COASTAL engineering co.

July 25, 2018 **Project #C18729.00**

By Certified Mail/Return Receipt Requested

Secretary Matthew A. Beaton
Executive Office of Energy and Environmental Affairs (EEA)
Attn: MEPA Office
100 Cambridge Street, Suite 900
Boston, MA 02114

RE: **ENF - RESPONSE TO ONSITE MEETING COMMENTS**
Proposed Rock Revetment and Pedestrian Walkway
EEA# 15877
Town of Weymouth
278 Wessagussett Road and 20 River Street
Weymouth, MA
Parcels: 4-21-3 and 2-12-10

On behalf of Town of Weymouth, we are hereby submitting our response to the comments made at the onsite meeting that was conducted by Alexander Strysky on June 28, 2018 for the above referenced project. Please contact the undersigned if you have any questions.

Sincerely,

COASTAL ENGINEERING CO., INC.

Roger P. Michniewicz

Roger P. Michniewicz, P.E.
Marine Division Manager

Enclosures: Coastal Advisory Services letter dated 7-12-18
Revised ENF Narrative

cc: Town of Weymouth
Distribution List

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Pursuant to Wetland Protection Act regulations, 310 CMR 10.00, an ENF was filed for a proposed pedestrian access between public beaches located at Wessagussett Beach and George E Lane beach in the town of Weymouth. A coastal engineering structure, integrated with the pedestrian walkway, is also proposed to replace existing coastal structures that currently provide toe stability to the adjacent coastal bank and protects pre-1978 structures and public infrastructure located at the top of the bank. At the MEPA onsite, questions were raised regarding classification of the resource areas and mitigation measures proposed to stabilize the existing coastal bank. The following narrative is intended to address these concerns and to supplement information provided in the ENF.

PROJECT BACKGROUND

The town of Weymouth, Massachusetts owns two coastal beaches located on Hingham Bay: Wessagussett Beach located on Wessagussett Road, and George E. Lane beach located on River Street. The two public beach areas are separated by a cobble strewn beach fronting a well-vegetated coastal bank that extends for about two thousand linear feet (2000') along the shoreline. Approximately one thousand linear feet (1000') of the southwest portion of the coastal bank is armored, while the remaining one thousand foot (1000') long section of the coastal bank, which extends northeasterly toward George E. Lane Beach, is naturally protected by a well-established coastal dune and beach system.

Approximately five hundred feet (500') of the thousand foot (1000') long armored coastal bank is already protected by a licensed rock revetment, while the remaining five hundred foot (500') long section is protected by a combination of remnant concrete bath house foundations and concrete sea walls. The other thousand foot (1000') long section of the vegetated coastal bank is naturally protected from coastal storm wave action by a well-established coastal dune and beach system that provides erosion protection due to its width and surface elevation (EL 10). Both beaches have been previously maintained as sandy beaches for public use by the placement of sand over the naturally occurring underlying glacial till soil commonly observed along the shoreline in this area of Hingham Bay.

The sandy beach materials at the site have been sourced over the years both from periodic dredging of nearby Weymouth Fore River and from land-based borrow pits. According to available State License Plans and existing town environmental permit records, George E. Lane Beach has been nourished in recent times in response to the increased public demand for public bathing facilities, whereas Wessagussett Beach, which had also been historically nourished with sand for public use, has not had any sand placed on the beach for several decades, resulting in the bare natural glacial till observed today.

The natural glacial till in the tidal zone along the shoreline consists of very dense, consolidated soil that includes clay, silt, sand, gravel, and boulders that are generally resistant to storm wave erosion forces. However, over time, the sand veneer and finer grain portion of the glacial till soil have slowly eroded away, leaving behind only cobbles and boulders that are currently strewn along the shoreline. Remnant concrete foundations and seawalls as well as cement blocks from the old bathhouse structures are also evident along the shoreline. This is particularly the case along the one thousand foot (1000') long area fronting the dilapidated bath house and concrete wall section of the beach where sand nourishment has not been maintained by the town. Historical records indicate that Wessagussett Beach had previously been nourished with sand well beyond its current northeasterly

limit of the existing rubble stone groin, extending northeasterly along the shoreline to the limits of George E. Lane Beach. At the time, the two sandy beaches were only separated by the existence of a rubble stone groin, which still exists at the southwesterly end of George E. Lane Beach to this day.

Coastal engineering structures along the armored section of the shoreline have also not been maintained and are in various states of disrepair. The existing rock revetment has slumped with many of the armor stones dislodged from the original position. The historical bath houses have been demolished and the remaining concrete foundations, concrete retaining walls and concrete stairs leading to the public beach from the off street parking area on Wessagussett Road have deteriorated due to the long term exposure to extreme weather and salt water exposure. Portions of the interconnecting concrete seawall adjacent to the remnant bath house foundations were also observed to be collapsed in some areas and in need of replacement. The date of 1928 is observed to be cast into one intact area of this concrete seawall. As a result, the coastal bank in many places is unstable and subject to potential slope stability failure. In addition, the area along the shoreline is not accessible for safe pedestrian passage between the two existing sandy beaches.

In addition, there presently exists a second fully intact concrete seawall located on the base of the coastal bank, about 10 feet landward of the seaward-most concrete seawall in this area. The well vegetated coastal bank in this area exists at about a 2:1 (horizontal to vertical) slope, and its stability is highly dependent upon the existence of the concrete bath house foundations and concrete seawalls presently located in this area. The coastal bank in this area extends up to about 45 feet in height and provides stability to both Wessagussett Road and a Town-owned paved parking area presently located near the top of the coastal bank. The paved parking area is supported by a large 180-foot-long concrete retaining wall constructed on the coastal bank. Portions of this wall were observed to be leaning forward due to the instability of the coastal bank in this area.

For several decades, the Town has been pondering the installation of a public access walkway along the shoreline in this area to provide pedestrian access between the two sandy beaches, and has recently received a substantial grant ($184,000) from the Massachusetts Executive Office of Housing and Economic Development of the Commonwealth of Massachusetts through the Seaport Economic Council to design and permit such a facility.

This is an important community project that will benefit the public interest by providing barrier free access to the public water front. The project will connect two important town assets and also provide improved storm damage protection for upland public infrastructure.

ALTERNATIVE ANALYSIS

The initial design concept was to construct a pile-supported elevated walkway along the shoreline at the base of the coastal bank to accomplish this task. However, it was quickly realized that such a free-standing structure would be highly susceptible to coastal storm wave damage because its deck would need to be situated at about EL 12 (NAVD 1988) well below the FEMA Velocity Flood Zones, which are designated to be between EL 18 and EL 20 in the project area. Furthermore, the condition of the existing 500-foot-long section of concrete seawalls and concrete bathhouse foundation components located at the toe of the coastal bank in this area require immediate attention due to their current deteriorated condition. It became apparent that the proposed elevated walkway

construction project would need to stabilize the adjacent coastal bank at the same time. If the coastal bank instability issue is not resolved prior to the installation of the proposed elevated walkway, access to the coastal bank area for future stabilization work would be greatly inhibited or even prevented once the elevated walkway was in place.

Following careful analysis of the various options which were presented in the ENF, a composite structure consisting of a rock revetment with an integral pedestrian walkway built into the top of the revetment was selected as the preferred option that addresses the accessibility and the bank stabilization concerns of the project. The proposed rock revetment is designed to currently accepted engineering design standards that includes the installation of filter fabric between the revetment stones and the underlying soil, a seaward face slope of 1.5 to 1 (horizontal to vertical), and with the face stones set to create as rough a surface as possible to greatly dissipate ocean storm wave energy.

The coastal bank within about half of the project area (500 lin. ft.) is already protected from coastal storm erosion by a Massachusetts DPW licensed rock revetment, and the design footprint of the proposed facility in that area can be easily accomplished within the footprint of the existing rock revetment without any further encroachment seaward of the existing toe of the revetment. The existing rock revetment is currently in need of reconstruction because the toe stones are no longer embedded below grade and the rocks comprising the revetment are no longer well interlocked.

The coastal bank in the remaining half of the project area (500 lin. ft.) is currently protected from coastal storm erosion by the existing vertical-faced concrete bathhouse foundations and the somewhat damaged concrete seawalls. The ongoing stability of the seawalls is in jeopardy due to the continued undermining of the walls over time, with some sections observed to have already collapsed.

The design footprint of the proposed facility requires portions of the the rock revetment to be located seaward of the vertical face of the existing concrete bathhouse foundations and concrete seawalls in this area. The area of the beach located between Mean Low Water and the base of the coastal bank over the 1000 foot length of the project site calculates to about 172,000 square feet, or about 4 acres. The footprint of the rock revetment that is proposed to be constructed seaward of the vertical face of the existing concrete bath house foundations and concrete seawalls at the site is about 11,000 square feet, or about 6% of the beach area.

The coastal bank at the site locus is owned by the Town and is observed to be well vegetated with a considerable amount of invasive species plants. The project, therefore, includes a proposal to undertake an extensive ecological restoration program along the entire coastal bank to ensure its stability well into the future. The project also includes the mitigation of three storm water drainage outlet pipes whose outlets are situated on the face of the bank. The erosional impact of this storm water runoff on the coastal bank is proposed to be mitigated by providing scour protection and underdrains to percolate storm runoff into the ground before it reaches the shoreline below.

STATUS OF ENVIRONMENTAL PERMITTING

A Notice of Intent for the project was filed with the Weymouth Conservation Commission (WCC) and the Department of Environmental Protection – Wetlands Division (DEP) on May 15, 2018, and the first hearing for the proposed project was held on May 30, 2018, where the hearing was continued to August 22, 2018. An Environmental Notice Form (ENF) was filed with the Massachusetts Executive Office of Energy and Environmental Affairs (EEA) on June 13, 2018 and an onsite meeting was held by EEA on June 28, 2018. Attendees at the onsite meeting were: Alexander Strysky (EEA), Gregory DeCesare (DEP), Rebecca Haney (CZM Coastal Geologist), Robert Luongo (Weymouth Director of Planning and Community Development), Mary Ellen Schloss (Weymouth Conservation Administrator), Frank Singleton (Weymouth Conservation Commissioner), Jason Norton (Coastal Engineering Company), and Roger Michniewicz (Coastal Engineering Company).

Mr. DeCesare indicated that the coastal bank located adjacent to the bath house foundations and the concrete seawalls is most likely a sediment source for a coastal beach and, therefore, may not be eligible for the installation of an engineered structure (rock revetment) to protect the toe of the coastal bank from coastal erosion. Ms. Haney stated that, based upon her inspection of the area, she determined that the existing coastal bank in this area was a sediment source to a coastal beach and would not be eligible for the installation of an engineered structure (rock revetment) to serve this purpose. She also questioned Coastal Engineering Company's (CEC) resource area determination and suggested that the shoreline in this area be instead be classified as a combination of a rocky intertidal shore and a coastal beach.

Because the viability of this proposed public pedestrian walkway project is highly dependent upon the ability to construct a rock revetment along the base of the coastal bank at the site, the Town of Weymouth retained Jim O'Connell, a well-qualified and experienced Coastal Geologist with Coastal Advisory Services located in Brant Rock, MA. Mr. O'Connell reviewed plans prepared by CEC and made an independent site visit in order to make a professional determination regarding the classification of the wetland resource areas at the subject property and, more importantly, to make a professional determination regarding whether the coastal bank is a sediment source that provides sediment to a coastal beach. (Attached is a copy of Mr. O'Connell's letter report dated July 12, 2018 that describes the results of his findings regarding the wetland resource areas at the site). Mr. O'Connell concludes in the letter report that the coastal bank is a vertical buffer and NOT a sediment source to a coastal beach. Mr. O'Connell also concludes in the letter report that the area located seaward of the coastal bank in this area is a "mixed sediment beach" and not a rocky intertidal shore. There currently is no separate standard in the Massachusetts Wetlands Protection Act for a "mixed sediment" beach.

Other areas of the site where the existing coastal wetland resource areas were inspected and discussed at the EEA onsite meeting include the coastal dune area located just beyond the northeasterly end of the walkway project and the proposed ADA-compliant vehicle parking area located at the southwest end of the walkway project. CEC agreed that the first area was in fact a coastal dune and would revise our project design to include an elevated pedestrian walkway that would extend from the existing rubble stone groin currently located in this area, over the coastal dune, and then ending at the coastal beach located beyond the vegetated dune. The walkway design in this area will include perforated decking that will allow sufficient sunlight to pass through the decking to the underlying beach grass to ensure its continued existence. The elevated walkway in this

area would connect the project walkway to a public access mat that will be seasonally placed on George E. Lane Beach to assist with public access along the beach.

The second area inspected at the EEA onsite meeting was the area at Wessagussett Beach where a two-vehicle capacity concrete ADA-compliant accessible parking area is being proposed. CEC had designated this location to be Land Subject to Coastal Storm Flowage, whereas Ms. Haney interpreted this area as a coastal beach.

CEC has conducted test pits in this area and observed it to be highly disturbed due to substantial shallow buried concrete components still existing beneath the ground surface. As such, the area does not perform as a coastal beach and should not, therefore, be classified as such. Nonetheless, CEC agreed to review the design of the limited paved parking surface for this area, and will review alternate design options that will allow accessible ADA compliant parking spaces that meets the performance standards required for a coastal beach to the greatest extent possible.

The proposed project is currently under simultaneous review by the Weymouth Conservation Commission. The initial public hearing was held on May 30, 2018 with the next hearing date scheduled for August 22, 2018, pending resolution of the issues raised at the MEPA on-site.

Further discussion concerning the project is expected with regards to the interpretation of coastal wetland resource areas at the site based upon input from related State regulatory and advisory agencies, town personnel, and the town's professional consultants for the project. Although there are differences of opinion between Ms. Haney on-site comments and professional opinion expressed by Mr. O'Connell in his letter report, we believe these issues can be resolved through the Conservation Commission and normal regulatory review process.

DISCUSSION AND ANALYSIS

A comprehensive alternatives analysis was included in the revised ENF documents submitted to the EEA and others on the Distribution List on June 19, 2018 (see attached copy). The combination elevated walkway/rock revetment option shown on the permit plans submitted to the EEA and the Weymouth Conservation Commission is the preferred alternative because it provides the most sensible structural and ecological solution. The project area is located in a very high energy FEMA Velocity Zone whose base flood elevation is situated at an extremely high elevation relative to the beach elevation, with a base flood elevation varying between EL. 18 and EL. 20 (NAVD 1988) at the site, compared to a grade of the toe of the coastal bank between EL 3 and EL. 10. This was recently evidenced at the site by the observation that two large concrete Jersey Barriers that had been placed on the top of one of the bath house foundations (at El. 10) were knocked off the foundation and down to the beach below by storm waves during the recent winter coastal storms.

The top of the proposed rock revetment and the surface of the proposed elevated pedestrian walkway are both set at EL 12, which is high enough to protect the coastal bank from all but the most severe coastal storms but is still well below the base flood elevation. Any proposed elevated walkway designed for this project needs to be well secured to be able to survive intense coastal storms in which coastal storm waves can be expected to be overtopping the walkway deck elevation. The proposed combination walkway/rock revetment is designed to be able to withstand such coastal storm events.

The proposed coastal engineering structure is required to provide a stable base for the elevated pedestrian walkway; toe stability to the adjacent coastal bank and a vertical buffer for storm damage protection and flood control. The new sloping-faced rock armoring is intended to replace the existing deteriorated vertical-faced concrete structures along the southwesterly section of the coastal bank and to repair the existing failing rock revetment along the northeasterly section. Based on the report prepared by Mr. Jim O'Connell, the existing bank is a vertical buffer, and does NOT serve as a major continuous source of sediment for beaches, dunes, and barrier beaches. As such, the coastal armoring of the existing coastal bank is permissible pursuant to the interests of 310 CMR 10:30.

Due to the high energy environment, existing low elevation of the beach, and composition of the sediment presently existing along the shore line in this area, it is not possible to install a soft solution toe erosion protection system to protect the existing dilapidated vertical-faced concrete components. Likewise, it is not practical to remove these existing concrete components which still afford considerable erosion protection to the coastal bank and replace them with soft components such as coconut fiber rolls, coir envelopes, or cobble stone berms.

The attributes of the proposed project are exceptionally beneficial to the improvement of the current dilapidated condition of this area at the site. Safe pedestrian access to this 500-foot-long section of the shoreline is currently unavailable due to the instability of the concrete components that presently exist at the site. The Town cannot remove these concrete components at this time because they provide structural stability to the coastal bank in this area. In spite of the existence of these concrete components, there is evidence that the stability of the coastal bank in this area will continue to be in jeopardy as the concrete wall components deteriorate or are undermined by coastal storm activity. The coastal bank above the top of the concrete components is well vegetated and is not observed to be eroding due to coastal storm activity.

There is an overriding public interest associated with the project because it is designed to provide ADA-compliant public access to the shorefront in this area while eliminating a blighted shorefront area where safe public access is currently not available. The vertical face of the existing concrete foundation and wall components located along about 500 linear feet of the project site is detrimental to the adjacent wetland resource areas because such vertical faced engineered structures are known to significantly reflect storm wave energy off their vertical face and back out onto the adjacent areas, thereby greatly exacerbating the erosion of such resource areas. The installation of a properly designed slope-faced rock revetment to replace these concrete components will be very beneficial to the existing wetland resource areas due to its ability to significantly reduce such reflected wave energy. Such a facility will also ensure the continued stability of the well-vegetated coastal bank located above the existing concrete foundation and wall components where such stability is now in jeopardy.

The proposed project includes the placement of a portion of the proposed rock revetment over a small portion of designated beach area at the site. Under 310 CMR 10.27(2) (3), the performance standards for a coastal beach require that any project on a coastal beach shall not have an adverse effect by increasing erosion, decreasing the volume or changing the form of any such coastal beach or an adjacent or down drift coastal beach. The proposed work on the beach area is minimal and the "mixed sediment" material makeup of the beach has not been determined to function as typical sandy beach materials. The existing vertical faced concrete foundations and sea walls presently have a significant adverse effect on the coastal beach at the site, and the replacement of these structures with a sloping

faced rock revetment will be very beneficial by greatly reducing the existing storm wave energy that is currently reflected back onto the beach area by the vertical faced walls. The rock revetment will enable the well-vegetated coastal bank in this area to continue to remain stable and function as a vertical buffer for storm damage prevention and flood control. As such, the storm damage prevention, flood control, and protection of wildlife habitat interests of the 310 CMR 10.27 are met.

Based on the above assessment, along with supporting documentation provided, we believe that any other mitigating measures needed to address the above issues can be addressed through the normal regulatory review process. Accordingly, we respectfully request a MEPA certificate indicating No EIR be required.

Jim O'Connell Coastal Geologist
Coastal Advisory Services
P.O. Box 401, Brant Rock, MA 02020
781-588-0502 JimOConnell28.com
JimOConnell28@gmail.com

July 12, 2018

Jay Norton
Coastal Engineering Company, Inc.
260 Cranberry Highway
Orleans, MA 02653

RE: Coastal Resource Identification and Functional Analysis along a Section of Wessagusett Beach, Weymouth

Dear Jay:

The following is an analysis of the Coastal Bank along a section of the Town-owned Wessagusett Beach, Weymouth, providing an opinion of whether the Coastal Bank is a Sediment Source, Vertical Buffer, or both, and to identify the designation/type of Coastal Beach or Rocky Intertidal Shore, based on the DEP Wetlands Protection Regulations.

A site visit was conducted on July 6, 2018 to view the site and document existing conditions.

Site Locus

The Coastal Bank area of interest is located along a town-owned section of Wessagusett Beach, Weymouth, as shown in **Figures 1A & 1B below**.

Fig 1A: Coastal Bank area of Interest along Wessagusett Beach, Weymouth

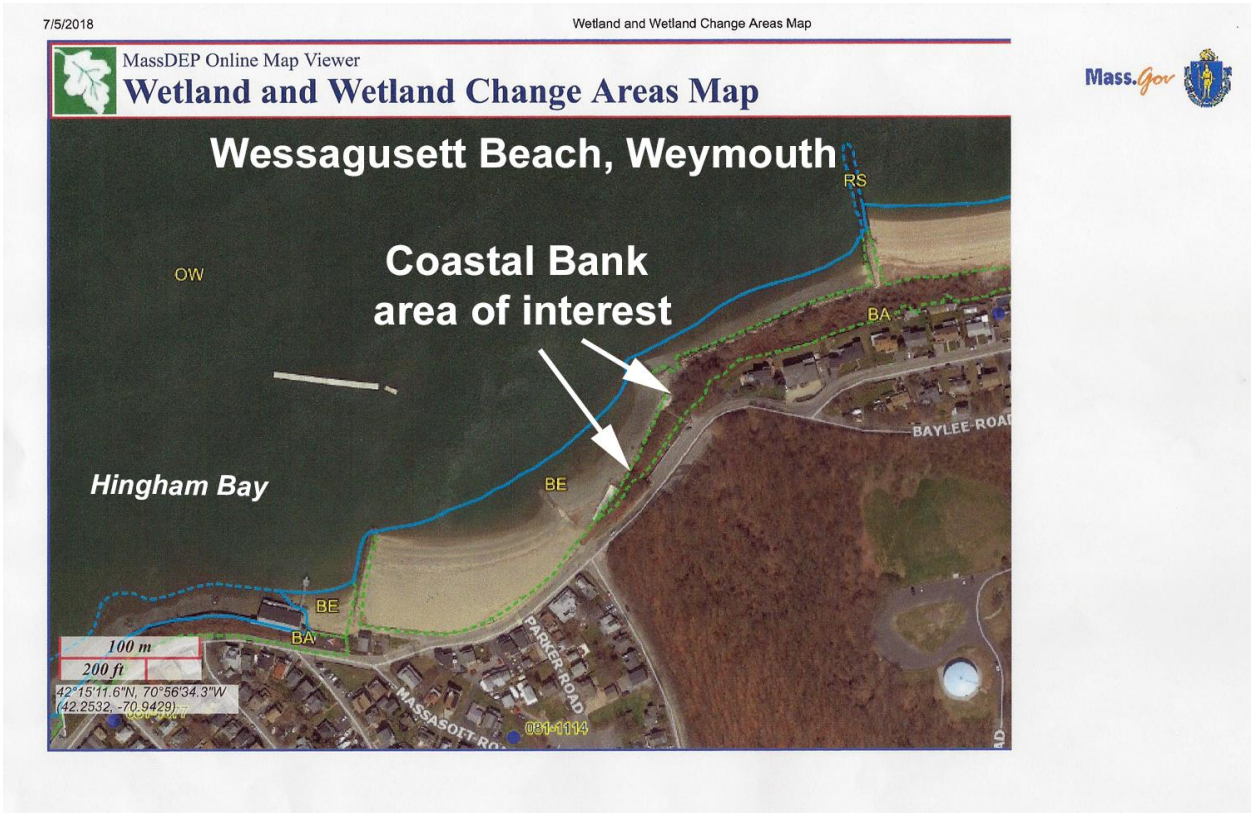

Fig 1B: DEP Wetlands Map showing the Coastal Bank area of interest

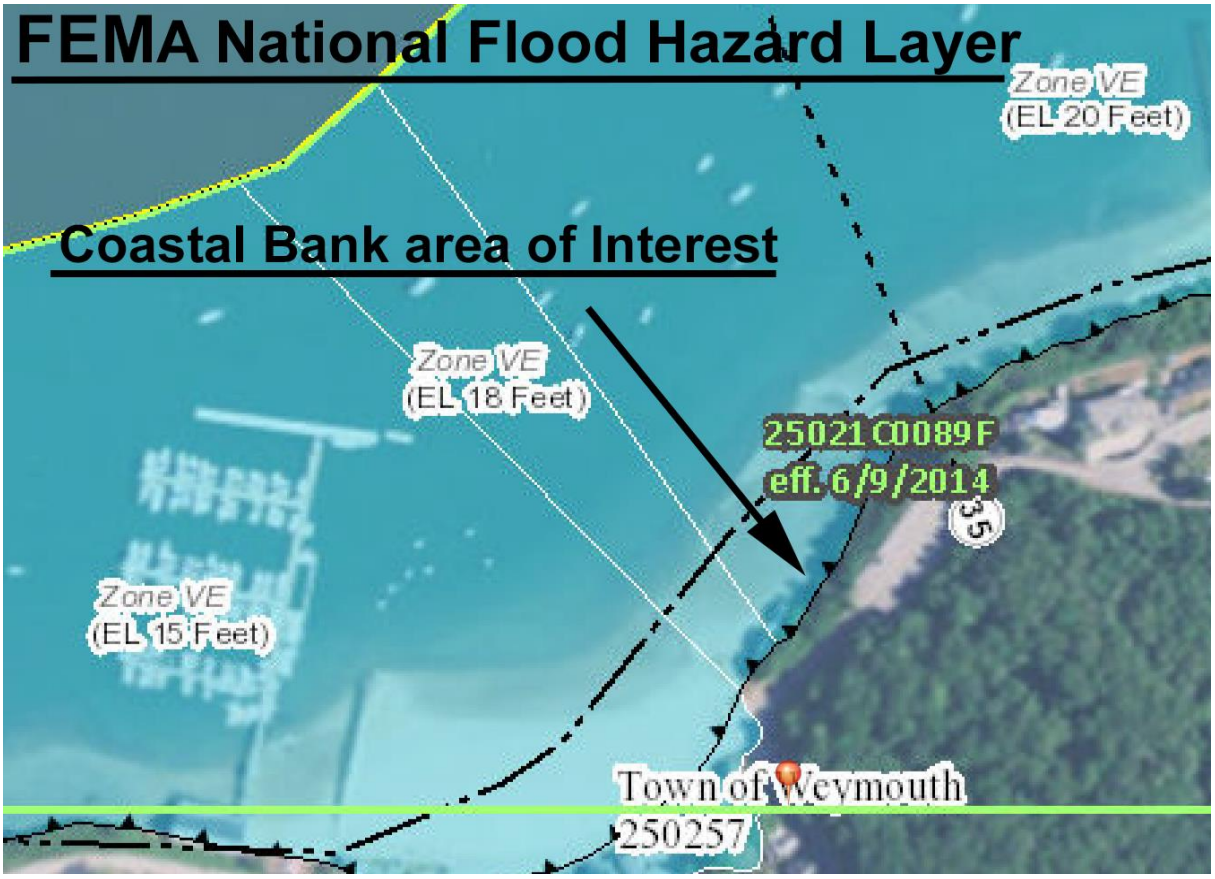

Fig 3 showing the Coastal Bank area of interest in a FEMA-mapped Velocity Zone EL 18 and 20' NAVD inundating partway up the Bank under 100-year storm conditions

Fig 3 above shows the Coastal Bank area of interest in a FEMA-mapped Velocity Zone EL 18 and 20' NAVD inundating partway up the Bank under 100-year storm conditions.

Fig 4: low altitude Google aerial photo showing the dilapidated condition of the Coastal Bank and Beach along a Town-owned section of Wessagusett Bach, Weymouth

Figure 4 above and Figure 5 below shows the Coastal Bank area of interest which is a highly altered, blighted area including; dilapidated, sections of collapsed concrete seawall/bulkhead fronting an existing vertical concrete seawall/bulkhead; abandoned concrete foundations; cinder blocks and purposely laid cobblestone strewn along the stretch of the mixed sediment beach; and, an existing in-tack vertical concrete seawall/bulkhead along the entire stretch at the Toe of the Coastal Bank landward of the concrete debris.

Fig 5 showing the locations of the existing concrete foundations and concrete walls

Figure 5 above shows the 2 existing concrete foundations at each end of the Coastal Beach (east & west ends), and the location of the existing in-tack vertical concrete seawall/bulkhead.

The locations of the 'existing concrete remnants and debris of old bathhouse foundations' on each end of the beach and toe of Coastal Bank as shown above in Figure 5 are also shown on the Coastal Engineering Plan #C 3.2.1. and C 3.2.3, dated 5/12/18.

Figure 6 below is a close-up of the abandoned old bathhouse concrete foundation against the east end of the Coastal Bank.

Fig 6 showing the old bathhouse concrete foundation at the east end of the beach & bank

Figure 7 below shows an old dilapidated, broken concrete seawall/bulkhead with footing strewn along the beach fronting an existing in-tack vertical concrete seawall/bulkhead at the existing Toe of the Coastal Bank.

Fig 7 showing the dilapidated broken sections of seawall strewn on the beach fronting an existing in-tact vertical concrete seawall/bulkhead

Figure 8 below is a close-up of the existing, in-tack 8' high vertical concrete seawall/bulkhead that exists along the entire length of the eastern section at the Toe of the Coastal Bank.

Fig 8 is a close-up of the existing, in-tack vertical concrete seawall/bulkhead that lies along the entire length at the Toe of the Coastal Bank

Based on an August 3, 1994 Certificate of Emergency issued by DEP, it appears that imported gravel may have existed in between the old bathhouse foundations and the existing vertical concrete seawall/bulkhead. However, based on recent visual observations, any gravel that may have been deposited has since for the most part eroded.

Figure 9 below is the plan accompanying a request and approval for emergency repair of a 'severely deteriorated retaining wall' submitted to the Weymouth Conservation Commission and DEP in 1994 modified only by underlines showing the location of the many existing 'concrete retaining walls', including a present in-tact wall at the Toe of Coastal Bank.

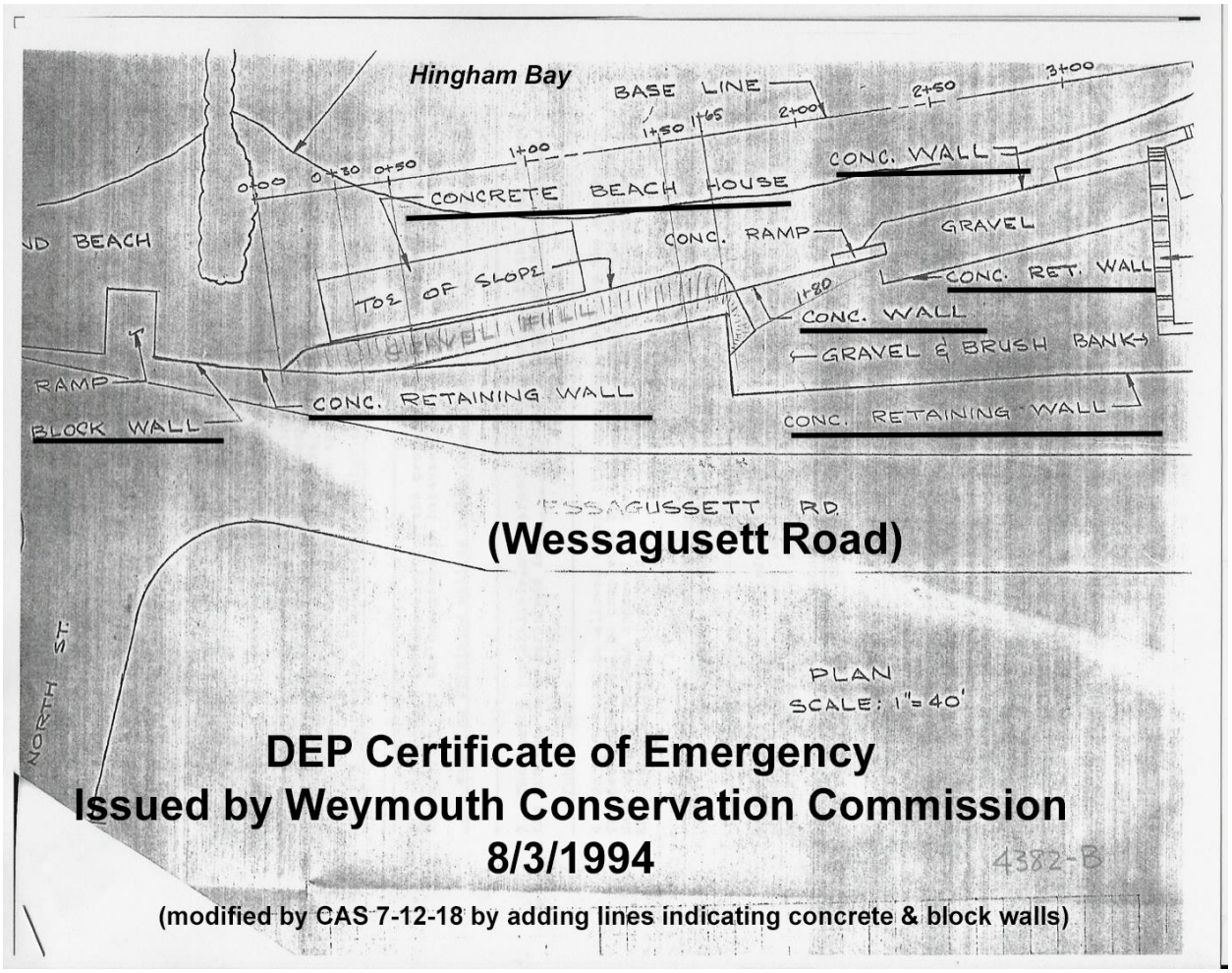

Fig 9: Plan accompanying Certification of Emergency issued by Weymouth Conservation Commission on 8/3/1994

Figure 10 below is a close-up of the existing, in-tack 3-4' high vertical concrete seawall/bulkhead that exists along the entire length of the western section at the Toe of the Coastal Bank.

Fig 10 shows the existing 3-4' high seawall/bulkhead that lies along the western section at the Toe of the Coastal Bank

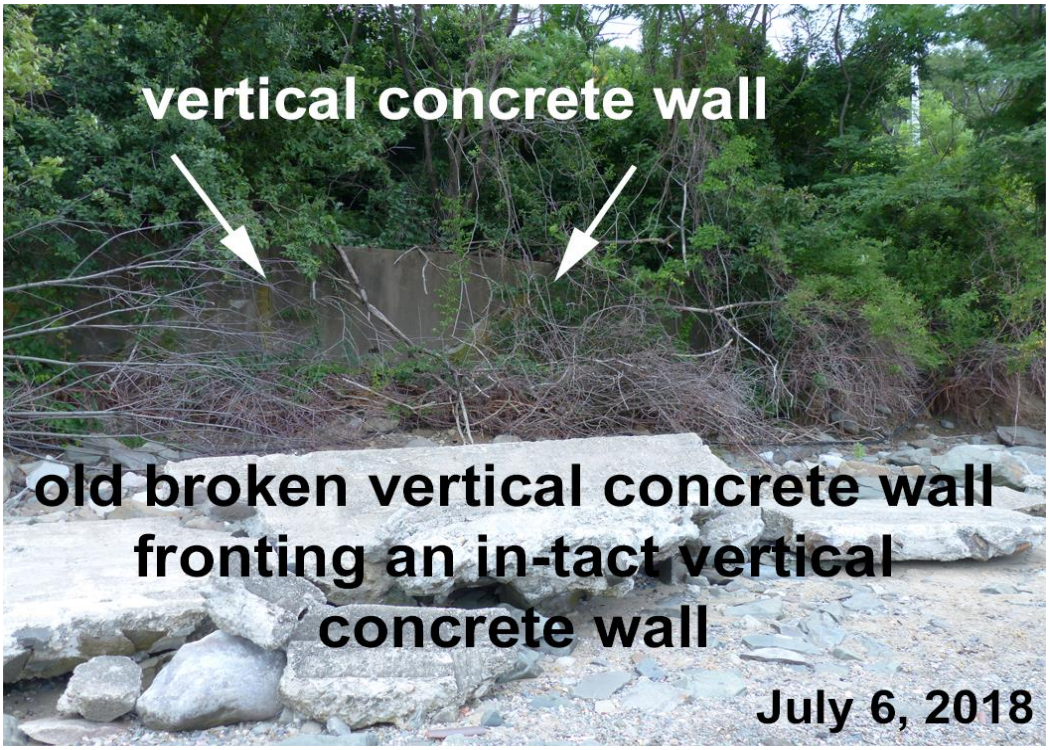

Fig 11 showing sections of a broken seawall/bulkhead that lie strewn on the beach fronting the CB.

Fig 12 showing the only area along the Coastal Bank that is not densely vegetated, possibly due to run-off

Figure 12 above shows the only area along the Coastal Bank that is not densely vegetated, possibly due to rain run-off. If it were storm waves, the entire Bank would be similarly unvegetated. However, note that the unvegetated area is above an existing in-tact vertical concrete seawall/bulkhead, and fronted by boulders placed along the beach.

Discussion: Vertical Buffer or Sediment Source Coastal Bank or Both

In addition to site observations above, the relevant section of the DEP Wetlands Protection Regulations to determine whether a Coastal Bank is a sediment source or vertical buffer, or both is copied below.

Coastal Bank means the seaward face or side of any elevated landform, other than a coastal dune, which lies at the landward edge of a coastal beach, land subject to tidal action, or other wetland (310 CMR 10.30(2)).

Thus, Coastal Bank exists along the area of interest **as shown in the Figures above**.

Based on the recently published DEP/MCZM (August, 2017), 'A Practical Manual for Conservation Commissions to Protect the Storm Damage Prevention and Flood Control Functions of Coastal Resource Areas', otherwise known as the Coastal Manual, '*The seaward*

edge (or bottom) of the coastal bank begins at the toe of the coastal bank slope, where other coastal wetland resource areas end.'

'Note that the WPA Regulations specify a coastal bank as being an "elevated landform." Therefore, a coastal engineering structure (CES), such as a seawall, which is directly between a beach and a dune, is not considered a coastal bank.' (p. 1.51)

310 CMR 10.30:
Coastal Banks

(1) *Preamble.*

Coastal banks are likely to be significant to storm damage prevention and flood control.

Coastal banks that supply sediment to coastal beaches, coastal dunes and barrier beaches are per se significant to storm damage prevention and flood control.

Coastal banks that, because of their height, provide a buffer to upland areas from storm waters are significant to storm damage prevention and flood control.

Coastal banks composed of unconsolidated sediment and exposed to vigorous wave action serve as a major continuous source of sediment for beaches, dunes, and barrier beaches (as well as other land forms caused by coastal processes). The supply of sediment is removed from banks by wave action, and this removal takes place in response to beach and sea conditions. It is a naturally occurring process necessary to the continued existence of coastal beaches, coastal dunes and barrier beaches which, in turn, dissipate storm wave energy, thus protecting structures of coastal wetlands landward of them from storm damage and flooding.

Coastal banks, because of their height and stability, may act as a buffer or natural wall, which protects upland areas from storm damage and flooding. While erosion caused by wave action is an integral part of shoreline processes and furnishes important sediment to downdrift landforms, erosion of a coastal bank by wind and rain runoff, which plays only a minor role in beach nourishment, should not be increased unnecessarily.

Summary

As shown in the Figures above, a vertical, concrete seawall/bulkhead exists along the entire area of the Toe of Coastal Bank of interest. The 'Toe of Coastal Bank' is landward of the existing, vertical concrete seawall/bulkhead.

The imported gravel that apparently existed between the concrete bathhouse foundations, the seaward dilapidated broken concrete seawall sections and the landward concrete seawall has apparently eroded.

The Coastal Bank is densely vegetated as shown in Figures 5 above, with only a very short section of Bank unvegetated **as shown in Figure 5 above, noted as #1 in the figure and Figure 12**.

There are other very short sections that are non-vegetated, so small as to be 'negligible' (**see Figure 9).**

That the Coastal Bank is armored along its entire length of interest with an in-tact 4-8' high vertical seawall/bulkhead, is densely vegetated, is fronted by 2 old concrete bathhouse foundations, and fronted by additional dilapidated sections of collapsed seawall, the Coastal Bank it is not exposed to vigorous wave action *and not serving as a major continuous source of sediment for beaches, dunes, and barrier beaches* (310 CMR 10.30(1)).

Based on the above analysis and on-site visual observations, my professional opinion is that the Coastal Bank is a Vertical Buffer and not a sediment source.

A discussion of the location of the Top of Coastal Bank is not necessary for this report as the focus of this analysis is in determining whether the Coastal Bank is a sediment source, vertical buffer, or both.

ROCKY INTERTIDAL SHORES

The WPA Regulations (310 CMR 10.31) define rocky intertidal shores as "*naturally occurring rocky areas, such as bedrock or boulder-strewn areas between the mean high-water line and the mean low water line*."

Rocky intertidal areas occur on rocky shores, such as headlands and cobble/boulder beaches. Although they tend to be more irregular in topography and have a greater predominance of bedrock outcrops, a rocky intertidal shore can also include the intertidal area of mixed sand, pebble, and/or cobble beach, provided there is a predominance of boulders present. (p. 1-57 Coastal Manual)

Based on visual observations and measurements, although boulders are present on the beach, my opinion is that the beach fronting the Coastal Bank of interest is a 'mixed sediment' beach and not Rocky Intertidal Shore. I suggest an intertidal shore must contain >50% boulders, or a combination of >50% boulders and bedrock to be classified as Rocky Intertidal Shore.

I hope this analysis assist in the review of the proposed project.

As always if you have any questions regarding the content of this Report please feel free to contact me at any time.

Yours Truly,

Jim O'Connell

Jim O'Connell, Coastal Geologist/Certified Floodplain Manager
Coastal Advisory Services

Project Description, Performance Standards and Alternatives Analysis

PROJECT DESCRIPTION

In July, 2016, the Town of Weymouth, through its Waterfront Committee and Conservation Commission, issued a Request for Proposals for Design and Permitting Services for the purpose of connecting Weymouth's two sandy public salt water bathing beaches in North Weymouth. Both Wessagussett Beach, located at the southwest end of the site, and George E. Lane Beach, located at the northeast end of the site, are owned and managed by the Town of Weymouth. The two sandy beaches are separated by about 1000 linear feet of barren rocky intertidal shore that is strewn with rocks, boulders, and extensive concrete debris from two former large masonry bath houses, a former masonry life guard building, and concrete retaining walls along the shoreline that are in various states of disrepair. The rocky intertidal shore at the project site is inaccessible to general public use for safe foot passage along the shoreline from one beach to the other, especially during high tide events. The rocky intertidal shore is separated from the adjacent sandy beaches located at each end by the existence of rock mound groins that extend out into Hingham Bay. The rocky intertidal shore at the site abuts a well-vegetated coastal bank that begins at the easterly end of Wessagussett Beach and extends about 2000 linear feet northeasterly across the project site and ends at a point where George E. Lane beach abuts River Street. Nearly all of the coastal bank is Town owned, and extends from about EL. 4 (NAVD 88) at its toe up to a maximum of about EL. 50 at its highest point. The FEMA Flood Zone ranges between VE (EL 18) and VE (EL 20) along the length of the coastal bank. There presently exist 18 adjacent dwellings that are located above the top of the coastal bank in this area, consisting of 16 dwellings along the length of Regatta Road and 2 dwellings along a portion of Wessagussett Road.

Figure 1 - Aerial of Project Location

Figure 2 - Picture showing existing revetment and rocky intertidal shore

A section of the coastal bank at the site is armored at its toe by a licensed rock revetment (MA-DPW Contract No. 2098, issued May, 1960) that was constructed in 1960. This revetment starts at the stone groin located at the southwest end of George E. Lane Beach and extends southwesterly about 500 linear feet along the toe of the coastal bank where it ends at another stone groin. The top of this rock revetment is situated at about EL. 10 (NAVD 88) and provides coastal bank toe erosion protection to maintain the coastal bank slope stability for the last four dwellings along the road above. The rock revetment is in fair condition and needs to be reconstructed because the toe stones are no longer embedded below grade and the rocks making up the revetment are becoming unraveled.

The remaining portion of the coastal bank that extends about 500 linear feet from the end of the rock revetment to the edge of the existing stone groin located adjacent to Wessagussett Beach is not protected by a rock revetment. However, this stretch of shoreline did not require a rock revetment in 1960 because it was already protected from shoreline erosion by the previous construction of two 95 foot wide masonry bath houses supported by cast-in-place concrete foundations, a 60 foot wide masonry life guard building and viewing platform supported by a cast-in-place

foundation, and the construction of an inter-connecting cast-in-place concrete retaining wall that was located at the toe of the coastal bank and extended between the building structures at the site. All of these building superstructures have been removed from the site, but their concrete foundations still remain at the site in various stages of disrepair. The retaining wall that is located at the toe of the coastal bank in this area has partially collapsed due to long term shorefront storm erosion, but presently exists at the toe of the coastal bank as large sections of concrete debris. It is interesting to note that this wall still has a date of 1928 cast into its face at one location. This stability of this concrete wall was first noticed to be in jeopardy in 1994 due to shoreline erosion caused by coastal storms that occurred that year. Consequently, the Weymouth Conservation Commission issued a Certification of Emergency in August of that year to allow the stabilization of the wall by the placement of gravel fill on the seaward side of the wall. Please note that this Certificate included a sketch plan that shows the existence of all the concrete walls located on the coastal bank at that time. It appears that most of that gravel fill placed at that time has been eroded away and the wall is now in the partially collapsed state that we see at the site today.

There presently remains a second tier of a continuous, intact, cast-in-place concrete retaining wall on the coastal bank that is located about 10 feet landward of, and parallel to the failing concrete wall that is located at the toe of the coastal bank. This second concrete retaining wall relies on the lower concrete retaining wall for its stability and is currently in jeopardy of failure due to the deteriorating condition of the lowest wall on the coastal bank. In addition to these two concrete walls, there presently exists a third cast-in-place concrete wall that is located on the coastal bank near its top. This third concrete wall provides stability for Wessagussett Road and for a 180-foot long Town owned paved parking area (The Shelf) for public parking to provide access to this shorefront for all Weymouth residents. The existence of these concrete structures and concrete walls is documented on a license plan for a former adjacent beach improvement project issued by the Massachusetts DPW in July, 1958 (DPW Contract No. 1955). The existing concrete structures and walls at the site were not proposed to be licensed at that time because the license plan clearly shows that all of these structure and wall components were located landward of the MHW line at that time.

The stability of the concrete retaining wall supporting the paved parking area at the top of the coastal bank is highly dependent upon the stability of the existing concrete walls located near the toe of the coastal bank in this area. The stability of this retaining wall is in jeopardy due to the unstable condition of the two existing concrete walls located at and near the base of the coastal bank in this area. In addition to the concrete structure foundations and concrete walls at the site, there presently exists a cast-in-place concrete stairway that extends over the coastal bank from the paved parking area above to the life guard building foundation area below. This stairway is in fair to poor condition and is proposed to be replaced as part of the project because it is to be left open to public access.

Figure 3 - Test pit showing glacial till

Based upon both published surficial geology maps for Weymouth and a recent series of test pits made at the site using a backhoe, the area located seaward of the toe of the coastal bank at the site consists of very dense consolidated glacial till. Glacial till is defined as unsorted glacial sediment derived from the erosion and entrainment of material by the moving ice of a glacier. Glacial till is the material that was deposited as the glacial ice melted and dropped the soil and rock fragments, and consists of dense, consolidated deposits of unsorted clay, silt, sand, gravel, and boulders. The rocky intertidal shore seen at the site is the result of the slow, long term erosion of the dense glacial till soil deposit at the site where the finer grain soil is washed away and the larger stones and boulders are left behind to remain in place on the surface to form the rocky intertidal shore we currently see at the site today. There is strong published and physical evidence that the glacial till strata extends in both directions beyond the limits of the rocky intertidal shore seen at the site and into the shorefront areas that underlie both Wessagussett Beach and George E. Lane Beach. The site plan for a beach

maintenance project at Wessagussett beach in 2001 shows an extensive array of eight 170 foot long adjacent parallel trenches that were excavated in the glacial till perpendicular to the shoreline. Evidently, the impervious glacial till strata in this area was causing ponding of sea water on the sandy beach once the tide went out whereby the beach sand remained saturated and not very useable for public sunbathing. The excavated trenches were subsequently backfilled with sand to provide drainage of the sea water from the beach nourishment sand during low tide events.

Extensive historical records for the area indicate that the adjacent sandy beaches exist primarily due to the placement of sandy sediments over the natural glacial till strata obtained from the periodic dredging of the Weymouth Fore River Channel and resultant placement of the dredge material on the two beaches. The historical records also include evidence of long term annual beach nourishment programs where both beaches have been nourished via land based sand sources to maintain the current beach profiles.

Figure 4 - Photo depicting existing concrete walls and remnants

A bird's eye view of the Weymouth shoreline indicates that the long shore current travels from northeast to southwest whereby beach sand collects up against the existing rock mound groins located at the southwest end of each of Wessagussett Beach and George E. Lane Beach. It appears that George E. Lane Beach is entirely dependent upon artificial beach nourishment to maintain its beach profile because the entire shoreline located northeast of the beach appears to be completely armored by a continuous line of rock revetments and concrete seawalls.

Likewise, it is apparent that Wessagussett beach is entirely dependent on artificial beach nourishment to maintain its beach profile because there is no evidence that the existing bank is a sediment source. In fact it is highly doubtful that the very small amount of sand that may even erode along the coastal bank in the area situated between the two beaches ever gets transported to Wessagussett Beach by littoral drift. Furthermore, the existing rock mound groin separating these two shorefront areas does not appear to trap any sand on its northeast side due to longshore current transport, which would indicate that sand from the coastal bank in this area was available for nourishment of Wessagussett Beach. It is interesting to note that the extended shoreline located southwest of Wessagussett Beach has existed almost entirely as a natural rocky intertidal shore for quite some distance because of the apparent lack of artificial beach nourishment in that area and abandonment of recreational facilities at the site.

The Weymouth Department of Planning and Community Development is the lead agency on the beach connection project. The Town's Waterfront Plan, prepared by Henderson Planning Group in 1988, recommended the construction of a pedestrian walkway between the two beaches in order to enhance the recreational opportunities for both areas. The Town has been fortunate enough to have recently received a grant from the Seaport Economic Council for the design and permitting for the installation of a 1000 foot long fully-accessible public access walkway at the site to connect both beaches, increase accessible open space at Weymouth's beaches, and to enhance opportunities for passive recreation along the Town's waterfront. Coastal Engineering Company, Inc. was selected to assist the Town with the design and permitting of this project.

The initial concept suggested by the Town was to design and permit the installation of a 1000 foot long elevated walkway along the shorefront at the toe of the coastal bank at the site. However, it was quickly realized that such a concept would be problematic for several reasons. The grade of the shoreline edge at the site ranges between EL. 2.0 (NAVD 88) and EL. 8.0, and the FEMA Flood Map for this area indicates that the area is situated in a Velocity Zone with a height designation that ranges between EL. 18 and El. 20 across the site. A practical deck elevation of a proposed elevated walkway would probably be situated at about EL. 12, well below the FEMA Flood Elevation. This type of structure would be cost prohibitive due to the likely storm wave forces it would need to withstand and also

due the presence of the dense glacial till at the site which would require the use of heavy steel piles to be able to penetrate to the required embedment depths to ensure the stability of the structure. Also, it is evident that once such an elevated walkway was constructed, it would prevent, or at least greatly inhibit, construction access to the toe of the coastal bank along its length to perform future repair of the existing rock revetment, repair of the existing concrete walls at the site, or construction access for the installation and maintenance of any future shorefront erosion protection facility located at the toe of the coastal bank in the vicinity of the existing concrete building foundations and concrete walls located at the toe of the coastal bank at the site. Consequently, it was determined that the most stable, cost effective design for the project would be a composite structure that would consist of both a rock revetment for shorefront coastal bank stabilization and a sturdy elevated concrete/timber pedestrian walkway located at the top of the rock revetment that would abut the surface of the coastal bank at about EL. 12. The design of the walkway is such that it is well embedded and secured between the rock revetment and the face of the coastal bank to provide stability of the walkway to be able to endure the occasional coastal storm where storm waves may overtop the revetment for a period of time.

Wessagussett Beach is a sandy beach located adjacent to the southwest end of the site, and George E. Lane Beach is a sandy beach located adjacent to the northeast end of the site. Both ends of the pedestrian walkway project site are separated from the adjacent sandy beaches by rubble stone groins that extend perpendicular to the beach and out into Hingham Bay. No work on the existing groins at the site is being proposed as part of this project. The shorefront area at the revetment project site can be best described as a Rocky Intertidal Shore (below MHW) and/or Land Subject to Coastal Storm Flowage (above MHW) that extends up to the bottom of the coastal bank at the site. It is interesting to note that historical records indicate that this current rocky intertidal shore area at the site formerly consisted of a significant sandy beach area where large public access bath houses had previously been located near the base of the existing coastal bank. There is historical evidence that this area was the site of an initial extensive beach nourishment project in 1960 and then additional episodes of beach nourishment in successive years. The beach nourishment was evidently placed on top of the naturally occurring glacial till strata we currently observe at the site today. Now it appears that beach nourishment of this shorefront area has been suspended for several years, and that virtually all of the beach sand in the area located between the two sandy beaches has been eroded away and all that remains at the site is the rocky intertidal shore, the concrete bath house foundations, the life guard building and platform foundation, and the existing intact concrete wall and collapsed concrete wall components located along the toe of the coastal bank.

The project design proposes to raise the top of both the reconstructed revetment and the new revetment to EL. 12 NAVD88. Likewise, the surface of the proposed pedestrian walkway is designed to be located at EL. 12 NAVD88. The FEMA Flood Map for this area indicates that the entire revetment and pedestrian access walkway project is located in Velocity Flood Zones that range between EL. 18 and EL. 20. Consequently, the proposed rock revetment and pedestrian walkway must be well designed and constructed of substantial components due to the anticipated storm wave forces to which the facility will be exposed from time to time. The entire rock revetment has been designed to current rock revetment design standards utilizing a double filter fabric layer at its interface with the underlying soil, and with the revetment face stones set to create as rough a sloping surface as possible to help dissipate storm wave energy. Mean High Water (MHW) at the site is situated at about EL. 4.39 (NAVD 88), and large portions of the existing and proposed rock revetment will be located seaward of the MHW line. It is acknowledged that additional State Licenses and Permits as well as Federal Permits will be required for the project beyond the initial Order of Conditions permit.

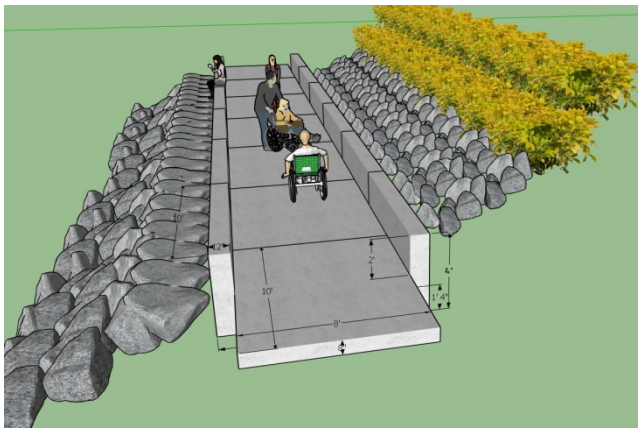

Figure 5 - Proposed boardwalk

The proposed project also includes the seasonal placement of an 1100 linear foot pedestrian access beach mat across George E. Lane Beach between the end of the proposed pedestrian walkway and the existing sidewalk at

Regatta Road. The coastal beach in this area extends up to the toe of the adjacent well-vegetated coastal bank. The beach grade elevation at the intersection of the two resource areas ranges between EL. 10 and EL. 12. Consequently, due to the extent and elevation of coastal beach in this area, it affords considerable erosion protection of the toe of the adjacent coastal bank, and no scarp erosion of the toe of the coastal bank in this area was observed.

The design of this project includes the complete removal of the extensive unsightly concrete foundation components, concrete stairs, and collapsed concrete wall components presently existing at the site. The project design proposes to collect and crush all of these concrete components to a useable size on site, after which the material thus obtained can be utilized as part of the engineered fill material that will be required for the foundation of the proposed pedestrian walkway at the site. Such an operation will eliminate the need to transport all of these concrete components away from the site for delivery to a suitable disposal facility. The remaining existing concrete walls supporting the coastal bank in this area of the site will be left in place and incorporated into the proposed revetment and walkway design.

The proposed project also includes other related work as follows:

1. The removal of existing visible wooden flotsam, metal debris, and concrete rubble located along the rocky intertidal shore adjacent to the project site.
2. The proposed construction of a 5 foot wide strip of small diameter rip-rap adjacent to the proposed revetment on the upland side of the entire length of the proposed pedestrian walkway to stabilize the bottom of the vegetated coastal bank at its intersection with the proposed pedestrian walkway and to facilitate the collection and dissipation of stormwater runoff that may flow down the adjacent coastal bank.
3. The installation of a continuous 1000 foot long trench drain along the landward side of the proposed pedestrian walkway to intercept and percolate into the ground stormwater runoff from the coastal bank and especially from the three existing roadway stormwater drainage outfall pipes that currently terminate on the face of the coastal bank at the site.
4. The reconstruction of a trap rock lined drainage swale down the coastal bank to extend from the Baylee Road stormwater drainage outlet pipe located at about EL. 34 on the coastal bank down to the proposed drainage leaching trench at the proposed pedestrian walkway. Based upon Weymouth DPW records, this area was originally designated as a drainage ditch running down the coastal bank. A recent inspection of this drainage ditch revealed significant enough erosion of the coastal bank to warrant the installation of the proposed drainage swale to prevent further erosion of the bank.
5. The proposed reconstruction of the existing concrete stairway that extends from the town-owned "Shelf" paved parking area located at the top of the coastal bank down to the former life guard building located in this area. This existing concrete stairway is in disrepair and will be replaced with a new precast concrete stairway in the same footprint.
6. The installation of one set of granite stairs built into the rock revetment to allow pedestrian access from the walkway down to the shoreline below.
7. The proposed construction of a paved concrete two-vehicle capacity ADA-compliant parking area located at the southwest end of the proposed pedestrian walkway adjacent to Wessagussett Beach and Wessagussett Road. The existing resource area where this new parking is proposed to be located is presently designated as Land Subject to Coastal Storm Flowage. Non-ADA compliant parking will continue to be provided in the parking area on the Shelf where pavement stall striping is recommended to maximize the number of parking spaces at this location. Stormwater runoff from this small ADA-compliant concrete parking area will be percolated into the ground via the proposed adjacent rock revetment which is designed to border the seaward side of the parking area.
8. The proposed construction of a paved sidewalk and adjacent timber guardrail to be located along the northwest side of Wessagusett Road that extends from the Shelf parking area down to the proposed handicap-accessible parking area below. This sidewalk is proposed to be located within the buffer zone to the top of a coastal bank at the site. The proposed sidewalk is cross-sloped to direct stormwater runoff from the sidewalk toward the existing adjacent vegetated coastal bank at the site.
9. The proposed installation of security cameras and lighting fixtures at various points along the walkway as designated by the Town.

10. The proposed seasonal installation of an 1100 foot long by 6.5 foot wide public access mat on the surface of the sandy beach to allow easier public passage over the existing sandy beach that extends along George E. Lane Beach between the nearest sidewalk on River Street and the northeast end of the proposed elevated walkway. The mat will be temporarily pinned to the beach surface using light duty metal or plastic anchors manufactured for that purpose. The proposed mat will need to be installed seasonally by the Town at a location situated above the high tide line along the beach. The location of the proposed beach mat will be determined at the beginning of each season in order to avoid the existing beach grass as much as possible. The beach mats will need to be placed above the high tide line seasonally. The mats will need to be placed seaward of the edge of existing beach grass to the maximum extent possible. However, in some areas where the high tide line intercepts the seaward limit of existing beach grass, additional beach grass may need to be planted seasonally to mitigate for the loss of any existing beach grass due to the installation of the mat in a particular season. Please note that the proposed mat provides for pedestrian access along the beach, but the mat is not designated as being completely ADA compliant.
11. A Vegetation Management and Maintenance Plan is being proposed for the entire 2000 foot long coastal bank at the site. Existing invasive plant species will be removed and will be replaced with salt tolerant indigenous plant species to better stabilize the surface of the coastal bank.

Resource Areas

The resource areas at or within 100 feet of the site consist of a Land Subject to Coastal Storm Flowage (LSCSF), Coastal Beach, Coastal Bank, Rocky Intertidal Shore, and Land Containing Shellfish. The narrative below will provide a description of the potential impacts of the proposed project on these resource areas.

Land Subject to Coastal Storm Flowage (LSCSF)

310 CMR 10.04 Definition: Land Subject to Coastal Storm Flowage

> *"land subject to any inundation caused by coastal storms up to and including that caused by the 100-year storm, surge of record or storm of record, whichever is greater"*

The proposed project is located within land subject to coastal storm flowage (LSCSF) because the property is within the FEMA 1% chance flood zone VE base flood elevations (BFEs) that range between EL. 18 and EL. 20 (NAVD88).

The proposed project will include the reconstruction of about 500 linear feet of the existing rock revetment along the toe of the coastal bank at the site and the construction of about 500 linear feet of a new rock revetment in the remaining portion of the site where there presently exists concrete building foundations and retaining walls along the coastal bank. The new revetment will be constructed to a top elevation of EL. 12. The toe of the proposed rock revetment will be located both landward of Mean High Water (MHW) and seaward of MHW depending upon the existing grade of the shorefront located adjacent to the toe of the coastal bank at a specific location at the site. Portions of the proposed rock revetment and elevated walkway will need to be constructed on land subject to coastal storm flowage as well as on the rocky intertidal shore. The proposed rough surface, sloping face rock revetment will provide much better coastal bank protection than the existing vertical face concrete foundations at the site for storm damage prevention and flood control to ensure the stability of the coastal bank and related infrastructure supported by the coastal bank. The proposed rock revetment will better absorb storm wave energy, protect property and infrastructure presently located at the top of the bank, and help protect the Coastal Bank wildlife resource area located on the sloping face of the existing vegetated coastal bank.

Coastal Beaches

310 CMR 10.27(2) Definition:

> *Coastal Beach means unconsolidated sediment subject to wave, tidal and coastal storm action which forms the gently sloping shore of a body of salt water and includes tidal flats. Coastal beaches extend from the mean low water line landward to the dune line, coastal bank line or the seaward edge of existing human-made structures, when these structures replace one of the above lines, whichever is closest to the ocean.*
>
> Coastal beaches exist at the site at Wessagussett Beach and at George E. Lane Beach because these areas contain unconsolidated sediment. A Coastal Beach was determined to not exist along the entire shoreline at the location of the proposed rock revetment, the proposed pedestrian walkway, and the proposed ADA compliant parking area. Test pits were recently performed at various locations along the shoreline in these project areas and the soil was observed to be consolidated, extremely dense, glacial till deposits. Several attempts of excavating test pits at the location of the proposed ADA-compliant parking area at the site were prevented by the presence of buried concrete components, and the one successful test pit in this area indicated the presence of the dense glacial till soil.
>
> The minor amount of sand that is being eroded from the coastal bank within the project area is not observed to be of sufficient quantity to form a coastal beach within the limits of the stone mound groins that separate this area from the two adjoining Town beaches. The area seaward of the toe of the coastal bank is presently observed to be a rocky intertidal shore and not a coastal beach.

(3) Any project on a coastal beach, except any project permitted under 310 CMR 10.30(3)(a), shall not have an adverse effect by increasing erosion, decreasing the volume or changing the form of any such coastal beach or an adjacent or downdrift coastal beach.

The only area at the site that may incur an impact to a coastal beach is at George E. Lane Beach where the seasonal public access beach mat is being proposed and where a pedestrian access ramp from the end of the pedestrian walkway down to the coastal beach is being proposed. The proposed public access beach mat will not interfere with the movement of sediment along the coastal beach, because the mat will only be installed for the summer beach season, and the beach form will remain naturally dynamic for the rest of the year after the mat is removed. Any disturbed areas of beach grass by the installation of the mat will be mitigated by the replanting of an equivalent square footage of beach grass in a nearby well suited area along the coastal beach.

There presently exists a rubble stone groin located at each end of the proposed rock revetment which will protect the adjoining sandy beaches from any adverse beach erosion due to the construction of the proposed rock revetment. This situation presently exists at the intersection of the northeast end of the existing rock revetment and the southwest end of George E. Lane Beach. The two areas are separated by a rubble stone groin and the coastal beach in this area shows no sign of erosion due to the close proximity of the directly adjacent rock revetment.

(4) Any groin, jetty, solid pier, or other such solid fill structure which will interfere with littoral drift, in addition to complying with 310 CMR 10.27(3), shall be constructed as follows:

> *(a) It shall be the minimum length and height demonstrated to be necessary to maintain beach form and volume. In evaluating necessity, coastal engineering, physical oceanographic and/or coastal geologic information shall be considered.*
>
> *(b) Immediately after construction any groin shall be filled to entrapment capacity in height and length with sediment of grain size compatible with that of the adjacent beach.*

(c) Jetties trapping littoral drift material shall contain a sand by-pass system to transfer sediments to the downdrift side of the inlet or shall be periodically redredged to provide beach nourishment to ensure that downdrift or adjacent beaches are not starved of sediments.

The proposed rock revetment and reconstruction of the existing rock revetment will not interfere with littoral drift along the adjacent coastal beaches because there are currently four existing rock rubble groins along the beach that are in command of sediments that travel along the beach within the littoral drift at the project site. No reconstruction work of the existing groins is being proposed as part of this project.

(5) Notwithstanding 310 CMR 10.27(3), beach nourishment with clean sediment of a grain size compatible with that on the existing beach may be permitted.

(6) In addition to complying with the requirements of 310 CMR 10.27(3) and (4), a project on a tidal flat shall if water-dependent be designed and constructed, using best available measures, so as to minimize adverse effects, and if non-water-dependent, have no adverse effects, on marine fisheries and wildlife habitat caused by:

(a) alterations in water circulation;

(b) alterations in the distribution of sediment grain size; and

(c) changes in water quality, including, but not limited to, other than natural fluctuations in the levels of dissolved oxygen, temperature or turbidity, or the addition of pollutants.

The seaward most limit of work for this proposed project lies within the rocky intertidal shore. This area is mainly used for access for construction equipment to travel along the shoreline and for construction of the proposed rock revetment. This temporary work area will extend between 15 and 20 feet seaward of the toe of the proposed revetment, and any disturbance of this area by the equipment will be very minor due to the consolidated nature of the glacial till soil in this area. This equipment will operate during low tides and will never operate within the water. Therefore, water quality and water circulation will remain unaffected.

There is a large portion of proposed rock revetment that will permanently reside below the mean high water elevation and within the tidal flat. Since the proposed revetment will consist of the same materials as the existing rock revetment at the site, the water circulation, water quality, and distribution of sediment grain size will remain unchanged. Because of the dense, consolidated characteristics of the adjacent glacial till along the shoreline in this area, no detrimental impact to the rocky intertidal shore is anticipated as a result of the construction of the proposed project. No alterations in water quality, in the distribution of sediment grain size, and changes in water quality are anticipated as a result of this project.

(7) Notwithstanding the provisions of 310 CMR 10.27(3) through (6), no project may be permitted which will have any adverse effect on specified habitat sites or rare vertebrate or invertebrate species, as identified by procedures established under 310 CMR 10.37.

The subject property is not identified as an area for rare vertebrate or invertebrate species.

Coastal Banks

310 CMR 10.30(2) Definition:

Coastal Bank means the seaward face or side of any elevated landform, other than a coastal dune, which lies at the landward edge of a coastal beach, land subject to tidal action, or other wetland.

Wetlands Program Policy 92-1:

A) The slope of a coastal bank must be greater than or equal to 10:1

The slope of the existing coastal bank at the site ranges between slightly less than 2:1 to slightly more that 2:1.

D) A "top of coastal bank" will fall below the 100-year flood elevation and is the point where the slope ceases to be greater than or equal to 10:1.

The top of the coastal bank at the site generally appears to physically extend up to the rear property line of all the adjacent residential properties located along Regatta Road and up to the edge of the existing parking area (the "Shelf") and along the paved roadway along Wessagussett Road. The toe of the coastal bank at the location of the proposed revetment and pedestrian walkway intersects with either Land Subject to Coastal Storm Flowage or Rocky Intertidal Shore.

This project proposes to reconstruct about 500 linear feet of an existing licensed rock revetment (northeastern half of the revetment project at the site) and to construct about 500 linear feet of a new rock revetment (southwestern half of the revetment project site) to protect the stability of the existing coastal bank supporting public roadway and public utility infrastructure. The portion of the coastal bank at the site that is currently not protected by a licensed rock revetment is observed to be currently protected by the existing concrete foundation and wall components. However, there is evidence of coastal bank erosion in the areas where portions of the concrete wall at the toe of the coastal bank have collapsed due to undermining of the wall due to past and recent storm events. DEP Wetlands Protection Regulation 310 CMR 10.02(2)(a)(2) allows for the installation of a rock revetment to protect the stability of the coastal bank in this area because the coastal bank is not acting as a sediment source for a coastal beach, barrier beach, or a coastal dune as required by the regulations. The wetland resource area located adjacent to the toe of the coastal bank is not a coastal beach, but is a rocky intertidal shore. Therefore, the coastal bank at the site acts only as a vertical buffer for storm damage prevention and flood control that provides stability to public infrastructure located at the top of the coastal bank including Wessagusett Road and the adjacent paved parking area at the Shelf. The Shelf parking area is supported by a large concrete retaining wall along the edge of the parking area that is founded on the sloping face of the coastal bank, and the stability of the retaining wall appears to be in jeopardy due to the erosion of the toe of the coastal bank in this area.

(3) No new bulkhead, revetment, seawall, groin or other coastal engineering structure shall be permitted on such a coastal bank except that such a coastal engineering structure shall be permitted when required to prevent storm damage to buildings constructed prior to the effective date of 310 CMR 10.21 through 10.37 or constructed pursuant to a Notice of Intent filed prior to the effective date of 310 CMR 10.21 through 10.37 (August 10, 1978), including reconstructions of such buildings subsequent to the effective date of 310 CMR 10.21 through 10.37, provided that the following requirements are met:

(a) a coastal engineering structure or a modification thereto shall be designed and constructed so as to minimize, using best available measures, adverse effects on adjacent or nearby coastal beaches due to changes in wave action, and

(b) the applicant demonstrates that no method of protecting the building other than the proposed coastal engineering structure is feasible.

(c) protective planting designed to reduce erosion may be permitted.

This regulation only applies to eroding coastal banks that have been shown to be a sediment source to a coastal beach, barrier beach, or coastal dune. Half of the coastal bank length at the project site is already armored by a licensed rock revetment which is proposed to be reconstructed as part of the project. The other half of the coastal bank is presently armored be existing concrete structures related to former concrete beach front public access facilities and walls in various states of disrepair. The project proposes to replace some of these damaged structures

with a rock revetment as part of the project. These structures never needed to be licensed because they were never located seaward of the Mean High Water line until recently. Due to the collapsed condition of some of these concrete components, portions of the coastal bank in this area are now exposed to storm wave erosion.

The existing licensed rock revetment along the coastal bank located at the northeast half of the revetment project area was constructed in 1960 and this project proposes to repair and improve this structure at this time. The remaining shorefront area at the site for which a new rock revetment is being proposed is eligible for the construction of such a new rock revetment because this area is already protected by existing concrete structure foundations and concrete walls in various stages of disrepair, and the proposed revetment will be able to provide a more environmentally sensitive means of protection of the coastal bank than presently exists. The existing concrete components are all vertically faced which tend to reflect storm wave energy back away from the walls whereas the proposed revetment will be constructed with a rough, sloping face that will significantly absorb such storm wave energy. Such an improvement will tend to significantly reduce reflected storm wave erosion forces acting on the adjacent rocky intertidal shore that presently is occurring at the site due to the vertical faced concrete foundations and walls. Because of the presence of the existing rubble mound groin and the existing concrete structures located along the toe of the coastal bank in the revetment project area, and also because the resource area located seaward of the coastal bank is a rocky intertidal shore and not a coastal beach, the coastal bank at the site serves only as a vertical buffer for storm damage prevention and flood control and is eligible for athe construction of a rock revetment. The rocky intertidal shore extends about 1000 feet between rubble stone groins located at each end that separates it from the adjacent sandy coastal beaches located beyond the groins. The coastal bank in the project area is not a sediment source for the maintenance of the adjacent down drift Wessagussett Beach. The beach profile for Wessagussett Beach is maintained by regular beach nourishment from occasional hydraulic dredging operations and from regular land based sources. The coastal bank at the site serves only as a vertical buffer for storm damage prevention and flood control. Consequently, the coastal bank is eligible for the installation of an engineered structure under the regulations.

(4) Any project on a coastal bank or within 100 feet landward of the top of a coastal bank, other than a structure permitted by 310 CMR 10.30(3), shall not have an adverse effect due to wave action on the movement of sediment from the coastal bank to coastal beaches or land subject to tidal action.

It is evident at the site that the coastal bank in the project area is not a source of sediment for the maintenance of the adjacent down drift Wessagussett Beach, and the existing shorefront area located seaward of the coastal bank is not a coastal beach but is a rocky intertidal shore.

(5) The Order of Conditions and the Certificate of Compliance for any new building within 100 feet landward of the top of a coastal bank permitted by the issuing authority under M.G.L. c. 131, § 40 shall contain the specific condition: 310 CMR 10.30(3), promulgated under M.G.L. c. 131, § 40, requires that no coastal engineering structure, such as a bulkhead, revetment, or seawall shall be permitted on an eroding bank at any time in the future to protect the project allowed by this Order of Conditions.

N/A

WHEN A COASTAL BANK IS DETERMINED TO BE SIGNIFICANT TO STORM DAMAGE PREVENTION OR FLOOD CONTROL BECAUSE IT IS A VERTICAL BUFFER TO STORM WATERS, 310 CMR 10.30(6) THROUGH (8) SHALL APPLY:

(6) Any project on such a coastal bank or within 100 feet landward of the top of such coastal bank shall have no adverse effects on the stability of the coastal bank.

The proposed project increases the stability of the coastal bank by increasing the stability of the existing licensed rock revetment by virtue of it being reconstructed, and by the construction of a new rock revetment in the area of the coastal bank currently protected by concrete structure foundations and concrete walls. Portions of the concrete walls located at the toe of the coastal bank have collapsed and now such areas are exposed to some toe scarp erosion.

(7) Bulkheads, revetments, seawalls, groins or other coastal engineering structures may be permitted on such a coastal bank except when such bank is significant to storm damage prevention or flood control because it supplies sediment to coastal beaches, coastal dunes, and barrier beaches.

The proposed project is located at the base of an existing coastal bank that has a licensed Coastal Engineering Structure (CES) located over about half its length. The other half of the coastal bank located in the project area is undergoing some toe erosion, but it is evident at the site that the bank provides an insignificant amount of sediment to the area located directly adjacent to the coastal bank. In addition, any small amount of sediment eroded from the coastal bank during coastal storm events does not appear to move laterally to provide sediment to the adjacent sandy beaches because of the existence of rubble stone groins situated at the ends of the proposed revetment project.

(8) Notwithstanding the provisions of 310 CMR 10.30(3) through (7), no project may be permitted which will have any adverse effect on specified habitat sites of rare vertebrate or invertebrate species, as identified by procedures established under 310 CMR 10.37.

The subject property is not identified as an area for rare vertebrate or invertebrate species.

Rocky Intertidal Shores

310 CMR 10.31 (2) Definition:

Rocky Intertidal Shores_means naturally occurring rocky areas, such as bedrock or boulder- strewn areas between the mean high water line and the mean low water line.

(3) When a Rocky Intertidal Shore Is Determined to Be Significant to Storm Damage Prevention, Flood Control, or Protection of Wildlife Habitat, any proposed project shall be designed and constructed, using the best practical measures, so as to minimize adverse effects on the form and volume of exposed intertidal bedrock and boulders.

The proposed project is designed to have no adverse impact to the form and volume of the existing intertidal boulders existing along the shoreline at the site. The proposed revetment will work in tandem with the adjacent rocky intertidal shore for storm damage prevention and flood control. The exposed boulders sit on a dense deposit of consolidated glacial till which is not easily eroded by storm wave activity. The proposed rock revetment is designed with components and features which will significantly reduce the reflection of storm wave energy back onto the adjacent rocky intertidal shore as presently exists with the existing vertical faced concrete foundations and walls presently located at the site.

(4) When a Rocky Intertidal Shore is Determined to Be Significant to the Protection of Marine Fisheries or Wildlife Habitat, any proposed project shall if water-dependent be designed and constructed, using best available measures, so as to minimize adverse effects, and if non-water-dependent, have no adverse effects, on water circulation and water quality. Water quality impacts include, but are not limited to, other than natural fluctuations in the levels of dissolved oxygen, temperature or turbidity, or the addition of pollutants.

The proposed project is designed to have no adverse impact on water circulation and water quality. The proposed rock revetment will reduce the erosive forces of storm waves currently reflecting off the existing vertical faced concrete foundations and walls at the site. This will reduce the erosion effects on the adjacent rocky intertidal shore at the site.

(5) Notwithstanding the provisions of 310 CMR 10.31(3) and (4), no project may be permitted which will have any adverse effect on specified habitat sites of rare vertebrate or invertebrate species, as identified by procedures established under 310 CMR 10.37.

The project site is not identified as an area for rare vertebrate or invertebrate species.

Land Containing Shellfish

310 CMR 10.34(2) Definition:

Land Containing Shellfish means land under the ocean, tidal flats, rocky intertidal shores, salt marshes and land under salt ponds when any such land contains shellfish.

(4) Except as provided in 310 CMR 10.34(5), any project on land containing shellfish shall not adversely affect such land or marine fisheries by a change in the productivity of such land caused by:

(a) alterations of water circulation;

(b) alterations in relief elevation;

(c) the compacting of sediment by vehicular traffic;

(d) alterations in the distribution of sediment grain size;

(e) alterations in natural drainage from adjacent land; or

(f) changes in water quality, including, but not limited to, other than natural fluctuations in the levels of salinity, dissolved oxygen, nutrients, temperature or turbidity, or the addition of pollutants.

(5) Notwithstanding the provisions of 310 CMR 10.34(4), projects which temporarily have an adverse effect on shellfish productivity but which do not permanently destroy the habitat may be permitted if the land containing shellfish can and will be returned substantially to its former productivity in less than one year from the commencement of work, unless an extension of the Order of Conditions is granted, in which case such restoration shall be completed within one year of such extension.

There exists a State Listed Shellfish Suitability Area located adjacent to the project site, but its closest limit is situated at least 50 feet seaward of any proposed project component and at least 25 feet seaward of any proposed temporary limit of work at the site. Temporary work is proposed to occur during the construction of the rock revetment at the site on Land Subject to Coastal Storm Flowage and on Rocky Intertidal Shore. The work will include the presence of an excavator and front end loader working in this area within about 20 feet of the toe of the proposed rock revetment during its construction. Such work will onlt occur during low tide events and now equipment will be allowed to work in the water at any time. It is anticipated that this temporary construction work will have little, if any, impact on the adjacent shellfish suitability area.

(6) In the case of land containing shellfish defined as significant in 310 CMR 10.34(3)(b) (i.e., those areas identified on the basis of maps and designations of the Shellfish Constable), except in Areas of Critical Environmental Concern, the issuing authority may, after consultation with the Shellfish Constable, permit the shellfish to be moved from such area under the guidelines of, and to a suitable location approved by, the Division of Marine Fisheries, in order to permit a proposed project on such land. Any such project shall not be commenced until after the moving and replanting of the shellfish have been commenced.

Although not anticipated, if any shellfish are encountered at the work site during construction, the Shellfish Constable will be notified. Shellfish will be moved (if necessary) under the direction and supervision of the Shellfish Constable.

(7) Notwithstanding 310 CMR 10.34(4) through (6), projects approved by the Division of Marine Fisheries that are specifically intended to increase the productivity of land containing shellfish may be permitted. Aquaculture projects approved by the appropriate local and state authority may also be permitted.

N/A. The proposed project is not an aquaculture project.

(8) Notwithstanding the provisions of 310 CMR 10.34(4) through (7), no project may be permitted which will have any adverse effect on specified habitat of rare vertebrate or invertebrate species, as identified by procedures established under 310 CMR 10.37.

The subject property is not identified as an area for rare vertebrate or invertebrate species.

Alternatives Analysis

1. **Alternative 1: No Action**

This 1000 foot long shoreline is inaccessible to pedestrian passage due to the lack of beach sand and due to the presence of the boulder strewn boulder field and significant amounts of concrete rubble from previous shorefront structures located in this area. The Town has been planning to clean up this area and provide safe public access along the shoreline for several decades without any success due to budget constraints.

The 500 foot long portion of the coastal bank that is not protected by a rock revetment is undergoing some toe scarp erosion due to the undermining and collapse of portions of the existing old concrete seawall located at the toe of the coastal bank in this area. This condition is causing the bank to become unstable and the town infrastructure located at the top of the bank is now in jeopardy due to undermining of portions of the existing concrete walls along the toe of the coastal bank and the subsequent erosion of the exposed toe of the coastal bank in this area.

If Alternative 1 is utilized, about 500 linear feet of the existing coastal bank will collapse in the near future due to the progressive collapse of the existing concrete seawall and the subsequent storm erosion of the toe of the exposed coastal bank as described in the Project Description and Performance Standards narrative. This will result in the permanent loss of the existing vegetated face of the coastal bank in this area, as well as the permanent loss of town-owned infrastructure located at the top of the coastal bank.

2. **Alternative 2: Construct only a pile supported elevated boardwalk along the shoreline**

This concept would provide pedestrian access along the shoreline but such a structure would be highly susceptible to coastal storm damage due to the force of coastal storm waves and due to the amount of existing boulders and concrete rubble currently located in this area that might be cast against the structure during severe storm events. The Town will be reluctant to remove the existing concrete structures at the site as part of the elevated walkway project because they afford some erosion protection to the toe of the coastal bank at this time. In addition, once such a pier structure was constructed, it would preclude or at least significantly inhibit the repair of the existing rock revetment or prevent the construction of a new rock revetment or other erosion protection system at the toe of the eroding coastal bank once the elevated boardwalk was in place. The existing coastal bank would incur the same permanent destabilization as described in Alternative 1 above.

If Alternative 2 is utilized, the Town's plan for an elevated, 1000-foot long, ADA-compliant public access pedestrian walkway will be accomplished to connect the two Town-owned public beaches. This alternative would be a substantial steel pile-supported elevated walkway that would need to be situated parallel to, and just seaward of the toe of the coastal bank at the site. This alternative does not include the installation of any shorefront erosion protection of the toe of the coastal bank. The installation of the elevated walkway would have a minor impact on the resource areas at the site but would prevent, or at least greatly inhibit construction access to the toe of the coastal bank for future installation of a coastal bank erosion protection system whether it be an engineered structure or a soft solution system, and/or repair of such a system in the future. Such an elevated walkway structure would be very susceptible to storm damage in severe coastal storms due to its required orientation to the shoreline (broadside), and due to the fact that the walkway deck would be located six to eight feet below the FEMA designated Velocity Zone elevations in this area. The rocky

intertidal shore would incur minor temporary disturbance during the installation of the walkway, but the walkway structure could be broken up in a major coastal storm whereby its components could cause permanent damage to the toe and face of the coastal bank and possibly contribute to its collapse.

3. Alternative 3: Remove the existing concrete foundations and wall debris at the toe of the coastal bank and install a soft solution erosion protection system at the toe of the coastal bank

The existing concrete foundations and walls located at the toe of the coastal bank at the site afford considerable stability to the coastal bank and the public road, parking, and utility infrastructure located at the top of the coastal bank. The town will be reluctant to remove the existing concrete structures as part of any erosion protection system at this time because of the additional instability this would cause to the existing coastal bank and infrastructure. Soft solution erosion protection systems would consist of coconut fiber rolls and/or coir envelopes that would be installed at the base of the coastal bank. The current shorefront grade at the toe of the coastal bank in this area would require such facilities to be located partially below high tide events which would act to accelerate the disintegration of the biodegradable components of such facilities. In any event, such erosion protection facilities do not perform very well during storm events and do not have the structural capacity to protect the coastal bank from severe erosion during coastal storm events. The Town is very concerned about the stability of the public infrastructure located at the top of the coastal bank in this area.

The construction of Alternative 3 would result in minor temporary impact to the rocky intertidal shore during construction, and would provide only a temporary stabilization of the coastal bank due to the biodegradable nature of such erosion protection components, and their lack of ability to protect the stability of a coastal bank in severe coastal storm events. This alternative is not capable of providing permanent erosion protection to the stability of the coastal bank for major storm events. The stability of the coastal bank would remain in jeopardy if this alternative was utilized. The installation of this system in conjunction with the installation of an elevated, pile supported walkway along the shoreline would result in future construction access to the system being greatly curtailed for the required repairs to the system once the walkway was installed.

4. Alternative 4: Remove the concrete foundations and concrete debris at the site and create a sandy beach at the site

This concept would require the placement of at least 20,000 cubic yards of sand at the site to create a beach profile that matches the near end of the George E. Lane Beach. The beach grade would need to be brought up to EL. 10 at its intersection with the toe of the coastal bank to afford the same coastal bank erosion protection as is observed at George E. Lane Beach. This concept would involve the elimination of the rocky intertidal shore resource area since it would be completely covered with sand if the beach was created. Also, the Town has a long history of permitting issues regarding the required routine beach nourishment of Wessagussett Beach due to the grave shoaling concerns of the adjacent down drift Wessagussett Yacht Club. The Yacht Club typically challenges any proposal by the Town to nourish Wessagussett Beach due to their concerns regarding the subsequent shoaling of their down drift marina area. We anticipate that it will be exceptionally difficult to obtain the required permits to create a substantial sandy beach at the project site due to the same concerns of the Yacht Club.

This alternative would result in the permanent loss of about five acres of rocky intertidal shore but will create the same area of semi-permanent coastal beach, depending on the ability of the Town to provide sand nourishment in this area in the future. This alternative is based upon the assumption that this new beach will remain in as stable a condition as George E. Lane beach. However, this area was created as a sandy beach through a massive sand nourishment in the past and all that sand is now gone, leaving the existing rocky intertidal shore we see at the site today.

5. Alternative 5: Construct a composite rock revetment/pedestrian walkway along the toe of the coastal bank

(RECOMMENDED ALTERNATIVE)

This concept would provide necessary protection for the stability of the coastal bank at the site while providing a structurally sound and revetment-protected elevated public access walkway along the shoreline to allow pedestrian access between both town-owned beaches. This alternative will serve several beneficial purposes as follows:

1. The existing licensed rock revetment at the site is now in a state of disrepair and needs to be reconstructed as is being proposed by the project.
2. The existing area that consists of extensive deposits of concrete foundation components and concrete walls is in disrepair and is a danger to the public. This project proposes to remove these concrete structures and recycle them into the construction of the new rock revetment and public access walkway project.
3. The project will provide a continuous rock revetment designed to current design standards that will provide a buffer for storm damage prevention and flood control for four existing residences and for public infrastructure located at the top of the coastal bank, including a roadway, a public parking area, and electric utility poles.
4. The project will provide an ADA-compliant public access walkway along the waterfront for the safety and enjoyment of the public in this presently dangerous shorefront area.
5. The project will provide two ADA-compliant parking spaces for access to the proposed walkway along the shoreline.
6. The project proposes to capture the runoff from the three existing road stormwater drainage systems that presently have outlet pipes located on the coastal bank in the area as well as other stormwater runoff that presently flows down the coastal bank and percolate the runoff flows into the ground before they can run directly into Hingham Bay.

The composite rock revetment/elevated pedestrian walkway is designed to provide mutual interlocking stabilization of each structure so that the facility can withstand severe coastal storms and remain intact through all but the largest anticipated storms. This alternative will result in the permanent loss of about 3,600 sq. ft. of rocky intertidal shore and about 29,000 sq. ft. of land subject to coastal storm flowage. Also, this alternative will result in the temporary disturbance of about 15,000 sq. ft. of rocky intertidal shore and about 11,000 sq. ft. of land subject to coastal storm flowage during the construction phase. However, this alternative will remove about 600 cubic yards of existing concrete components from this area, and will provide long term erosion protection for about 1000 linear feet of the existing coastal bank at the site. Also, this alternative will provide a significant public access facility to the public for enjoyment of the waterfront.