



State of Rhode Island and Providence Plantations  
 Coastal Resources Management Council  
 Oliver H. Stedman Government Center  
 4808 Tower Hill Road, Suite 116  
 Wakefield, RI 02879-1900

(401) 783-3370  
 Fax (401) 783-3767

### ASSENT

CRMC File No.: 2016-02-090 CRMC Assent No.: B2016-02-090

Whereas,  
 of

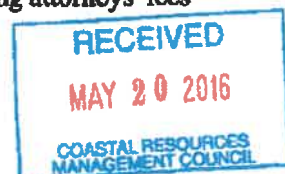
**Town of New Shoreham**  
**New Shoreham Town Hall; Att: Nancy Dodge, Twn Mgr**  
**P O Drawer 220**  
**Block Island, RI 02807**

has applied to the Coastal Resources Management Council for assent to: construct and maintain a riprap revetment on the shoreline side slope of the Town's closed landfill to help protect the landfill from shoreline erosion. A public access pathway will be provided up and over the landfill to provide/maintain lateral public access along the shoreline. The project requires a Special Exception pursuant to RICRMP Section 300.7.D.1 which prohibits the construction of structural shoreline protection bordering Type 1 waters., and represents that they are the owner(s) of the riparian rights attached to the property involved and submitted plans of the work to be done.

Now, said Council, having fully considered said application in accordance with all the regulations as set forth in the Administrative Procedures Act does hereby authorize said applicant, subject to the provisions of Title 46, Chapter 23 of the General Laws of Rhode Island, 1956, as amended, and all laws which are or may be in force applicable thereto: **construct and maintain a riprap revetment on the shoreline side slope of the Town's closed landfill to help protect the landfill from shoreline erosion. A public access pathway will be provided up and over the landfill to provide/maintain lateral public access along the shoreline. The project requires a Special Exception pursuant to RICRMP Section 300.7.D.1 which prohibits the construction of structural shoreline protection bordering Type 1 waters; located at plat 2, lot 39,40,48-1; 14 West Beach Road, New Shoreham, RI, in accordance with said plans submitted to this Council and approved by this Council. In accordance with revisions to RIGL 46-23-6.3 Expiration Tolling Periods (as amended effective June 19, 2015), all work being permitted must be completed on or before July 1, 2019 after which date this assent is null and void, (unless written application requesting an extension is received by CRMC sixty (60) days prior to expiration date).**

Applicant agrees that as a condition to the granting of this assent, members of the Coastal Resources Management Council or its staff shall have access to applicant's property to make on-site inspections to insure compliance with the assent.

Licensee shall be fully and completely liable to State, and shall waive any claims against State for contribution or otherwise, and shall indemnify, defend, and save harmless State and its agencies, employees, officers, directors, and agents with respect to any and all liability, damages (including damages to land, aquatic life, and other natural resources), expenses, causes of action, suits, claims, costs (including testing, auditing, surveying, and investigating costs), fees (including attorneys' fees



Town of New Shoreham  
CRMC Assent No. B2016-02-090  
May 13, 2016  
Page Two

and costs), penalties (civil and criminal), and response, cleanup, or remediation costs assessed against or imposed upon Licensee, State, or the Property, as a result of Licensee's control of the Property, or Licensee's use, disposal, transportation, generation and/or sale of Hazardous Substances or that of Licensee's employees, agents, assigns, sublicensees, contractors, subcontractors, permittees, or invitees.

Nothing in this assent shall be construed to impair the legal rights of this granting authority or of any person. By this assent the granting authority by no manner, shape, or form assumes any liability or responsibility implied, or in fact, for the stability or permanence of said project; nor by this assent is there any liability implied or in fact assumed or imposed on the granting authority. Further, the granting authority by its representatives or duly authorized agents shall have the right to inspect said project at all times including, but not limited to, the construction, completion, and all times thereafter.

This Assent is granted with the specific proviso that the construction authorized therein will be maintained in good condition by the owner thereof, his heirs, successors, or assigns for a period of fifty (50) years from the date thereof, after which time this permission shall terminate necessitating either complete removal or a new application.

Permits issued by the CRMC are issued for a finite period of time, confer no property rights, and are valid only with the conditions and stipulations under which they are granted. Permits imply no guarantee of renewal, and may be subject to denial, revocation, or modification.

If this matter appeared before the full Council, a copy of the legal decision from this proceeding may be acquired by contacting the CRMC office in writing.

A copy of this Assent shall be kept on site during construction.

Application for future alteration of the shoreline or other construction or alteration within the CRMC jurisdiction shall be submitted to the CRMC for review prior to commencing such activity.

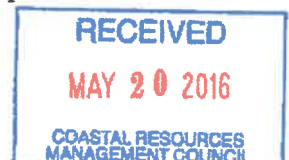
All applicable policies, prohibitions, and standards of the RICRMP shall be upheld.

All local, state or federal ordinances and regulations must be complied with.

Please be advised that as a further conditions of this Assent, it is hereby stipulated that you and/or your agents shall comply at all times with Federal and State Water Quality Standards and other State standards and regulations regarding water quality, and shall exercise such supervision over and control of these facilities to prevent the dumping or discarding or refuse, sanitary wastes and other pollutants in the tidal waters, either from vessels docked at said facilities or from land adjacent thereto.

No work that involves alteration to wetlands or waters of the United States shall be done under this Assent until the required Federal Permit has been obtained.

Non-compliance with this assent shall result in legal action and/or revocation of this permit.



Town of New Shoreham  
CRMC Assent No. B2016-02-090  
May 13, 2016  
Page Three

CAUTION:

**The limits of authorized work shall be only for that which was approved by the CRMC. Any activities or alterations in which deviate from the approved plans will require a separate application and review. If the information provided to the CRMC for this review is inaccurate or did not reveal all necessary information or data, then this permit may be found to be null and void. Plans for any future alteration of the shoreline or construction or alteration within the 200' zone of CRMC jurisdiction or in coastal waters must be submitted for review to the CRMC prior to commencing such activity.**

**Permits, licenses or easements issued by the Council are valid only with the conditions and stipulation under which they are granted and imply no guarantee of renewal. The initial application or an application for renewal may be subject to denial or modification. If an application is granted, said permit, license and easement may be subject to revocation and/or modification for failure to comply with the conditions and stipulations under which the same was issued or for other good cause.**

**ATTENTION: ALL STRUCTURES AND FILLED AREAS IN THE TIDAL, COASTAL, OR NAVIGABLE WATERS OF THE STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS ARE SUBJECT TO:**

- 1. The Superior Property Rights of the State of Rhode Island and Providence Plantations in the Submerged and Submersible Lands of the Coastal, Tidal, and Navigable Waters;**
- 2. The Superior Navigation Servitude of the United States;**
- 3. The Police Powers of the State of Rhode Island and the United States to regulate Structures in the Tidal, Coastal, or Navigable Waters.**

**THE SUBMERGED AND SUBMERSIBLE LANDS OF THE TIDAL, COASTAL, AND NAVIGABLE WATERS OF THE STATE ARE OWNED BY THE STATE AND HELD IN TRUST FOR THE PUBLIC. CONVEYANCE OF THESE LANDS IS ILLEGAL; TITLES PURPORTING TO TRANSFER SUCH LANDS ARE VOID. ASSENTS THAT INVOLVE THE FILLING OR USE OF THE STATES SUBMERGED LANDS ARE GRANTED WITH THE PROVISIO THAT IT IS SUBJECT TO THE IMPOSITION OF A USAGE FEE TO BE ESTABLISHED BY THE COASTAL RESOURCES MANAGEMENT COUNCIL.**

**SPECIFIC STIPULATIONS OF APPROVAL**

**General Stipulations**

**A. The applicant shall record this assent in its entirety in the land evidence records of the Town of New Shoreham within thirty (30) days of the date of assent issuance. Certification by the Town Clerk's office that this stipulation has been complied with shall be furnished to Coastal Resources Management Council in the form of a copy of the recorded assent by the applicant within fifteen (15) days thereafter. Failure to comply with provision may render this assent null and void.**

Town of New Shoreham  
CRMC Assent No. B2016-02-090  
May 13, 2016  
Page Four

B. For the purpose of this permit, the coastal feature shall be the coastal beach, coastal wetland and manmade landfill bluff; and the inland edge of the coastal feature shall be the inland edge of the coastal beach and coastal wetland.

C. The approved site plans shall be those entitled "B.I. Landfill Slope Repairs..." in 13 sheets, by Fairbanks Engineering Corp., last revised 4/4/16 and attached to this CRMC assent. Except as stipulated or modified herein, all details and specifications thereon shall be strictly adhered to. Any and all changes require written approval from this office.

D. **Revetment End Erosion Monitoring:** The Town shall actively monitor the north and south end of the revetment for any end erosion and shall take the necessary actions to protect the landfill from end erosion if it occurs. Prior approval is required from the CRMC.

E. **Public Access Pathway:** The pathway over the landfill to provide lateral shoreline access shall be established immediately following the completion of the revetment and associated plantings. The public access pathway shall be available for public use as long as the landfill is in place and protected by a revetment. The pathway shall be relocated landward when it becomes necessary to relocate the revetment landward.

F. **Long-range Landfill Remediation Plan:** The Town of New Shoreham shall prepare a landfill remediation plan which provides a schedule for removing landfill waste necessary to relocate the riprap protected seaward edge of the landfill landward to keep pace with shoreline erosion on both the north and south sides of the landfill (in an incremental manner as herein described). As part of this plan, the town shall actively monitor the north and south end of the revetment for any end erosion. A benchmark shall be established at the northwest and southwest limits of the constructed revetment, with the coordinates provided to the CRMC.

Based upon the predicted rate of shoreline erosion along the west beach section of Block Island, 45 feet of landward shoreline movement is possible within a 15 year timeframe. If the shoreline erosion extends 45 feet landward of the monitoring points, as determined by the high water line on the shoreline which abuts the landfill on the north or south side being 45 feet landward of the established coordinates provided to the CRMC, the town would be required to act. Once this 45 foot loss is realized, the plan shall require that the revetment be relocated a minimum 50 feet landward, as measured from the established benchmarks, to align the revetment with or slightly behind the current coastal feature.

The Town of New Shoreham shall also prepare a Landfill Closure Plan to be submitted to the RIDEM, Division of Waste Management by December 31, 2016. A reduction of the slope along the northern edge of the landfill shall be addressed as part of the closure plan. The plan shall attempt to redefine this slope, reducing it to as close to 3:1 as feasible.

G. Vegetation in the adjacent coastal wetland shall remain in an undisturbed condition.



Town of New Shoreham  
CRMC Assent No. B2016-02-090  
May 13, 2016  
Page Five

**Earthwork Stipulations**

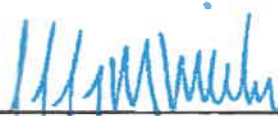
A. Erosion control measures pursuant to Section 4 of the Rhode Island Soil Erosion and Sediment Control Handbook (as amended) shall be implemented on site as necessary to properly control erosion. Erosion and sediment controls shall be coordinated with CRMC staff during all phases of work.

B. Sediment control measures pursuant to Section 6 of the Rhode Island Soil Erosion and Sediment Control Handbook (as amended) shall be implemented on site as necessary to properly control off site sedimentation. Particular attention shall be given to the coastal wetland north of the site.

C. All areas of disturbed soils which are impacted by construction, site work and related activities shall be temporarily stabilized throughout the site construction period. Soil stabilization may be achieved through appropriate temporary measures as described by the Rhode Island Soil Erosion and Sediment Control Handbook (as amended). Where the season is not conducive to the establishment of vegetative cover, other temporary measures shall be employed including the application of mulch and/or use of fiber rolls (erosion control blankets, etc.). Temporary erosion, runoff and sediment controls shall be employed and maintained until temporary or permanent vegetative cover can be achieved and/or site improvements such as approved buildings, roadways and parking areas are constructed resulting in a lack of exposed soil.

D. Upon the successful stabilization of exposed soils, all temporary (interim) erosion, runoff and sediment control measures shall be removed from the site for re-use and/or for disposal at a suitable, legal upland location or landfill. All temporary sediment basins, sediment traps and channels, etc., shall be removed and/or restored in accordance with the approved site plans.

In Witness Whereof, said Coastal Resources Management Council have hereto set their hands and seal this 13<sup>th</sup> day of May in the year two-thousand-and-sixteen.

  
\_\_\_\_\_  
Jeffrey M. Willis, Deputy Director  
Coastal Resources Management Council

/kc







**STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
COASTAL RESOURCES MANAGEMENT COUNCIL  
INTER-OFFICE MEMORANDUM**

**TO:** Grover J. Fugate  
**DEPT:** CRMC Executive Director  
**FROM:** Dave Reis, Rich Lucia  
**DEPT:** CRMC Permitting Section  
**RE:** CRMC File No. 2016-02-090

**DATE:** April 21, 2016  
**PAGE:** 1 of 2

**Applicant's Name:** Town of New Shoreham

**Project:** Construct and maintain a riprap revetment on the shoreline side slope of the Town's closed landfill to help protect the landfill from shoreline erosion. A public access pathway will be provided up and over the landfill to provide/maintain lateral public access along the shoreline. The project requires a Special Exception pursuant to RICRMP Section 300.7.D.1 which prohibits the construction of structural shoreline protection bordering Type 1 waters.

**Location:** 14 West Beach Road

**Water Type/Name:** Type 1, Conservation Area, Block Island Sound

**Coastal Feature:** Coastal beach and coastal wetland back by eroding manmade landfill "bluff"

**STAFF REPORT ADDENDUM**

- A. Staff Summary:** CRMC Staff recommends approval of the application for a riprap revetment as well as the special exception necessary to approve the project with the stipulation herein provided on page 2 as well as stipulations 2 and 3 of the original staff report (plus standard assent stipulations).
- B. New Information:** The postponement of the Semi-monthly Council Meeting from April 12<sup>th</sup> allowed CRMC Staff the opportunity for further discussions with the Town of New Shoreham's project consultants (Jim Geremia/engineering consultant, Robert Fairbanks/engineering and revetment design consultant, Scott Rabideau/environmental consultant). The discussions centered on the recommended stipulation options presented in the original staff report dated April 7, 2016. The Town's representatives made it clear that the Town was not willing to agree with staff stipulation option # 1 (removal of the landfill within 20 years). However, they indicated the Town may be willing to work with recommended stipulation option # 2 (incremental relocation of the seaward protected face of the landfill landward to accommodate shoreline erosion at an expected rate of 3 feet/year x 15 years = 45'). On that basis, CRMC Staff asked the consultants to provide wording for the stipulation which would be acceptable to the Town. The consultants did prepare wording which CRMC Staff agreed to and the consultants obtained the acquiescence of the Town Manager – Nancy Dodge. However, the Town Manager stated the financial commitment involved would require authorization by the New Shoreham Town Council. Although the stipulation is expected to pass the Town Council (Jim Geremia, pers. comm. 4/21/16), the Town Council had not voted on the matter as of the writing of this report. In this regard, the Town Council is scheduled to vote on the matter April 25<sup>th</sup> at 12:00 pm which will allow the vote to be reported to the CRMC prior to the CRMC Council Meeting on April 26<sup>th</sup>.

**Signed:** \_\_\_\_\_ **Supervising Environmental Scientist**

**Signed:** \_\_\_\_\_ **Supervising Civil Engineer**

**Tentative Stipulation Agreement Provided by the Town of New Shoreham:**

**Town Recommended Stipulation**  
**Town of New Shoreham**  
**CRMC File No. 2016-02-090**

**Long-range Landfill Remediation Plan:**

The Town of New Shoreham shall prepare a landfill remediation plan which provides a schedule for removing landfill waste necessary to relocate the riprap protected seaward edge of the landfill landward to keep pace with shoreline erosion on both the north and south sides of the landfill (in an incremental manner as herein described). As part of this plan, the town shall actively monitor the north and south end of the revetment for any end erosion. A benchmark shall be established at the northwest and southwest limits of the constructed revetment, with the coordinates provided to the CRMC.

Based upon the predicted rate of shoreline erosion along the west beach section of Block Island, 45 feet of landward shoreline movement is possible within a 15 year timeframe. If the shoreline erosion extends 45 feet landward of the monitoring points, as determined by the high water line on the shoreline which abuts the landfill on the north or south side being 45 feet landward of the established coordinates provided to the CRMC, the town would be required to act. Once this 45 foot loss is realized, the plan shall require that the revetment be relocated a minimum 50 feet landward, as measured from the established benchmarks, to align the revetment with or slightly behind the current coastal feature.

The Town of New Shoreham shall also prepare a Landfill Closure Plan to be submitted to the RIDEM, Division of Waste Management by December 31, 2016. A reduction of the slope along the northern edge of the landfill shall be addressed as part of the closure plan. The plan shall attempt to redefine this slope, reducing it to as close to 3:1 as feasible.

**Signed: \_\_\_\_\_ Supervising Environmental Scientist**

**Signed: \_\_\_\_\_ Supervising Civil Engineer**



**STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
COASTAL RESOURCES MANAGEMENT COUNCIL  
INTER-OFFICE MEMORANDUM**

**TO:** Grover J. Fugate  
**DEPT:** CRMC Executive Director  
**FROM** Dave Reis, Rich Lucia  
**DEPT:** CRMC Permitting Section  
**RE:** CRMC File No. 2016-02-090

**DATE:** April 7, 2016  
**PAGE:** 1 of 16

**Applicant's Name:** Town of New Shoreham

**Project:** Construct and maintain a riprap revetment on the shoreline side slope of the Town's closed landfill to help protect the landfill from shoreline erosion. A public access pathway will be provided up and over the landfill to provide/maintain lateral public access along the shoreline. The project requires a Special Exception pursuant to RICRMP Section 300.7.D.1 which prohibits the construction of structural shoreline protection bordering Type 1 waters.

**Location:** 14 West Beach Road

**Water Type/Name:** Type 1, Conservation Area, Block Island Sound

**Coastal Feature:** Coastal beach and coastal wetland back by eroding manmade landfill "bluff"

**STAFF REPORT**

- A. Staff Summary:** CRMC Staff recommends approval of the application for a riprap revetment as well as the special exception necessary to approve the project. However, CRMC Staff recommends a more aggressive long-range landfill plan than that currently recommend by the Town. A stipulation has been prepared for the Council's consideration in this regard.
- B. Staff Analysis:** The 10 acre (+/-) Town of New Shoreham landfill is located immediately adjacent to the shoreline at the end of West Beach Road. The landfill has been impacted by shoreline erosion over the years with major erosive impacts resulting in debris deposition on the shore and in tidal waters during post-tropical storm Sandy in 2012. The shoreline in the area of the landfill is eroding at approximately 1.8 and 3.3 feet per year according to recent shoreline change maps prepared by Bryan Oakley, PhD (Assistant Professor of Environmental Geoscience, Department of Environmental Earth Science, Eastern Connecticut State University). In fact the entire shoreline in this area is exhibiting significant erosion. This is primarily attributed to this shoreline segment being "sand-starved" due to an interruption in the south to north trend of long-shore drift caused by the jetties which protect the entrance to the Great Salt Pond. This application aims to protect the landfill from shoreline erosion through the construction of a riprap revetment. In order to construct the revetment at a shallower slope (2.5:1 as opposed to the existing 1:1 slope) approximately 7,000 cubic yards of existing landfill waste will be excavated and reburied further landward on site. Some material such as metal waste may be recycled.

**Signed:** \_\_\_\_\_ **Supervising Environmental Scientist**

**Signed:** \_\_\_\_\_ **Supervising Civil Engineer**

During the course of several meetings held with representatives of the Town of New Shoreham, RIDEM Waste Management Staff and the RI Division of Planning (Community Development Block Grant or “CDBG” Staff), various discussions occurred with regard to whether the revetment would constitute a permanent solution or an interim solution to the landfill erosion issue. During these discussions, CRMC Staff understood the revetment was being investigated and funded as an interim solution to halt the immediate erosion of debris onto the shoreline while additional investigations for landfill remediation occurred. In this regard, the applicant’s narrative states: “It is only after this approval is in-hand that the applicant would be in a position to plan and coordinate the removal and transportation of solid waste off the island.” And: “This option will however be part of the town’s long-range planning.” With respect to clarifying this issue, CRMC Staff met again with the Town’s representatives (Scott Rabideau, environmental consultant and Jim Geremia, engineering consultant) on March 31, 2016 and continued discussions with Robert Fairbanks (revetment designer) to request a more definitive description of the long-term plans for landfill remediation. CRMC Staff further provided the Town with the comment letter provided by the Nature Conservancy dated March 23, 2016 which supports the interim solution but with recommended stipulations including a request for long-term plan to remediate (remove) the landfill (see public comments section below). As a result of this discussion and the Nature Conservancy’s comments, the Town’s representatives agreed to submit a more detailed long-range landfill remediation plan description for staff evaluation by April 4, 2016. This revised long-range plan is provided in attachment 1 of this report.

The long-range plan for the landfill has been provided as an addendum to the applicant’s narrative. The addendum is included with this staff report as “attachment 1”. In summary, the long-range plan states the Town will perform test pits to help characterize the waste and where white goods (refrigerators, stoves, etc.) and metals are encountered, these materials will be shipped off the island for recycling. The empty landfill “cells” created by this process will be kept available for the re-burial of waste which may become exposed or threatened by future erosion along the shoreline. (This effort will need to be coordinated and approved by RIDEM, Office of Waste Management. CRMC Staff expects temporary clean fill may be required within the waste-emptied “cells” to maintain a proper landfill cap and to maintain a surface topography which sheds water from the landfill to minimize the infiltration of rainfall.) While CRMC Staff suggested this approach and supports this plan as a minimal level of effort, this effort does not meet the Nature Conservancy’s recommendations as contained in their written comments (see public comments section below).

(Note: During a meeting of January 8, 2015, RIDEM Staff indicated that the existing landfill has never been properly capped and officially closed. RIDEM, Division of Waste Management. RIDEM Staff indicated that ultimately a RIDEM approved landfill closure must take place. CRMC Staff does not support a permanent closure “in place” due to the shoreline erosion concerns described in this report.)

**Signed:** \_\_\_\_\_ **Supervising Environmental Scientist**

**Signed:** \_\_\_\_\_ **Supervising Civil Engineer**

With regard to an appropriate long-range plan, CRMC Staff is in agreement with the Nature Conservancy's recommendation that an appropriate long-range plan would be to remove the landfill in its entirety or to engage in a continuing effort to remove the seaward portion of the landfill in a stepwise progression toward the landfill's inland limit. The primary reasons for CRMC Staff's opinion is that although the landfill will be protected by a revetment designed to survive a 100 year storm, the shoreline on both sides of the landfill can be expected to recede due to continuing shoreline erosion thereby resulting in the landfill protruding seaward of the adjacent shoreline making it more susceptible to damage namely by "end erosion". Of particular concern is the north facing unprotected landfill side-slope which abuts a coastal wetland subject to inundation during coastal storms (see figure 1 attached).

- C. Special Exception:** Pursuant to RICRMP Section 300.7.D.1, the construction of structural shoreline protection facilities bordering Type 1 waters is prohibited. A Special Exception is required for relief from prohibited activities.

Pursuant to RICRMP Section 130, the Council may grant relief to prohibited activities through the granting of a Special Exception provided the following **criteria** are met:

*1) The proposed activity serves a compelling public purpose which provides benefits to the public as a whole as opposed to individual or private interests. The activity must be one or more of the following:*

*(a) an activity associated with public infrastructure such as utility, energy, communications, transportation facilities, however, this exception shall not apply to activities proposed on all classes of barriers, barrier islands or spits except as provided in 210.2.D.9;*

*(b) a water-dependent activity that generates substantial economic gain to the state; and/or*

*(c) an activity that provides access to the shore for broad segments of the public.*

*2) All reasonable steps shall be taken to minimize environmental impacts and/or use conflict.*

*3) There is no reasonable alternative means of, or location for, serving the compelling public purpose cited.*

The Town of New Shoreham addressed the Special Exception Criteria in the narrative provided with their application. **Based on CRMC Staff's review of the Town's responses, CRMC Staff agrees with the Town that the proposed revetment qualifies for the granting of a Special Exception.** CRMC Staff's conclusions and recommendation are based on the following findings with regard to the special exception criteria:

Signed: \_\_\_\_\_ Supervising Environmental Scientist

Signed: \_\_\_\_\_ Supervising Civil Engineer

1. **Special Exception Criteria 1:** Although not specifically stated in the applicant's narrative, CRMC Staff believes **the landfill should be considered "public infrastructure"**. Although now operating as a transfer station which transports waste to the mainland, the landfill represents a component of public infrastructure which previously served Block Island. In addition, properly protecting the landfill will serve to prevent waste from being further eroded onto the shoreline and into public waters thereby creating a public nuisance for residents and tourists alike.
2. **Special Exception Criteria 2:** CRMC Staff believes **all reasonable steps have been taken to minimize environmental impacts**. The fundamental question in this regard becomes what is considered "reasonable". Clearly, the best option would be to remove all waste and transport it to an existing licensed landfill on the mainland. The Town has estimated this cost at over 20 million dollars. This 20 million dollar cost was determined to be beyond the Town's immediate financial ability but is stated as being: "...part of the Town's long-range planning." Absent this option in the short term, CRMC Staff believes that reasonable steps have been taken to implement the riprap protection design alternative as presented in the Town's narrative. Additionally, the riprap slope protection provides a solution that can be implemented in a reasonable period of time (to be initiated in the fall of 2016 and completed by the summer of 2017 based on interagency meetings attended by CRMC Staff). The riprap slope protection can also be moved landward incrementally to protect the landfill during any long term solution which may involve removing waste and transporting it off the island.
3. **Special Exception Criteria 3:** CRMC Staff concludes that **there does not appear to be any reasonable alternatives means of, or location for, serving the compelling public purpose cited**. Staff's conclusion is based on the fact that the landfill already exists in a location which is threatened by shoreline erosion and based on the alternatives investigated by the Town; the chosen alternative appears to be the most cost effective and allows for implementation within a reasonable period of time. The Town's preliminary construction cost estimates for each alternative are attached to this report in appendix 1. **The range of alternatives investigated by the Town include the following:**

Signed: \_\_\_\_\_ Supervising Environmental Scientist

Signed: \_\_\_\_\_ Supervising Civil Engineer

- **Alternative 1:** Geotextile Sand Containers (GSC's) – This alternative was suggested by CRMC Staff due to this method being recently accepted as an “experimental coastal erosion control strategy” by the Technical Review Committee pursuant to section 980 of the Salt Pond SAMP. This alternative would still be subject to a Special Exception as structural shoreline protection since it would be implemented outside of the eligible experimental shoreline segments (Matunuck or Misquamicut). GSC's are simply large sand-filled geotextile bags which can be stacked similar to riprap and covered with sand and planted. The advantages included utilizing potentially available sand sources on the Island such as dredge material. However, it was determined sand would still need to be transported to the island from the mainland similar to transporting riprap from the mainland for construction of the riprap revetment. And, the applicant's preliminary construction cost estimate indicates it would be more expensive than constructing a riprap revetment (see table 2 in appendix 1 – attached). The maintenance cost of this alternative was also deemed to be of concern to the Town. On this basis, CRMC Staff agrees with the Town's dismissal of this alternative.
- **Alternative 2:** Hybrid revetment with GSC's above a riprap revetment toe – This alternative was also determined to be more expensive than the riprap revetment alternative and have additional maintenance cost concerns (see table 3 in appendix 1 – attached). On this basis, CRMC Staff agrees with the Town's dismissal of this alternative.
- **Alternative 3:** Landfill removal alternative – As discussed under Special Exception Criteria 2 above, this alternative would involve the removal of all landfill waste for transport to an existing licensed landfill on the mainland. This would represent a long-term project requiring sampling and characterization of the waste. This would also involve a regulatory review by the RIDEM, Office of Waste Management (and potentially the EPA). The Town has also estimated this cost at over 20 million dollars (see table 4 in appendix 1- attached). This cost was determined to be beyond the Town's immediate financial ability but is stated as being: “...part of the Town's long-range planning.”
- **Alternative 4:** No action alternative – no action would be taken.
- **Chosen Alternative:** - Riprap Revetment - This is the alternative subject to this application.

**Signed:** \_\_\_\_\_ **Supervising Environmental Scientist**

**Signed:** \_\_\_\_\_ **Supervising Civil Engineer**

**D. CRMC Staff Engineer's Comments regarding the proposed Shoreline Protection Facility:**

The current design is for a shoreline protection facility that has a 2.5:1 (horizontal: vertical) slope consisting of stone riprap extending from the toe to elevation 18' (NAVD88) to a vegetated slope (elevation 18' to 25' (NAVD88)). The stone will extend above the FEMA predicted wave elevation plus one foot for anticipated sea level rise. The vegetated slope shall be a loam and seed mix, planted with beachgrass along the entire slope.

The size of the stone at the toe of the revetment will be 12,000 pounds (approximately 4' stones) and the remainder of the slope to elevation 18' (NAVD 88) shall be 6,000 pound stone (approximately 3' stones). The larger stone at the toe is to protect the revetment from sliding and scouring. Based on the latest Federal Insurance Rate Maps (FIRM) Maps, the site is designated as an area subject to Velocity Wave action (Elevation +13 feet (NAVD88)). The applicant's engineer has designed the Revetment based on the FEMA flood study and concluded that the significant wave height of 5.85' can be expected during a 1-percent chance storm event. To be conservative, the design wave is 27 percent larger or 7.43' ( $1.27 \times H_s$ ) (height of the highest 10% of waves ( $H_{1/10}$ )).

Please note that utilizing "Stormtools" the significant wave height was 17.32' for a 100 year storm event at the closest calculated point which is approximately 2000' from the shore. In a communication with Professor Emeritus, Malcolm Spaulding P.E., a higher resolution (20 meter) of predicted wave height has been generated using computer model STWAVE. The predicted wave at the site using STWAVE results (approximately 2 meters or 6.6') is closer to the FEMA and the consultant's results. On this basis, the consultant's wave analysis appears accurate.

With regard to sea level rise the consultant has designed the stone section revetment to extend further up the slope to elevation to 18' (NAVD88). Based on "Stormtools" (Reference RICRMP Section 145.C.4 (Climate Change and Sea Level Rise, Policies), in the event of a 5' sea level rise a small northern and southern sections of the landfill may be inundated (See Figure 1). This coincides with the estimated 80 year sea level rise (Year 2100) using the US Army Corp of Engineers sea level calculator; <http://corpsclimate.us/ccaceslcurves.cfm>). However, in order to provide protection from this type of flooding the side slopes and top of the landfill would need to be elevated which is not a practical alternative.

Please note the CRMC staff and the Nature Conservancy (see public comments section below) has expressed the similar concerns; the inadequate riprap revetment returns to the north and south, the potential of erosion abutting the existing wetland, and eventual erosion behind the revetment. The applicant has revised the project to incorporate a gradual return to the north which should reduce the potential of erosion behind the revetment. The return to the south is setback further inland and is better gradually tied into the existing bluff and therefore the staff engineer does not have objections to the southern configuration.

Signed: \_\_\_\_\_ Supervising Environmental Scientist

Signed: \_\_\_\_\_ Supervising Civil Engineer



In conclusion, it is the staff engineer's opinion that the structure will withstand a majority of storm events, particularly a direct approaching wave. However, waves approaching from the north during storms will inundate the coastal wetland north of the landfill and may cause erosion along the landfill's exposed northern flank (i.e., an "end-run"). Although there are no engineering objections to the proposed project it is staff opinion that the town investigate a long-term solution, such as the removal of the landfill (Reference CRMC staff report herein). Furthermore, the Revetment has been designed in accordance with RICRMP 300.7 (Shoreline Protection Facilities) and therefore there are no engineering objections to the proposed project.

**E. Public Comments:** Although the public notice period which ends on April 8, 2016 had not concluded at the time this report was prepared, comments were received from:

1. **The Nature Conservancy:** The Nature Conservancy (TNC) submitted comments in a letter dated March 23, 2016. In summary, although TNC believes the landfill should be permanently removed from its current location on the shoreline and the habitat restored to its original habitat type, TNC supports the proposed work as a "stopgap" measure with several stipulations:

- Utilize sand dredged from Great Salt Pond (now disposed of offshore) to nourish West Beach (in the vicinity of the landfill) while avoiding eelgrass beds. CRMC staff agrees with this stipulation and plans to work with the Army Corps of Engineers (ACOE) in the future to accomplish this. However, this cannot be stipulated on the Town's assent for the landfill since the dredging is performed by the ACOE to support their navigation project. Note: This recommendation has been the subject of prior CRMC Staff discussions with Bryan Oakley, PhD.
- Monitoring of end erosion north and south of the proposed landfill revetment. Staff agrees with this stipulation and has prepared a stipulation for the Council's consideration.
- Preparation of a long term plan to remediate (remove) the landfill when the revetment fails. Staff agrees with this stipulation and has prepared a stipulation for the Council's consideration.

2. No other public comments had been received as of the April 6<sup>th</sup> completion date of this report.

Signed: \_\_\_\_\_ Supervising Environmental Scientist

Signed: \_\_\_\_\_ Supervising Civil Engineer

- F. Public Access:** To support continued lateral access along the shoreline, the project includes a public access trail which will pass up and over the landfill above the revetment slope. This will compensate for the loss of access along the shore since it should be expected the mean high water (MHW) line will be against the revetment to immediately following construction.
- G. Recommendations:** CRMC Staff **recommends approval** of this application for a riprap revetment to protect the existing landfill which is currently subject to shoreline erosion as well as the special exception to approve the project. However, continued shoreline erosion can be expected on both the north and south sides of the landfill likely resulting in the landfill protruding seaward of the adjacent shoreline on an ever increasing basis. This continued shoreline erosion will increase the threat of end erosion in the future. This combined with the existing threat of end erosion along the coastal wetland edge on the north flank of the landfill remains of significant concern despite the appropriately designed revetment to protect the seaward face of the landfill. On this basis, **CRMC Staff recommends a more aggressive long-range plan than that currently recommend by the Town.** The long-range plan should be designed to either completely remove the landfill or, at a minimum, remove landfill waste as necessary to relocate the riprap protected seaward edge of the landfill landward as necessary to keep pace with shoreline erosion on both the north and south sides of the landfill.

CRMC Staff further recommends that landfill waste be removed along the coastal wetland edge. This edge should be graded to a 3:1 slope and adequately protected with plantings (or other protection such as Geotextile Sand Containers) as necessary to minimize the threat of “end-erosion” on the landfill’s northern flank. A stipulation has been prepared for the Council’s consideration in this regard.

((Justification: With regard to stipulation option 1 (which follows – see stipulations), at an estimated average shoreline erosion rate of 3 feet per year, the bordering shoreline will have eroded 60 feet over 20 years thereby approaching and threatening the end returns of the riprap revetment (designed with 60-75’ wide end returns). With regard to option 2 (which follows – see stipulations), at an estimated shoreline erosion rate of 3’ per year, the shoreline will have eroded 45 feet in 15 years thereby justifying an incremental 50’ move landward. Staff further believes the landfill’s northern flank bordering the wetland should receive protection ASAP (i.e., 5 years) to minimize the risk of a storm impacting this unprotected landfill edge.))

(Note: CRMC Staff have provided these remediation options as our best attempt to provide a justifiable long-range plan that provides a quantifiable goal necessary for definitive landfill remediation and financial planning purposes. Staff welcomes Council and Town input regarding other options which may also provide a quantifiable goal going forward. Due to the special exception hearing being scheduled prior to the completion of the staff review and report, there was not an opportunity to discuss these recommended stipulations with the Town. However, this report was forwarded to the Town on April 7<sup>th</sup> to allow the Town to consider their response to these recommendations.)

Signed: \_\_\_\_\_ Supervising Environmental Scientist

Signed: \_\_\_\_\_ Supervising Civil Engineer

#### H. Recommended Stipulations:

1. **Long-range Landfill Remediation Plan:** At the direction of the RI Coastal Resources Management Council and as a condition of this approval for a riprap revetment to protect the seaward face of the landfill which required a granting of a special exception by the Council:

- I. The Town of New Shoreham shall prepare a landfill remediation plan which provides a schedule for removing the landfill in its entirety. These activities must be coordinate with RIDEM, Division of Waste Management. An annual progress and planning report shall be submitted to the CRMC and RIDEM for review by the end of each calendar year. The schedule for this remediation plan shall allow full implementation within 20 years of the date of this CRMC authorization.

or

- II. The Town of New Shoreham shall prepare a landfill remediation plan which provides a schedule for removing sufficient landfill waste necessary to relocate the riprap protected seaward edge of the landfill sufficiently landward to keep pace with shoreline erosion on both the north and south sides of the landfill. Each incremental move landward shall result in the toe of the revetment being relocated a minimum of 50 feet landward of the inland edge of the coastal feature (coastal bluff or coastal beach) on the north and south sides of the landfill at the time of each incremental move landward. In addition, landfill waste must be removed along the coastal wetland edge bordering the northern edge of the landfill as necessary to create a 3:1 landfill protection slope (cap) adequately protected with plantings (or other protection such as Geotextile Sand Containers) as necessary to minimize the threat of “end-erosion” on the landfill’s northern flank. An annual progress and planning report shall be submitted to the CRMC and RIDEM for review by the end of each calendar year. The schedule for this incremental remediation plan shall provide for implementation of the wetland edge /northern flank 3:1 graded slope cap within 5 years and the first incremental move landward of the riprap protected seaward face within 15 years of the date of this CRMC authorization.

2. **Revetment End Erosion Monitoring:** The Town shall actively monitor the north and south end of the revetment for any end erosion and shall take the necessary actions to protect the landfill from end erosion if it occurs. Prior approval is required from the CRMC.
3. **Public access pathway:** The pathway over the landfill to provide lateral shoreline access shall be established immediately following the completion of the revetment and associated plantings. The public access pathway shall be available for public use as long as the landfill is in place and protected by a revetment. The pathway shall be relocated landward when it becomes necessary to relocate the revetment landward.

Signed: \_\_\_\_\_ Supervising Environmental Scientist

Signed: \_\_\_\_\_ Supervising Civil Engineer

**Appendix 1**  
**Preliminary Cost Estimate Tables for**  
**Alternatives Evaluated**

# CRMC DECISION WORKSHEET

File No. 2016-02-090

Town of New Shoreham

Hearing Date:	
Approved as Recommended	
Approved w/additional Stipulations	
Approved but Modified	
Denied	Vote

APPLICATION INFORMATION					
File Number	Town	Project Location	Category	Special Exception	Variance
2016-02-090	New Shoreham	14 West Beach Road New Shoreham	<b>B</b>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		Plat <input type="text"/> Lot <input type="text"/>			
		Owner Name and Address			
		Town of New Shoreham			
Date Accepted	2/29/16	Attn: Nancy O. Dodge, Town Mgr. PO Box 220 Block Island, RI 02807			
			Work at or Below MHW	<input type="checkbox"/>	
Date Completed	4/7/16		Lease Required	<input type="checkbox"/>	

## PROJECT DESCRIPTION

Construct and maintain a riprap revetment on the shoreline side slope of the Town's closed landfill to help protect the landfill from shoreline erosion. A public access pathway will be provided up and over the landfill to provide/maintain lateral public access along the shoreline. The project requires a Special Exception pursuant to RICRMP Section 300.7.D.1 which prohibits the construction of structural shoreline protection bordering Type 1 waters.

## KEY PROGRAMMATIC ISSUES

Coastal Feature(s) coastal beach, coastal wetland, manmade landfill "bluff"

Water Type One, Conservation Area

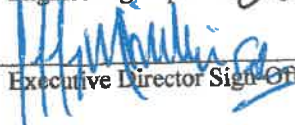
CRMP 130, 145, 200.1, 210.1, 210.3, 210.4, 210.6


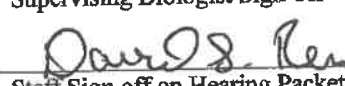
SAMP None

**Variances and/or Special Exception Details:** Requires a Special Exception: Pursuant to RICRMP Section 300.7.D.1, the construction of structural shoreline protection facilities bordering Type 1 waters is prohibited. A Special Exception is required for relief from prohibited activities.

## STAFF RECOMMENDATION(S)

Engineer	RL	Recommendation:	Approval with stipulations
Biologist	DR	Recommendation:	Approval with stipulations
Other Staff		Recommendation:	

 4/7/16  
Engineering Supervisor Sign-Off date  
 7 APR 2016  
Executive Director Sign-Off date

 4/7/16  
Supervising Biologist Sign-off date  
 4/7/16  
Staff Sign off on Hearing Packet (Eng/Bio) date

**STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
COASTAL RESOURCES MANAGEMENT COUNCIL  
INTER-OFFICE MEMORANDUM**

**TO:** Grover J. Fugate  
**DEPT:** CRMC Executive Director  
**FROM:** Dave Reis, Rich Lucia  
**DEPT:** CRMC Permitting Section  
**RE:** CRMC File No. 2016-02-090

**DATE:** April 7, 2016

**PAGE:** 1 of 16

**Applicant's Name:** Town of New Shoreham

**Project:** Construct and maintain a riprap revetment on the shoreline side slope of the Town's closed landfill to help protect the landfill from shoreline erosion. A public access pathway will be provided up and over the landfill to provide/maintain lateral public access along the shoreline. The project requires a Special Exception pursuant to RICRMP Section 300.7.D.1 which prohibits the construction of structural shoreline protection bordering Type 1 waters.

**Location:** 14 West Beach Road

**Water Type/Name:** Type 1, Conservation Area, Block Island Sound

**Coastal Feature:** Coastal beach and coastal wetland back by eroding manmade landfill "bluff"

**STAFF REPORT**

- A. Staff Summary:** CRMC Staff recommends approval of the application for a riprap revetment as well as the special exception necessary to approve the project. However, CRMC Staff recommends a more aggressive long-range landfill plan than that currently recommend by the Town. A stipulation has been prepared for the Council's consideration in this regard.
- B. Staff Analysis:** The 10 acre (+/-) Town of New Shoreham landfill is located immediately adjacent to the shoreline at the end of West Beach Road. The landfill has been impacted by shoreline erosion over the years with major erosive impacts resulting in debris deposition on the shore and in tidal waters during post-tropical storm Sandy in 2012. The shoreline in the area of the landfill is eroding at approximately 1.8 and 3.3 feet per year according to recent shoreline change maps prepared by Bryan Oakley, PhD (Assistant Professor of Environmental Geoscience, Department of Environmental Earth Science, Eastern Connecticut State University). In fact the entire shoreline in this area is exhibiting significant erosion. This is primarily attributed to this shoreline segment being "sand-starved" due to an interruption in the south to north trend of long-shore drift caused by the jetties which protect the entrance to the Great Salt Pond. This application aims to protect the landfill from shoreline erosion through the construction of a riprap revetment. In order to construct the revetment at a shallower slope (2.5:1 as opposed to the existing 1:1 slope) approximately 7,000 cubic yards of existing landfill waste will be excavated and reburied further landward on site. Some material such as metal waste may be recycled.

Signed: Dave Reis Supervising Environmental Scientist

Signed: Paul M. Jones Supervising Civil Engineer



During the course of several meetings held with representatives of the Town of New Shoreham, RIDEM Waste Management Staff and the RI Division of Planning (Community Development Block Grant or "CDBG" Staff), various discussions occurred with regard to whether the revetment would constitute a permanent solution or an interim solution to the landfill erosion issue. During these discussions, CRMC Staff understood the revetment was being investigated and funded as an interim solution to halt the immediate erosion of debris onto the shoreline while additional investigations for landfill remediation occurred. In this regard, the applicant's narrative states: "It is only after this approval is in-hand that the applicant would be in a position to plan and coordinate the removal and transportation of solid waste off the island." And: "This option will however be part of the town's long-range planning." With respect to clarifying this issue, CRMC Staff met again with the Town's representatives (Scott Rabideau, environmental consultant and Jim Geremia, engineering consultant) on March 31, 2016 and continued discussions with Robert Fairbanks (revetment designer) to request a more definitive description of the long-term plans for landfill remediation. CRMC Staff further provided the Town with the comment letter provided by the Nature Conservancy dated March 23, 2016 which supports the interim solution but with recommended stipulations including a request for long-term plan to remediate (remove) the landfill (see public comments section below). As a result of this discussion and the Nature Conservancy's comments, the Town's representatives agreed to submit a more detailed long-range landfill remediation plan description for staff evaluation by April 4, 2016. This revised long-range plan is provided in attachment 1 of this report.

The long-range plan for the landfill has been provided as an addendum to the applicant's narrative. The addendum is included with this staff report as "attachment 1". In summary, the long-range plan states the Town will perform test pits to help characterize the waste and where white goods (refrigerators, stoves, etc.) and metals are encountered, these materials will be shipped off the island for recycling. The empty landfill "cells" created by this process will be kept available for the re-burial of waste which may become exposed or threatened by future erosion along the shoreline. (This effort will need to be coordinated and approved by RIDEM, Office of Waste Management. CRMC Staff expects temporary clean fill may be required within the waste-emptied "cells" to maintain a proper landfill cap and to maintain a surface topography which sheds water from the landfill to minimize the infiltration of rainfall.) While CRMC Staff suggested this approach and supports this plan as a minimal level of effort, this effort does not meet the Nature Conservancy's recommendations as contained in their written comments (see public comments section below).

(Note: During a meeting of January 8, 2015, RIDEM Staff indicated that the existing landfill has never been properly capped and officially closed. RIDEM, Division of Waste Management. RIDEM Staff indicated that ultimately a RIDEM approved landfill closure must take place. CRMC Staff does not support a permanent closure "in place" due to the shoreline erosion concerns described in this report.)

Signed: \_\_\_\_\_



Supervising Environmental Scientist

Signed: \_\_\_\_\_



Supervising Civil Engineer

With regard to an appropriate long-range plan, CRMC Staff is in agreement with the Nature Conservancy's recommendation that an appropriate long-range plan would be to remove the landfill in its entirety or to engage in a continuing effort to remove the seaward portion of the landfill in a stepwise progression toward the landfill's inland limit. The primary reasons for CRMC Staff's opinion is that although the landfill will be protected by a revetment designed to survive a 100 year storm, the shoreline on both sides of the landfill can be expected to recede due to continuing shoreline erosion thereby resulting in the landfill protruding seaward of the adjacent shoreline making it more susceptible to damage namely by "end erosion". Of particular concern is the north facing unprotected landfill side-slope which abuts a coastal wetland subject to inundation during coastal storms (see figure 1 attached).

- C. **Special Exception:** Pursuant to RICRMP Section 300.7.D.1, the construction of structural shoreline protection facilities bordering Type 1 waters is prohibited. A Special Exception is required for relief from prohibited activities.

Pursuant to RICRMP Section 130, the Council may grant relief to prohibited activities through the granting of a Special Exception provided the following **criteria** are met:

*1) The proposed activity serves a compelling public purpose which provides benefits to the public as a whole as opposed to individual or private interests. The activity must be one or more of the following:*

*(a) an activity associated with public infrastructure such as utility, energy, communications, transportation facilities, however, this exception shall not apply to activities proposed on all classes of barriers, barrier islands or spits except as provided in 210.2.D.9;*

*(b) a water-dependent activity that generates substantial economic gain to the state; and/or*

*(c) an activity that provides access to the shore for broad segments of the public.*

*2) All reasonable steps shall be taken to minimize environmental impacts and/or use conflict.*

*3) There is no reasonable alternative means of, or location for, serving the compelling public purpose cited.*

The Town of New Shoreham addressed the Special Exception Criteria in the narrative provided with their application. **Based on CRMC Staff's review of the Town's responses, CRMC Staff agrees with the Town that the proposed revetment qualifies for the granting of a Special Exception.** CRMC Staff's conclusions and recommendation are based on the following findings with regard to the special exception criteria:

Signed: David S. Ren Supervising Environmental Scientist

Signed: Richard M. Jones Supervising Civil Engineer

1. **Special Exception Criteria 1:** Although not specifically stated in the applicant's narrative, CRMC Staff believes **the landfill should be considered "public infrastructure"**. Although now operating as a transfer station which transports waste to the mainland, the landfill represents a component of public infrastructure which previously served Block Island. In addition, properly protecting the landfill will serve to prevent waste from being further eroded onto the shoreline and into public waters thereby creating a public nuisance for residents and tourists alike.
2. **Special Exception Criteria 2:** CRMC Staff believes **all reasonable steps have been taken to minimize environmental impacts**. The fundamental question in this regard becomes what is considered "reasonable". Clearly, the best option would be to remove all waste and transport it to an existing licensed landfill on the mainland. The Town has estimated this cost at over 20 million dollars. This 20 million dollar cost was determined to be beyond the Town's immediate financial ability but is stated as being: "...part of the Town's long-range planning." Absent this option in the short term, CRMC Staff believes that reasonable steps have been taken to implement the riprap protection design alternative as presented in the Town's narrative. Additionally, the riprap slope protection provides a solution that can be implemented in a reasonable period of time (to be initiated in the fall of 2016 and completed by the summer of 2017 based on interagency meetings attended by CRMC Staff). The riprap slope protection can also be moved landward incrementally to protect the landfill during any long term solution which may involve removing waste and transporting it off the island.
3. **Special Exception Criteria 3:** CRMC Staff concludes that **there does not appear to be any reasonable alternatives means of, or location for, serving the compelling public purpose cited**. Staff's conclusion is based on the fact that the landfill already exists in a location which is threatened by shoreline erosion and based on the alternatives investigated by the Town; the chosen alternative appears to be the most cost effective and allows for implementation within a reasonable period of time. The Town's preliminary construction cost estimates for each alternative are attached to this report in appendix 1. **The range of alternatives investigated by the Town include the following:**

Signed: David S. Re... Supervising Environmental Scientist

Signed: Robert M. J... Supervising Civil Engineer

- **Alternative 1: Geotextile Sand Containers (GSC's)** – This alternative was suggested by CRMC Staff due to this method being recently accepted as an “experimental coastal erosion control strategy” by the Technical Review Committee pursuant to section 980 of the Salt Pond SAMP. This alternative would still be subject to a Special Exception as structural shoreline protection since it would be implemented outside of the eligible experimental shoreline segments (Matunuck or Misquamicut). GSC's are simply large sand-filled geotextile bags which can be stacked similar to riprap and covered with sand and planted. The advantages included utilizing potentially available sand sources on the Island such as dredge material. However, it was determined sand would still need to be transported to the island from the mainland similar to transporting riprap from the mainland for construction of the riprap revetment. And, the applicant's preliminary construction cost estimate indicates it would be more expensive than constructing a riprap revetment (see table 2 in appendix 1 – attached). The maintenance cost of this alternative was also deemed to be of concern to the Town. On this basis, CRMC Staff agrees with the Town's dismissal of this alternative.
- **Alternative 2: Hybrid revetment with GSC's above a riprap revetment toe** – This alternative was also determined to be more expensive than the riprap revetment alternative and have additional maintenance cost concerns (see table 3 in appendix 1 – attached). On this basis, CRMC Staff agrees with the Town's dismissal of this alternative.
- **Alternative 3: Landfill removal alternative** – As discussed under Special Exception Criteria 2 above, this alternative would involve the removal of all landfill waste for transport to an existing licensed landfill on the mainland. This would represent a long-term project requiring sampling and characterization of the waste. This would also involve a regulatory review by the RIDEM, Office of Waste Management (and potentially the EPA). The Town has also estimated this cost at over 20 million dollars (see table 4 in appendix 1- attached). This cost was determined to be beyond the Town's immediate financial ability but is stated as being: “...part of the Town's long-range planning.”
- **Alternative 4: No action alternative** – no action would be taken.
- **Chosen Alternative: - Riprap Revetment** - This is the alternative subject to this application.

Signed: David S. Rein Supervising Environmental Scientist

Signed: Richard M. Janni Supervising Civil Engineer

**D. CRMC Staff Engineer's Comments regarding the proposed Shoreline Protection Facility:**

The current design is for a shoreline protection facility that has a 2.5:1 (horizontal: vertical) slope consisting of stone riprap extending from the toe to elevation 18' (NAVD88) to a vegetated slope (elevation 18' to 25' (NAVD88)). The stone will extend above the FEMA predicted wave elevation plus one foot for anticipated sea level rise. The vegetated slope shall be a loam and seed mix, planted with beachgrass along the entire slope.

The size of the stone at the toe of the revetment will be 12,000 pounds (approximately 4' stones) and the remainder of the slope to elevation 18' (NAVD 88) shall be 6,000 pound stone (approximately 3' stones). The larger stone at the toe is to protect the revetment from sliding and scouring. Based on the latest Federal Insurance Rate Maps (FIRM) Maps, the site is designated as an area subject to Velocity Wave action (Elevation +13 feet (NAVD88)). The applicant's engineer has designed the Revetment based on the FEMA flood study and concluded that the significant wave height of 5.85' can be expected during a 1-percent chance storm event. To be conservative, the design wave is 27 percent larger or 7.43' ( $1.27 \times H_s$ ) (height of the highest 10% of waves ( $H_{1/10}$ )).

Please note that utilizing "Stormtools" the significant wave height was 17.32' for a 100 year storm event at the closest calculated point which is approximately 2000' from the shore. In a communication with Professor Emeritus, Malcolm Spaulding P.E., a higher resolution (20 meter) of predicted wave height has been generated using computer model STWAVE. The predicted wave at the site using STWAVE results (approximately 2 meters or 6.6') is closer to the FEMA and the consultant's results. On this basis, the consultant's wave analysis appears accurate.

With regard to sea level rise the consultant has designed the stone section revetment to extend further up the slope to elevation to 18' (NAVD88). Based on "Stormtools" (Reference RICRMP Section 145.C.4 (Climate Change and Sea Level Rise, Policies), in the event of a 5' sea level rise a small northern and southern sections of the landfill may be inundated (See Figure 1). This coincides with the estimated 80 year sea level rise (Year 2100) using the US Army Corp of Engineers sea level calculator; <http://corpsclimate.us/ccaceslcurves.cfm>). However, in order to provide protection from this type of flooding the side slopes and top of the landfill would need to be elevated which is not a practical alternative.

Please note the CRMC staff and the Nature Conservancy (see public comments section below) has expressed the similar concerns; the inadequate riprap revetment returns to the north and south, the potential of erosion abutting the existing wetland, and eventual erosion behind the revetment. The applicant has revised the project to incorporate a gradual return to the north which should reduce the potential of erosion behind the revetment. The return to the south is setback further inland and is better gradually tied into the existing bluff and therefore the staff engineer does not have objections to the southern configuration.

Signed: David S. Rees Supervising Environmental Scientist

Signed: Richard M. Jurek Supervising Civil Engineer

In conclusion, it is the staff engineer's opinion that the structure will withstand a majority of storm events, particularly a direct approaching wave. However, waves approaching from the north during storms will inundate the coastal wetland north of the landfill and may cause erosion along the landfill's exposed northern flank (i.e., an "end-run"). Although there are no engineering objections to the proposed project it is staff opinion that the town investigate a long-term solution, such as the removal of the landfill (Reference CRMC staff report herein). Furthermore, the Revetment has been designed in accordance with RICRMP 300.7 (Shoreline Protection Facilities) and therefore there are no engineering objections to the proposed project.

E. **Public Comments:** Although the public notice period which ends on April 8, 2016 had not concluded at the time this report was prepared, comments were received from:

1. **The Nature Conservancy:** The Nature Conservancy (TNC) submitted comments in a letter dated March 23, 2016. In summary, although TNC believes the landfill should be permanently removed from its current location on the shoreline and the habitat restored to its original habitat type, TNC supports the proposed work as a "stopgap" measure with several stipulations:

- Utilize sand dredged from Great Salt Pond (now disposed of offshore) to nourish West Beach (in the vicinity of the landfill) while avoiding eelgrass beds. CRMC staff agrees with this stipulation and plans to work with the Army Corps of Engineers (ACOE) in the future to accomplish this. However, this cannot be stipulated on the Town's assent for the landfill since the dredging is performed by the ACOE to support their navigation project. Note: This recommendation has been the subject of prior CRMC Staff discussions with Bryan Oakley, PhD.
- Monitoring of end erosion north and south of the proposed landfill revetment. Staff agrees with this stipulation and has prepared a stipulation for the Council's consideration.
- Preparation of a long term plan to remediate (remove) the landfill when the revetment fails. Staff agrees with this stipulation and has prepared a stipulation for the Council's consideration.

2. No other public comments had been received as of the April 6<sup>th</sup> completion date of this report.

Signed: \_\_\_\_\_



Supervising Environmental Scientist

Signed: \_\_\_\_\_



Supervising Civil Engineer



**F. Public Access:** To support continued lateral access along the shoreline, the project includes a public access trail which will pass up and over the landfill above the revetment slope. This will compensate for the loss of access along the shore since it should be expected the mean high water (MHW) line will be against the revetment to immediately following construction.

**G. Recommendations:** CRMC Staff recommends approval of this application for a riprap revetment to protect the existing landfill which is currently subject to shoreline erosion as well as the special exception to approve the project. However, continued shoreline erosion can be expected on both the north and south sides of the landfill likely resulting in the landfill protruding seaward of the adjacent shoreline on an ever increasing basis. This continued shoreline erosion will increase the threat of end erosion in the future. This combined with the existing threat of end erosion along the coastal wetland edge on the north flank of the landfill remains of significant concern despite the appropriately designed revetment to protect the seaward face of the landfill. On this basis, **CRMC Staff recommends a more aggressive long-range plan than that currently recommend by the Town.** The long-range plan should be designed to either completely remove the landfill or, at a minimum, remove landfill waste as necessary to relocate the riprap protected seaward edge of the landfill landward as necessary to keep pace with shoreline erosion on both the north and south sides of the landfill.

CRMC Staff further recommends that landfill waste be removed along the coastal wetland edge. This edge should be graded to a 3:1 slope and adequately protected with plantings (or other protection such as Geotextile Sand Containers) as necessary to minimize the threat of "end-erosion" on the landfill's northern flank. A stipulation has been prepared for the Council's consideration in this regard.

((Justification: With regard to stipulation option 1 (which follows – see stipulations), at an estimated average shoreline erosion rate of 3 feet per year, the bordering shoreline will have eroded 60 feet over 20 years thereby approaching and threatening the end returns of the riprap revetment (designed with 60-75' wide end returns). With regard to option 2 (which follows – see stipulations), at an estimated shoreline erosion rate of 3' per year, the shoreline will have eroded 45 feet in 15 years thereby justifying an incremental 50' move landward. Staff further believes the landfill's northern flank bordering the wetland should receive protection ASAP (i.e., 5 years) to minimize the risk of a storm impacting this unprotected landfill edge.))

(Note: CRMC Staff have provided these remediation options as our best attempt to provide a justifiable long-range plan that provides a quantifiable goal necessary for definitive landfill remediation and financial planning purposes. Staff welcomes Council and Town input regarding other options which may also provide a quantifiable goal going forward. Due to the special exception hearing being scheduled prior to the completion of the staff review and report, there was not an opportunity to discuss these recommended stipulations with the Town. However, this report was forwarded to the Town on April 7<sup>th</sup> to allow the Town to consider their response to these recommendations.)

Signed:  Supervising Environmental Scientist

Signed:  Supervising Civil Engineer

**H. Recommended Stipulations:**

1. **Long-range Landfill Remediation Plan:** At the direction of the RI Coastal Resources Management Council and as a condition of this approval for a riprap revetment to protect the seaward face of the landfill which required a granting of a special exception by the Council:

- I. The Town of New Shoreham shall prepare a landfill remediation plan which provides a schedule for removing the landfill in its entirety. These activities must be coordinate with RIDEM, Division of Waste Management. An annual progress and planning report shall be submitted to the CRMC and RIDEM for review by the end of each calendar year. The schedule for this remediation plan shall allow full implementation within 20 years of the date of this CRMC authorization.

or

- II. The Town of New Shoreham shall prepare a landfill remediation plan which provides a schedule for removing sufficient landfill waste necessary to relocate the riprap protected seaward edge of the landfill sufficiently landward to keep pace with shoreline erosion on both the north and south sides of the landfill. Each incremental move landward shall result in the toe of the revetment being relocated a minimum of 50 feet landward of the inland edge of the coastal feature (coastal bluff or coastal beach) on the north and south sides of the landfill at the time of each incremental move landward. In addition, landfill waste must be removed along the coastal wetland edge bordering the northern edge of the landfill as necessary to create a 3:1 landfill protection slope (cap) adequately protected with plantings (or other protection such as Geotextile Sand Containers) as necessary to minimize the threat of "end-erosion" on the landfill's northern flank. An annual progress and planning report shall be submitted to the CRMC and RIDEM for review by the end of each calendar year. The schedule for this incremental remediation plan shall provide for implementation of the wetland edge /northern flank 3:1 graded slope cap within 5 years and the first incremental move landward of the riprap protected seaward face within 15 years of the date of this CRMC authorization.

2. **Revetment End Erosion Monitoring:** The Town shall actively monitor the north and south end of the revetment for any end erosion and shall take the necessary actions to protect the landfill from end erosion if it occurs. Prior approval is required from the CRMC.
3. **Public access pathway:** The pathway over the landfill to provide lateral shoreline access shall be established immediately following the completion of the revetment and associated plantings. The public access pathway shall be available for public use as long as the landfill is in place and protected by a revetment. The pathway shall be relocated landward when it becomes necessary to relocate the revetment landward.

Signed:  Supervising Environmental Scientist

Signed:  Supervising Civil Engineer