

## Appendix E

New York State Coastal Management Program

Consistency Determination

## NEW YORK STATE COASTAL MANAGEMENT PROGRAM CONSISTENCY DETERMINATION

**Project:** Montauk Point in the Township of East Hampton, Suffolk County, New York, Storm Damage Reduction Project (Project). The proposed Project consists of the construction of a Stone revetment at Montauk Point for protection of Turtle Hill plateau and securing the integrity of the Montauk Point Lighthouse (Lighthouse) and its associated facilities from wave and storm activities.

**Applicant:** U.S. Army Corps of Engineers (USACE), New York District (District).

**Applicable Policies:** Based on a review of the Coastal Management Program Policies for New York, 21 policies were found to be potentially applicable to the proposed Project. These policies are listed below.

**Consistency Determination:** Each of the 21 applicable policies was evaluated with respect to the Project's consistency with their stated goals. The Project has been found to be consistent with each policy.

**Policy 1:** Restore, revitalize and redevelop deteriorated and underutilized waterfront areas for commercial, industrial, cultural, recreational and other compatible uses.

**Determination:** The proposed reinforcement of the revetment would protect the Plateau, Lighthouse and its associated facilities, as well as other unknown historic and cultural resources, and enhance recreational activities at Montauk Point State Park.

**Policy 2:** Facilitate the siting of water dependent uses and facilities on or adjacent to coastal waters.

**Determination:** By restoring the existing shoreline of Turtle Hill plateau with the revetment, the Lighthouse and its associated facilities and unknown historic and cultural resources would be protected, and made to be more useful for public recreation.

**Policy 5:** Encourage the location of development in areas where public services and facilities essential to such development are adequate.

**Determination:** The restoration of the Project's shoreline is necessary due to the need of the Lighthouse as an aid for navigation for ships heading for New York Harbor and Long Island Sound, as well as other eastern seaboard ports. The proposed Project would protect the Plateau, Lighthouse and its associated facilities, as well as other unknown historic and cultural resources, and enhance recreational activities at Montauk Point State Park. Public services such as the museum, concession operations, restrooms, and parking facilities appear adequate to support current users.

**Policy 7:** Significant coastal fish and wildlife habitats would be protected, preserved and where practical, restored so as to maintain their viability as habitats.

**Determination:** The Project is not expected to have a significant impact on marine fisheries.



The federally-listed endangered Atlantic ridley (*Lepidochelys kempii*) and leatherback (*Dermochelys coriacea*) sea turtles and the threatened loggerhead (*Caretta caretta*) and green (*Chelonia mydas*) sea turtles have been identified as transient species through the Project area (Beach 1992). Recent studies indicate that the nearshore waters within Peconic Bay, Gardiners Bay, Block Island Sound, and Long Island Sound are critical developmental habitat for juveniles of the Atlantic ridley sea turtle and a major feeding area for the Loggerhead sea turtle (USFWS 1997, Bortman and Niedowski 1998, PEP 2001). Juvenile Atlantic ridley sea turtles recorded in Long Island waters represent the largest concentrations ever documented outside the Gulf of Mexico (Morreale *et al.* 1992). In the Northeast, during the summer months, juveniles (approximately 2 to 5 years of age) of the Atlantic ridley, loggerhead, leatherback, and green sea turtles migrate from the open ocean to inshore waters including areas along the coast of Long Island (Bortman and Niedowski 1998).

Atlantic **Sturgeon** (*Acipenser oxyrinchus oxyrinchus*) are also protected, and like all anadromous fish, Atlantic sturgeon are vulnerable to various impacts because of their wide-ranging use of rivers, estuaries, bays, and the ocean throughout the phases of their life. General factors that may affect Atlantic sturgeon include: dam construction and operation; dredging and disposal; and water quality modifications such as changes in levels of dissolved oxygen (DO), water temperature and contaminants.

Federally-listed endangered Northern right whales (*Eubalaena glacialis*) (usually individuals) are regularly sighted migrating through the nearshore waters off Montauk Point, usually from March through June (USFWS 1997) and have been identified as a transient species by the NMFS (Beach 1992). Small aggregations of Federally-listed endangered finback whales (*Balaenoptera physalus*) feed close to shore from Shinnecock Inlet to Montauk Point from January to March, and federally-listed endangered humpback whales (*Megaptera novaengliae*) feed all around Montauk Point, primarily between June and September (USFWS 1997).

One federally-listed and state-listed endangered plant, the sandplain gerardia (*Agalinis acuta*), has been historically known to have occurred at several locations within the Project area (USACE 1993), and there are two extant areas containing this plant within two miles of the Project area (USFWS 1992). However, according to the NYSDEC Wildlife Resources Center, this plant has not been identified in the Project area since 1927 (USACE 1993). Several site visits by District personnel along with local naturalists and Town biologists have concluded that the sandplain gerardia is not present in the Project area (USACE 1993).

The *Atlas of Breeding Birds of New York State* lists the state-listed threatened common tern as a confirmed breeder in the Project area and the least bittern and Northern harrier as probable breeders (Andrle and Carroll 1988). According to the 1989 Long Island Colonial Waterbird and Piping Plover Survey, the least tern has not nested in the Project area since 1984 (Downer and Leibelt 1990) and was not listed by the *Atlas of Breeding Birds of New York State* as occurring in the Project area.



State-listed plant species that may occur in the include the endangered sandplain gerardia (see above), which was historically identified as occurring in the Project area, and the rare seabeach knotweed (*Polygonum glaucum*) and threatened saltmarsh spike rush (*Eleocharis halophila*) are known to be present in the Project area (USACE 1993).

Although several species of federally-listed endangered and threatened species of animals and plants discussed above can be expected to occur in the general vicinity of the Project area at any time (USFWS 1992, Beach 1992), no impacts to these species are expected to occur as a result of construction of the stone revetment alternative. The sea turtle and marine mammal species discussed above are highly mobile and are only considered as transient species in the Project area (Beach 1992). Therefore these species are unlikely to be present or would avoid the Project area during construction. Furthermore, the construction of the revetment is not expected to negatively impact the preferred habitat of these species since they do not breed in the region and are considered pelagic.

Impacts to the rare seabeach knotweed (*Polygonum glaucum*) and the threatened saltmarsh spike rush (*Eleocharis halophila*), which are known to be present within the Project area (USACE 1993), are not expected because construction activities would not impact vegetative areas.

Common terns (state threatened) may be present in the Project area from late April to mid-May. Common terns breed in colonies that may contain several hundred to several thousand birds (NYSDEC 1998a). The nest is a simple scrape built above the high tide line in sand, gravel, shells or windrowed seaweed (Andrle and Carroll 1988). A clutch of 2-4 (usually 3) eggs is laid during late May through July. Both sexes share incubation duties for 21-27 days and the young fledge about 28 days after hatching (Andrle and Carroll 1988). The District will continue to coordinate with the NYSDEC regarding anticipated impacts to individual common terns and their habitat due to implementation of the Project.

Because the selected Project alternative would not impact vegetated habitats (see Section 4.3) impacts to individual least bitterns and northern harriers or their habitat is unlikely due to the Project.

According to the 1989 Long Island Colonial Waterbird and Piping Plover Survey, the least tern has not nested in the Project area since 1984 (Downer and Leibelt 1990) and was not listed by the *Atlas of Breeding Birds of New York State* as occurring in the Project area (Andrle and Carroll 1988).

**Policy 9:** Expand recreational use of fish and wildlife resources in coastal areas by increasing access to existing resources, supplementing existing stocks, and developing new resources.

**Determination:** Construction of the proposed Project would have a temporary minimal adverse effects on fish and wildlife resources and recreation activities directly within the project area. However, upon completion of the construction, the Project would continue the



provision of full public access to existing fish and wildlife resources and provide long-term protection and additional habitat for numerous fish, shellfish, and wildlife resources.

**Policy 12:** Activities or development in the coastal area would be undertaken so as to minimize damage to natural resources and property from flooding and erosion by protecting natural protective features including beaches, dunes, barrier islands, and bluffs.

**Determination:** The proposed Project would reduce the impact of natural erosional processes, thus protecting the Lighthouse and its associated facilities from storm and wave activities. This Project would represent a continuation of augmentation of the natural features of the bluff.

**Policy 13:** The construction or reconstruction of erosion protection structures shall be undertaken only if they have a reasonable probability of controlling erosion for at least 30 years as demonstrated in design and construction standards and/or assured maintenance or replacement programs.

**Determination:** The construction of the proposed Project would reduce the impact of natural erosional processes and protect Turtle Hill plateau from storm and wave activities. The structure has a reasonable probability of controlling erosion for at least 30 years.

**Policy 14:** Activities and development including the construction or reconstruction of erosion protection structures, shall be undertaken so that there would be no measurable increase in erosion or flooding at the site of such activities or development, or at other locations.

**Determination:** The construction of the proposed Project would protect the Lighthouse and its associated facilities, and reduce the impact of natural erosional processes and storm and wave activities to Turtle Hill plateau. The Project is tied back in a manner that will prevent flanking and will not increase erosion or flooding in adjacent areas.

**Policy 15:** Mining, excavation or dredging in coastal waters shall not significantly interfere with the natural coastal processes that supply beach materials to land adjacent to such waters and shall be undertaken in a manner which would not cause an increase in erosion of such land.

**Determination:** The proposed Project would not involve mining or dredging in coastal waters. However, minor excavation may be necessary for proper access to the revetment. All construction activities in coastal waters would not significantly interfere with coastal processes, but will act to continue the augmentation of the natural features to protect Turtle Hill plateau, the Lighthouse, and other facilities.

**Policy 16:** Public funds shall only be used for erosion protective structures where necessary to protect human life, and new development which requires a location within or adjacent to an erosion hazard area to be able to function, or existing development; and only where the public benefits outweigh the long term monetary and other costs including the natural protective features.

**Determination:** Construction of the proposed Project would have a long-term benefit for the public in that it would maintain recreational and educational opportunities at Montauk Point State Park. In addition, construction of the proposed Project would protect Turtle



Hill plateau from natural erosional processes, thus protecting the Lighthouse and its associated facilities for aiding in navigation.

**Policy 18:** To safeguard the vital economic, social and environmental interests of the State and of its citizens, proposed major actions in the coastal area must give full consideration to those interests, and to the safeguards which the State has established to protect valuable coastal resource areas.

**Determination:** The proposed construction activities would provide a means of protecting an important public navigational aid and recreational area with minimal short-term impacts to natural resources. The protection provided will act to preserve the economic and social interests of the State of New York derived from visitation to Montauk Point State Park and the Lighthouse.

**Policy 19:** Protect, maintain, and increase the level and types of access to public water-related recreation resources and facilities.

**Determination:** Construction of the proposed Project would protect, maintain, and enhance the Montauk Point State Park and adjacent recreational areas.

**Policy 20:** Access to publicly-owned foreshore and to lands immediately adjacent to the foreshore or the water's edge that are publicly-owned shall be provided and it shall be provided in a manner compatible with adjoining uses.

**Determination:** Construction of the proposed Project would protect Turtle Hill plateau from natural erosional processes and increase public access to Montauk Point State Park and adjacent recreational areas.

**Policy 21:** Water dependent and water enhanced recreation would be encouraged and facilitated, and would be given priority over non-water related uses along the coast.

**Determination:** Construction of the proposed Project would support the continuation of water dependent recreation activities such as fishing, surfing, sightseeing, and boating.

**Policy 22:** Development, when located adjacent to the shore, would provide for water-related recreation, whenever such use is compatible with reasonably anticipated demand for such activities, and is compatible with the primary purpose of the development.

**Determination:** Construction of the proposed Project would protect Turtle Hill plateau from natural erosional processes and increase public access to Montauk Point State Park and support the continuation of water dependent recreation activities such as fishing, surfing, sightseeing, and boating.

**Policy 23:** Protect, enhance and restore structures, districts, areas or sites that are of significance in the history, architecture, archaeology or culture of the state, its communities, or the nation.

**Determination:** The Lighthouse was commissioned by President Washington in 1796 and was completed in 1797. Since its construction, the Lighthouse has served as an important navigation aid for the first land encountered by ships headed for New York Harbor and Long Island Sound, as well as other eastern seaboard ports. In addition, the Lighthouse is included in the U.S. Department of Interior's National Register of Historic Places.



Construction of the proposed Project would protect Turtle Hill plateau from natural erosional processes, thus securing the integrity of the Lighthouse, its associated facilities, and other unknown artifacts that might be present in the area.

**Policy 24:** Prevent impairment of scenic resources of statewide significance.

**Determination:** Construction of the proposed Project would protect Turtle Hill plateau from natural erosional processes, thus preserving the scenic resources at Montauk Point State Park and the Lighthouse and its associated facilities.

**Policy 25:** Protect, restore or enhance natural and man-made resources which are not identified as being of statewide significance, but which contribute to the overall scenic quality of the coastal area.

**Determination:** Construction of the proposed Project would protect Turtle Hill plateau from natural erosional processes, thus enhancing recreational activities and preserving scenic quality at Montauk Point State Park and the Lighthouse and its associated facilities.

**Policy 35:** Dredging and filling in coastal waters and disposal of dredged material would be undertaken in a manner that meets existing State permit requirements, and protects significant fish and wildlife habitats, scenic resources, natural protective features, important agricultural lands, and wetlands.

**Determination:** Construction of the proposed Project may require minor excavation along coastal waters and may have a short-term, temporary impact on fish and wildlife resources. However, the proposed project would secure the integrity of Turtle Hill plateau, thus enhancing and protecting wildlife habitats and scenic resources. In addition, the revetment from the high tide mark seaward would have a long-term beneficial affect for fish and shellfish in providing shelter and forage opportunities.

**Policy 38:** The quality and quantity of surface water and groundwater supplies, would be conserved and protected, particularly where such waters constitute the primary or sole source of water supply.

**Determination:** Construction of the proposed Project would cause a short-term, temporary increase in turbidity and sedimentation of adjacent surface waters. However, the increase in sedimentation is expected to settle quickly out of the water column and would not cause any adverse harmful affect to fish and wildlife. No impacts to groundwater are expected from the proposed Project.

**Policy 44:** Preserve and protect tidal and freshwater wetlands and preserve the benefits derived from these areas.

**Determination:** Construction of the proposed Project would protect Turtle Hill plateau and not have any direct or indirect impacts to freshwater wetlands, coastal ponds, or interdunal swales in the project area.





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**DEPARTMENT OF STATE**  
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ANDREW M. CUOMO  
GOVERNOR

CESAR A. PERALES  
SECRETARY OF STATE

October 13, 2016

Peter Wepler  
Chief, Environmental Analysis Branch  
U.S. Army Corps of Engineers - Planning  
26 Federal Plaza - Room 2151  
New York, NY 10278-0090

Re: F-2016-0376  
U.S. Army Corps of Engineers  
Montauk Point Storm Damage Reduction Project -  
Suffolk County, NY  
**No Review Necessary - Modification To Previously  
Reviewed Activity**

Dear Mr. Wepler:

The Department of State (DOS) previously reviewed the above-indicated U.S. Army Corps of Engineers (Corps) activity and our concurrence with the Corps' consistency certification was presumed on January 11, 2006. On April 14, 2016, DOS received from the Corps additional documents describing proposed modifications to the project.

DOS has reviewed these modifications and evaluated the potential coastal effects resulting from the described changes. DOS has determined that these modifications of the activity would not result in coastal zone effects that would be substantially different than those previously reviewed by the Department. Therefore, further DOS review of the modifications, and the Department's concurrence with an individual consistency certification for the proposed activity, are not required.

This Concurrence is without prejudice to, and does not obviate the need to, obtain all other applicable licenses, permits, or other forms of authorization or approval that may be required pursuant to existing State statutes.

When communicating with us regarding this matter, please contact Jeffrey Zappieri at (518) 473-2476 or [Jeffrey.zappieri@dos.ny.gov](mailto:Jeffrey.zappieri@dos.ny.gov) and refer to our file #F-2016-0376.

Sincerely,

Jeffrey Zappieri  
Consistency Review Unit  
Office of Planning and Development

JZ/dc

Cc: NYSDEC - Sue McCormick  
USACE - Robert Smith





**DEPARTMENT OF THE ARMY**  
U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT  
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Environmental Analysis Branch

April 19, 2016

Mr. Jeffrey Zappieri  
Consistency Review, New York Coastal Management Program  
New York Department of State  
One Commerce Place  
99 Washington Avenue, Suite 1010  
Albany, New York 12231-0001

Subject: Montauk Point Storm Damage Reduction Project - Suffolk County, NY

Mr. Zappieri:

The Army Corps of Engineers (USACE) New York District (NAN) has evaluated and prepared a Hurricane Sandy Limited Reevaluation Report (HSLRR) and Environmental Assessment (EA) for the authorized, but unconstructed Montauk Point Storm Damage Reduction stone revetment project, which was designed to protect the bluff and historic lighthouse at Montauk Point in New York (Figures 1 and 2). Because the Montauk Point Storm Damage Reduction Feasibility Study (FS) and Environmental Impact Statement (EIS) were finalized by NAN in October 2005, and the project was congressionally authorized in 2006, a brief review of the project is necessary to verify that existing conditions have not changed significantly after Hurricane Sandy, and that the currently recommended project meets the project authorization. In general, the project proposed for construction in the HSLRR is the same length as the authorized project; however, there are some revisions to the design cross-section to ensure the stability, constructability and cost effectiveness of the structure. The purpose of this letter is to coordinate the minor changes to the Montauk Point Storm Damage Reduction project with your office and to give you an opportunity to update coordination pursuant to New York State's Coastal Management Program (CMP) as required by U.S. Department of Commerce regulations (15 CFR 930.57).

As stated previously, the stone revetment proposed for construction in the HSLRR is the same length as the authorized project (approximately 840 feet); however, there are some revisions to the design cross-section to ensure the stability, constructability and cost effectiveness of the structure. Foremost, the construction of the 2005 FS buried toe, was reviewed and deemed cost prohibitive as sheet piling and dewatering would be required in the area in front of the revetment during the estimated two year construction period. In the adjusted design, the toe is not buried. There is also a bottom bench at 10 feet NAVD88 for equipment during construction and future maintenance. The bench, which is mostly above Mean High Water (MHW), also functions to dissipate wave energy during storm events which decreases the need for

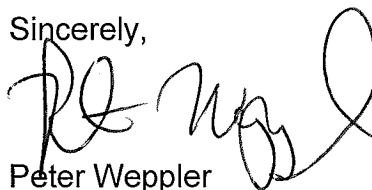
excavation and rock placement higher up the bluff face. The proposed plan increases the impact to intertidal habitat by 0.08 acres.

Several revetment profile options were evaluated, with varying bench elevations, bench widths and slopes to determine the most practicable revetment design in consideration of storm protection, constructability, cost and impacts to intertidal habitat (Figure 3 – Revetment Option Cross-Sections). After evaluating the revetment options and existing revetment conditions, Option C, with a top bench elevation of 21 feet NAVD88, a lower bench elevation of 10 feet and a slope of 1 Vertical (V) to 2 Horizontal (H), was determined to be the most practicable revetment option. Option C takes advantage of an existing layer of stone near Mean Low Low Water (MLLW) that has eroded from the hillside. In addition, the 1V to 2H revetment slope (the steepest stable seawall slope) is cost effective (e.g., requires less stone than a 1:3 slope) and minimizes impacts to intertidal habitat. See Figure 4 – Site Plan – HSRR (Option C) for a plan view of the current revetment design; Figure 5 – Cross-Section Comparative - Site Plan vs. 2005 Feasibility Design; and Table 1 - Comparison of 2005 Revetment Design vs. 2013 Revetment Design for a comprehensive comparison of the 2005 and 2013 revetment design features. In addition, the currently proposed project will use the same construction access roads and staging areas identified in the 2005 FS (Figure 6 – Access Roads and Staging Areas).

A comparison of the original and current, proposed projects was evaluated in the attached draft Environmental Assessment (EA) which includes a determination of how the project meets or advances the applicable State Coastal Policies. The District has determined that the intended activity is consistent with New York State's CMP.

I look forward to working with you and your staff on this effort. If you should have any questions, please contact Mr. Robert J. Smith of my staff at 917-790-8729

Sincerely,

A handwritten signature in black ink, appearing to read 'Peter Wepler', written over a horizontal line.

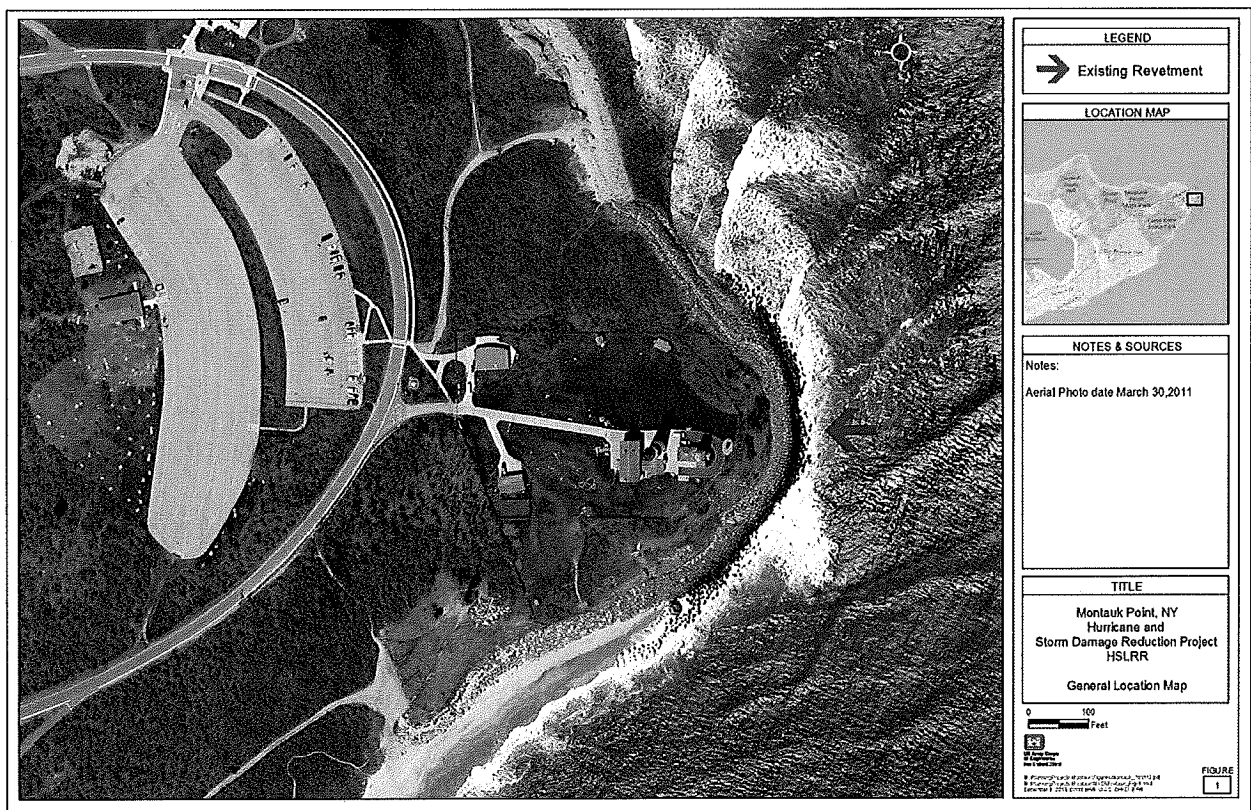
Peter Wepler  
Chief, Environmental Analysis Branch

Attachments

# Montauk Point Project Description

The Montauk Point Lighthouse is located on an eroding bluff at the eastern tip of Long Island in the Township of East Hampton, Suffolk County, New York (see Figure 1 – to view the General Location Map). Due to erosion of the bluff, the lighthouse is less than 120 feet from the edge of the bluff. Continued erosion has been recognized as a problem for many decades and various efforts have been made to stabilize the shoreline with limited success.

The Montauk Point Lighthouse was designated as National Landmark in March 2012. The lighthouse was commissioned by President Washington and completed in 1796. It has served as an important navigation aid for the first land encountered by ships heading for New York Harbor and Long Island Sound, as well as other eastern seaboard ports. The lighthouse continues to operate as a navigation aid with a marine rotating beacon and fog signal.

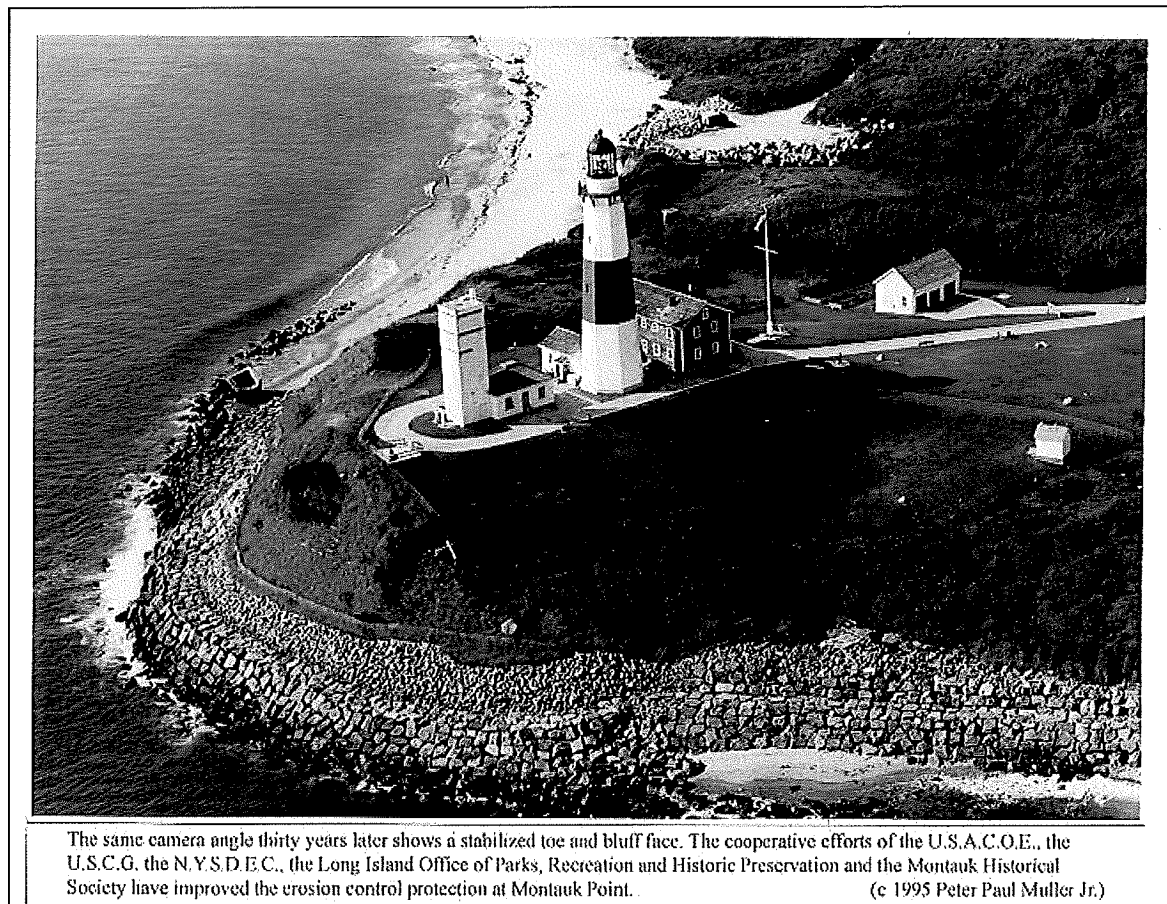


### Figure 1. Project Location Map

The lighthouse complex is owned and operated by the Montauk Historical Society (nonprofit 501-C-3). The Montauk Historical Society is dedicated to the protection, preservation and educational development of this nationally significant historic site. Membership in the Montauk

Historical Society and visitation to the lighthouse is fee based and open to all without any discrimination. Fees help maintain the properties and overall operation.

Erosion of the coastal bluff at Montauk Point has been recognized as a problem for many decades. There is a long history of erosion control activities constructed by both governmental and non-governmental agencies from 1946<sup>1</sup> to the most recent efforts in the 1990s (see Figure 2). The existing erosion control measures, including the revetment, are inadequate for long-term protection against waves and water levels.



**Figure 2. Montauk Lighthouse, associated grounds, and revetment circa 1995**

<sup>1</sup> A 700 foot revetment was installed in 1946 by the Army Corps of Engineers. This revetment eventually failed and was replaced by a 300 foot revetment constructed by the Coast Guard in 1991. This revetment was augmented by a 150 foot long revetment completed by Montauk Historical Society on both ends of the Coast Guard revetment in 1992. Since 1992, the Montauk Historical Society has conducted periodic repairs to the revetment as the existing revetment continues to degrade due to storm damage.

## **AUTHORIZED PROJECT**

### **Authorization History**

The Final Report of the USACE Chief of Engineers (Chief's Report) on the Montauk Point, New York, and Hurricane & Storm Damage Reduction Project was provided to Congress on March 31, 2006 and the project was authorized in Water Resources Development Act of 2007. NAN is the lead Federal agency for the project, and the New York State Department of Environmental Conservation (NYSDEC) is the non-federal cooperating agency.

The 2006 Chief's Report and the project authorization are based on the Final Montauk Point Storm Damage Reduction Feasibility Study and EIS, October 2005. This report was prepared under the authority of a resolution adopted by the Committee on Environment and Public Works of the U.S. Senate on May 15, 1991. A second resolution, also dated May 15, 1991, authorized the study of interim emergency protection works until a comprehensive project was formulated, designed and constructed.

### **Project Area**

The project area is located in Suffolk County, New York, between the Atlantic Ocean and Block Island Sound at the easternmost end of the south fork of Long Island. Montauk is in the Town of East Hampton. The study area includes the entire historic Montauk Point Lighthouse Complex situated on a high bluff underlain with glacial till, about 70-feet above Mean Sea Level (MSL). The lighthouse is the focal point of the historic complex and surrounding facilities. The lighthouse complex consists of the Lighthouse Tower and Keeper's House, the Fire Control Tower, and Garage, which was an earlier Keeper's House. Also part of the complex are the archaeological sites associated with the Lighthouse and Montauk Point.

The lighthouse is located adjacent to the Montauk Point State Park (New York). Turtle Cove, a popular surf casting and surfing beach, is located south of the lighthouse.

### **Lighthouse Ownership**

The ownership of the light house and associated property was transferred from the U.S. Coast Guard to the Montauk Historical Society (nonprofit 501-C-3) on September 30, 1996. Surrounding property is owned by the State of New York and the Town of East Hampton. The Historical Society's continued ownership of the project is subject to the condition to maintain the Montauk Light Station in accordance with the provisions of the National Historic Preservation Act of 1966, amended (16 U.S.C. 470 et seq.) and other applicable laws. All rights, title, and interest would revert to the United States if the Montauk Light Station ceases to be maintained in accordance with the National Historic Preservation Act as a nonprofit center for public benefit

for interpretation and preservation of the material culture of the United States Coast Guard, maritime history of Montauk, and Native American and colonial history.

The Montauk Historical Society is dedicated to the protection, preservation, and educational development of this nationally significant historic site. Through programs, exhibits, publications and special events, the story of this site is conveyed to the public. Membership in the Montauk Historical Society and visitation to the lighthouse is fee based and open to all without any discrimination. Fees help maintain the properties and overall operation.

A waiver to the USACE single landowner policy from the Assistant Secretary of the Army (Civil Works) was granted on 29 June 2005 for the project.

### **Authorized Project Description**

The project consists of 840-feet of revetment protection for the bluff. The protection covers the most vulnerable bluff area that would directly endanger the lighthouse complex due to bluff failure. The 2005 revetment design was based on Engineering Manual 1110-2-1614 "Design of Coastal Revetments, Seawalls and Bulkheads". The FS revetment was designed to withstand a 73 year return period storm. The revetment was designed to be 840 feet long utilizing 12.6 ton quarry stone armor units extending from the crest down to the embedded toe. The designed revetment was sloped at 2:1, with a crest of +24 NAVD88. The revetment was anchored by an embedded toe at a depth of 16 feet below existing grade, at a distance of about 65 feet from the interface between Mean Low Low Water and the existing revetment. The estimated first cost for the stone revetment was \$13,792,000 (2004 price level), including contingency, planning, engineering and design, and construction supervision and administration.

## **REEVALUATION OF PROJECT COSTS**

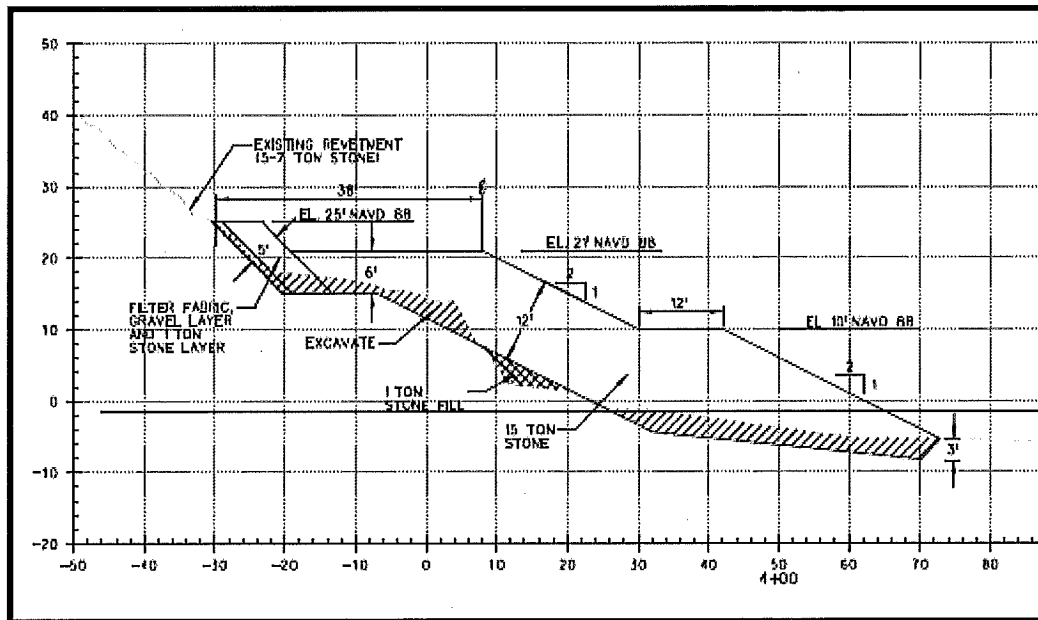
### **Design Refinements**

In August 2013, USACE completed a post-Hurricane Sandy assessment of the existing Montauk Point revetment to review existing site conditions and determine if refinements to the 2005 feasibility level design might be advisable. USACE staff found that, in spite of continuous maintenance/repair activity, the existing stone structure is continuing to degrade and is inadequate to provide long term protection of the bluff. Some of the deficiencies noted included partial collapse of the revetment due to overtopping, movement downslope of material, gradual loss of interlocking of armor stones, water seepage along the south shore, and splitting of poor quality armor stone. Degradation of the revetment will continue and possibly accelerate in the future without the authorized project. The site visit findings reinforced the urgent need for the construction of the proposed Montauk Point revetment to protect the historic lighthouse complex and other natural, cultural and recreational resources.

Next, the FS Revetment Design was reviewed and evaluated for potential refinements. Variations on the FS Revetment Design were developed and considered for selection. The variations were evaluated based upon ability to meet performance requirements and consideration of sea level change (SLC), constructability, quantity of stone required, environmental impacts, long term maintenance implications, and cost. Eight variations of the revetment design were considered.

The selected option consists of 15 ton armor stone overlain on the existing 5-7 ton stone revetment. Loose material at the foot of the proposed revetment will be removed to form a stable base and prevent future scour. The revetment slopes from the toe at a 2:1 slope until elevation 10' NAVD88, at which point a 12 foot wide bench is constructed. This bench is located about 8' above mean higher high water. From there, the revetment continues to slope at a 2:1 ratio until reaching elevation 21' NAVD88. The top bench at 21' NAVD88 is approximately 30 feet wide. The final element is a splash apron from elevation 21-25 NAVD88. This element consists of 1-2 ton stone underlain by a geo-textile fabric.

The selected variation typical cross section is illustrated below in Figure 3:



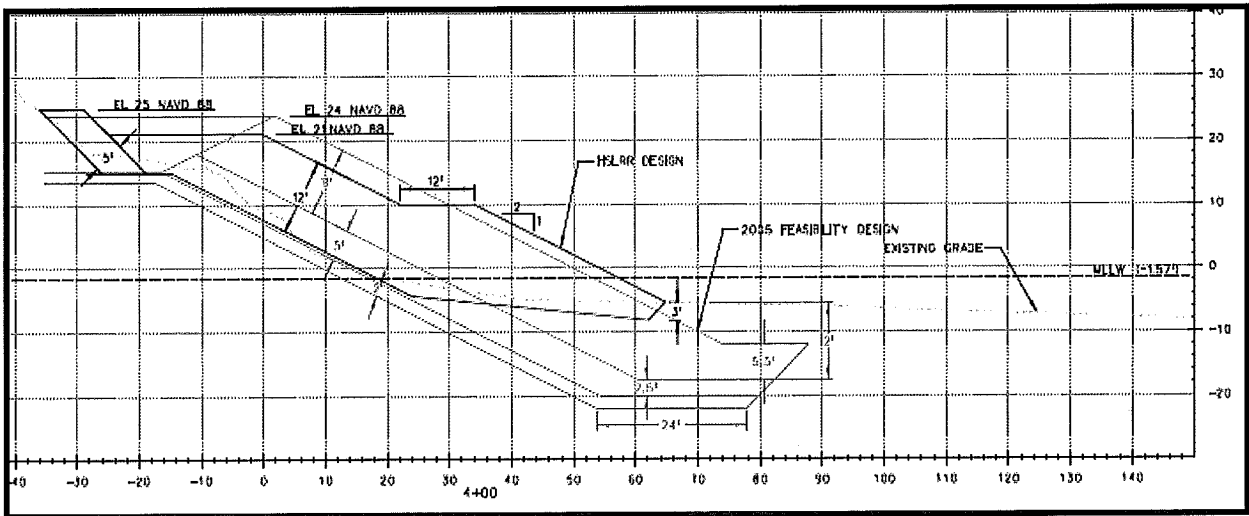
**Figure 3. HSLRR Revetment Typical Cross Section**

The selected option includes the following refinements from the FS design:

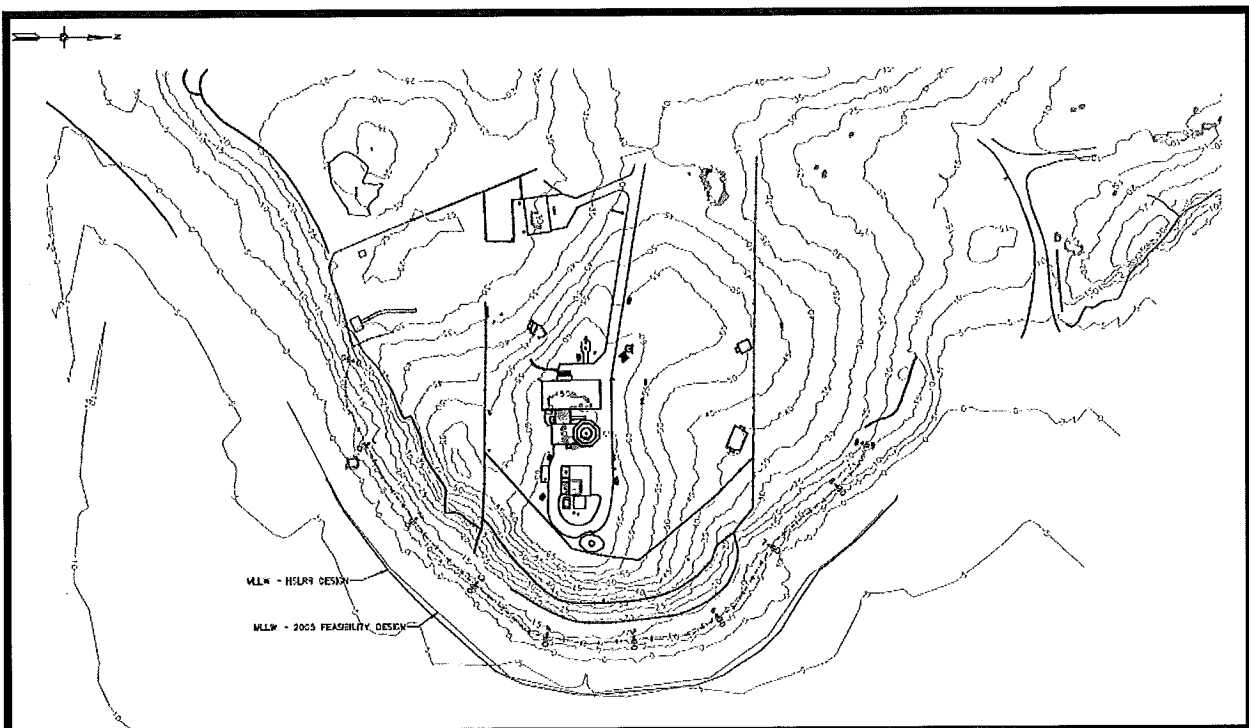
1. Build on top of the existing revetment (5-7 ton stone) instead of removing it. The FS design included the removal of the existing revetment and constructing the new revetment in its place. The HSLRR design will utilize the existing revetment as a foundation for the new revetment. This approach will reduce the amount of stone required, and provide a stronger level of protection. Furthermore, this approach has the added benefit of providing protection for the bluff during the entire construction process.
2. Construct a toe berm instead of a buried toe. The FS design included a buried toe installed to a depth of 16 feet below existing grade. The construction of the FS toe design would be very difficult because the construction will take place approximately 65 feet away from the existing shoreline. In addition, de-watering would likely be required to place the toe, which complicates the construction. The HSLRR design consists of a toe berm constructed at 10 feet NAVD-88 (above Mean High High Water). Minimal excavation will be required (2-4 feet below existing grade) to remove loose material and place the stone. The stone will only need to be placed approximately 40 feet away from the existing shoreline. It is anticipated that the toe berm would be built first to a width of 25 feet to accommodate a crane. The upper part of the revetment would be constructed on top of the toe berm, leaving a 12 foot wide berm to facilitate future maintenance. Excavation material is reduced from about 32,000 cubic yards to about 4,200 cubic yards. Based on soil borings (refusal at 2.5 feet) and observations made during site assessment, the existing material provides an adequate base. The toe berm design also reduces the amount of armor stone required.
3. Use 15 ton stone instead of 12.6 ton stone for armor stone. While 12.6 ton stone is adequate for the design wave height of 13.4 feet under current conditions, the water depths in front of the structure are anticipated to increase throughout the project life (thus increasing the design wave height) due to both erosion and sea level change. The selection of 15 ton stone results in increased strength without having to upgrade to special heavier duty equipment for stone handling and placement. In addition, the larger stone size increases productivity because a lower number of stones are required to be placed resulting in a shorter construction duration. Lastly, the larger stone will stay in place better, reducing future maintenance requirements.
4. Lower crest to 21 feet NAVD-88 instead of 24 feet NAVD-88. The reduced elevation of the crest reduces the amount of armor stone required, while still providing adequate protection against wave over-topping. This is achieved by an extra wide crest (approximately 33 feet). To provide an additional layer of protection against overtopping, a five foot layer of 1-2 ton stone is placed from 21' NAVD88 to 25' NAVD88. See the Coastal Engineering Appendix for additional details on this analysis.



Below is a comparison of the FS and HSLRR Cross Section and Plan View (Figures 4 and 5):



**Figure 4. Comparison of FS and HSLRR - Cross Section (Typical)**



**Figure 5. Comparison of FS and HSLRR - Plan View**

As noted above, the HSLRR design refinements result in a smaller footprint of impact than the FS. The HSLRR design does result in a slighter greater impact at the Mean Low Low Water interface. A summary of the key parameters of the FS design and the HSLRR refinements are provided in the table below (Table 1):

**Table 1. Key Parameters Comparison**

<b>Parameter</b>	<b>2005 Feasibility Study, Authorized Project</b>	<b>NAE Proposed Plan for HSLRR</b>
<b>Construction Approach</b>	Remove Existing Revetment, Reuse Quality Stone	Build Over Existing Revetment, Remove Poor Stone
<b>Armor Stone Size</b>	12.6 Ton Stone, 2 Layers and 1.3 Ton under layer Stone (64,600 tons)	15 Ton Stone, 2 Layers (49,000 tons)
<b>Splash Apron</b>	4-5 Ton Stone, 3 layers	1-2 Ton Stone
<b>Toe</b>	Buried Toe (12.6 Ton Stone)	Partial Buried Toe (15 Ton Stone)
<b>Bottom of Toe</b>	Excavate 16.5 ft Below Grade (32,000 cy)	Excavate 2-3 ft. Below Grade (4,200 cy)
<b>Toe "Bench"</b>	None	10 ft. NAVD88, 12ft. Wide at Finish
<b>Constructability</b>	Difficult Construction. Major Toe Excavation.	Minor Toe Excavation. Bench Provides Access.
<b>Reuse Existing Materials</b>	Some Reuse of Existing Stone	Build Over Existing Revetment
<b>Revetment at - 1.57 ft. NAVD88 (e.g. MLLW)</b>	Moves Out 34 ft. From Current Revetment	Moves Out 38 ft. From Current Revetment
<b>Inter-Tidal Area Loss (MHHW to MLLW)</b>	28560 ft <sup>2</sup> (0.655 Acres)	31920 ft <sup>2</sup> (0.733 Acres)

## Value Engineering

Essentially, the HSLRR process entailed an analysis that was analogous to a Value Engineering Analysis of the FS Design. While both designs meet the intended purpose of providing adequate protection against a 73 year design storm, the refinements proposed under the HSLRR improve the constructability and sustainability of the revetment. The construction of a buried toe 65 feet seaward of the existing revetment would have been very difficult and expensive. The toe berm provides a suitable construction platform to simplify initial construction, and permits an access point for future maintenance projects. Most normal waves will break on the toe. Larger storm waves will break on the toe berm, or at the base of the armor stone above the toe berm. At this point above the toe berm (10 ft. to 21 ft. NAVD88), the revetment will consist of two layers of 15 ton armor stone, plus the existing revetment of 5-7 ton armor stone beneath it as a foundation. This will provide excellent protection against the intended design storm. The HSLRR refinements have the added benefit of reducing the rock quantity and the construction duration, resulting in lower overall construction costs.

## **Coastal Engineering Review**

As part of the HSLRR, a Coastal Engineering review was conducted for the Montauk Point project. Items included in the review were design storm return period, design water level, sea level change, shoreline erosion-water depth impact, design wave height, stone size, and overtopping rate. For the most part, the 2005 feasibility level design was found to be adequate with the most significant changes resulting from a more robust sea level change (SLC) analysis and from constructability/sustainability considerations. These factors resulted in a recommended larger stone size for the revetment and for a toe berm feature instead of a buried toe. The overall foot print of the revised structure fits within five feet of the original revetment design footprint and eliminates a large amount of excavation that would have been necessary for a buried toe.

## **Potential Project Construction Description**

Montauk Point is accessible by land via Route 27 Long Island. It is anticipated that stone required for the project would be trucked to the site for placement. Two areas would be available to stage the stone, at the north side of the revetment and at the south side of the revetment. The entire proposed revetment project would be built on top of the existing revetment to take advantage of the existing armor stone. Unsuitable stone in the existing revetment would be removed. The revetment will be 840 ft. long and tie into the ends of the existing revetment.

For the purpose of the HSLRR cost estimate, the following construction sequencing was assumed:

Construction would start with the toe berm at elevation 10 ft. NAVD88. The berm will be constructed with 15 ton armor stone. The berm will be approximately 24 ft. wide to accommodate a construction crane. The crane will be able to reach both the upper and lower limits of the revetment. All loose material will be removed from the proposed toe area. From the bench, two crews can work at the same time. Starting from the center of the revetment, the crews can work backwards filling and narrowing the bench. As the crews back up, they would bury the bench with two layers of 15 ton stone. A 12 ft. bench would remain and be available for future maintenance access. The toe berm elevation provides over 8 feet of freeboard between the construction (toe berm) platform and the MHHW tide level. This provides reasonable protection against waves during construction. For construction access, stone ramps would be built to transition between the new and old revetment. Furthermore, the ramps would act to support the ends of the new revetment and should remain in place following construction.

A top bench would be constructed at approximately elevation 21 ft. NAVD88 with a stone splash apron to 25 ft. NAVD88. The upper slope would be protected as needed to approximately 30 ft. elevation. This is an area where cuttings from the slope may be utilized.

Note: The selected contractor will have the option to alter the construction sequence provided above to meet their requirements and resources.

### **Revetment Maintenance**

Maintenance of the revetment post-construction will be the responsibility of the non-Federal sponsor. The possibility of one coastal storm closely following another requires that the revetment be maintained to the extent practical in a state of readiness. Measures to effect repairs found necessary by inspections will be undertaken in a timely manner by the non-Federal sponsor. The annual cost of maintenance is reflected in the total project economic cost. For the 2005 Feasibility study and this HSLRR economic analysis, the annual maintenance cost was estimated to be about 0.5% of the total direct first cost of construction.