedness Plan and apply with a project identified as a priority in that plan may be eligible for additional points in this procurement.

Funding for awards will be from a combination of sources, including but not limited to The Dam and Seawall Repair or Removal Fund as established by M.G.L. c. 29, §2III and C. 286, §2A and 2G of the Acts of 2014, 2000-7028 and 2000-7026. Funds awarded under M.G.L. c. 29, §2III are subject to 301 CMR 15.00, entitled Provisions for Administration of the Dam and Seawall Repair or Removal Fund.


5.1.2.1 Dam, Levee and Seawall Repair and Removal: Application for Funding – Design and Permit Grant

Eligible Projects are for the completion of final design work and submittal of permits for repair and/or removal of dams, levees, seawalls and other forms of inland and coastal structures as defined by Category 1, Category 2, and Category 3 below. Eligible scopes of work include engineering and permitting services performed by qualified engineers.
- Category 1 - Dams and similar regulated and unregulated impoundments.
- Category 2 - Seawalls, coastal flood, and/or foreshore protection
- Category 3 - Inland flood control structures and levees, excluding dams and non-jurisdictional impoundments

For the selected projects, responding applicants will be offered a grant providing for reimbursement of approved costs. In addition to funds available from the Dam and Seawall Repair or Removal Fund established by M.G.L. c. 29, 2III, EEA may seek supplemental funding for projects critical to the protection of public health and safety as well as key public infrastructure.

5.1.2.2 Dam, Levee and Seawall Repair and Removal: Application for Funding – Construction Finance Grant

Eligible Project are for the repair and/or removal of dams, levees, seawalls and other forms of inland and coastal structures. The categories for which applications for the repair or removal of infrastructure will be accepted are the same as in Section 5.1.2.2 above.

For the selected projects, responding applicants may be offered funding through a grant or a finance package offering a combination of grant and loan funds. The availability of loan funds is expected to be extremely limited for FY2019. EEA will determine – at its own discretion – the form of any awarded finance package.

If included in a finance package, the interest rate for loans made shall be fixed at no more than 2% or one half the market rate as established by the Wall Street Journal prime rate in place at the time the application is made, whichever is greater.

To provide an incentive for projects that will maximize the use and/or restoration of natural systems, EEA reserves the right to modify the loan terms. Those projects which minimize or eliminate the use of hard infrastructure are eligible for a 0% interest rate. Projects will be considered for 0% interest if:

- Design plans recognize the potential impacts of climate change and improve resilience.
- Implementation will improve or expand the functions of naturally occurring systems.
- The project fits into a larger comprehensive plan to improve the environmental condition or the project complements other work ongoing in the local watershed.
In addition to funds available from the Dam and Seawall Repair or Removal Fund established by M.G.L. c. 29, 2III, EEA may seek supplemental funding for projects critical to the protection of public health and safety as well as key public infrastructure.

5.1.3 Department of Housing and Economic Development

5.1.3.1 MassWorks Dredging Program

The program will provide grant funding to cover expenses for dredging projects, including bid and procurement, mobilization and demobilization, mechanical dredging equipment, and dredged material management. Eligible projects must support public navigational dredging projects and be located within public tidelands. Projects that use grants to municipalities, for public infrastructure provided by this section, shall be procured by the municipality in accordance with Chapter 7, Section 39M of Chapter 30, Chapter 30B and Chapter 149.

The Governor signed economic development legislation that includes $50 million for saltwater dredging projects, creating an individual program for focused funding that will build upon the $4 million 2018 Navigational Dredging Pilot Program the Administration launched in 2018.

Eligibility of Applicants and Projects

Any of the 78 Massachusetts coastal cities/towns, acting by and through municipal officers or by and through any agency designated by such municipal officers to act on their behalf, or a public entity, may apply to the program for a grant in a specific amount to fund a specific public dredging project.

Eligible projects must be for navigational dredging of public waterways. Program investments will be targeted to proposed projects that can result in direct economic activity and/or address public safety issues. A particular emphasis will be placed on projects that are designed, permitted and ready for construction (“shovel-ready”) or will be within the 2019 fiscal year. MassWorks grants can be in addition to other forms of local, state, and federal assistance that the applicant might receive.

The Program was opened for the first time in 2018 with applications due in August. It is presumed this grant program will continue for the foreseeable future.


5.1.3.2 MassWorks Infrastructure Program

The MassWorks Infrastructure Program is a competitive grant program that provides a robust and flexible source of capital funds for municipalities and other eligible public entities to
complete public infrastructure projects that support and accelerate housing and job growth throughout the Commonwealth. Capital grants are available to all Massachusetts municipalities and public entities seeking support for public infrastructure improvement projects.

Per M.G.L.ch.23A§63, the primary purpose of the MassWorks Program is: to issue grants to municipalities and other public instrumentalities for design, construction, building, land acquisition, rehabilitation, repair and other improvements to publicly-owned infrastructure including, but not limited to, sewers, utility extensions, streets, roads, curb-cuts, parking, water treatment systems, telecommunications systems, transit improvements, public parks and spaces within urban renewal districts, and pedestrian and bicycle ways.

In past years this fund has been used for commercial piers to fund improvements to their infrastructure. In 2018 applications were accepted in early August. It is presumed this grant program will continue for the foreseeable future.

6. Literature Cited


Appendix A

Site Photos
Cohasset Harbor Infrastructure

Cohasset Harbor - View from Cohasset Cove

Parker Ave

Parker Ave

Parker Ave

Parker Ave
Cohasset Harbor Infrastructure
Cohasset Harbor Infrastructure

Cohasset Sailing Center

Cohasset Sailing Center

Cohasset Sailing Center

Cohasset Sailing Center
Cohasset Harbor Infrastructure

Government Island

Government Island

Government Island

Mill River Marine Railway
Cohasset Harbor Infrastructure

Border Street Seawall

Border Street Seawall

Border Street Seawall

Border Street Seawall
Cohasset Harbor Infrastructure

Atlantica Seawall

Atlantica Parking Lot

Atlantica Foundations
Cohasset Harbor Infrastructure

Lawrence Wharf

Seawall Failure - Stone Revetment

Seawall Failure - Stone Revetment
Cohasset Harbor Infrastructure

Seawall - Lawrence Wharf

Town Landing

Town Landing

Town Landing
Cohasset Harbor Infrastructure

Town Landing

Border Street Seawall

Border Street Seawall

Cohasset Harbor Inn
Cohasset Harbor Infrastructure

Cohasset Harbor Inn

Tide Gate

Town Pier - Margin Street

Town Pier - Margin Street
Cohasset Harbor Infrastructure

Town Pier - Margin Street

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Town Pier - Margin Street

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Town Pier - Margin Street

11/01/2018 09:51

Town Pier - Margin Street

11/01/2018 09:51
Cohasset Harbor Infrastructure
Cohasset Harbor Infrastructure

Cohasset Yacht Club

Jetty - Ballermine Estate

Breakwater
Cohasset Harbor Infrastructure

Breakwater

Breakwater

Breakwater