



Town of Newbury Beach Management Plan

Plum Island Newbury, MA

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BEACH MANAGEMENT PLAN
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TOWN OF NEWBURY BEACH MANAGEMENT PLAN

I. PURPOSE OF THE PLAN

The Town Beach in Newbury, Massachusetts is located on Plum Island, stretching from the town line with Newburyport to the north and the Plum Island National Wildlife Refuge to the south (Figures 1 and 2). The Town Beach provides a number of recreational opportunities to the public, including swimming, fishing, and boating. The Town of Newbury section of Plum Island is a barrier beach and also contains areas of coastal dunes and salt marsh located behind the beach. These coastal resource areas are all located within a complex barrier beach system. Because the Town Beach is within a highly dynamic and sensitive ecosystem and there is such a great desire for public use, the Town of Newbury is tasked with finding and maintaining a balance between providing safe and enjoyable recreational opportunities to its visitors, while protecting the barrier beach system, which includes fragile coastal dunes, beach, rare species and wildlife habitat.

In Massachusetts, a barrier beach is a resource area provided protection under the Massachusetts Wetlands Protection Act (WPA), Massachusetts General Law (MGL) c. 131 s. 40 and its implementing regulations, 310 Code of Massachusetts Regulations (CMR) 10.00. By definition, a barrier beach consists of two additional protected resource areas, Coastal Dune and Coastal Beach. As such, all activities that occur on a barrier beach fall under jurisdiction of the WPA.

The purpose of the Newbury Beach Management Plan presented herein is to identify issues pertaining to existing resource areas and to establish guidelines for coastal resource protection through appropriate management practices, in order to establish a framework in which the Town of Newbury can conduct sustainable recreation planning, facility improvements and maintenance activities. The primary goal for developing a beach management plan is to allow for the public to pursue recreational opportunities and environmental education in a safe and enjoyable environment, while instituting protection of the existing dune and beach system and other important ecological features which are an integral part of these coastal resources located within the Town of Newbury.

II. ENVIRONMENTAL REGULATIONS

Numerous local, state and federal statutes and regulations exist to protect barrier beaches and regulate activities within these areas. The following is a listing of the most significant environmental statutes and regulations that apply to activities at Plum Island Beach in Newbury, presented in accordance with the regulatory agency that oversees them.

A. MA Wetlands Protection Act (WPA) (MGL c. 131. s. 40)

The WPA and its implementing regulations (310 CMR 10.00), are the most significant laws and regulations in terms of use and applicability for the protection of important natural resource areas found on barrier beaches and the activities which occur in these areas. Plum Island in Newbury consists of coastal wetland environments that are subject to the jurisdiction of the WPA and its implementing regulations. The Newbury Conservation Commission (NCC) is the regulatory body responsible for the implementation of the WPA in Newbury. Their jurisdiction encompasses any activity proposed or undertaken within a wetland resource area or within 100 feet of a wetland resource that will remove, fill, dredge or alter a resource area. The NCC consists of a seven member board appointed by the Town Board of Selectmen. The Newbury Conservation Agent serves as staff of the NCC and provides the day-to-day administration of the wetland regulations.

B. Additional Regulations

Other state and federal laws and regulations may also apply to proposed work within the barrier beach. In addition, several regulations exist that dictate what activities are allowed on Newbury Beach, and they are also listed below.

1. State

Department of Environmental Protection (MassDEP), Wetlands and Waterways Program

- Massachusetts Wetlands Protection Act (overview and appeal authority of Conservation Commission decisions); administered by and with an initial filing with the NCC.
- State Building Code (780 CMR, including Section 5323 and Appendix 120.G)

MA Division of Fisheries and Wildlife, Natural Heritage & Endangered Species Program

- Massachusetts Endangered Species Act (MGL c.131A) and regulations (321 CMR 10.00)

Executive Office of Energy and Environmental Affairs

- Massachusetts Environmental Policy Act (MEPA) (MGL c. 30 s.61-62H) and regulations (301 CMR 11.00)
- Coastal Zone Management Act (MGL c.21As.4A) and regulations (301 CMR 20.00)

2. Federal

U.S. Fish & Wildlife Service (USFWS)

- Federal Endangered Species Act (16 U.S.C. 1451, et. seq.)

U.S. Army Corps of Engineers (USACE)

- Clean Water Act, Section 404 (33 U.S.C. 1251, et. seq.)
- Rivers and Harbors Act of 1899 (33 U.S.C. 401, et. seq.)

Others

- Coastal Barrier Resources Act (16 U.S.C. 1451, et. seq.)
- National Flood Insurance Act (42 U.S.C. 4001, et. seq.)
- Americans with Disabilities Act (42 U.S.C. 12101, et. seq.)

III. PUBLIC USE, ACCESS AND SAFETY

Public use of Newbury Beach occurs throughout the entire beach area. The current activities associated with public use, access and safety are described in detail below.

A. Public Use

1. Public Facilities

Pursuant to wetlands protection regulations, as well as coastal zone regulations, which encourage public beach access in identifiable rights of way (ROW), public facilities will ensure proper use of the public beach environment and also will maintain the vital balance of protection of the primary dunes and dune grass from adversely being impacted by pedestrian access.

Currently, the only existing public facilities on Plum Island in Newbury include a public parking lot located at the intersection of Plum Island Boulevard and Northern Boulevard and several porta-potties, including two (2) handicap porta-potties and six (6) regular porta-potties. However, plans have been drafted and approved for the construction of public facilities which will include comfort stations as well as lifeguard headquarters and storage facilities in the center of the Plum Island beach in Newbury. Funding has been tentatively approved and is pending prior to commencing construction of this project. The facilities will be in compliance of federal, state and local regulations to ensure protection of coastal wetlands, and will undergo the full permitting process.

Any proposed construction projects on the barrier beach will need to comply with the requirements of the Massachusetts WPA and its implementing regulations. In addition, any new structure or rebuilding of existing structures in any Flood Hazard Areas (including A-Zones), Coastal High-Hazard Areas (including Velocity Zones (V-Zones),

and Coastal Dunes shall comply with the State Building Code (780 CMR, including Section 5323 and Appendix 120.G), which imposes special restrictions on the placement and construction of structures within these areas. These restrictions include that structures in Coastal High Hazard Areas be elevated on adequately anchored pilings or columns, so that the lowest portion of the structure is elevated at least 2 feet above the base flood elevation. The newly revised State Building Code (effective January 1, 2008) also regulates “Windborne Debris Protection” (780 CMR 5301). The WPA and State Building Code will help insure that buildings are constructed adequately above surrounding dune elevations to limit collateral storm damage by minimizing storm debris, allow dune migration, erosion of dunes during storms and other beneficial functions described above.

Routine maintenance conducted by the Town of Newbury include signage repairs, repairs to pavement in the parking lot, snow fence maintenance, line striping, trash removal, removal/replacement of porta-potties, sweeping/cleaning of wind-blown sand etc.

2. Public Recreation

Public recreation on a barrier beach includes a variety of activities, including swimming, beach walking, wildlife observation and bird watching, kite flying, hunting and fishing. If left unmanaged, large numbers of pedestrians can significantly impact barrier beach resources. Destruction of dune vegetation can lead to blow-outs and destruction of dunes, and impact wildlife habitat. Wetlands can become compacted, and upper wrack line of the beach can be affected by the destruction of sand-binding plants there. Wildlife can be disturbed by human presence or adversely affected by visitor-generated garbage. Kites may be seen by nesting birds as potential predators, causing them to abandon nests temporarily and put vulnerable young birds at risk. Wildlife and birds can become entangled in discarded kite string, and be seriously injured or die as a result. Vegetation as well as dune form and function can be adversely affected by all of the pedestrian recreation activities noted above.

In general, beach areas should be appropriately designated for swimming, surfing, or boating, as appropriate. This should be implemented through communication with the Newbury and Newburyport Police Departments and lifeguard associations. Buoys and signage should designate and mark areas of special conditions as appropriate. Fencing and signage should be installed for onshore areas where human activities affect wildlife or fragile resource areas (dunes, beach grass, salt marsh, etc).

Other, more specific recreational activities are discussed in the following sections.

a. Hunting and Fishing

Hunting, while acceptable on some portions of the barrier beach under existing regulations established by the Mass. Division of Fishing and Wildlife, would nevertheless pose a major safety problem on a populated beach such as the Newbury Town Beach on Plum Island. Fishing on a populated beach could also pose a safety problem if not separated from recreational swimming areas during hours of active beach use.

In accordance with Newbury Town Code (number 45 - 4), sporting activities or games including fishing and surfing should be engaged in only in areas designated by the lifeguards. Ball-throwing is also restricted on the public beach except in areas designated by the lifeguards, between May 15 and Sept. 15 (Newbury Town Code number 45 - 7). Hunting is prohibited on the town beach.

b. Camping and Fires

Camping or making fires on the beach can cause degradation of the beach environment. Tenting and fires may impact vegetation or landform. They can destroy vegetated cover as well as alter dune form and function; they can impact rare species and their habitat, and can disturb activities of migratory shorebirds. Fires can impact dune fencing and signage through using them as combustion material. Fires can also create a public safety threat and debris problem through improper or careless disposal.

The Town of Newbury prohibits any person from camping, tenting, or sleeping on any part of the public beach between the hours of 11pm and 6am of each day (Town of Newbury Code number 45-5), and prohibits the starting or maintaining of an open fire on any part of the public beach (Town Code number 45-8).

c. Fireworks

Landing of fireworks on the barrier beach can result in quick-moving fires, which can destroy vegetation holding dunes in place. Fireworks can also cause serious disturbance to rare species and wildlife habitat. Launching and large-scale viewing of fireworks should be prohibited on coastal dunes and salt marshes, and especially near wildlife habitat, particularly that of nesting rare species.

Fireworks are prohibited by Massachusetts law except for large public displays permitted and regulated by municipal authorities.

d. Horseback Riding/ Off-road Vehicles

The use of vehicles and horseback riding on barrier beaches may destroy beach vegetation and destabilize the dunes. Coastal beaches may be affected by the churning of tires; tidal flats may be compacted. Use of vehicles and horseback riding can contribute to erosion of dune form and function. They can also degrade habitat of rare species.

Horseback riding is prohibited in the beach area for public safety reasons as well as potential damage to the fragile dune environment. The Town of Newbury Code number 45 - 2 states that no person shall operate or use any motor vehicle or motorized bicycle, except for authorized emergency vehicles, on any part of the public beach.

e. Pets

Pedestrians engage in a wide variety of activities on a barrier beach, including walking with pets on the beach. However, large, concentrated volumes of pedestrians with pets can have impacts on dune vegetation, wetlands, upper wrack line, wildlife and public health issues. Garbage and animal waste can have an adverse effect on beaches, water quality and tidal flats. Uncontrolled pets can harass wildlife and may cause a disturbance to other beach goers.

The Town of Newbury does not have a leash law; however, dog owners should be reminded to keep their pets under control and not allow them to roam the dunes on public and private property uncontrolled and be restrained from harassing wildlife and disturbing other beach goers.

Dogs should be prohibited in known areas of piping plovers during nesting and fledging season, as determined by the Parker River National Wildlife Refuge.

f. Watercraft

Barrier beach resources impacted by watercraft include: beaches, salt marsh, land containing shellfish, and land under the ocean. Coastal dunes may be impacted by pedestrians associated with vessel use. Vessel access at barrier beaches may conflict with recreational swimming. It may also conflict with rare species and wildlife habitat protection, especially at remote ends of barrier spits. Changes in bottom topography, alteration of substrate vegetation, and increased sedimentation due to prop-wash and hull impacts may occur. Increased access on barrier beaches or barrier spits can create a large human disturbance factor to areas which are otherwise inaccessible to most people but commonly used as nesting, feeding, resting and migration habitat for rare species and other wildlife.

The impacts of watercraft can also directly or indirectly impact the beach. Impacts are not likely to occur from minimal or occasional use of watercraft, but a continuous level of

impact that needs to be evaluated and subsequently regulated. Often it is the impact of humans associated with watercraft activities that can have the largest negative effect on the barrier beach environment.

In order to properly manage vessel access to barrier beach and islands, beach managers are encouraged to work closely with municipal harbormasters, the Massachusetts Harbormasters Association, the boating public, yacht clubs, the U.S. Coast Guard Auxiliary and the U.S. Power Squadron.

All management steps should be implemented to be consistent with Newbury Harbormaster. Watercraft use should be balanced with other uses through designation of special use areas. To accommodate migratory patterns of shorebirds, such as terns and plovers, temporary restrictions on the launching and beaching of small craft should be implemented.

B. Public Access

1. General

Public beach access should, and needs to, be provided. However, both foot and vehicle traffic can result in degradation of the barrier dune and damage to the beach vegetation. Access ways need to be provided which will not only assure safe access to pedestrians and authorized vehicles, but also reduce or minimize impacts to the beaches and dunes. In Newbury, public ROWs exist to provide access through the dunes to the beach. The number, location and condition of access were evaluated for the entire Plum Island area as part of the *Plum Island Public Access Plan*, which was prepared by Vine Associates, Inc. in 2006 for the Department of Conservation and Recreation (DCR). The purpose of this study was to identify all locations of access to the public beach and Merrimack River frontage and to determine which of ROWs could most easily be improved to sustain public access throughout Plum Island in Newbury and Newburyport.

Though many of the access ways described by the DCR document are outside of the physical limits of the Newbury Beach Management Plan, the goals and objectives for minimizing impact to beach resources and providing improved public access to the water are consistent with the Newbury Beach Management Plan, and this document is presented as Appendix K herein. The *Plum Island Public Access Plan* included objectives for providing a Town Building at the Town Center parking lot to provide public restrooms, life guard facilities, and a handicap access viewing area. The location of this building is now being considered at a private owned adjacent lot to the west that would be obtained by Town land acquisition. The design, permitting and funding advancement of the building remains an ongoing goal for Plum Island that is presently being advanced by the Town and the Plum Island Tax Payers Association (PITA).

Many of the existing public ROWs to the beach are unmarked and have not been maintained. Consequently, many of these points of access have been encroached upon by abutters. One of the specified goals of the public access plan is to re-activate, in priority order, important public ROWs and to abandon paths that extend from the street that are not on rights-of-way, to allow these areas to return to their natural state with sand, dunes and vegetation.

The Appendix K *Plum Island Public Access Plan* provides a three level priority system identification for each access way. Priority 1 ROWs are those locations where public access already exists, where minor to no existing physical obstructions exist or where the rights of way will replace existing public access points that are currently not located on actual rights of way. Priority 2 ROWs are desirable access locations that contain obstructions which are not readily removable, provide access to less desirable beach and basin locations, and/or require greater effort to construct or maintain (based on potential usage) as compared to Priority 1 locations. Priority 3 ROWs are locations that include obstructed locations and/or are unlikely to be utilized by the public as they lead to undesirable locations such as eelgrass beds, slat marsh or mudflats. According to 2006 Public Access Plan, a total of twenty-four (24) ROWs have been identified within the Town, which provide public access to the beach. These ROWs are shown in Figure 3, and described in Table 1 within Appendix K.

2. Pedestrian Access

A total of 24 pedestrian access ways to the beach have been identified in the Town of Newbury. All of these access ways are sand paths to the beach. The Town proposes improvements to twenty-one (21) 4-foot wide pedestrian access ways. The improvements include: signage at each end of the access ways to direct the public to them, and surface treatments and signage to protect the resource areas that are subjected to foot-traffic. The surface treatments proposed include the use of either wooden or plastic (mobi-mats or similar products) and snow fencing which can be moved from one location to another depending upon the shoreline dynamics along the beach. Mobi-mats consist of a lightweight, flexible, polyester mat will allow pedestrian access from the local streets to the beach without adversely impacting dune grass. Though highly effective, these mats are considerably more costly than the heavier, less effective wooden snow fence type mat surface. The selection of the location, timing and surface material type will need to be evaluated by the Town.

All proposed surface treatments will be used mainly at the beach end of the access ways, to prevent further erosion at the face of the dunes. Signage and snow fencing will be used and moved as necessary to keep pedestrian traffic within pathway limits to the beach and away from primary dune areas.

At the Town Center beach, pedestrian beach access will be relocated to a 10-foot wide area on the southern end of the parking lot that will be surfaced with a 9-foot wide mobimat that will provide both pedestrian and emergency vehicular access to the beach. The extensive erosion at the Town Center has resulted in a modification from the Appendix K access location, as well as consideration of moving the location of the proposed Town Building to a lot to the west from the parking lot.

Though the construction of an elevated boardwalk is not currently envisioned within the Newbury Beach Management Plan, the following general guidance items should be associated with any such future structure considered:

- a. Boardwalks should be elevated at least two feet above the dune with only posts or pilings in contact with the dune. This space will allow for beach grass growth and easy movement of sand and water.
- b. It should also allow for native vegetation, especially beach grass, to grow up to and under the boardwalk
- c. Planking should be spaced appropriately (about 1 inch apart).
- d. Where possible, the boardwalks should be ramped to allow for handicap access.
- e. The ocean side of the boardwalk should be constructed in abutting breakaway segments to limit storm damage to the ocean side part of the boardwalk.
- f. Where possible the boardwalk construction should follow a zigzag pattern to avoid the development of wind and wave tunnels through the dune.
- g. Construction techniques should allow for the height of the boardwalk to be increased with time as the surrounding dune grows in elevation.

The mat system employed should be placed in designated locations, especially where emergency and public safety vehicles must pass to minimize degradation. These mats should be inspected periodically and raised at the appropriate times to allow for the accretion of sand and the growth of vegetation. The mats should be removed and stored during the winter months and replaced each spring.

3. Vehicular Access

Vehicular access to the beach is allowed throughout the beach by authorized vehicle only. Vehicles authorized to use existing access ways include those used for emergency response, patrols and beach maintenance. At present, emergency vehicles access the beach in Newbury at three (3) locations via: the 10-foot wide sand paths at the Newbury Center Parking lot, 23rd Street and Dartmouth Way (see Figure 3). These access routes are desired to be improved with seasonal plastic surface treatments.

Emergency and routine patrol vehicles which presently access the beach include a 4-wheeler ATV and a small-tracked gator. Beach maintenance vehicles include a tractor and rake, a backhoe, front-end loader, and a tracked excavator.

4. Maintenance of Public Access Ways

Public access way maintenance should be performed by the Town of Newbury DPW. Access signs are posted at each end of every access way and are replaced as necessary. The Town maintains snow fencing to discourage public traversing the dunes on an as needed basis.

C. Public Safety

A great degree of public safety can be maintained through the use of special designated areas. In accordance with Newbury Town Code (number 45 - 4), sporting activities or games including fishing and surfing should be engaged in only in areas designated by the lifeguards. Ball-throwing is also restricted on the public beach except in areas designated by the lifeguards, between May 15 and Sept. 15 (Newbury Town Code number 45 - 7). Hunting is prohibited on the town beach.

1. Lifeguards

The Town typically employs between eight (8) to ten (10) lifeguards, including one (1) senior lifeguard at Newbury Beach during the summer season.

2. Emergency Response

The number of emergency responses at Newbury Beach is driven by surf conditions and rip tides. The emergency response vehicle is a four-wheeler ATV and tracked gator.

3. Beach Patrols

The beach is patrolled by the Newbury Police Department, using four-wheeler ATVs and a tracked gator.

D. Public Use, Access Ways and Safety Recommendations

The management recommendations presented below are for the entire Town Beach area, unless otherwise specifically noted.

- Continue current maintenance practices for existing roads, parking lots, and buildings located at the beach which include patching/resurfacing of pavement,

- line striping, sand sweeping.
- Provide periodic assessing of the conditions of the ROWs.
 - Review and implement the improvements outlined in the 2006 Plum Island Public Access Plan.
 - Identify and clearly mark each ROW with appropriate signage.
 - Continue the ban on hunting on the beach.
 - Continue the ban on horseback riding on the beach.
 - Continue the ban on the use of any motor vehicle or motorized bicycle on the beach, with the exception of authorized emergency vehicles.
 - Erect signage and notify the public of the requirement to pick up and carry out animal waste generated by their pets and the ban against dogs on the Beach from May 15 to September 15, clearly stating the penalties for failure to comply.
 - Enforce the Town of Newbury Ordinance number §109-1, which requires dog owners to pick up and carryout animal waste, and Town ordinance number §109-2, which prohibits dogs on the Beach at specific times. Fines should be levied and collected from offenders.
 - Provide plastic bags at beach access points for owners to collect and transport animal waste.
 - Construction activities associated with major Town facilities improvements will be covered by a separate NOI to be filed with the Conservation Commission and MassDEP.
 - Implement all watercraft management steps in cooperation with the Newbury Harbormaster.
 - Designate special use areas for swimming, surfing and watercraft. This should be implemented through communication with the Newbury and Newburyport Police Departments and lifeguard associations.
 - Implement temporary restrictions on the launching and beaching of small craft, to accommodate migratory patterns of shorebirds such as terns and plovers.
 - Monitor and manage, if necessary, the impact of human activities to minimize the impact to the dunes, and beaches.
 - Designate and mark areas of special conditions with buoys and signage, as appropriate.
 - Install snow/symbolic fencing and signage for onshore areas where human activities affect wildlife or fragile resource areas (dunes, beach grass, etc).

IV. RESOURCE AREA MANAGEMENT AND PROTECTION

A. General Description

As discussed previously, resource areas that exist at Plum Island Beach in Newbury, as defined under the WPA and its implementing regulations (310 CMR 10.00), include

Barrier Beach, Coastal Beach, Coastal Dune, Salt Marsh, and Land Subject to Coastal Storm Flowage. The Town's management of the beach strives to balance protection of the island's sensitive natural resources with the need to provide safe and enjoyable public recreational opportunities. This section identifies and describes the resource areas at Newbury Beach that are under the jurisdiction of the WPA and the most significant resource protection issues. This includes a description of the existing conditions of the Newbury beach-dune system, as well as stabilization and protection measures which are utilized within resource areas. These issues will also be an integral component of the Town's environmental education and outreach programs. Much of this information presented herein is also provided in the report "*Guidelines for Barrier Beach Management in Massachusetts* (MA Barrier Beach Task Force (MBBTF) 1994).

Severe erosion has taken place along many parts of the Plum Island coastal beach and dunes. Over the past several years, erosion has accelerated at the Town Center whereby about 6 homes to the north of the groin faced undermining. One home at 5th Street had to be removed due to severe undermining that damaged the foundation. The Town of Newbury through grant monies from DCR implemented an emergency dune stabilization program utilizing large (up to 3 feet by 4 feet by 27 foot long) biodegradable sand bags to stabilize the eroded area located approximately 500 feet north of the stone groin. This work is illustrated by Appendix L herein. Additional sand nourishment, plantings, and snow fencing have been installed in the early spring of 2009 to further stabilize these conditions.

B. Barrier Beach (310 CMR 10.29)

1. Definition

Barrier Beach *means a narrow low-lying strip of land generally consisting of coastal beaches and coastal dunes extending roughly parallel to the trend of the coast. It is separated from the mainland by a narrow body of fresh, brackish or saline water or a marsh system. A barrier beach may be joined to the mainland at one or both ends.* (310 CMR 10.29(2))

Plum Island is a barrier beach. This site has been assigned the unit code "Sb-1" as part of the Massachusetts Barrier Beach Inventory Project (MBBTF, 1994).

2. Functions

Barrier beaches, including all of their coastal dunes, are significant to the public interests of storm damage prevention, flood control, and protection of marine fisheries, wildlife habitat, and, where there are shellfish, land containing shellfish. "Significant" means that they play a role in protecting these public interests of the WPA.

3. Critical Characteristics

Since barrier beaches are composed of coastal beach and coastal dunes, the characteristics of a barrier beach that are critical to the protection of the public interests listed above are described below under the coastal beach and coastal dune subsections.

4. Performance Standards

When a barrier beach is significant to storm damage prevention, flood control, marine fisheries, or the protection of wildlife habitat, the following performance standards apply:

- All performance standards for coastal beach and coastal dunes.
- No project may be permitted which will have an adverse effect on state-listed rare vertebrate or invertebrate species (see subsection entitled Rare Species Habitat Protection later in this chapter for more information).

C. Coastal Beach (310 CMR 10.27)

1. Definition

Coastal Beach means unconsolidated sediment subject to wave, tidal and coastal storm action which forms the gently sloping shore of a body of salt water and includes tidal flats. Coastal beaches extend from the mean low water line landward to the dune line, coastal bankline or the seaward edge of existing manmade structures, when these structures replace one of the above lines, whichever is closest to the ocean. (310 CMR 10.27(2))

Tidal flats are the nearly level part of a coastal beach, usually extending from the low water line landward to the more steeply sloping portion of the coastal beach. On the bayshore they may end at the salt marsh line.

The coastal beach resource area at Plum Island in Newbury is located along the Atlantic Ocean.

2. Functions

Coastal beaches, including their tidal flats, are significant to the public interests of storm damage prevention, flood control, and the protection of wildlife habitat. Where tidal flats are present, they are presumed significant to the protection of marine fisheries and, where there are shellfish, to land containing shellfish.

3. Critical Characteristics

The characteristics of a coastal beach that are critical to storm damage prevention and flood control are: the ability of the coastal beach to respond to wave action and the volume and form of the beach.

The characteristics critical to the protection of marine fisheries or wildlife habitat are: distribution of sediment grain size; water circulation; water quality; and relief and elevation.

4. Performance Standards

When a coastal beach is significant to storm damage prevention, flood control, marine fisheries or the protection of wildlife habitat, the following performance standards apply:

- Any project on a coastal beach (with a few exceptions described in the Wetlands Protection regulations) must not have an adverse effect by increasing erosion, decreasing the volume, or changing the form of any coastal beach or an adjacent or downdrift coastal beach.
- Any groin, jetty, solid pier, or other solid fill structure which will interfere with littoral drift, in addition to complying with the above must also be constructed as follows: It must be the minimum length and height demonstrated to be necessary to maintain beach form and volume; Jetties trapping littoral drift sediment must contain a by-pass system to transfer sediments to the downdrift side of the inlet, or when the inlet is re-dredged, the sediment should be used for beach nourishment to ensure that downdrift or adjacent beaches are not starved of sediments; and Beach nourishment with clean sediment of compatible grain size may be permitted.

When a tidal flat is significant to marine fisheries or the protection of wildlife habitat, the following performance standards apply:

- Water-dependent projects must be designed and constructed using the best available measures to minimize adverse effects.
- Non-water-dependent projects must have no adverse effect on marine fisheries or wildlife habitat caused by: alterations in water circulation; alterations in the distribution of sediment grain size; and changes in water quality, including, but not limited to, other than natural fluctuations in the levels of dissolved oxygen, temperature, or turbidity, or the addition of pollutants.
- No project may be permitted which will have an adverse effect on specified habitat sites of state-listed rare vertebrate or invertebrate species.

5. Existing Conditions of Coastal Beach

The beach extends approximately 7,200 linear feet from the southern Federal Reservation – Newbury town line, to the northern Newbury – Newburyport property line. The width of the beach from mean low water to the toe of the dune is generally in the order of 75 to 300 feet. Severe erosion has taken place along many parts of the Plum Island Coastal Beach. The rate of erosion varies along the beach with the major erosion in 2008/2009 at the Town Center area, which has been stabilized with large sand bags. As well, other areas along the beach have suffered erosion whereby the overall level of the beach has been in a lowered direction.

6. Coastal Beach Management and Protection

The Town conducts routine beach operation and management practices, which include:

- Debris and Trash Removal
- Beach cleaning

Equipment used by the Town for various beach maintenance activities are summarized in the table below.

Table 1: Existing Beach Equipment and Typical Uses

Vehicle Type	Typical Uses
Small tracked Gator	Patrol
Four-Wheeler ATV	Patrol
Tractor with rake	Beach cleaning
Front-end Loader	Debris removal
Backhoe	Debris removal
Tracked Excavator	Debris removal

Maintenance by the Town DPW is performed along the entire length of the beach generally at least in the spring. Off-season maintenance occurs on an as-needed basis, particularly after coastal storms. There is no regular beach grooming performed, once the beach season begins.

a. Debris and Trash Removal

According to many sources, over 7 billion tons of waste impact the oceans of the world annually. It is, therefore, not surprising to note that Plum Island Beach is one of those sites that can be seriously impacted by this problem. While this barrier beach is not normally subjected to many of the municipal and commercial abuses, litter can be a major issue. The discarding of litter, in particular cigarette butts, beverage containers, pet wastes, plastics, and other detritus by human visitors can cause significant harm to our

beach and its inhabitants, both human and otherwise. A brief item description would include cigarettes and filters (most common), food wrappers and containers, balloons, glass bottles, cups, plates, forks, knives, spoons, caps, lids, aluminum cans, plastic bottles, straws, clothing, discarded food, bags, and many other items cast aside by those who visit and use Plum Island Beach. There is also a fair amount of debris and litter that washes in from “off-shore” sources. Thankfully, the state of Massachusetts has less beverage container litter than many other coastal states because of the deposit laws.

The Town of Newbury empties the trash barrels at Plum Island Center weekly during periods of heavy use, and as necessary during less busy intervals. Larger debris is removed by vehicle and disposed of offsite, depending on the material. Potential disposal locations include the Town’s Highway Barn and the landfill.

Residual litter, even after the most successful of preventative programs is a fact of life. Co-operative action in partnership with local conservation groups is still necessary to keep our beaches clean. Such organizations as Surfriders, Adopt-A-Beach, Massachusetts Coastal Zone Management and many others are useful not only as information sources, but also conduct organized annual beach clean-up events

There are many opportunities to minimize littering, and to mitigate the impact of littering as well as clean up after the fact. Much of this can be accomplished through public outreach and education and will be discussed in further detail in Section VII. Public Outreach and Education.

b. Beach Cleaning

The Newbury Public Works Department provides regular beach cleaning between Memorial Day and Labor Day consisting mainly of the removal of debris. There is a regular seasonal cleaning of the beach in the spring using a tractor and rake. The wrack is removed at that time, and as appropriate for the material gathered, it is placed at the toe of the dune (landward of snow fencing), to help with stabilization. This process is recognized to be important for the shorebirds. Other cleaning is provided after storms and on an as-needed basis.

c. Beach Maintenance

A variety of measures have been used over the years to slow erosion of beaches, and trap and accrete sand to build up beaches and dunes. Snow (or sand) fences are placed along fore-dunes or beach berms to trap and accrete sand. Beach grass or other vegetation is planted to trap sand as well.

The Town working with the PITA group has conducted routine beach maintenance through the placement of snow fence and planting of beach grass, through volunteers or

through the DPW. Most of the Town placed snow fencing is located in the vicinity of the Center, where it is regularly inspected and replaced as needed. Since wire from damaged snow fencing can pose a threat to individuals, coastal wildlife, including birds, fish, marine mammals, and others, it should be removed when damaged and replaced on a regular basis.

d. Beach Nourishment

"Nourishment" refers to the placement of sand on a beach or barrier beach to increase its volume. The feasibility of nourishment should be evaluated in combination with modification to any existing erosion control structures. Beach nourishment using dredged and other off-site materials is a preferred alternative to hard structures and a positive step for storm damage prevention on barrier beaches.

Nourishment sand may be obtained from several different sources and by different methods. Sand can be by offsite borrow, surplus sand from construction projects performed along the beach, sand swept from the parking lot and roads, or dredged sand from navigation channels or other acceptable dredged sand material. Typically, beach nourishment must be performed periodically if the source of natural sand no longer exists for a given beach area. Beach erosion rates should be determined, the sources of sand and the mechanisms of beach nourishment must be investigated, and the frequency and volume of sand necessary to maintain the beach must be identified. Storm frequency and magnitude can greatly affect how much and how often beach nourishment may be required.

Any sand that is used for beach nourishment should be similar in size to that of the natural beach. Sometimes sand of a larger size is necessary for nourishment if all natural sources of sand have been depleted. Appendix I provides a grain size curve for sand compatible with existing Plum Island sands.

The U.S. Army Corps of Engineers (USACE), DCR, the City of Newburyport and the Towns of Newbury and Salisbury are currently investigating the use of sediments from the upcoming Merrimack River Entrance Channel maintenance dredging for beach/dune nourishment. It is estimated that there are 160,000 cubic yards of dredged material that can be used for beach nourishment. Pending funding and the permitting of this work, the nourishment is scheduled for the Fall of 2009. The Merrimack River Beach Alliance was established for local municipalities, Federal and State Agencies, and State and Federal Representatives to communicate and help coordinate this major undertaking.

The Town's primary focus for future routine nourishment efforts will be concentrated on critical dune areas and those at the beach-dune interface. Details pertaining to the SSA are described below under Section D. Coastal Dunes, Dune Nourishment. (see Subsection V.I.6.c below).

D. Coastal Dunes (310 CMR 10.28)

1. Definition

Coastal Dune *means any natural hill, mound or ridge of sediment landward of a coastal beach deposited by wind action or storm overwash. Coastal dune also means sediment deposited by artificial means and serving the purpose of storm damage prevention and flood control.* (310 CMR 10.28 (2))

The coastal dune resource area at Plum Island is present along the entire length of the barrier beach.

2. Functions

Coastal dunes are significant to the public interests of storm damage prevention, flood control, and the protection of wildlife habitat. On barrier beaches, all coastal dunes are deemed significant to these public interests.

3. Critical Characteristics

The characteristics of coastal dunes that are critical to the protection of storm damage prevention, flood control, and wildlife habitat are: ability of the dunes to erode in response to the beach conditions; volume and form of the dunes; vegetative cover; ability of the dune to move landward or laterally; ability of the dune to continue serving as bird nesting habitat.

4. Performance Standards

When a coastal dune is significant to storm damage prevention, flood control, marine fisheries, or the protection of wildlife habitat, the following performance standards apply:

- Any alteration of, or structure on, a coastal dune or within 100 feet of a coastal dune shall not have an adverse effect on the coastal dune by: affecting the ability of waves to remove sand from the dune; disturbing the vegetative cover so as to destabilize the dune; causing any modification of the dune form that would increase the potential for storm or flood damage; interfering with the landward or lateral movement of the dune; causing removal of sand from the dune artificially; or interfering with mapped or otherwise identified bird nesting habitat.
- When a building already exists upon a coastal dune, a project accessory to the existing building may be permitted, provided that such work, using the best commercially available measures, minimizes the adverse effect on the coastal dune caused by the impacts listed above.

- The following projects may be permitted provided that they have no adverse effect on the coastal dune caused by the impacts listed above: pedestrian walkways, designed to minimize the disturbance to the vegetative cover and traditional bird nesting habitat; fencing and other devices designed to increase dune development, and to direct vehicular and pedestrian traffic; and plantings compatible with the natural vegetative cover.
- No project may be permitted which will have any adverse effect on the habitat of state-listed rare vertebrate or invertebrate species (see section later in this report entitled Rare Species and Wildlife Management for more information).

5. Existing Conditions of Coastal Dune

Severe erosion has taken place along many parts of the Coastal Dune. The rate of dunal erosion varies along the length of Plum Island, with many areas experiencing 50 to 100 feet of dune retreat over the last 5 to 10 years. Over the past several years, erosion has accelerated at the Town Center whereby about 6 homes to the north of the groin faced ocean undermining. In November of 2008, a house on 5th Street had to be removed due to severe undermining that damaged the foundation and building structure. The Town of Newbury through grant monies from DCR implemented an emergency dune stabilization program utilizing large (up to 3 feet by 4 feet by 27 foot long) biodegradable sand bags to stabilize the eroded area located approximately 500 feet north of the stone groin. This work was implemented in an accelerated manner. Appendix L illustrates the sand bag (or envelop) construction process. Additional sand nourishment, plantings, and snow fencing have been installed in the early spring of 2009 to further stabilize these conditions.

Many areas to the north of the Town Center currently have steep dune faces that are not vegetated due to recent storm conditions. These areas require nourishment and planting for stabilization.

6. Coastal Dune Management and Protection

Many of the Town's natural resource management and protection measures at the beach focus on the dune area. Dunes are **the** key natural component in a barrier beach system, since these sandy formations are the major element of the barrier, which in most cases prevent damage to natural or developed areas behind the dunes. Dune vegetation traps windblown sand, stabilizing the dunes and preventing the sand and other debris from covering developed portions of the property.

The primary functions of a barrier beach are storm damage protection, flood control and protection of wildlife habitat. Managing a barrier beach in order to preserve these important natural functions becomes increasingly necessary as development along the

coast continues to increase and relative sea level continues to rise. The Plum Island Beach has experienced significant erosion which affects the ability of the beach to provide storm damage protection, flood control and protection of wildlife habitat. Beach management actions should give priority to storm damage prevention, flood control, and wildlife habitat preservation

a. Control of Pedestrian Access

Pedestrian access should be focused at the public access ways in order to keep pedestrian traffic off the fragile dune system. The Town of Newbury identified all public pedestrian access ways as part of the 2006 *Plum Island Public Access Plan* and will make improvements for beach access through the existing ROWs.

b. Dune Maintenance

A variety of measures have been used over the years to stabilize dunes, slow erosion of dunes and beaches, and trap and accrete sand to build up beaches and dunes.

Snow (or sand) fences are appropriate means of building dunes for storm damage protection and flood control or maintaining a barrier beach system to manage blowing sand in and around built facilities and structures. Snow fences are placed by individuals, the PITA group, and the Town along fore-dunes or beach berms to trap and accrete sand. While snow fence installation allows sand to collect and help rebuild the dune, the dune can only be stabilized through the planting of vegetation. Dunes will not stay in place without vegetation and their roots to hold them. Beach grass or other vegetation is, therefore, planted in conjunction with fence use to trap sand and stabilize the dunes, pending conditions and available funding.

Snow fencing should be wood fencing with wood fence posts. Sets of snow fence with posts at 10 to 15 foot intervals should be installed parallel to the beach and dune face and supplemented with additional installations to quickly build a dune.

Beach grass and other vegetative plantings should be made in designated areas for storm damage restoration and erosion control, especially in overwash areas in front of sections of developed barrier beach. Plantings should be American Beach Grass (*Ammophila breviligulata*) planted in culms of two stems to a depth of 8 inches, generally spaced 12 to 18 inches apart. Planting may be fertilized with slow-release fertilizer. These plantings should be made in conjunction with snow fence installation.

In planning such restoration activities, care must be taken not to destroy rare species habitat by improperly planting in overwash fans and low relief fore-dune areas that may be utilized by species, such as piping plovers.

Whenever and wherever possible, the natural processes of beach and dune accretion and erosion should be allowed to occur. Beach and dune stabilization projects should not be

undertaken that will alter and degrade wildlife habitat, particularly for rare species such as terns and plovers.

Signs, in addition to snow fencing and vegetation plantings should be placed at dune restoration sites to control pedestrian and vehicle traffic. Residents of Plum Island should be encouraged to engage in dune restoration activities through activities designed to increase awareness of the fragile nature of the barrier beach and by enforcement of the Wetland Regulations.

c. Dune Nourishment

Dune nourishment can occur with the addition of outside material to the dunes. Several techniques for dune nourishment will be implemented by the Town of Newbury. These techniques are described below.

i. Stockpiling Sand for Nourishment

Stockpiled material will be used to fill voids within the beach dune system, on an emergency basis, or for non-emergency in the spring/summer season for the preparation of the dune prior to planting and fencing. Nourishment sands will be placed within the sand stockpile areas (SSA) at the Ulga Way lot (currently being used for this purpose), the Town Center parking lot or other approved Town owned properties to have in reserve for immediate placement for stabilizing eroded areas along the beach. Nourishment sand can be obtained from offsite borrow, surplus sand from construction projects performed along the beach, sand swept for the parking lot and roadways, and from dredging projects. Sands for nourishment shall not be intentionally excavated from surrounding beaches for the purposes of filling the SSA. Stockpiled sand for nourishment should have gradation in accordance with the following:

Table 2 – Sand Gradation Requirements for Plum Island

Sieve U.S. Standard	Percent Passing by Weight	
	Minimum	Maximum
½”	100	
No. 4	95	100
No. 10	75	98
No. 20	35	85
No. 40	5	57
No. 60	0	30
No. 100	0	10
No. 200	0	10

Prior to stockpiling any material within the SSA, grain size analyses should be performed on a representative sample of the material and submitted to the Town for approval. Sand for nourishment should be clean, granular, free from roots or other organic material, trash and frozen material and shall be capable of meeting the size requirements hereinafter specified. Sand material should also match the color of existing sediments as closely as possible, as approved by the Town. If necessary, all stockpiled sand should be sifted to meet sand quality requirements for beach nourishment as needed. Inspection of the quality of the sand deposited should be made on an on-going basis in accordance with an appropriate permit.

Equipment to be used for placing the beach nourishment sands will be in good condition with no leaks or spilling that could occur while the equipment is on the beach. Equipment anticipated for this activity include a, front-end loader, backhoe, and tracked excavator, tracked trucks and trucks with reduced pressure in the tires.

ii. Use of Clean Dredge Material

Another source of dune nourishment material can be from local area clean sand dredging projects. The Town is also currently investigating the possibility of using dredged sand material from the USACE Merrimack River Entrance Channel project for dune nourishment. Dredged material used for nourishment shall be “beach-quality” sand, which would also be compatible with dune nourishment as described in Section IV.C.6.1 above.

E. Salt Marsh (310 CMR 10.32)

1. Definition

*Salt Marsh means a coastal wetland that extends landward up to the highest high tide line, that is the highest spring tide of the year, and is characterized by plants that are well adapted to, or prefer living in, saline soils. Dominant plants within salt marshes are salt meadow cord grass (*Spartina patens*) and/or salt marsh cord grass (*Spartina alterniflora*). A salt marsh may contain tidal creeks, ditches and pools. (310 Code of Mass. Regulations 10.32 (2))*

The salt marsh resource areas at Plum Island are present along the back side of the barrier beach system, and not included within the Beach Management limits, however for general informational purposes, is presented herein.

2. Functions

Salt marshes are significant to the public interests of protection of marine fisheries, wildlife habitat, and, where there are shellfish, to the protection of land containing

shellfish, to the prevention of pollution, to storm damage prevention, and to groundwater supply.

3. Critical Characteristics

The characteristics of salt marshes that are critical to the protection of the public interests listed above are: growth, composition, and distribution of salt marsh vegetation; flow and level of tidal and fresh water; and presence and depth of peat.

4. Performance Standards

When a salt marsh is significant to the protection of marine fisheries, to the prevention of pollution, to storm damage prevention, or to ground water supply, the following performance standards apply:

- A proposed project in a salt marsh, on land within 100 feet of a salt marsh, or in a body of water adjacent to a salt marsh must not destroy any portion of the salt marsh and must not have an adverse effect on the productivity of the salt marsh. Alterations in growth, distribution, and composition of salt marsh vegetation must be considered in evaluating adverse effects on productivity. The harvesting of salt marsh hay is not prohibited.
- A small project within a salt marsh, such as an elevated walkway or other structure, which has no adverse effects other than blocking sunlight from the underlying vegetation for a portion of each day, may be permitted if the project complies with all other applicable requirements of these regulations.
- A project, which will restore or rehabilitate a salt marsh or create a salt marsh may be permitted.
- No project may be permitted which will have an adverse effect on state-listed rare vertebrate or invertebrate species (see subsection entitled Rare Species and Wildlife Management)

5. Existing Conditions of Salt Marsh

The salt marsh at Plum Island is extensive, with many tidal creeks running throughout the area.

6. Salt Marsh Management and Protection

Since “Salt Marsh” is technically not within the Barrier Beach, it is not extensively covered within this management plan. No impacts are allowed within the salt marsh at Plum Island.

F. Land Subject to Coastal Storm Flowage (310 CMR 10.04)

1. Definition

Land Subject to Coastal Storm Flowage (LSCSF) means land subject to any inundation caused by coastal storms up to and including that caused by the 100-year storm, surge of record or storm of record, whichever is greater (310 CMR 10.04). The areas mapped by the Federal Emergency Management Agency (FEMA) on community Flood Insurance Rate Maps (FIRM) as the 100-year flood plain within the coastal zone are included within LSCSF. On Plum Island, these areas include (but may not be limited to) velocity zones (V-zones), overwash zones, and areas of still water flooding during the 100-year statistical storm (A-zones) (Figure 4). LSCSF is an overlay resource area that includes other coastal wetland resource areas – Coastal Beach, Coastal Dune, and Salt Marsh. LSCSF does not have a buffer zone, nor does it have any performance standards.

2. Functions

Land subject to coastal storm flowage may be significant to the interests of storm damage prevention, flood control, pollution prevention and wildlife habitat.

3. Critical Characteristics

LSCSF contains other important resource areas, including Coastal Beach, Coastal Dune and Salt Marsh, which are important for storm damage prevention and flood control. The critical characteristics of each of these resource areas have been described in previous sections.

4. Performance Standards

There are currently no performance standards for work in LSCSF. However, Plum Island is defined as a Barrier Beach, consisting of Coastal Beach and Coastal Dune. LSCSF at Plum Island will fall within one of these two resource areas and be subject to all of its particular performance standards.

5. Existing Conditions of LSCSF

LSCSF on Plum Island extends to the edge of the 100-year flood plain. Some areas are in V-zones, which are those areas that FEMA has mapped as being likely to have at least a three-foot wave with velocity moving across the beach or dune surface during the 100-year storm. This includes the beach, much of the coastal dune and salt marsh, as well as parts of several developed areas.

New FEMA maps for Plum Island are being developed, although the Town has not yet gone through the permitting process. The Town is committed to doing this in the near future.

6. LSCSF Management and Protection

As stated previously above, LSCSF at Plum Island falls within either Coastal Beach or Coastal Dune. The performance standards for these resource areas would apply to any activity proposed within LSCSF in this area, as appropriate. Work may not increase coastal flooding by redirecting floodwaters or by decreasing the ability of resource areas to provide their natural storm damage protection functions. In addition, work on structures within LSCSF must also comply with the newly revised regulations of the State Building Code (780 CMR 523 and Appendix 120.G), as discussed in Section III, Environmental Regulations.

G. Resource Area Management Recommendations

The management recommendations presented below are for the entire beach area, unless otherwise specifically noted.

- Identify Beach property owned by the Town of Newbury appropriate for Beach Management activities, including Plum Island Center, Southern Boulevard and ROWs. Review records including deeds and surveys, combined with physical inspection to identify specific parcels of land appropriate for management activities.
- Continue to remove litter from the beach. The Town will also educate visitors regarding the importance of trash removal.
- Erect snow fences in appropriate locations, as funds are available.
- Plant Beach Grass and other vegetative plantings in conjunction with snow fence installation.
- Monitor condition of snow fence and replace, reinforce and repair as needed.
- Inspect beach grass plantings periodically. Replace and supplement plantings as needed, in conjunction with snow fence repair and other management measures.

- Monitor the status of the accumulation of sand along snow fences and the condition of plantings to determine the scope of maintenance and restorative measures.
- Place signs at dune restoration locations identifying the location as beach grass planting areas and dune restoration sites to minimize damage to beach grass and dune.
- Notify residents and owners of private property of benefits of erecting snow fences and beach grass plantings through the newspaper; informational literature, talks, lectures and public meetings on the topic.
- Establish a program for future beach nourishment.
- The Town should develop a program for videotaping beach/dunes spring/fall to visually document conditions. This provides a good baseline for FEMA funding if ever needed.
- Create and maintain a Sand Stockpile Area (SSA). Sand from the SSA will be used for the purposes of emergency storm response, sand nourishment/restoration at critical areas, and repairing/maintaining public access ways located along Plum Island.
- Implement dune nourishment techniques, as necessary, in appropriate locations.
- Interference of natural movement of sand will be minimized.

V. RARE SPECIES AND WILDLIFE MANAGEMENT

A. Rare Species Protection and Habitat Management

The Plum Island beach in Newbury is within a Priority Habitat of Rare Species (PH 1321) and Estimated Habitat of Rare Wildlife (EH 65) as designated by the Natural Heritage and Endangered Species Program. The primary species of concern in this area is the Piping Plover (*Charadrius melodus*), which is listed as both a Federal and State Threatened Species. Piping Plovers nest on coastal beaches above the high tide line, on sand flats at the end of sand spits, on gently sloping fore-dunes, and in blowouts or overwash areas between or behind coastal dunes. Its nest is a simple scrape in the sand or mixtures of sand, gravel and shells. The nest is typically placed on open sand or in patches of sparse to moderately dense beach grass and other dune vegetation. The management of the beach for threatened and endangered species habitat is an intense challenge, given the potential conflicts with recreational users of the beach.

Least Terns (*Sternula antillarum*), which are a State-listed species of Special Concern, are not known to nest on the Newbury town beach, but they do occur at the Parker River National Wildlife Refuge to the south. The nesting periods of the Least Tern are similar to those of the Piping Plover. However, terns nest in colonies while plovers nest in isolated pairs.

The Town of Newbury is working with the Parker River National Wildlife Refuge (PRNWR) to establish a Memorandum of Understanding (MOU) which will establish protocols for the monitoring and protection of Piping Plovers on Plum Island (Draft version in Appendix G). The MOU has also been reviewed by the U.S. Fish and Wildlife New England Field Office (USFWS).

Under the MOU, personnel from the PRNWR will identify and monitor piping plover nests and fledglings along Town property throughout the piping plover nesting and fledging season (April through August). They will also install and monitor symbolic fencing and signage to deter people from entering nesting plover territory and monitor beach raking activities. The PRNWR will also provide the Town with maps of current and past nesting locations. The PRNWR will work with the Town to determine if further management strategies are required, including possible adjustments to trash bin locations and beach cleaning. The Town will provide funding for the necessary equipment.

B. Wildlife Management

Certain less desirable wildlife species, including skunks, foxes and coyotes, can be attracted to homes because of trash, food waste, pet food and bird food. The Town will work with homeowners to remind and educate them how to deter unwanted wildlife species.

C. Rare Species and Wildlife Management Recommendations

- The Town will adhere to the MOU established between the Town and the PRNWR.
- Where conditions allow, portions of the primary dune system that may be over washed by natural storm events will be left untouched to enhance nesting habitat for plovers and least terns, and provide travel corridors for plover chicks.
- To accommodate migratory patterns of shorebirds such as terns and plovers, temporary restrictions on the launching and beaching of small craft should be implemented.
- The Town will work with homeowners to minimize the attraction of undesirable wildlife species.

VI. STORM-RELATED MAINTENANCE AND DAMAGE PROTECTION

A. General

During a serious coastal storm, such as the one of April 15 - 20, 2007, severe erosion of the beach occurs as a result of high winds and pounding waves -- made particularly serious if the storm continues for an extended period. Flooding of the area behind the primary dune can also become a significant problem. All of such storm action

destabilizes the dunes, destroys dune vegetation and wildlife habitat, and alters dune form and function. Large amounts of sand are washed out to sea, leaving the beach narrowed and its function as protective buffer, compromised.

B. Debris Removal

The Town will continue to remove storm debris as described in Section IV. Resource Area Management and Protection.

C. Access Way Repair

The Town will continue to make repairs to access ways as described in Section III. B. Public Access.

D. Storm-Related Beach and Dune Maintenance

Stockpiled sand from the SSA will be used to fill voids within the beach and dunes, on an emergency basis and prior to planting beach grass and installing snow fence. Equipment to be used will be in good condition with no leaks or spilling that could occur while the equipment is on the beach. The equipment used to conduct these activities are those discussed in Section IV Resource Area Management and Protection.

E. Storm-related Maintenance and Damage Protection Recommendations

The following actions may be taken as emergency measures, with the approval of the Conservation Commission, depending on the seriousness of the damage to the dunes (as detailed in the Town of Newbury's "Storm Emergency Certification Conditions"):

- Temporary repair may be undertaken of coastal engineering structures, including a groin, jetty, breakwater, seawall, revetment, or bulkhead, provided such a structure was previously licensed.
- Sand may be replaced in areas where the storm has caused erosion, in order to provide temporary stabilization of the area. Sand to be used may not be removed from any existing vegetated coastal dune, as defined in the Wetlands Protection Act and Regulations. Documentation will be provided to the Conservation Commission identifying the source of all sand used, and sand will be of compatible grain size to that already existing on the beach. Specifications for location and volume of sand to be brought in will be approved by the Conservation Commission before work can commence. The method to be used for sand delivery and placement must be included in the specifications provided.

VII. PUBLIC OUTREACH AND EDUCATION

A. Education

An informed and educated visitor to the Plum Island Beach is important to maintaining the barrier beach. A clear and understandable public education program will contribute to the visitor abiding by the rules and regulations established and the actions needed to maintain the barrier beach. The Newbury Beach Advisory Committee, formed under the Town of Newbury Conservation Commission, was engaged in educational activities. This committee no longer exists. However, the Plum Island Taxpayers Association (PITA) has taken on many of their former roles, and may engage in educational activities.

The Committee uses environmental education programs and projects to inform residents and non-residents of vital issues affecting the barrier beach. Specific projects which provide for public participation and education include the planting of dune grass, erecting snow fences to assure public access along rights of way, providing signage, offering lectures on environmental issues and communicating items of interest to local newspapers.

B. Litter

As discussed earlier, litter is a large problem on Plum Island. However, there are many opportunities to minimize littering, and to mitigate the impact of littering as well as clean up after the fact. Much of this can be accomplished through public outreach and education. Perhaps most important are beach residents' actions taken to prevent littering from occurring in the first place. The support of island residents is critical in providing year-round awareness in the drive against litter.

On-going litter abatement and awareness campaigns, using phrases and slogans such as "take your rubbish home with you" and/or "clean up after yourself" can be effective. Teaming with local merchants to limit the amount of take-out food wrap and containers can also serve to reduce the potential for litter in the first place.

School outreach can include talks on various aspects of litter reduction. Publicizing "no litter zones", and clearly delineating litter enforcement statutes and fines, will assist in raising the awareness of not only the local population, but of visitors as well. Assuming that visitors will bring articles that will not "go home", the strategic placement of convenient, attractive disposal barrels or receptacles is mandatory.

The actions listed above apply not only to residents but also filter onto the general populace. For example, dog owners from anywhere are allowed free range of the beach area from mid-October thru mid-April. An effective aid in reducing dog feces problems

is to provide disposable pet waste bag dispensers at access areas located near parking spaces.

C. Signage

Posting of signs is one of the best methods of informing the beach-going public regarding matters of importance to preservation of the barrier beach. Posting and informing the public in this fashion will lead to a greater degree of compliance with rules and regulations.

Signs have been erected over time in various shape, sizes and colors to inform the public with some success. To be effective, signs must be quickly readable, with a short, pointed message. They must fit into the landscape without being so inconspicuous that they are ignored. The shape, size, color and placement must avoid visual pollution (garish colors, overpowering designs), but attract attention with appropriate use of color and careful attention to sign placement for high visibility, accessibility, and readability.

Maintenance is extremely important, as is rapid replacement if lost, stolen, or damaged signs. If possible standardized, generic signage should be coordinated with other agencies such as Massachusetts Coastal Zone Management, Massachusetts Division of Fisheries and Wildlife, New England Aquarium, etc. Signs should be placed not only for information purposes, but also to aid in controlling pedestrian traffic. Posting of the ordinances and penalties for violations must be clearly done in order to foster compliance.

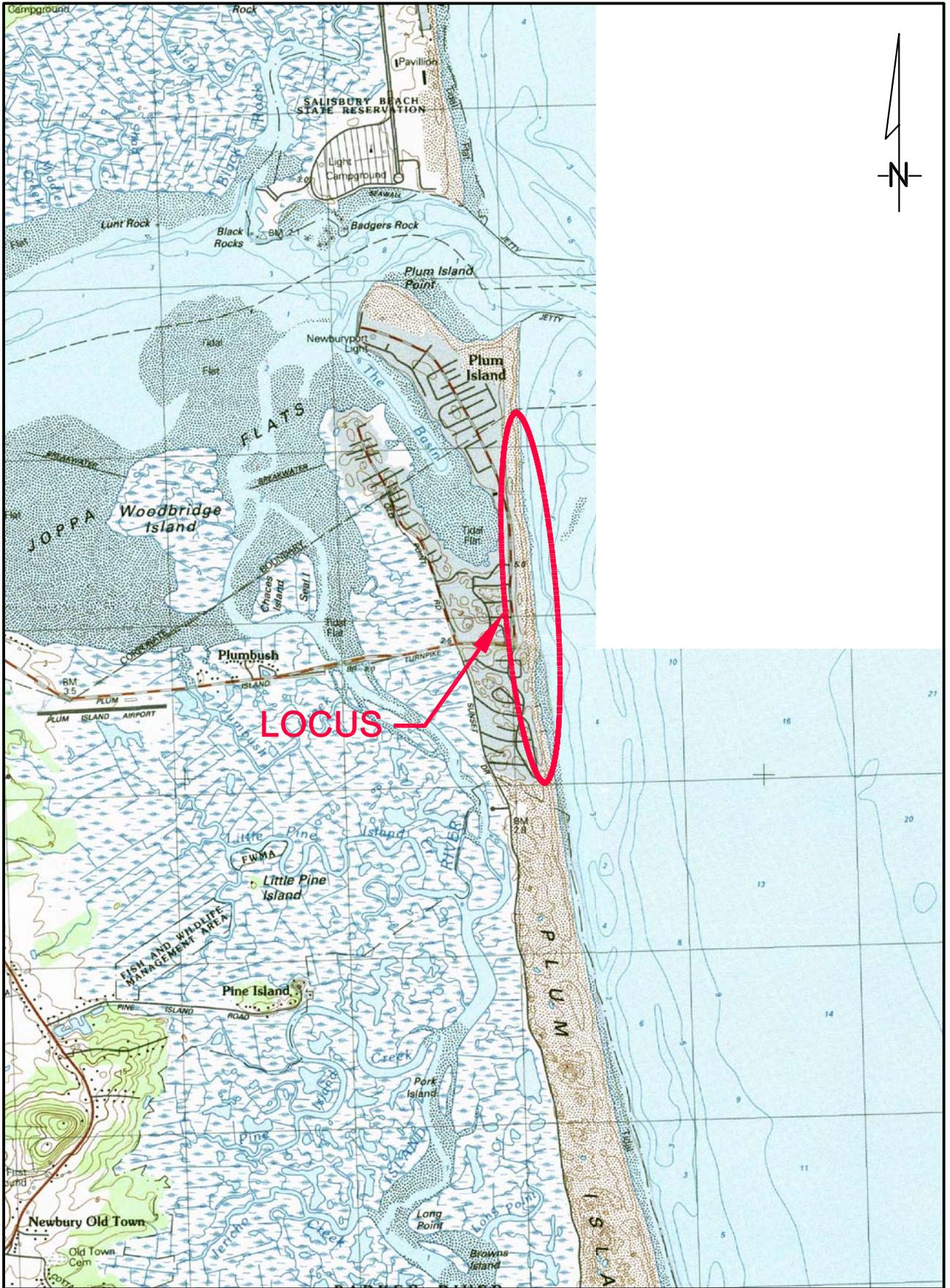
D. Public Outreach and Education Recommendations

- The Town should devote time, funding and personnel resources to establishing and maintaining an educational program.
- Educational materials should be prepared and made available to the general public. The materials should include:
 - Lectures
 - Brochures
 - Curriculum materials
 - Signs and Exhibits
 - Videos/slide shows
 - Books, pamphlets, maps etc.
 - Bulletin board
- Develop a public awareness program, including school outreach, to help reduce the amount of litter on the beach.
- Place trash receptacles at strategic, easily-seen and convenient locations.
- Determine appropriate locations and standard templates for each combination of rules and regulations at Rights of Way , Plum Island Center, and Plum Island Turnpike.

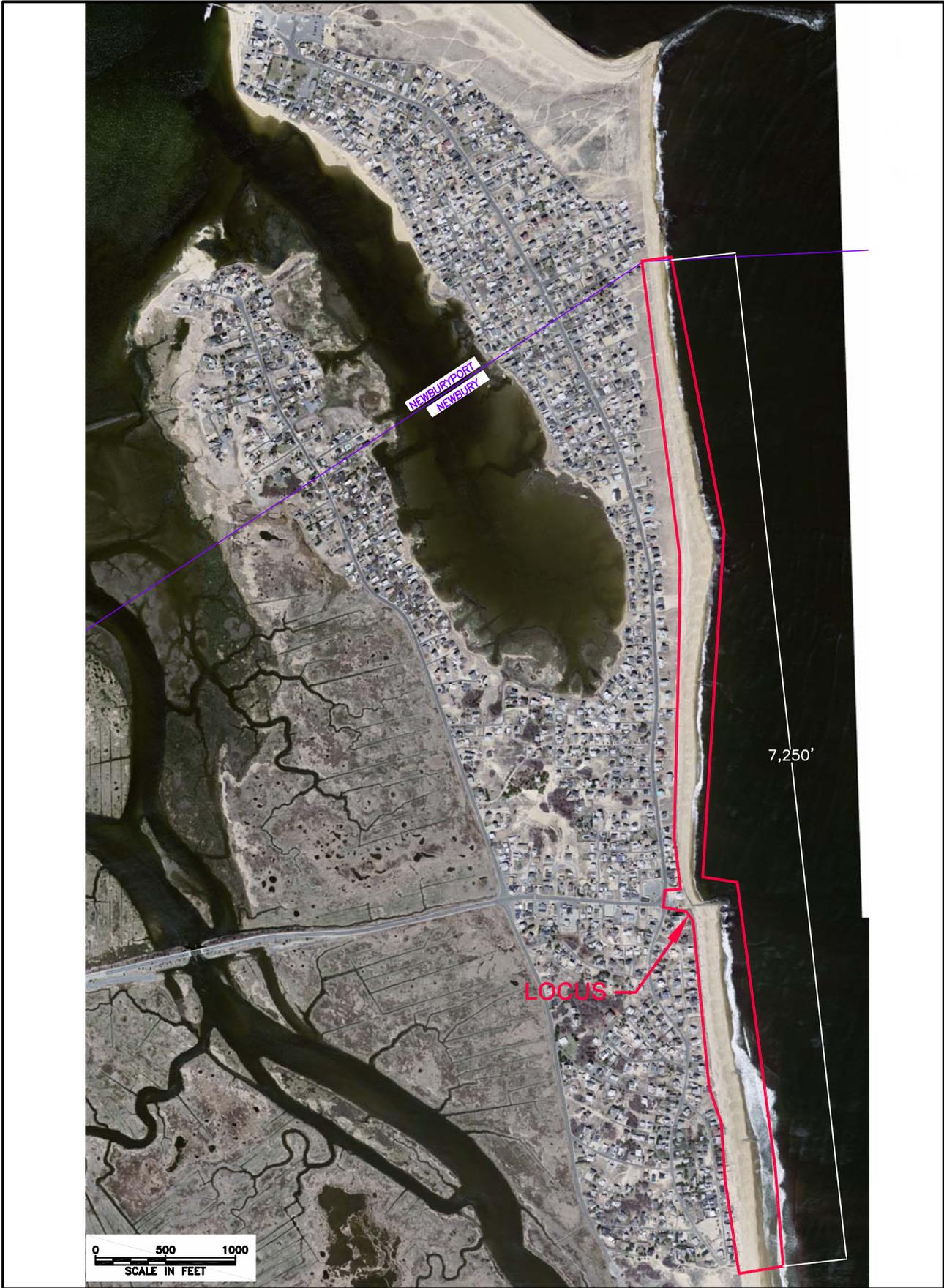
- Place standard-sized signs specific to rights of way (ROW), along Southern and Northern Boulevards, Plum Island Center and Plum Island Turnpike for:
 - Beach access
 - Lifeguards (or lack thereof)
 - Dogs
 - Dune/dune restoration
 - Alcohol prohibition
- Place signs, as appropriate, (i.e. “Residents Only, Permit Required, specific time-limits, etc.) regarding parking along: Southern and Northern Boulevards and at Plum Island Center.
- Erect a bulletin board, placed at Plum Island Center for the purpose of educating and informing the public about Newbury Beach Management actions, conservation information, projects, with schedules of planned activities, and educational data.
- Establish a maintenance program whereby routine, scheduled inspections would monitor the condition of signage and lead to actions which would prolong the visibility and effectiveness of the signage in place.
- Maintain vigilance regarding any changes (location and/or information) necessary to retain or upgrade effectiveness.
- Partner with merchants to limit the amount of take-out food wrappers and containers.

FIGURES

- 1. Site Locus**
- 2. Orthophoto**
- 3. Public Access Improvement Plan**
- 4. FEMA Flood Insurance Map**



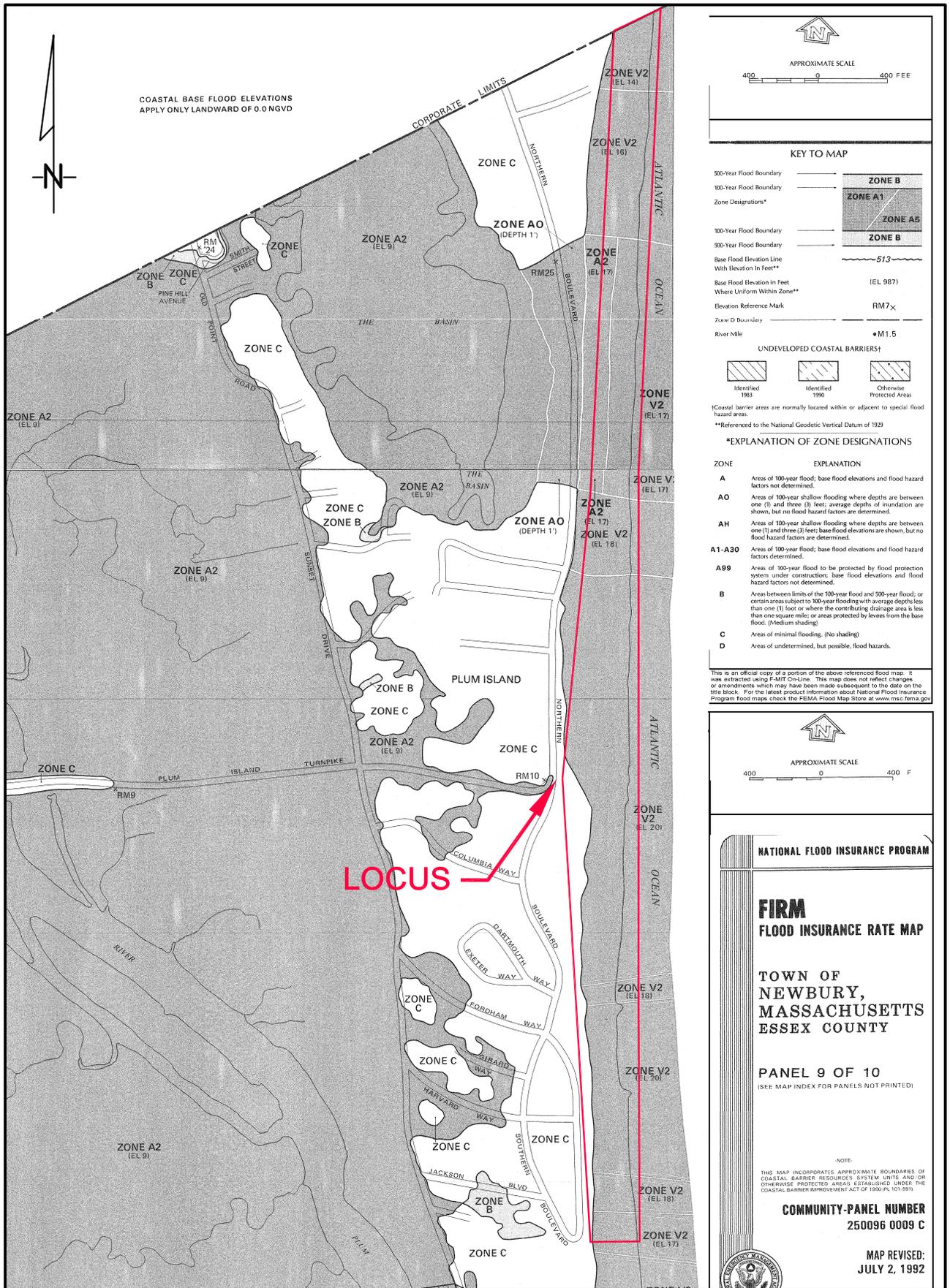
TOWN OF NEWBURY BEACH MANAGEMENT PLAN
 SITE LOCUS
 FIGURE 1



TOWN OF NEWBURY BEACH MANAGEMENT PLAN
ORTHOPHOTO
FIGURE 2



TOWN OF NEWBURY BEACH MANAGEMENT PLAN
PUBLIC ACCESS IMPROVEMENT PLAN
FIGURE 3



TOWN OF NEWBURY BEACH MANAGEMENT PLAN FEMA FLOOD INSURANCE RATE MAP FIGURE 4

APPENDIX A

Applicable Laws and Regulations

APPLICABLE LAWS AND REGULATIONS

FEDERAL STATUTES

Migratory Bird Treaty of 1918	16 U.S. Code 703
Coastal Zone Management Act	16 U.S. Code 1451
Endangered Species Act	16 U.S. Code 1531
Coastal Barrier Resources Act	16 U.S. Code 3502
Rivers and Harbors Act of 1899	33 U.S. Code 401
Water Pollution Control Act (Clean Water Act)	33 U.S. Code 1251
Marie Protection, Research, and Sanctuaries Act	33 U.S. Code 1401
Marine Plastic Pollution Research and Control Act of 1987	33 U.S. Code 1901
National Flood Insurance Act	42 U.S. Code 4001
National Environmental Policy Act	42 U.S. Code 4321
Americans With Disabilities Act	42 U.S. Code 12101

STATE STATUTES, REGULATIONS AND EXECUTIVE ORDERS

Landowner Liability Limitations	Mass. General Laws (M.G.L.) Chapter 21, §17c
Coastal Zone Management Act and Regulations	M.G.L. Chapter 21A, §4A 301 Code of Mass Regulations (CMR) 20.00
CZM Federal Consistency Regulations	301 CMR 21.00
Clean Water Act and Regulations	M.G.L. Chapter 21A, §42 314 CMR 1-15.00
Sanitary Code/Title V Regulations	310 CMR 15.00

Handicap Access Act and Regulations	M.G.L. Chapter 22, §13A 521 CMR 2-3.00
MA Environmental Policy Act and Regulations	M.G.L. Chapter 30, §§61-62H 301 CMR 11.00
Areas of Critical Environmental Concern Regulations	301 CMR 12.00
Motor Vehicles Act and Regulations	M.G.L. Chapter 90 540 CMR1-19.00
Motorboats and Other Vessels Act and Regulations	M.G.L. Chapter 90B 323 CMR 1-5.00
Public Waterfront Act and Regulations	M.G.L. Chapter 91 310 CMR 9.00
Marine Fish and Fisheries Act and Regulations	M.G.L. Chapter 130 322 CMR 1-12.00
Coastal Wetlands Restriction Act and Regulations	M.G.L. Chapter 130, §105 302 CMR 4.00
Inland Fisheries, Game and Other Natural Resources Act and Regulations	M.G.L. Chapter 131 321 CMR 1-9.00
Wetlands Protection Act and Regulations	M.G.L. Chapter 131, §40 310 CMR 10.00
Endangered Species Act and Regulations	M.G.L. Chapter 131A 321 CMR 10.00
Ocean Sanctuary Act and Regulations	M.G.L. Chapter 132A 302 CMR 5.00
Pesticide Control Act and Regulations	M.G.L. Chapter 132B 333 CMR 1-11.00
Building Standards and Regulations	M.G.L. Chapter 143 248 CMR (Plumbing) 521 CMR 2-3.00 (Architectural Access Board) 780 CMR 1-34.00 (Building Code, inc. floodplain)

MA Historic Commission Regulations	950 CMR 70-71.00
Crimes Against the Person	M.G.L. Chapter 265
Crimes Against Property	M.G.L. Chapter 266
Crimes Against Public Health	M.G.L. Chapter 270

Executive Order No.149: Flood Insurance Coordination (1978)

Executive Order No. 181: Barrier Beaches (1980)

Executive Order No. 190: Regulations of Off-Road Vehicle Use on Public Lands Containing Coastal Wetlands Resources (1980)

LOCAL

Town of Newbury ordinances, by-laws, regulations, rules, policies and guidelines covering the following:

Zoning
Chapter 95 Wetland by-laws
Waterways
Animal Control
Loitering
Health

APPENDIX B

Executive Order No. 181 Re: Barrier Beaches

COMMONWEALTH OF MASSACHUSETTS

BY His Excellency

EDWARD J. King
Governor

EXECUTIVE ORDER NO. 181

BARRIER BEACHES

Preamble

A barrier beach is a narrow low-lying strip of land generally consisting of coastal beaches and coastal dunes extending roughly parallel to the trend of the coast. It is separated from the mainland by a narrow body of fresh brackish or saline water or marsh system. It is a fragile buffer that protects landward areas from coastal storm damage and flooding.

The strength of the barrier beach system lies in its dynamic character; its ability to respond to storms by changing to a more stable form. Frequently man induced changes to barrier beaches have decreased the ability of landform to provide storm damage prevention and flood control. Inappropriate development on barrier beaches has resulted in the loss of lives and great economic losses to residents and to local, state and federal governments. The taxpayer, who often cannot gain access to barrier beach areas, must subsidize disaster relief and flood insurance for these high hazard areas.

Since barrier beaches are presently migrating landward in response to rising sea level, future storm damage to development located on the barriers is inevitable.

WHEREAS, the Commonwealth seeks to mitigate future storm damage to its barrier beach areas;

NOW, THEREFORE, I, Edward J. King, Governor of the Commonwealth of Massachusetts, by virtue of the authority vested in me by the Constitution and laws of the Commonwealth, do hereby order and direct all relevant state agencies to adopt the following policies:

- 1. Barrier beaches shall be given priority status for self-help and other state and federal acquisition programs and this priority status shall be incorporated into the Statewide Outdoor Comprehensive Recreation Plan. The highest priority for disaster assistance funds shall go towards relocating willing sellers from storm damaged barrier beach areas.*
- 2. State funds and federal grants for construction projects shall not be used to encourage growth and development in hazard prone barrier beach areas.*
- 3. For state-owned barrier beach property, management plans shall be prepared which are consistent with state wetland policy and shall be submitted to the Secretary of Environmental Affairs for public review under the provisions of the Massachusetts Environmental Policy Act.*
- 4. At a minimum, no development shall be permitted in the velocity zones or primary dune areas of barrier beaches identified by the Department of Environmental Quality Engineering.*
- 5. Coastal engineering structures shall only be used on barrier beaches to maintain navigation channels at inlets and then only if mechanisms are employed to ensure that downdraft beaches are adequately supplied with sediment.*
- 6. Dredge material of a compatible grain size shall be used for barrier beach nourishment, if economically feasible.*
- 7. The Coastal Zone Management Office shall coordinate state agency management policy for barrier beach areas.*

*Given at the Executive Chamber in Boston
this 8th day of August, in the
year of Our Lord one thousand nine hundred
and eighty and of the independence of
America, two-hundred and five.*

*EDWARD J. KING
GOVERNOR
Commonwealth of Massachusetts*

*MICHAEL JOSEPH CONNOLLY
Secretary of the Commonwealth*

GOD SAVE THE COMMONWEALTH OF MASSACHUSETTS

APPENDIX C

Executive Order No. 149 Re: Flood Insurance Coordination

By His Excellency
MICHAEL S. DUKAKIS
Governor

Executive Order No. 149

PROVISIONS FOR STATE COORDINATION AND PARTICIPATION WITH THE FEDERAL ADMINISTRATION UNDER THE NATIONAL FLOOD INSURANCE ACT OF 1968, AS AMENDED, AND RULES AND REGULATIONS PROMULGATED THEREUNDER.

WHEREAS, uneconomic uses of the Commonwealth's floodplains are occurring and the potential for flood losses continues to increase despite substantial efforts to control floods; and

WHEREAS, national, state and local studies of areas and property subject to flooding indicate a further increase in flood damage potential and flood losses, even with continuing investment in flood protection structures; and

WHEREAS, the Commonwealth of Massachusetts has extensive and continuing programs of the construction of buildings, roads, and other facilities and annually acquires and disposes of lands in flood hazard areas, all of which activities significantly influence patterns of commercial, residential, and industrial development; and

WHEREAS, the availability of programs for federal loans and mortgage insurance, state financial assistance, and land use planning are determining factors in the utilization of lands; and

WHEREAS, the availability of flood insurance under the National Flood Insurance Program, as provided by the National Flood Insurance Act of 1968, as amended, requires that a state agency be assigned to the coordination of federal, state and local aspects of floodplain, mudslide and flood-related erosion area management activities in the state; and

WHEREAS, the Massachusetts Water Resources Commission is the state agency responsible for state level programs for flood prevention, flood control, and flood protection, as provided by M.G.L. c.21, §9;

NOW, THEREFORE, I, MICHAEL S. DUKAKIS, by virtue of the authority vested in me as Governor of the Commonwealth of Massachusetts, do order and direct:

1. The Water Resources Commission is hereby designated as the state coordinating agency to assist in the implementation of the National Flood Insurance Program, 24 CFR §1909 et al. (1977) The Water Resources Commission is further designated as the state agency to implement the floodplain management criteria for state-owned properties in special hazard areas, as set forth in 24 CFR §1910.12 (1977). Pursuant to this designation, the Commission shall encourage a broad and unified effort to prevent uneconomic uses and development of the state's floodplains, and in particular, to alleviate the risk of flood losses to state lands and installations and state-financed or supported improvements. Specifically:

(i.) Under the leadership and direction of the Water Resources Commission, all state agencies directly responsible for the construction of all structures, roads or other facilities shall, to the extent possible, avoid the use of floodplains in connection with such facilities.

In the event that construction of such facilities in a floodplain cannot be avoided, the floodplain management criteria set forth in 24 CFR §§1910.3, 1910.4, and 1910.5 shall be observed when applicable. Flood-proofing measures shall be applied to existing state facilities where possible in order to reduce the potential for future flood damage.

(ii.) All state agencies responsible for the administration of grant or loan programs, involving the construction of structures, roads, or other facilities shall evaluate potential flood hazards to such facilities and, in order to minimize both the exposure of such facilities to flood damage and the need for future state expenditures for flood protection and disaster relief, shall to the extent possible avoid the use of floodplains for such construction.

(iii.) All state agencies responsible for the disposal of lands or properties shall, prior to disposal, a) evaluate flood hazards in connection with such lands or properties and b) attach such restrictions with respect to their use as are necessary to minimize future state expenditures for flood protection and disaster relief. In carrying out the purposes of this paragraph, each state agency may make allowance for any estimated reduction in fair market value resulting from the incorporation of use restrictions in the disposal documents.

(iv.) All state agencies responsible for programs which affect land use planning, including state permit programs, shall take flood hazards into account when evaluating plans, and encourage land use appropriate to the degree of hazard involved.

2. The Water Resources Commission is hereby designated as the agency responsible for making recommendations as to areas in the state eligible for hydrological ratemaking studies as required by the rules and regulations of the Federal Insurance Administration.

Given at the Executive Chamber in Boston this 29th day of November in the year of our Lord one thousand nine hundred and seventy-eight and of the Independence of the United States of America the two hundred and second.

**MICHAEL S. DUKAKIS
Governor
COMMONWEALTH OF MASSACHUSETTS**

**PAUL GUZZI
Secretary of the Commonwealth**

APPENDIX D

Resource Protection Partners

RESOURCE PROTECTION PARTNERS

The Town of Newbury's efforts to manage the natural resources at Newbury Beach would not be successful without the help of the following resource protection organizations:

Plum Island Tax Payer's Association (PITA)

PITA is not an official advisory group, but more like a type of "friends group". One of the groups mission is to assist the Newbury Conservation Commission through periodic meetings to review existing management and future improvements to the property. The group consists primarily of local residents and abutters to the property. They help organize volunteers to help with beach clean-ups, dune fence installation, dune grass plantings, and make management recommendations, etc.

Coastal Zone Management

The Massachusetts Office of Coastal Zone Management (CZM) is a part of the Executive Office of Energy and Environmental Affairs (EOEEA). CZM's mission is to balance the impacts of human activity with the protection of coastal and marine resources. As a networked program, CZM was specifically established to work with other state agencies, federal agencies, local governments, academic institutions, nonprofit groups, and the general public to promote sound management of the Massachusetts coast.

Massachusetts Department of Environmental Protection

The Department of Environmental Protection (MassDEP) is the state agency responsible for ensuring clean air and water, the safe management of toxics and hazards, the recycling of solid and hazardous wastes, the timely cleanup of hazardous waste sites and spills, and the preservation of wetlands and coastal resources. MassDEP is a regulatory agency that is also available to provide technical assistance on environmental matters within its jurisdiction.

Massachusetts Audubon Society: Joppa Flats

Recently the Massachusetts Audubon society opened the doors to their new headquarters located across the Merrimack River in Newburyport. They are willing to assist with the protection and management of rare shorebirds and offers a variety of informational educational sessions.

Massachusetts Department of Fisheries, Wildlife, and Environmental Law Enforcement

The *Natural Heritage & Endangered Species Program* provides training, information and management recommendations relative to the Department's rare species protection measures. The *Environmental Police-Law Enforcement* provides much needed enforcement services for Newbury staff. Officers assist with traffic control, enforcing rules and regulations, monitoring sportsmen licenses and responding to emergencies.

Massachusetts Emergency Management Agency

The Massachusetts Emergency Management Agency assists Newbury before, during and after major storm events, in particular MEMA act's as Newbury's liaison to obtain FEMA money.

The United States Coast Guard

The Coast Guard maintains air patrols over the Massachusetts coastline, including the Town of Newbury Beach using helicopters. The U.S. Coast Guard Newburyport Station is located on the Merrimack River, just minutes away. They have daily boat patrols during the summer season and assist with emergency rescues, either off shore or on the jetties.

Parker River National Wildlife Refuge

The Town of Newbury is working with the Parker River National Wildlife Refuge (PRNWR) to establish a Memorandum of Understanding (MOU) which will establish protocols for the monitoring and protection of Piping Plovers on Plum Island (Draft version in Appendix G). The MOU has also been reviewed by the U.S. Fish and Wildlife New England Field Office (USFWS).

APPENDIX E

DCR Guide to Dune Stabilization



A GUIDE TO DUNE STABILIZATION

P.O. Box 5303
Salisbury, MA 01952
(508) 462-4481

MIKE MAGNIFIX
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
SALISBURY BEACH STATE RESERVATION



A) IMPORTANCE OF DUNES

- The primary dune is the first line of defense against storms; it absorbs and mitigates the force of onshore storm wave action, protecting your house and the mainland behind the dunes. Because dunes are at a higher elevation than the beach, they protect inland areas from storm damage and flooding by storm waves. Vegetation cover, such as dune grass, contributes to the growth and stability of coastal dunes, minimizing wind erosion and trapping wind blown sand. We must maintain this dune system in order to retain its protective qualities.

B) DUNE GRASS PROTECTION PROGRAM

- Dune vegetation is very intolerant of both pedestrian and vehicular traffic. Even the pressure of foot traffic will cause severe root dieback, resulting in substantial reduction of vegetative cover, which in turn can lead to rapid deterioration of the entire dune system. That is why it is so important to keep people off the dunes, especially in the summer when most vegetative destruction occurs due to increased foot traffic.

C) SNOW FENCING

- Snow fence shall be installed around the perimeter or in front of the dune to direct pedestrian movement away from the fragile dune area. The best current available barrier material is wood picket snow fencing with a 50% porosity and posts placed no more than 12 feet apart. You will be supplied with one roll of snow fence, one bundle of 5 posts and 15 aluminum fence fasteners. Additional snow fence and stakes can be purchased at your local hardware store. If you do not have an existing dune in front of your house, install the fence approximately 50-100 feet from your house, parallel to the ocean on perpendicular to the prevailing winds. (NE).

SNOW FENCE INSTALLATION

- 1) Space the stakes approx 12 feet apart and drive them at least two feet into the ground.
- 2) Attach fencing to stakes at the top, middle and bottom with aluminum fence fasteners.
- 3) Bottom of wooden fence shall contact the ground surface along its entire length, tapping the top of the wooden slats may be necessary to ensure that the fence touches the ground.
- 4) At the ends of each fence, wrap post with at least one or two wooden slats and twist wires around post to attach the wire ends to the fence. Make sure that no wire ends are exposed to the public.

DUNE GRASS PLANTING

American Beach Grass will be available for planting this spring. It can also be purchased from commercial growers or collected by thinning native strands. Thinning native strands must be done with extreme care in order to avoid creation of new areas of erosion. Plants should be taken only from back dune areas or protected areas that have dense stands of beach grass. When in doubt, call us and we will analyze the area and give you our recommendation.

A) THINNING NATIVE AMERICAN STRANDS OF BEACH GRASS

- dig clumps of beach grass with a shovel.
- shake to release the sand, separate into groups of three live culms (stems) each, and remove dead culms, blades and any underground stems. Culms should be planted as soon as possible and watered.

B) PLANTING PROCEDURE

Beach grass can be planted successfully from mid October to mid April (the best time to plant is between March and April when the ground is not frozen) Survival rates are much lower in the summer months and not recommended. Open a hole 12-14 inches deep with a narrow bladed spade. Space holes 18-20 inches apart, and stagger rows for maximum sand entrapment. Place three culms in hole with main root seven to nine inches below surface of the sand. Pack the sand around the plants by stomping on the ground next to the plants with your feet to eliminate air from the root zone. Fertilize in spring only. Use inorganic, time released granular fertilizer such as 10-10-10 or 15-10-10 at a rate of 2 pounds per 1,000 square feet.

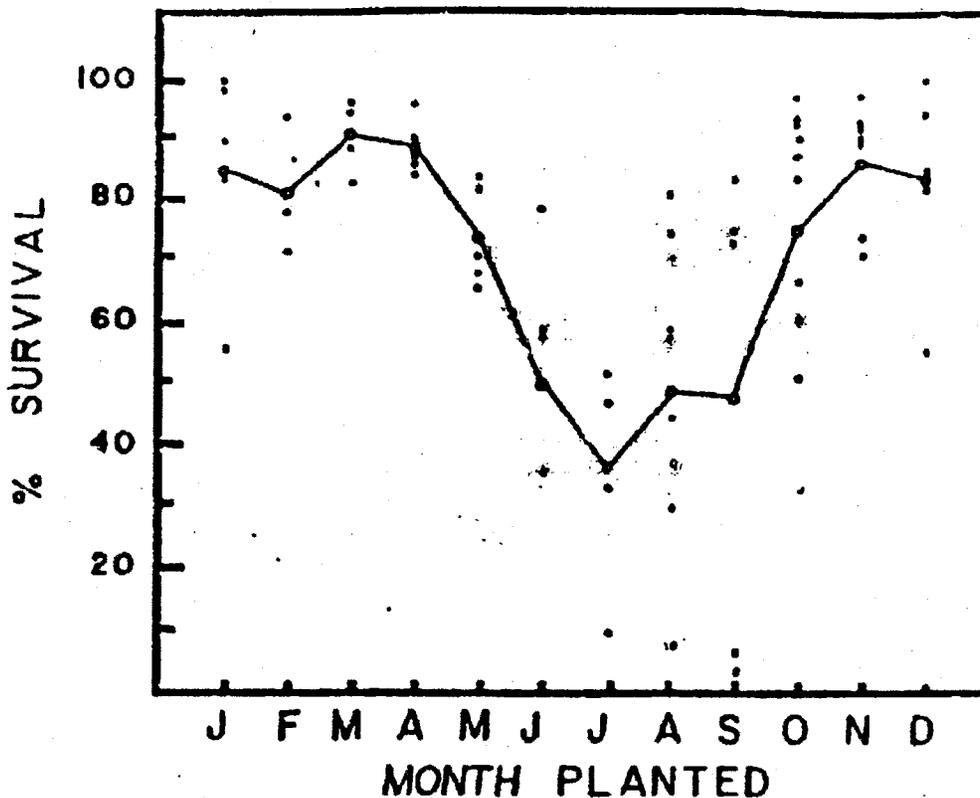
C) COVERAGE

Roughly 3,000 culms, at three culms per hole, and enough to cover area about 2,00 square feet (40 feet by 50 feet). Studies have shown that a 90 foot wide strip of vigorously growing beach grass, planted perpendicular to the prevailing wind direction, will trap and retain all of the sand being blown by the wind. Therefore, of possible, in order to get the maximum dune stabilization, the planted areas should be at least 90 feet wide.

D) OTHER DUNE PLANTS

Other native plants that will grow on dunes include seaside goldenrod, beach pea, bayberry, dusty miller, weeping lowe grass and beach plum. Non-native plants that do well at coastal locations include Japanese black pine, rugosa rose, bristly locust, and autumn olive.

In conclusion, we must take protective measures to ensure that our dunes will last and protect the land and property behind them. We have experienced several damaging storms in recent years and realize how important it is to have a well established dune system. One of the most important mechanisms in protecting the dunes is through public education and individual conservation. Sand, vegetation and fencing are three major components required to maintain a healthy dune system, especially where recreational use is extremely high. So, planting, protecting and preserving the dune system is critical in order to maintain Salisbury Beach, the environment, your property and our way of life. If you have any questions or would like more information, please, call our office at 462-4481.



The best time to plant beachgrass is from October through April. Note the poor survival when planted from June through September.

Commercial Sources of Beach Grass

Beachgrass is usually sold in bundles of 300 culms per bundle. The price in this area ranges from \$20.00 per bundle for 1-5 bundles to \$15.00 per bundle for 500 or more bundles.

Soil Conservation Service
Bristol County Conservation District
21 Spring Street
Taunton, MA 02780
508-824-6668

Harold Fine
24 Smith Street
Rehoboth, MA 02769
508-222-3477

Springer Environmental Services
245 Keene Road
Acushnet, MA 02743

Agricultural Stabilization Nursery
P.O. Drawer 987
New Bern, NC 28560
919-637-3567

Church's Nursery
Old Shore Road (Erma Road) *SEASHORE*
RFD #1 *609 884 3927*
Cape May, NJ 08204

Moore's Sod Farm
P.O. Box 281
Berlin, MD 21811

Feat and Son
Kilby Ln.
Jericho, NY
(516) 288-3458

APPENDIX F

**NHESP and USFWS Guidelines for Managing Recreational Use of
Beaches to Protect Piping Plovers, Terns and Their Habitats in
Massachusetts**

Guidelines for Managing Recreational Activities in Piping Plover Breeding Habitat on the U.S. Atlantic Coast to Avoid Take Under Section 9 of the Endangered Species Act

Northeast Region, U.S. Fish and Wildlife Service
April 15, 1994

(Also see additional Service guidance on [fireworks](#) and in the [1996 Revised Recovery Plan](#).)

The following information is provided as guidance to beach managers and property owners seeking to avoid potential violations of Section 9 of the Endangered Species Act (16 U.S.C. 1538) and its implementing regulations (50 CFR Part 17) that could occur as the result of recreational activities on beaches used by breeding piping plovers along the Atlantic Coast. These guidelines were developed by the Northeast Region, U.S. Fish and Wildlife Service (Service), with assistance from the U.S. Atlantic Coast Piping Plover Recovery Team. The guidelines are advisory, and failure to implement them does not, of itself, constitute a violation of the law. Rather, they represent the Service's best professional advice to beach managers and landowners regarding the management options that will prevent direct mortality, harm, or harassment of piping plovers and their eggs due to recreational activities.

Some land managers have endangered species protection obligations under Section 7 of the Endangered Species Act (see section I below) or under Executive Orders 11644 and 11989⁽¹⁾ that go beyond adherence to these guidelines. Nothing in this document should be construed as lack of endorsement of additional piping plover protection measures implemented by these land managers or those who are voluntarily undertaking stronger plover protection measures.

This document contains four sections: [\(I\)](#) a brief synopsis of the legal requirements that afford protection to nesting piping plovers; [\(II\)](#) a brief summary of the life history of piping plovers and potential threats due to recreational activities during the breeding cycle; [\(III\)](#) guidelines for protecting piping plovers from recreational activities on Atlantic Coast beaches; and [\(IV\)](#) literature cited.

I. LEGAL CONSIDERATIONS

Section 9 of the Endangered Species Act (ESA) prohibits any person subject to the jurisdiction of the United States from harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting listed wildlife species. It is also unlawful to attempt such acts, solicit another to commit such acts, or cause such acts to be committed. A "person" is defined in Section 3 to mean "an individual, corporation, partnership, trust, association, or any other private entity; or any officer, employee, agent, department, or instrumentality of the Federal Government, of any State, municipality, or

political subdivision of a State, or of any foreign government; any State, municipality, or political subdivision of a State; or any other entity subject to the jurisdiction of the United States." Regulations implementing the ESA (50 CFR 17.3) further define "harm" to include significant habitat modification or degradation that results in the killing or injury of wildlife by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering. "Harass" means an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Penalties for violations of Section 9 are provided in Section 11 of the ESA; for threatened species, these penalties include fines of up to \$25,000, imprisonment for not more than six months, or both.

Section 10 of the ESA and related regulations provide for permits that may be granted to authorize acts prohibited under Section 9, for scientific purposes or to enhance the propagation or survival of a listed species. States that have Cooperative Agreements under Section 6 of the ESA, may provide written authorization for take that occurs in the course of implementing conservation programs. For example, State agencies have authorized certain biologists to construct predator exclosures for piping plovers. It is also legal for employees or designated agents of certain Federal or State agencies to take listed species without a permit, if the action is necessary to aid sick, injured, or orphaned animals or to salvage or dispose of a dead specimen.

Section 10 also allows permits to be issued for take that is "incidental to, and not the purpose of, carrying out an otherwise lawful activity" if the Service determines that certain conditions have been met. An applicant for an incidental take permit must prepare a conservation plan that specifies the impacts of the take, steps the applicant will take to minimize and mitigate the impacts, funding that will be available to implement these steps, alternative actions to the take that the applicant considered, and the reasons why such alternatives are not being utilized.

Section 7 of the ESA may be pertinent to beach managers and landowners in situations that have a Federal nexus. Section 7 requires Federal agencies to consult with the Service (or National Marine Fisheries Service for marine species) prior to authorizing, funding, or carrying out activities that may affect listed species. Section 7 also requires that these agencies use their authorities to further the conservation of listed species. Section 7 obligations have caused Federal land management agencies to implement piping plover protection measures that go beyond those required to avoid take, for example by conducting research on threats to piping plovers. Other examples of Federal activities that may affect piping plovers along the Atlantic Coast, thereby triggering Section 7 consultation, include permits for beach nourishment or disposal of dredged material (U.S. Army Corps of Engineers) and funding of beach restoration projects (Federal Emergency Management Authority).

Piping plovers, as well as other migratory birds such as least terns, common terns, American oystercatchers, laughing gulls, herring gulls, and great black-backed gulls, their nests, and eggs are also protected under the Migratory Bird Treaty Act of 1918 (16

U.S.C. 703-712). Prohibited acts include pursuing, hunting, shooting, wounding, killing, trapping, capturing, collecting, or attempting such conduct. Violators may be fined up to \$5000 and/or imprisoned for up to six months.

Almost all States within the breeding range of the Atlantic Coast piping plover population list the species as State threatened or endangered (Northeast Nongame Technical Committee 1993). Various laws and regulations may protect State-listed species from take, but the Service has not ascertained the adequacy of the guidelines presented in this document to meet the requirements of any State law.

II. LIFE HISTORY AND THREATS FROM HUMAN DISTURBANCE

Piping plovers are small, sand-colored shorebirds that nest on sandy, coastal beaches from South Carolina to Newfoundland. Since 1986, the Atlantic Coast population has been protected as a threatened species under provisions of the U.S. Endangered Species Act of 1973 (U.S. Fish and Wildlife Service 1985). The U.S. portion of the population was estimated at 875 pairs in 1993 (U.S. Fish and Wildlife Service 1993). Many characteristics of piping plovers contribute to their susceptibility to take due to human beach activities.

LIFE HISTORY

Piping plovers begin returning to their Atlantic Coast nesting beaches in mid-March (Coutu et al. 1990, Cross 1990, Goldin 1990, MacIvor 1990, Hake 1993). Males establish and defend territories and court females (Cairns 1982). Eggs may be present on the beach from mid-April through late July. Clutch size is generally four eggs, and the incubation period⁽²⁾ usually lasts for 27-28 days. Piping plovers fledge only a single brood per season, but may renest several times if previous nests are lost. Chicks are precocial⁽³⁾ (Wilcox 1959, Cairns 1982). They may move hundreds of yards from the nest site during their first week of life (see [Table 1](#), Summary of Chick Mobility Data). Chicks remain together with one or both parents until they fledge (are able to fly) at 25 to 35 days of age. Depending on date of hatching, flightless chicks may be present from mid-May until late August, although most fledge by the end of July (Patterson 1988, Goldin 1990, MacIvor 1990, Howard et al. 1993).

Piping plover nests are situated above the high tide line on coastal beaches, sand flats at the ends of sandspits and barrier islands, gently sloping foredunes, blowout areas behind primary dunes, and washover areas cut into or between dunes. They may also nest on areas where suitable dredge material has been deposited. Nest sites are shallow scraped depressions in substrates ranging from fine grained sand to mixtures of sand and pebbles, shells or cobble (Bent 1929, Burger 1987a, Cairns 1982, Patterson 1988, Flemming et al. 1990, MacIvor 1990, Strauss 1990). Nests are usually found in areas with little or no vegetation although, on occasion, piping plovers will nest under stands of American beachgrass (*Ammophila breviligulata*) or other vegetation (Patterson 1988, Flemming et al. 1990, MacIvor 1990). Plover nests may be very difficult to detect, especially during the 6-7 day egg-laying phase when the birds generally do not incubate (Goldin 1994).

Plover foods consist of invertebrates such as marine worms, fly larvae, beetles, crustaceans or mollusks (Bent 1929, Cairns 1977, Nicholls 1989). Feeding areas include intertidal portions of ocean beaches, washover areas, mudflats, sandflats, wrack lines⁽⁴⁾, and shorelines of coastal ponds, lagoons or salt marshes (Gibbs 1986, Coutu et al. 1990, Hoopes et al. 1992, Loegering 1992, Goldin 1993). Studies have shown that the relative importance of various feeding habitat types may vary by site (Gibbs 1986, Coutu et al. 1990, McConnaughey et al. 1990, Loegering 1992, Goldin 1993, Hoopes 1993) and by stage in the breeding cycle (Cross 1990). Adults and chicks on a given site may use different feeding habitats in varying proportion (Goldin et al. 1990). Feeding activities of chicks may be particularly important to their survival. Cairns (1977) found that piping plover chicks typically tripled their weight during the first two weeks post-hatching; chicks that failed to achieve at least 60% of this weight gain by day 12 were unlikely to survive. During courtship, nesting, and brood rearing, feeding territories are generally contiguous to nesting territories (Cairns 1977), although instances where brood-rearing areas are widely separated from nesting territories are not uncommon (see [Table 1](#)). Feeding activities of both adults and chicks may occur during all hours of the day and night (Burger 1993) and at all stages in the tidal cycle (Goldin 1993, Hoopes 1993).

THREATS FROM NONMOTORIZED BEACH ACTIVITIES

Sandy beaches that provide nesting habitat for piping plovers are also attractive recreational habitats for people and their pets. Nonmotorized recreational activities can be a source of both direct mortality and harassment of piping plovers. Pedestrians on beaches may crush eggs (Burger 1987b, Hill 1988, Shaffer and Laporte 1992, Cape Cod National Seashore 1993, Collazo et al. 1994). Unleashed dogs may chase plovers (McConnaughey et al. 1990), destroy nests (Hoopes et al. 1992), and kill chicks (Cairns and McLaren 1980).

Pedestrians may flush incubating plovers from nests (see [Table 2](#), Summary of Data on Distances at Which Plovers React to Disturbance), exposing eggs to avian predators or causing excessive cooling or heating of eggs. Repeated exposure of shorebird eggs on hot days may cause overheating, killing the embryos (Bergstrom 1991). Excessive cooling may kill embryos or retard their development, delaying hatching dates (Welty 1982). Pedestrians can also displace unfledged chicks (Strauss 1990, Burger 1991, Hoopes et al. 1992, Loegering 1992, Goldin 1993). Fireworks are highly disturbing to piping plovers (Howard et al. 1993). Plovers are particularly intolerant of kites, compared with pedestrians, dogs, and vehicles; biologists believe this may be because plovers perceive kites as potential avian predators (Hoopes et al. 1992).

THREATS FROM MOTOR VEHICLES

Unrestricted use of motorized vehicles on beaches is a serious threat to piping plovers and their habitats. Vehicles can crush eggs (Wilcox 1959; Tull 1984; Burger 1987b; Patterson et al. 1991; United States of America v. Breezy Point Cooperative, Inc., U.S. District Court, Eastern District of New York, Civil Action No. CV-90-2542, 1991; Shaffer and Laporte 1992), adults, and chicks. In Massachusetts and New York,

biologists documented 14 incidents in which 18 chicks and 2 adults were killed by vehicles between 1989 and 1993 (Melvin et al. 1994). Goldin (1993) compiled records of 34 chick mortalities (30 on the Atlantic Coast and 4 on the Northern Great Plains) due to vehicles. Many biologists that monitor and manage piping plovers believe that many more chicks are killed by vehicles than are found and reported (Melvin et al. 1994). Beaches used by vehicles during nesting and brood-rearing periods generally have fewer breeding plovers than available nesting and feeding habitat can support. In contrast, plover abundance and productivity has increased on beaches where vehicle restrictions during chick-rearing periods have been combined with protection of nests from predators (Goldin 1993; S. Melvin, pers. comm., 1993).

Typical behaviors of piping plover chicks increase their vulnerability to vehicles. Chicks frequently move between the upper berm or foredune and feeding habitats in the wrack line and intertidal zone. These movements place chicks in the paths of vehicles driving along the berm or through the intertidal zone. Chicks stand in, walk, and run along tire ruts, and sometimes have difficulty crossing deep ruts or climbing out of them (Eddings et al. 1990, Strauss 1990, Howard et al. 1993). Chicks sometimes stand motionless or crouch as vehicles pass by, or do not move quickly enough to get out of the way (Tull 1984, Hoopes et al. 1992, Goldin 1993). Wire fencing placed around nests to deter predators (Rimmer and Deblinger 1990, Melvin et al. 1992) is ineffective in protecting chicks from vehicles because chicks typically leave the nest within a day after hatching and move extensively along the beach to feed (see [Table 1](#)).

Vehicles may also significantly degrade piping plover habitat or disrupt normal behavior patterns. They may harm or harass plovers by crushing wrack into the sand and making it unavailable as cover or a foraging substrate, by creating ruts that may trap or impede movements of chicks, and by preventing plovers from using habitat that is otherwise suitable (MacIvor 1990, Strauss 1990, Hoopes et al. 1992, Goldin 1993).

III. GUIDELINES FOR PROTECTING PIPING PLOVERS FROM RECREATIONAL DISTURBANCE

The Service recommends the following protection measures to prevent direct mortality or harassment of piping plovers, their eggs, and chicks.

MANAGEMENT OF NONMOTORIZED RECREATIONAL USES

On beaches where pedestrians, joggers, sun-bathers, picnickers, fishermen, boaters, horseback riders, or other recreational users are present in numbers that could harm or disturb incubating plovers, their eggs, or chicks, areas of at least 50 meter-radius around nests above the high tide line should be delineated with warning signs and symbolic fencing⁽⁵⁾. Only persons engaged in rare species monitoring, management, or research activities should enter posted areas. These areas should remain fenced as long as viable eggs or unfledged chicks are present. Fencing is intended to prevent accidental crushing of nests and repeated flushing of incubating adults, and to provide an area where chicks can rest and seek shelter when large numbers of people are on the beach.

Available data indicate that a 50 meter buffer distance around nests will be adequate to prevent harassment of the majority of incubating piping plovers. However, fencing around nests should be expanded in cases where the standard 50 meter-radius is inadequate to protect incubating adults or unfledged chicks from harm or disturbance. Data from various sites distributed across the plover's Atlantic Coast range indicates that larger buffers may be needed in some locations (see [Table 2](#)). This may include situations where plovers are especially intolerant of human presence, or where a 50 meter-radius area provides insufficient escape cover or alternative foraging opportunities for plover chicks.⁽⁶⁾

In cases where the nest is located less than 50 meters above the high tide line, fencing should be situated at the high tide line, and a qualified biologist should monitor responses of the birds to passersby, documenting his/her observations in clearly recorded field notes. Providing that birds are not exhibiting signs of disturbance, this smaller buffer may be maintained in such cases.

On portions of beaches that receive heavy human use, areas where territorial plovers are observed should be symbolically fenced to prevent disruption of territorial displays and courtship. Since nests can be difficult to locate, especially during egg-laying, this will also prevent accidental crushing of undetected nests. If nests are discovered outside fenced areas, fencing should be extended to create a sufficient buffer to prevent disturbance to incubating adults, eggs, or unfledged chicks.

Pets should be leashed and under control of their owners at all times from April 1 to August 31 on beaches where piping plovers are present or have traditionally nested. Pets should be prohibited on these beaches from April 1 through August 31 if, based on observations and experience, pet owners fail to keep pets leashed and under control.

Kite flying should be prohibited within 200 meters of nesting or territorial adult or unfledged juvenile piping plovers between April 1 and August 31.

Fireworks should be prohibited on beaches where plovers nest from April 1 until all chicks are fledged. (See the Service's February 4, 1997 [*Guidelines for Managing Fireworks in the Vicinity of Piping Plovers and Seabeach Amaranth on the U.S. Atlantic Coast.*](#))

MOTOR VEHICLE MANAGEMENT

The Service recommends the following minimum protection measures to prevent direct mortality or harassment of piping plovers, their eggs, and chicks on beaches where vehicles are permitted. Since restrictions to protect unfledged chicks often impede vehicle access along a barrier spit, a number of management options affecting the timing and size of vehicle closures are presented here. Some of these options are contingent on implementation of intensive plover monitoring and management plans by qualified biologists. It is recommended that landowners seek concurrence with such monitoring plans from either the Service or the State wildlife agency.

Protection of Nests

All suitable piping plover nesting habitat should be identified by a qualified biologist and delineated with posts and warning signs or symbolic fencing on or before April 1 each year. All vehicular access into or through posted nesting habitat should be prohibited. However, prior to hatching, vehicles may pass by such areas along designated vehicle corridors established along the outside edge of plover nesting habitat. Vehicles may also park outside delineated nesting habitat, if beach width and configuration and tidal conditions allow. Vehicle corridors or parking areas should be moved, constricted, or temporarily closed if territorial, courting, or nesting plovers are disturbed by passing or parked vehicles, or if disturbance is anticipated because of unusual tides or expected increases in vehicle use during weekends, holidays, or special events.

If data from several years of plover monitoring suggests that significantly more habitat is available than the local plover population can occupy, some suitable habitat may be left unposted if the following conditions are met:

1. The Service OR a State wildlife agency that is party to an agreement under Section 6 of the ESA provides written concurrence with a plan that:
 - A. Estimates the number of pairs likely to nest on the site based on the past monitoring and regional population trends.

AND

- B. Delineates the habitat that will be posted or fenced prior to April 1 to assure a high probability that territorial plovers will select protected areas in which to court and nest. Sites where nesting or courting plovers were observed during the last three seasons as well as other habitat deemed most likely to be pioneered by plovers should be included in the posted and/or fenced area.

AND

- C. Provides for monitoring of piping plovers on the beach by a qualified biologist(s). Generally, the frequency of monitoring should be not less than twice per week prior to May 1 and not less than three times per week thereafter. Monitoring should occur daily whenever moderate to large numbers of vehicles are on the beach. Monitors should document locations of territorial or courting plovers, nest locations, and observations of any reactions of incubating birds to pedestrian or vehicular disturbance.

AND

2. All unposted sites are posted immediately upon detection of territorial plovers.

Protection of Chicks

Sections of beaches where unfledged piping plover chicks are present should be temporarily closed to all vehicles not deemed essential. (See the provisions for essential vehicles below.) Areas where vehicles are prohibited should include all dune, beach, and intertidal habitat within the chicks' foraging range, to be determined by either of the following methods:

1. The vehicle free area should extend 1000 meters on each side of a line drawn through the nest site and perpendicular to the long axis of the beach. The resulting 2000 meter-wide area of protected habitat for plover chicks should extend from the ocean-side low water line to the bay-side low water line or to the farthest extent of dune habitat if no bay-side intertidal habitat exists. However, vehicles may be allowed to pass through portions of the protected area that are considered inaccessible to plover chicks because of steep topography, dense vegetation, or other naturally-occurring obstacles.

OR

2. The Service OR a State wildlife agency that is party to an agreement under Section 6 of the ESA provides written concurrence with a plan that:
 - A. Provides for monitoring of all broods during the chick-rearing phase of the breeding season and specifies the frequency of monitoring.

AND

- B. Specifies the minimum size of vehicle-free areas to be established in the vicinity of unfledged broods based on the mobility of broods observed on the site in past years and on the frequency of monitoring. Unless substantial data from past years show that broods on a site stay very close to their nest locations, vehicle-free areas should extend at least 200 meters on each side of the nest site during the first week following hatching. The size and location of the protected area should be adjusted in response to the observed mobility of the brood, but in no case should it be reduced to less than 100 meters on each side of the brood. In some cases, highly mobile broods may require protected areas up to 1000 meters, even where they are intensively monitored. Protected areas should extend from the ocean-side low water line to the bay-side low water line or to the farthest extent of dune habitat if no bay-side intertidal habitat exists. However, vehicles may be allowed to pass through portions of the protected area that are considered inaccessible to plover chicks because of steep topography, dense vegetation, or other naturally-occurring obstacles. In a few cases, where several years of data documents that piping plovers on a particular site feed in only certain habitat types, the Service or the State wildlife management agency may provide written concurrence that vehicles pose no danger to plovers in other specified habitats on that site.

Timing of Vehicle Restrictions in Chick Habitat

Restrictions on use of vehicles in areas where unfledged plover chicks are present should begin on or before the date that hatching begins and continue until chicks have fledged. For purposes of vehicle management, plover chicks are considered fledged at 35 days of age or when observed in sustained flight for at least 15 meters, whichever occurs first.

When piping plover nests are found before the last egg is laid, restrictions on vehicles should begin on the 26th day after the last egg is laid. This assumes an average incubation period of 27 days, and provides a 1 day margin of error.

When plover nests are found after the last egg has been laid, making it impossible to predict hatch date, restrictions on vehicles should begin on a date determined by one of the following scenarios:

1. With intensive monitoring: If the nest is monitored at least twice per day, at dawn and dusk (before 0600 hrs and after 1900 hrs) by a qualified biologist, vehicle use may continue until hatching begins. Nests should be monitored at dawn and dusk to minimize the time that hatching may go undetected if it occurs after dark. Whenever possible, nests should be monitored from a distance with spotting scope or binoculars to minimize disturbance to incubating plovers.

OR

2. Without intensive monitoring: Restrictions should begin on May 15 (the earliest probable hatch date). If the nest is discovered after May 15, then restrictions should start immediately.

If hatching occurs earlier than expected, or chicks are discovered from an unreported nest, restrictions on vehicles should begin immediately.

If ruts are present that are deep enough to restrict movements of plover chicks, then restrictions on vehicles should begin at least 5 days prior to the anticipated hatching date of plover nests. If a plover nest is found with a complete clutch, precluding estimation of hatching date, and deep ruts have been created that could reasonably be expected to impede chick movements, then restrictions on vehicles should begin immediately.

Essential Vehicles

Because it is impossible to completely eliminate the possibility that a vehicle will accidentally crush an unfledged plover chicks, use of vehicles in the vicinity of broods should be avoided whenever possible. However, the Service recognizes that life-threatening situations on the beach may require emergency vehicle response. Furthermore, some "essential vehicles" may be required to provide for safety of pedestrian recreationists, law enforcement, maintenance of public property, or access to private dwellings not otherwise accessible. On large beaches, maintaining the frequency

of plover monitoring required to minimize the size and duration of vehicle closures may necessitate the use of vehicles by plover monitors.

Essential vehicles should only travel on sections of beaches where unfledged plover chicks are present if such travel is absolutely necessary and no other reasonable travel routes are available. All steps should be taken to minimize number of trips by essential vehicles through chick habitat areas. Homeowners should consider other means of access, eg. by foot, water, or shuttle services, during periods when chicks are present.

The following procedures should be followed to minimize the probability that chicks will be crushed by essential (non-emergency) vehicles:

1. Essential vehicles should travel through chick habitat areas only during daylight hours, and should be guided by a qualified monitor who has first determined the location of all unfledged plover chicks.
2. Speed of vehicles should not exceed five miles per hour.
3. Use of open 4-wheel motorized all-terrain vehicles (ATVs) or non-motorized all-terrain bicycles is recommended whenever possible for monitoring and law enforcement because of the improved visibility afforded operators.
4. A log should be maintained by the beach manager of the date, time, vehicle number and operator, and purpose of each trip through areas where unfledged chicks are present. Personnel monitoring plovers should maintain and regularly update a log of the numbers and locations of unfledged plover chicks on each beach. Drivers of essential vehicles should review the log each day to determine the most recent number and location of unfledged chicks.

Essential vehicles should avoid driving on the wrack line, and travel should be infrequent enough to avoid creating deep ruts that could impede chick movements. If essential vehicles are creating ruts that could impede chick movements, use of essential vehicles should be further reduced and, if necessary, restricted to emergency vehicles only.

SITE-SPECIFIC MANAGEMENT GUIDANCE

The guidelines provided in this document are based on an extensive review of the scientific literature and are intended to cover the vast majority of situations likely to be encountered on piping plover nesting sites along the U.S. Atlantic Coast. However, the Service recognizes that site-specific conditions may lead to anomalous situations in which departures from this guidance may be safely implemented. The Service recommends that landowners who believe such situations exist on their lands contact either the Service or the State wildlife agency and, if appropriate, arrange for an on-site review. Written documentation of agreements regarding departures from this guidance is recommended.

In some unusual circumstances, Service or State biologists may recognize situations where this guidance provides insufficient protection for piping plovers or their nests. In such a case, the Service or the State wildlife agency may provide written notice to the

landowner describing additional measures recommended to prevent take of piping plovers on that site.

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1. Executive Order 11644, Use of Off-Road Vehicles on the Public Lands and Executive Order 11989, Off-Road Vehicles on Public Lands pertain to lands under custody of the Secretaries of Agriculture, Defense, and Interior (except for Indian lands) and certain lands under the custody of the Tennessee Valley Authority.

2. "Incubation" refers to adult birds sitting on eggs, to maintain them at a favorable temperature for embryo development.

3. "Precocial" birds are mobile and capable of foraging for themselves within several hours of hatching.

4. Wrack is organic material including seaweed, seashells, driftwood and other materials deposited on beaches by tidal action.

5. "Symbolic fencing" refers to one or two strands of light-weight string, tied between posts to delineate areas where pedestrians and vehicles should not enter.

6. For example, on the basis of data from an intensive three year study that showed that plovers on Assateague Island in Maryland flush from nests at greater distances than those elsewhere (Loegering 1992), the Assateague Island National Seashore established 200 meter buffers zones around most nest sites and primary foraging areas (Assateague Island National Seashore 1993). Following a precipitous drop in numbers of nesting plover pairs in Delaware in the late 1980's, that State adopted a Piping Plover Management Plan that provided 100 yard buffers around nests on State park lands and included intertidal areas (Delaware Department of Natural Resources and Environmental Control 1990).

Table 1. Summary of Chick Mobility Data

Source	Location	Data
Patterson 1988 (p.40)	Maryland and Virginia	18 of 38 broods moved to feeding areas more than 100 meters from their nests; 5 broods moved more than 600 meters (distance measured parallel to wrackline).
Cross 1989 (p.23)	Virginia	At three sites, observers relocated broods at mean distances from their nests of 153 m +/-97m (44 observations, 14 broods), 32 m +/-7 m (8 observations, 3 broods), and 492 m +/-281 m (12 observations, 4 broods).
Coutu et al. 1990 (p.12)	North Carolina	Observations of 11 broods averaged 212 m from their nests; 3 broods moved 400-725 m from nest sites.
Strauss 1990 (p.33)	Massachusetts	10 chicks moved more than 200 m during first 5 days post-hatch while 19 chicks moved less than 200 meters during same interval.
Loegering 1992 (p.72)	Maryland	Distances broods moved from nests during first 5 days post-hatch averaged 195 m in Bay habitat (n=10), 141 m in Interior habitat (n=36), and 131 m in Ocean habitat (n=41). By 21 days, average movement in each habitat had, respectively, increased to 850 m (n=1), 464 m (n=10), and 187 m (n=69). One brood moved more than 1000 m from its nest.
Melvin et al. 1994	Massachusetts and New York	In 14 incidents in which 18 chicks were killed by vehicles, chicks were run over ≤ 10 m to ≤ 900 m from their nests. In 7 of these instances, mortality occurred ≥ 200 m from the nest.

Table 2. Summary of Data on Distances at which Piping Plovers React to Disturbance

Source	Location	Data
Flushing of Incubating Birds by Pedestrians		
Flemming et al. 1988 (p.326)	Nova Scotia	Adults usually flushed from the nests at distances <40 m; however, great variation existed and reaction distances as great as 210 m were observed.
Cross 1990 (p.47)	Virginia	Mean flushing distances in each of two years were 47 m (n=181, range = 5 m to 300 m) and 25 m (n=214, range = 2 m to 100 m).
Loegering 1992 (p.61)	Maryland	Flushing distances averaged 78 m (n=43); range was 20 m to 174 m. Recommended use of 225 m disturbance buffers on his site.
Cross and Terwilliger 1993	Virginia	Mean flushing distance for all years on all sites (Virginia plover sites, 1986-91) was 63 m (n=201, SD=31, range = 7 m to 200 m). Differences among years were not significant, but differences among sites were.
Hoopes 1993 (p.72)	Massachusetts	Mean flushing distance for incubating plovers was 24 m (n=31).
Disturbance to Non-incubating Birds		
Hoopes 1993 (p.89)	Massachusetts	Mean response distance (all ages, all behaviors) was 23 m for pedestrian disturbances (range = 10 m to 60 m), 40 m for vehicles (range = 30 m to 70 m), 46 m for dogs/pets (range = 20 m to 100 m), and 85 m for kites (range = 60 m to 120 m).
Goldin 1993b (p.74)	New York	Average flushing distance for adult and juvenile plovers was 18.7 m for pedestrian disturbances (n=585), 19.5 m for joggers (n=183), and 20.4 m for vehicles (n=111). Pedestrians caused chicks to flush at an average distance of 20.7 m (n=175), joggers at 32.3 m (n=37), and vehicles at 19.3 m (n=7). Tolerance of individual birds varied; one chick moved 260 m in direct response to 20 disturbances in 1 hour.

APPENDIX G

Memorandum of Agreement Between Newbury and PRNWR

MEMORANDUM OF UNDERSTANDING

BETWEEN

U.S. FISH AND WILDLIFE SERVICE
PARKER RIVER NATIONAL WILDLIFE REFUGE
6 PLUM ISLAND TURNPIKE
NEWBURYPORT, MA 01950

AND

TOWN OF NEWBURY, MASSACHUSETTS
25 HIGH ROAD
NEWBURY, MASSACHUSETTS 01951

I. INTRODUCTION:

This understanding is between the Parker River National Wildlife Refuge “Refuge” and the Town of Newbury, Massachusetts “Town” for the cooperative management and monitoring of the Federal threatened and State endangered piping plover and state endangered least tern on that portion of Plum Island owned/managed by the Town.

II. PURPOSE:

The objectives of this cooperative effort are to:

1. Monitor beach property within the Town of Newbury for the presence of nesting piping plover and/or least terns.
2. Protect any piping plover or least tern nests, located on Plum Island beaches within the Town, from human and animal disturbance during the nesting period.
3. Assist the Refuge with the management and monitoring of nesting sites each year.

This effort will formalize an on-going informal effort between the Refuge and the Town in managing and monitoring nesting sites for piping plover along the Plum Island beach within the Town.

This formalized partnership will facilitate and enhance efforts to protect, manage, and monitor nesting piping plovers and least terns, should they nest on the Town beach, and contribute to the survival of these two species.

This agreement provides for the sharing of services, personnel, equipment, facilities, and funds.

III. AUTHORITY:

This MOU between the Parties is hereby entered into by the FWS under authority of the Fish and Wildlife Coordination Act, as amended, (16 U.S.C. Section 661), the Fish and Wildlife Act of 1956 [16 U.S.C. 742f(a)(4)], the North American Conservation Act (16 U.S.C. 4401-4412; 103 Stat 1968) P.L.101-233; National Wildlife Refuge System

Administration Act of 1966 (16 U.S.C. 668dd-668ee) -- This Act, derived from sections 4 and 5 of Public Law 89-669 (October 15, 1966; 80 Stat. 927), constitutes an "organic act" for the National Wildlife Refuge System. It was recently amended by P.L. 105-57, "The National Wildlife Refuge System Improvement Act of 1997."

Note: The obligations of both Parties herein are subject to the availability of funding, and nothing contained herein shall be construed as binding either Party to expend in any one fiscal year any sum in excess of available private dollars, State or congressional appropriations, or to involve either Party in any contract or other obligation for further expenditure of money in excess of such appropriations or private allocations.

IV. STATEMENT OF MUTUAL BENEFIT:

This program will promote the Service's mission of working with others to conserve, protect, and enhance fish, wildlife and plants and their habitats for the continuing benefit of the American people. It will also promote the Towns efforts to support the protection and management of barrier beach property by providing habitat for the piping plover and least tern.

V. RESPONSIBILITIES:

A. The Refuge will:

- 1) Provide staff and/or volunteers to monitor the beach for piping plover and least tern nesting activity, fence and sign nesting sites, set up predator exclosures around nests, monitor nesting activity.
- 2) Train any Town staff working on the beach during the nesting season with regard to nesting piping plover or least tern activity. .
- 3) Provide a report reviewing the season's piping plover nesting activity and issues, and provide recommendations for the next season.

B. The Town shall:

- 1) Provide the necessary materials for protecting nesting piping plover and least terns including, but not limited to, fencing materials, nest exclosures, and nesting area signs.
- 2) Assist with funding temporary staff engaged in monitoring nesting activities on the Town portion of Plum Island.
- 3) Coordinate any beach management activity with refuge staff during the nesting season to prevent any adverse impacts to piping plovers or least terns.
- 4) Provide signs and enforce all local ordinances regarding dogs within 100 yards of nesting piping plovers or least terns.
- 5) Work with Refuge staff to provide information to Plum Island residents and visitors regarding this piping plover and least tern cooperative effort.

- C. Refuge staff will meet with the Town at least semi-annually to review the purposes of this agreement, accomplishments of the previous years work, and the next nesting season.

VI. AGREEMENT TERM:

This Agreement shall be for a term of 5 years, commencing on the date of its execution, after which it shall be reviewed for possible renewal. This Agreement may be terminated, without cause, by either party, by giving a 30-day written notice to the other party.

VII. SPECIAL PROVISIONS:

- A. This MOU is neither a fiscal nor a funds obligation document. Any endeavor involving reimbursement or contribution of funds between the parties of this MOU will be handled in accordance with applicable laws, regulations, and procedures.
- B. This agreement is made upon the express condition that the United States, its agents, and employees shall be free from all liabilities and claims for damages and/or suits for or by reason of injury to any person or property of any kind whatsoever, whether to the person or property of the Town or third parties, from any cause whatsoever arising from any activities conducted pursuant to the terms of this Agreement, and the Town hereby covenants and agrees to indemnify, defend, save, and hold harmless the United States, its agents and employees from all such liabilities, expenses and costs on account of or by reason of any injuries, deaths, liabilities, claims, suits or losses however occurring or damages arising out of the same. This indemnification shall survive the termination of this Agreement
- C. This Agreement shall constitute the entire Agreement between the parties and may not be modified or amended except by a written instrument executed by each of the parties, expressing such amendment. No failure by either party to exercise, and no delay in exercising any right, power or remedy hereunder shall operate as a waiver thereof, nor shall any single or partial exercise of any right, power or remedy hereunder preclude any other or further exercise thereof, or the exercise of any other right, power or remedy.
- D. No member of or delegate of Congress or a resident commissioner after their election or appointment, either before or after they have qualified and during continuance in office; and no officer, agent, or employee of the Federal Government shall be admitted to any share or part of this contract or agreement or any benefit arising therefrom. The provision herein, with respect to the interest of members of Congress and resident commissioners in this agreement shall not be constructed to extend to an incorporated company where such contract or agreement is for the general benefit of such corporation.
- E. During the term of this Agreement, the Town will not discriminate against any person because of race, color, religion, sex, or national origin and will take affirmative action to ensure that applicants are employed without regard to their race, color, sexual orientation, national origin, disabilities, religion, age, or sex.
- F. The Town will pay to the United States the full value for all damages to the lands or

other properties or employees of the FWS arising out of acts or omissions of the Town, its representatives, employees or contractors during the term of this Agreement.

- G. This Agreement does not grant rights or benefits of any nature to any third party.
- H The Town shall not assign to any other person or entity any part of this Agreement, unless the prior written approval of the Refuge.
- I. The principle contacts for this MOU are:
 - 1. U.S. Fish and Wildlife Service
Parker River NWR
Graham W. Taylor, Refuge Manager
6 Plum Island Turnpike
Newburyport, MA 01950
(978) 465-5753
 - 2. Newbury Conservation Commission
Doug Packer, Chair
25 High Road
Newbury, MA 01951
(978) 462-1372

In Witness Whereof, the parties have caused this Memorandum of Understanding to be executed as of the date of last signature below:

APPROVED:

U.S. Fish and Wildlife Service
Parker River NWR

Town of Newbury, Massachusetts
Board of Selectmen

BY: _____
Title:

BY: _____
Title: Chair

DATE: _____

DATE: _____

APPENDIX H

Piping Plover Nesting Area 2007-2008

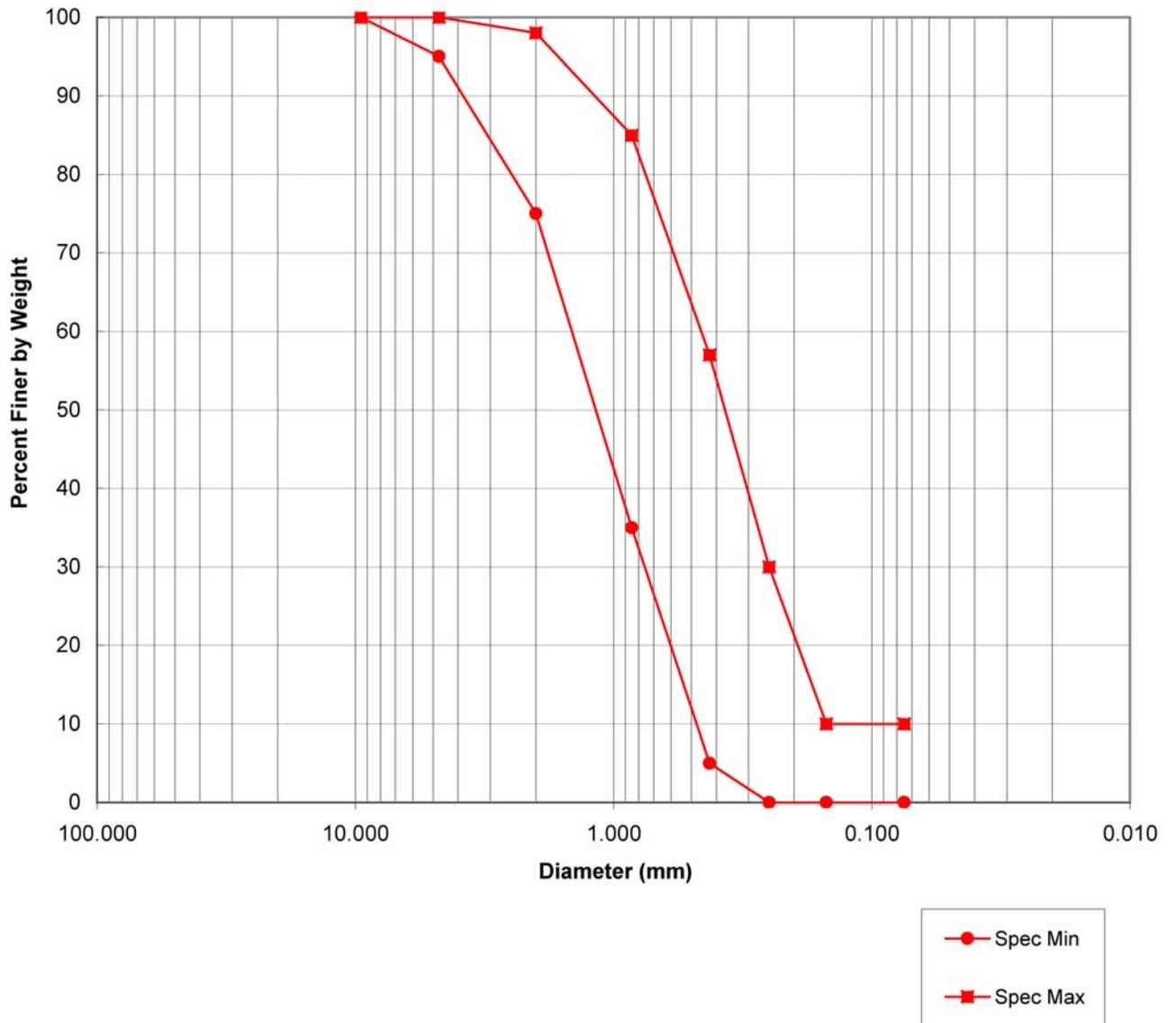


TOWN OF NEWBURY BEACH MANAGEMENT PLAN PIPING PLOVER NESTING AREA 2007–2008

APPENDIX I

Beach Sand Gradation Specifications for Offsite Sourcing

Town of Newbury Beach Management Plan
Beach Sand Gradation Specifications
For Offsite Sourcing



APPENDIX J

Site Photographs



PHOTOGRAPH 1
Newbury Beach from Helicopter Looking South.



PHOTOGRAPH 2
Newbury Beach from Helicopter Looking North from Reservation.



PHOTOGRAPH 3
Town Center Parking Facility.



PHOTOGRAPH 4
Town Center Groin.



PHOTOGRAPH 5
Erosion at Town Center (November 2008).



PHOTOGRAPH 6
Erosion Control Sand Bags and Planting at Town Center (April 2009).



PHOTOGRAPH 7
Typical Dune and Beach from Town Center looking South.



PHOTOGRAPH 8
Erosion at Beach Access Point.



PHOTOGRAPH 9
Mobi Mat Erosion Control.



PHOTOGRAPH 10
Newbury Beach from looking South.

APPENDIX K

Plum Island Public Access Plan (2006)

PLUM ISLAND PUBLIC ACCESS PLAN



Prepared for:

Department of Conservation and Recreation

Boston, MA

Prepared by:



August, 2006

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1.0 INTRODUCTION

In 2006, the City of Newburyport and the Town of Newbury requested funding from the State Seaport Council to undertake a public access planning study for the residentially developed portion of Plum Island. The Seaport Council subsequently authorized the state Division of Conservation and Recreation to prepare the study. The purpose of the study is to identify potential access routes to Plum Island beaches and the Newburyport Plum Island Basin and to develop conceptual plans for the Plum Island Point Parking lot and restroom facility and the Newbury Center Parking lot and proposed lifeguard station, viewing platform and restroom facility.

2.0 GEOGRAPHIC SETTING AND STUDY AREA

Plum Island is a nine mile long barrier island located just offshore of the Merrimack River estuary in northeastern Massachusetts (See Figure 1, Project Locus). The island is connected to the mainland in only one location at the Plum Island Turnpike which crosses through the City of Newburyport and Town of Newbury. The Bay Circuit Trail which, when complete, will extend some 200 miles from northeastern to southeastern Massachusetts, currently terminates in Plum Island and provides bicyclists and walkers an alternative means of access to the island. Captains Fishing Parties has an excursion vessel operation located at the northern tip of the island. The only other boat access on the island is a small ramp on the Plum Island/Parker River side of the island in the Parker River National Wildlife Reservation which is used by small craft such as kayaks and canoes.

The island is comprised of four communities which include from north to south, Newburyport, Newbury, Rowley and Ipswich. The northern tip of the island in the City of Newburyport forms the entrance to the Merrimack River from the Atlantic Ocean. At its southern tip in the Town of Ipswich, the island forms the entrance to the mouth of the Ipswich River. The Atlantic Ocean lies to the east and the Plum Island and Parker Rivers which contain significant tidal flats and salt marsh areas lie to the west. The northern portion of the island is forked and forms a Basin that contains salt marsh, sandy beaches and eelgrass areas (see Figure 2, Plum Island and Surrounding Environment).

The northern third of the island, which is the Study Area, is primarily residentially developed with some commercial uses such as retail stores, restaurants and lodging places. The southern two thirds of the island, which is owned by the state and federal governments, is an important natural and cultural resource which remains in its natural state.

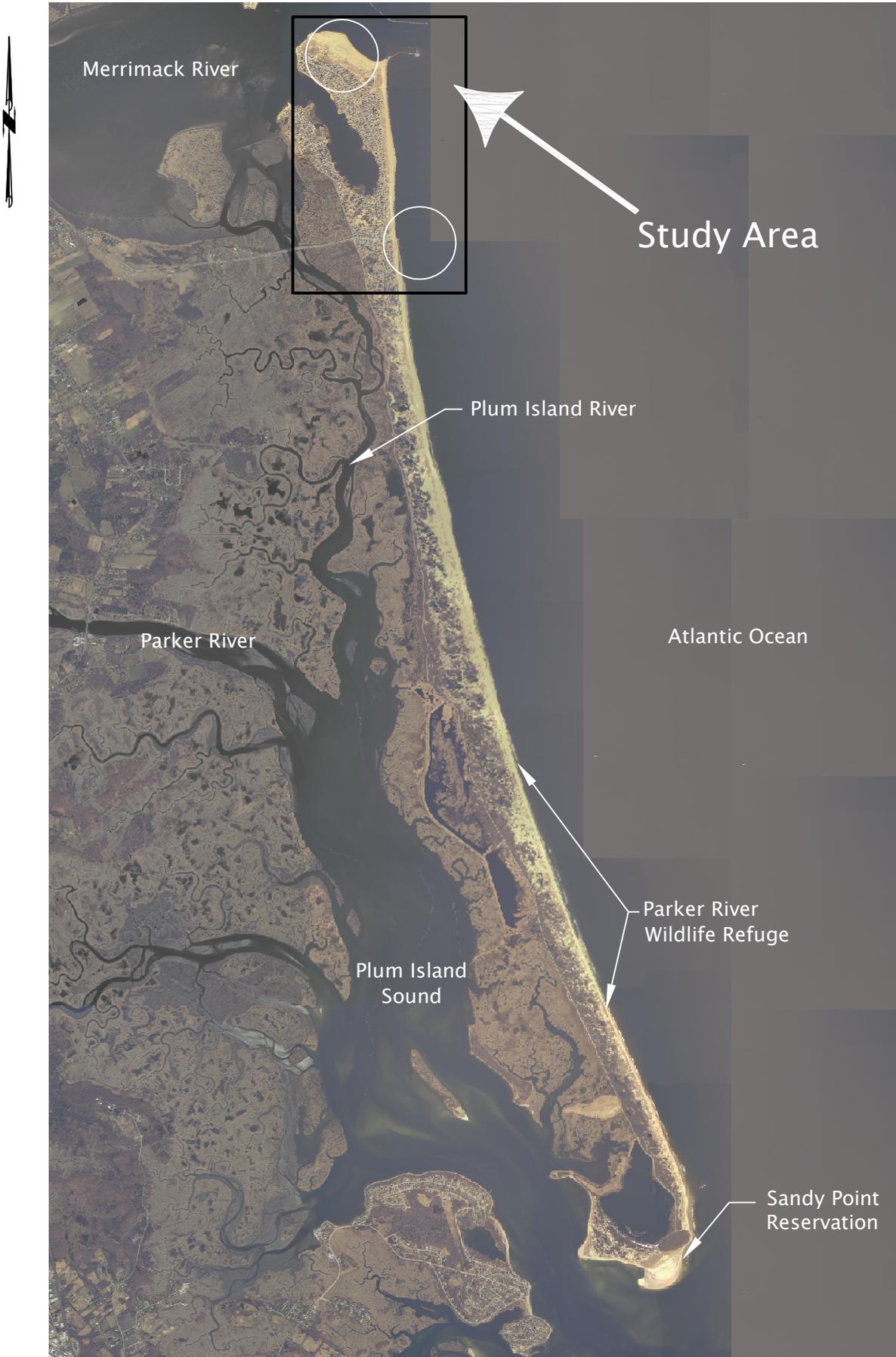


Figure 2
PLUM ISLAND AND SURROUNDING ENVIRONMENT

The island is located along the Atlantic Flyway and due to its unique natural environment, is of special significance to waterfowl and shorebirds. Hundreds of thousands of birdwatchers and other nature enthusiasts from all over the country visit the island's public parks on an annual basis.

The closure of the federal and state-owned beaches (typically during the months of April through July) to protect the nesting habitat of the piping plover places enormous pressure on the northern residential portion of the island as visitors seek alternate locations for reaching the beach and the Atlantic Ocean.

3.0 CULTURAL AND CIVIC CONTEXT

In the early 1800's, the island was connected to the mainland by a bridge and began to develop into a summer resort destination with streets, a trolley system, hotels, restaurants and dockage for visiting steamships. The notoriously treacherous conditions at the mouth of the Merrimack River spurred the need for life saving facilities which formally began in the mid to late 1800's when the federal government constructed a Life Saving Station on the Island. These facilities were later replaced with a U. S. Coast Guard Station that was constructed on Plum Island Point in the 1930's/1940's. In the 1970's the Coast Guard Station was moved off the island to Newburyport along the Merrimack River on Water Street where it remains today.

Starting around the 1940's, summer homes on the island began to be converted into year round residences which put pressure on the existing well water and septic systems. During the 1970's and 1980's development pressures increased as many homes were expanded which eventually led to the failure of many septic systems. In the late 1990's plans were developed to provide public water and sewer systems to the island. Newbury and Newburyport voted to appropriate funding in 2000 and the work was begun in 2004. The water and sewer project is still ongoing and is expected to be completed by 2007. Legislation that funded the water and sewer project also placed a moratorium on new commercial development. There is one hotel located on the island, one service station, a few restaurants and other commercial establishments.

3.1 State and Federal Government

As noted, the state and federal government own large tracts of land in the southern portion of the island. The federal government owns the 4,600 acre Parker River National Wildlife Refuge which offers bird watching, trails and beach coming activities on its six+ miles of sandy beaches and dunes along the Atlantic Ocean as well as tidal creeks, salt marshes and salt panes along the western side of the island. The state Division of Conservation and Recreation owns the 77-acre Sandy Point

Reservation located beyond and south of the Refuge which contains beaches and walking paths.

Access to the federal and state lands is via a gated entrance on Sunset Drive which for a fee leads to a paved road extending the remaining length of the island. Restricted parking, walkways and foot trails provide access to beaches. To protect the sensitive ecosystem, visitors are required to use existing marked paths and are not allowed to cross the extensive sand dunes. The Refuge also contains viewing platforms and observation towers.

The federal government also owns about 63 acres of land on the northern tip of the island which was formerly used as the Coast Guard Life Saving Station.

3.2 Non Profit Organizations

There are several active non profit organizations involved in preserving and enhancing the unique quality and character of the island. These organizations include the Plum Island Tax Payers Association (PITA) which works to improve the quality of life on the island, undertakes fundraising, provides public information and holds community meetings in their hall located on Northern Boulevard; the Friends of Parker River National Wildlife Refuge which assists the federal government in public awareness of conservation and resource management goals for the Refuge; the Newbury Beach Committee, formed in 2002, which is developing a beach management plan and is involved in fundraising and dune restoration and grass planting activities; the Friends of Plum Island Lighthouse which maintains the City of Newburyport-owned Plum Island Coast Guard building under a lease agreement; and other recreational organizations such as the Plum Island Surfcasters which was founded in 1957 and offers educational programs for children and adults.

4.0 REGULATORY CONTEXT

Plum Island is a barrier beach which contains coastal dunes, dune grass, salt marsh areas, tidal creeks and mudflats and an abundance of waterfowl and wildlife including the endangered piping plover birds.

In Massachusetts, barrier islands and salt marshes receive special protection and any proposed development of these resources must abide by strict guidelines. Because most of the residential structures on the island were constructed prior to the promulgation of the state regulations governing these special resource areas, home owners are allowed to expand and re-construct their residences within certain development guidelines. Over the past several years both the Town of Newbury and the City of Newburyport have enacted wetland regulations that require new

structures to be supported on pilings and elevated at least 2 feet above existing flood levels to allow the natural sand movement and dune formation to occur.

Projects proposed in these resource areas must file applications with the local Conservation Commission in the respective municipalities within which the work is being proposed.

5.0 PUBLIC FACILITIES

5.1 Parking Areas

There is a fee-based paved, public parking lot located at the northern tip of the island which is owned and operated by the City of Newburyport. The parking lot has a small ticket booth and can accommodate approximately 150 vehicles including patrons using the adjacent playground.

There is a public parking lot located at intersection of Plum Island Boulevard and Northern Boulevard which is owned and managed by the Town of Newbury. There are also several private, fee based parking lots located near the Plum Island Center which together provide 100- 200 parking spaces at rates that range from \$2.00 to \$10.00 per day.



Newburyport Parking Lot



Newbury Center Parking Lot

5.2 Parks

In addition to the previously mentioned Parker River Wildlife Refuge and Sandy Point Reservation, there is also a playground, the Sawyer Memorial Park, located at the northern end of the island adjacent to the City of Newburyport Parking Lot. The playground was constructed by PITA within the last few years and contains picnic tables, slides, swings, benches and a shade structure. There is also a small passive recreational area, the Father Sears Park located close the Refuge which is used for sitting and viewing the natural environment.

5.3 Public Access Structures

A new 375 linear foot timber, pile supported boardwalk was installed along the northeast portion of the island in 2005-2006. Significant areas around the walkway, which were previously used as paths to the beach, have now filled in with sand and beach vegetation.



Sawyer Memorial Park



Plum Island Point Boardwalk

5.4 Restrooms

There are very limited public restroom facilities within the Plum Island Study Area. At the northern portion of the island in the City of Newburyport parking lot there is a single story, 484 square foot (sf), masonry, restroom facility containing five stalls and two urinals that is in need of replacement. There is also usually one or two porta potties placed adjacent to the building during summer months. The Newbury Center Parking lot contains two handicap porta potties and six regular porta potties.



City of Newburyport Restroom Facility



Newbury Center Porta Potties

5.5 Other

The City of Newburyport is acquiring the former Parker River Wildlife Office and Maintenance Building located at Plum Island Point. The City will use the facility for a small police and fire substation, a lifeguard station and public restrooms. The building will require renovations to accommodate these uses and is outside the scope of this study.



Parker River Wildlife Office

6.0 PUBLIC ACCESS PLAN

As stated in Section 1.0, the City of Newburyport and the Town of Newbury requested funding from the State Seaport Council to undertake a public access planning study for the residentially developed portion of Plum Island. The purpose of the study is to identify existing and potential improved access routes to Plum Island beaches and Plum Island Basin and to develop conceptual plans for the Newburyport Plum Island Point Parking lot and restroom facility and the Newbury Center Parking lot and proposed lifeguard station, viewing platform and restroom facility. The following sections describe the proposed public access plan including identification of and prioritization for activating individual public access ways; and a conceptual layout of the proposed building and cost estimates for suggested improvements.

6.1 Public Access Objectives

The major objectives of the Plum Island Public Access Plan is to identify appropriate locations for public access to the beach and to provide a priority system for undertaking improvements to activate the various access paths with surface treatment and signage including emergency vehicular access. The Plan also provides schematic designs and preliminary cost estimates for the development of a new life guard station including public restrooms and a viewing platform as well as site improvements at the Newbury Center parking lot and renovation of the existing restroom facility, recommendations for a future restroom facility, re-striping of the parking lot and installation of fencing at the Newburyport Plum Island Point Parking Lot to control access and segregate users of the playground from users of the beach.

6.2 Public Walkways

The Plum Island Beach Company originally laid out the street system on Plum Island in 1920 that exists today. Many of the rights of way extend to the coastline providing public access to the beaches, the Atlantic Ocean and the Plum Island and Parker Rivers. Over the years, some of the rights of way have been obstructed by various types of structures or have been used as private yards.



Stair Encroachment

Mobi Mat Demonstration 17th Street



To address the pressures placed on residents resulting from visitors desiring to access the beaches in the northern portion of the island (which is further exacerbated when the federal and state beaches are closed to protect the piping plovers) PITA began a public access initiative in 2004 to identify and open up these public access rights of way. This effort resulted in the marking and signage of nine rights of way

located off of Northern Boulevard. In 2006, the group implemented a demonstration project to determine if a new surface treatment, “Mobi Mats” could successfully be used to maintain a firm walking surface and at the same time allow sand to travel over and under the mat and vegetation to grow alongside. Two 4’6” *Mobi Mats* of different weights were installed in 17th Street in April of 2006. The Mats have held up well to foot traffic while allowing sand to travel over and under the mats. In late summer of 2006, another larger *Mobi Mat* (9’2” wide) will be installed at the Newbury Center parking lot for demonstration use as combined pedestrian/emergency vehicular access. Private fundraising is currently underway to acquire the demonstration mats.

There are over 100 additional rights of way on the island of which 80 have been identified (with the assistance of representatives from PITA) as locations where public access should be encouraged (see Figure 3, Public Access Plan). There are also existing paths that extend from the public roads to the Atlantic Ocean that are not located on rights of way. The goal of the public access plan is to re-activate in priority order important public rights of ways and to abandon paths that extend from the street that are not on rights of way to allow these areas to return to their natural state with sand , dunes and vegetation.

Some of the rights of way will be improved with surface treatment such as the *Mobi Mats* and a signage system will be developed to assist the public in identifying rights of way to be used to travel to their desired destination.



Figure 3
PUBLIC ACCESS PLAN

6.2.1 Priority Setting

The Public Access Plan labels each right of way suggested for improvement using a color-coded system. As noted on the plan, Priority 1 rights of way are those locations where public access already exists, where minor to no existing physical obstructions, exist or the where the rights of way will replace existing public access points that are currently not located on actual rights of way. Priority 2 rights of way are desirable access locations that contain obstructions which are not readily removable, provide access to less desirable beach and basin locations, and/or or require greater effort to construct or maintain (based on potential usage) as compared to Priority 1 locations. Priority 3 rights of way are locations that include obstructed locations and/or are unlikely to be utilized by the public as they lead to undesirable locations such as eelgrass beds, salt marsh or mudflats. Table 1 provides an inventory of the public access rights of way and identifies priorities.

6.2.2 Signage

As part of the initial PITA public access program, signs were installed along the main streets indicating public access locations. A signage plan including a designation system should be developed with consistent design theme for use in designating public access ways throughout the Study Area. "No Access" signs should also be installed in the areas that will be closed to public access. Such efforts will assist visitors in their way-finding and will reduce the use of closed footpaths.

6.2.3 Surface Treatment

As noted, PITA has explored the use of *Mobi Mats* on the public access ways. *Mobi Mats* are lightweight, flexible, polyester mats that come in widths varying from 4'6"; 6'5" and 9'2 inches. The mats have been used in various applications in sensitive beach environments.

There are also roll up timber mats and composite type walkways that have been used in the past in other beach applications. However, these mats, while perhaps less expensive than *Mobi Mats*, are much heavier and not as easily placed and/or removed.

6.3 Emergency Vehicular Access

An important feature of the public access plan is to ensure that there is adequate access with suitable stability for emergency vehicles. At present, emergency vehicles access the beach via the sand path at the Newbury Center Parking lot, at 23rd Street and at Dartmouth Way. The federal government also maintains emergency access ways at Plum Island Point. The public access plan would formalize these access routes with some changes. Emergency Access and public access at the Newbury Center Parking lot will be relocated to the northerly side of the lot as described in 6.4 below.

TABLE 1
Public Access Inventory

<u>(#)</u>	<u>Roadway</u>	<u>Town</u>	<u>Location</u>	<u>Provides Access To</u>	<u>Surveyed</u>	<u>Description</u>	<u>Signs</u>	<u>Priority</u>	<u>Potential Walkway</u>
1	Fordham Way	Newbury	South of House #30 (Temple/Fordham Intersection)	Beach	NO	Well Marked w/Fences	YES	1	W
2	"	"	South of House #37 (Harvard/Fordham Intersection)	Beach	NO	Well Marked w/Fences	YES	1	W
3	Northern Blvd.	"	Town of Newbury Parking Lot	Beach	YES	Path to Beach	YES	1	W
4	"	"	3rd Street	Beach	YES	Path to Beach - Wall	NO	1	W
5	"	"	South of House #16, 5th Street	Beach	YES	Path to Beach	NO	1	W
6	"	"	7th Street	Beach	YES	Path to Beach	YES	1	W
7	"	"	11th Street, Goes Thru House #36	Beach	YES	Partially Thru House	NO	1	W
8	"	"	13th Street	Beach	YES	Path to Beach	YES	1	W
9	"	"	South of House #48, 15th Street	Beach	YES	Stairs Washed Out	YES	1	W
10	"	"	North of House #50, 17th Street	Beach	NO	Demonstration Plastic Walkway Location	YES	1	W
11	"	"	North of House #80, 23rd Street	Beach	NO	Public Access - Vehicles (DPW)	YES	1	W
12	"	"	South of House #86, North of House #84, 25th Street	Beach	NO	Possibly Thru Carport - Deck/Stairs	NO	2	
13	"	"	South of House #90, 27th Street	Beach	NO	Steps to Beach	NO	2	
14	"	"	South of House #98, 29th Street	Beach	YES	Possibly Intersects Overhang on Hse #98	YES	1	W

TABLE 1 (Continued)

15	"	"	South of House #100, 31st Street	Beach	NO	Path to Beach	NO	2	
16	"	"	33rd Street	Beach	YES	Path to Beach	YES	1	W
17	"	"	35th Street	Beach	YES	Path to Beach	YES	1	W
18	"	"	37th Street	Beach	NO	Easy Access	NO	1	W
19	"	"	39th Street	Beach	NO	Easy Access	NO	1	W
20	"	"	41st Street	Beach	NO	Path to Beach Possible Encroachment on	NO	1	W
21	"	"	43rd Street	Beach	NO	South Side	NO	1	W
22	"	"	45th Street	Beach	NO	Easy Access Poles on North	NO	1	W
23	"	"	47th Street	Beach	NO	Side	NO	1	W
24	"	"	49th Street	Beach	YES	Path to Beach	YES	1	W
25	"	Newburyport	51st Street	Beach	NO	Path to Beach	YES	1	W
26	"	"	53rd Street	Beach	NO	Path to Beach	YES	1	W
27	"	"	55th Street	Beach	NO	Path to Beach	NO	1	W
28	"	"	57th Street	Beach	NO	Path to Beach	NO	1	W
29	"	"	Grant Street	Gov't Beach	NO	Government Beach	NO	3	
30	"	"	City of Newburyport Parking Lot	Beach	YES	New Elevated Boardwalk to River	YES	1	W
31	"	"	City of Newburyport - Plum Island Point	Beach	NO	Access to River	YES	1	W
32	Harbor Street	"	South of House #29	Basin	NO	Fencing	NO	1	W
33	"	"	76th Street	Basin	NO	Access OK	NO	1	W
34	Basin Street	"	Opposite House #32, North of House #27	Basin	NO	Unnamed Access	NO	1	W
35	"	"	64th Street	Basin	NO	Path to Basin R.O.W., Walk in	NO	1	W
36	Northern Blvd.	"	54th Street	Basin/Marsh	NO	Marsh	NO	3	
37	"	Newbury	42nd Street	Basin/Marsh	NO	Marsh	NO	3	

TABLE 1 (Continued)

						Deck May Encroach -			
38	"	"	40th Street	Basin/Marsh	NO	Resident's Need	NO	1	W
39	"	"	36th Street	Basin/Marsh	NO	Bulkhead/Rocks - Unlikely	NO	3	
40	"	"	34th Street - No Road from Blvd.	Basin/Marsh	NO	Possible Deck Encroachment - No Road Access	NO	3	
41	"	"	26th Street	Basin/Marsh	NO	Possible Marsh	NO	3	
42	"	"	22nd Street	Basin/Marsh	NO	Marsh	NO	3	
43	"	"	Off 20th Street - Between Lot #'s 128- 129	Basin/Marsh	NO	Marsh	NO	3	
44	"	"	Off 20th Street - Between Lot #'s 130- 132	Basin/Marsh	NO	Marsh	NO	3	
45	"	"	Off 20th Street - Between Lot #'s 133- 150	Basin/Marsh	NO	Marsh	NO	3	
46	"	"	16th Street, End to the Right	Basin/Marsh	NO	Launch Boat Ramp	YES	1	W
47	"	"	Hutchins Road	Hutchins Road - East/West Basin East/Vegetated	YES	Landscaped Yard	YES	1	W
48	"	"	14th Street	Land	NO	Dunes	NO	3	
49	Old Point Road	"	Hutchins Road - Opposite Side	Hutchins Road - East/West Basin	YES	Landscaped Yard	YES	1	W
50	"	"	Johnson Street	Basin/Marsh	NO	Bush/Marsh R.O.W., Thru	NO	3	
51	"	"	Ivy Street	Basin/Marsh	NO	Shed/Marsh	NO	3	
52	"	"	Cinder Street	Basin/Marsh	NO	Open/Marsh	NO	3	
53	"	"	Anchor Street	Basin/Marsh	NO	Vegetated/Marsh	NO	3	
54	"	"	Brock Street	Basin/Marsh	NO	Clear/Marsh	NO	3	
55	"	"	Finnigan Way	Basin/Marsh	NO	Open Beach, Marsh, Wall	NO	3	

TABLE 1 (Continued)

56	"	"	Davoi Street	Basin/Marsh	NO	Retaining Wall, Stairs Wood	NO	3
57	"	"	Riverside Street	Basin/Marsh	NO	Rock/Timber Wall, Fence	NO	3
58	"	"	Smith Street	Basin/Marsh	NO	R.O.W. to Walkway - Partially Blocked	NO	3
59	"	Newburyport	Blue Hill Avenue - East	Basin	NO	Severely Vegetated to Basin	NO	3
60	"	"	Blue Hill Avenue - West	West to Marsh	NO	West Side Marsh	NO	3
61	"	"	F - Street	West to Marsh	NO	West Side Marsh	NO	3
62	"	"	Flora Street	Basin	NO	Rock Wall, Access Open	NO	3
63	"	"	G - Street	West to Marsh	NO	West Side Marsh	NO	3
64	"	"	Gloria Street	Basin	NO	Marsh	NO	3
65	"	"	H - Street	West to Marsh	NO	Open	NO	3
66	"	"	Hellania Street	Basin/Marsh	NO	Marsh	NO	3
67	"	"	I - Street	West to Marsh	NO	Marsh	NO	3
68	"	"	Iris Street	Basin/Marsh	NO	Marsh	NO	3
69	"	"	J-Street - West Side	West to Marsh	NO	Open	NO	3
70	"	"	Julia Street	Basin	NO	Launching Ramp	YES	2
71	"	"	K-Street - West Side	West to Marsh	NO	Marsh	NO	3
72	"	"	Kate Street	Basin	NO	Open	NO	3
73	"	"	L Street - West Side	West to Marsh	NO	Marsh	NO	3
74	"	"	Louise Street	Basin	NO	Open	NO	3
75	"	"	M-Street - West Side	West to Marsh	NO	Marsh	NO	3
76	"	"	Martha Street	Basin	NO	Marsh	NO	3
77	"	"	N-Street - West Side	West to Marsh	NO	Marsh	NO	2
78	"	"	Nancy Street	Basin	NO	Good - Recommended	NO	2
79	"	"	O-Street - West Side	West to Marsh	NO	Marsh	NO	3
80	"	"	Pauline Street	Basin	NO	Marsh	NO	3

6.4 Newbury Center Parking Lot, Life Guard Station, Restrooms and Viewing Platform

The Newbury Center Parking Lot will be redesigned and a new structure constructed to provide life guard, public restroom and public viewing facilities. The proposed improvements are shown on Figure 4, Newbury Center Parking Lot Site Plan.

6.4.1 Site Layout, Parking and Utilities

The parking lot will be slightly reconfigured and the amount of pavement will be reduced by approximately 2,500 square feet. One handicap access parking spot and van unloading area will be provided at the northeastern end of the lot. Two bicycle racks will be installed at the southwestern end of the lot. There is existing electric service nearby and water and sewer service is understood to be provided as part of the ongoing water and sewer project.

6.4.2 Proposed Building and Viewing Platform

The existing life guard trailer used for life guard functions and porta potties will be replaced with a new building which will house handicap accessible restroom facilities as well as life guard facilities including an office and storage for All Terrain Vehicles. A handicap access ramp will be installed to provide access to the structure. An approximately 300 square foot viewing platform will be constructed at the eastern end of the structure. The building will be elevated to ensure that the bottom of the lowest structural member of the building is at least two feet above existing grade. The area underneath the structure, ramp and viewing platform will not be paved. See Figure 5 for conceptual plan view and elevations of the proposed life guard, restroom facility which will be connected to the new public water and sewer system.

6.4.3 Beach Access

As noted, there is an existing beach access that extends from about the middle of the Center Parking Lot edge toward an existing stone groin and the beach.



Newbury Center Existing Access to Beach

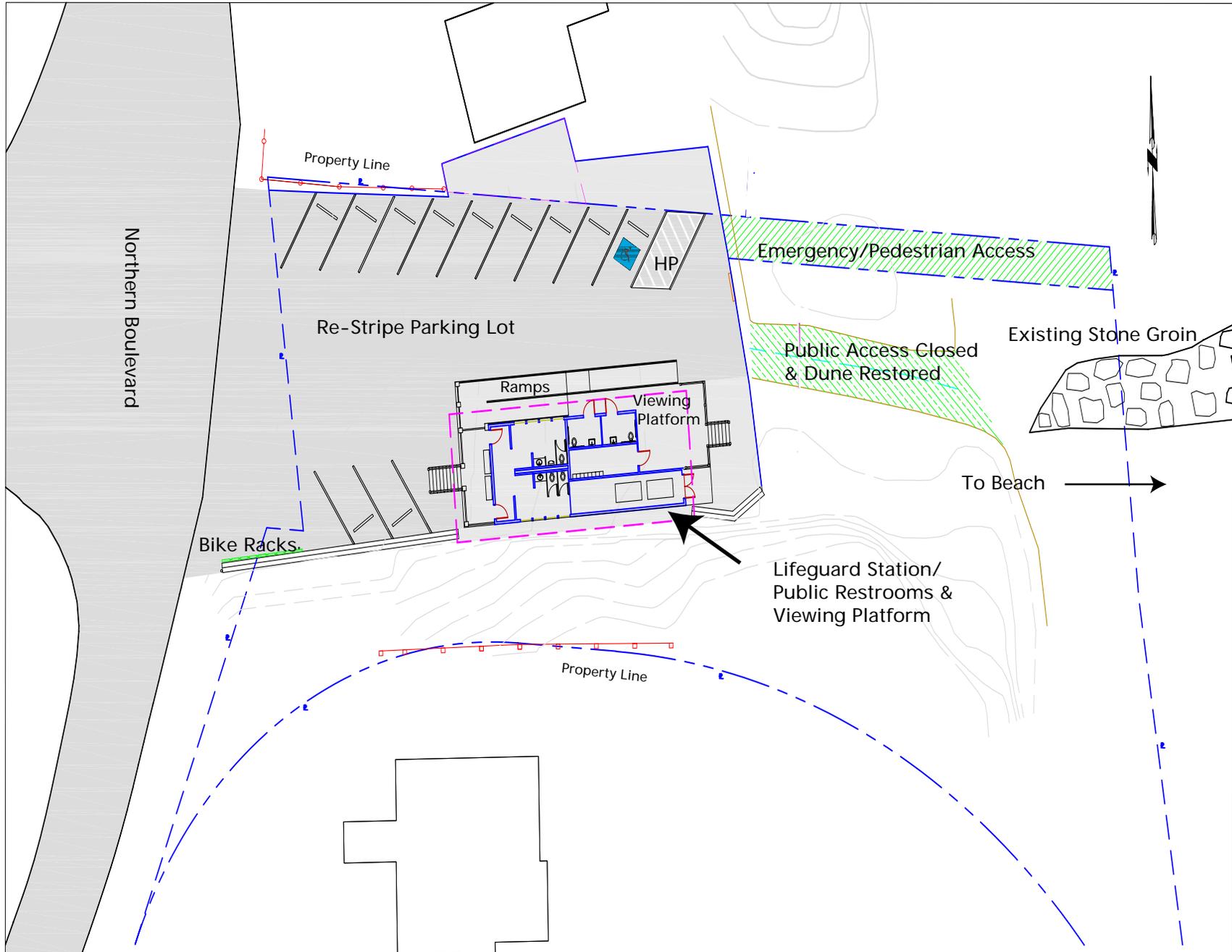


Figure 4
NEWBURY CENTER PARKING LOT SITE PLAN

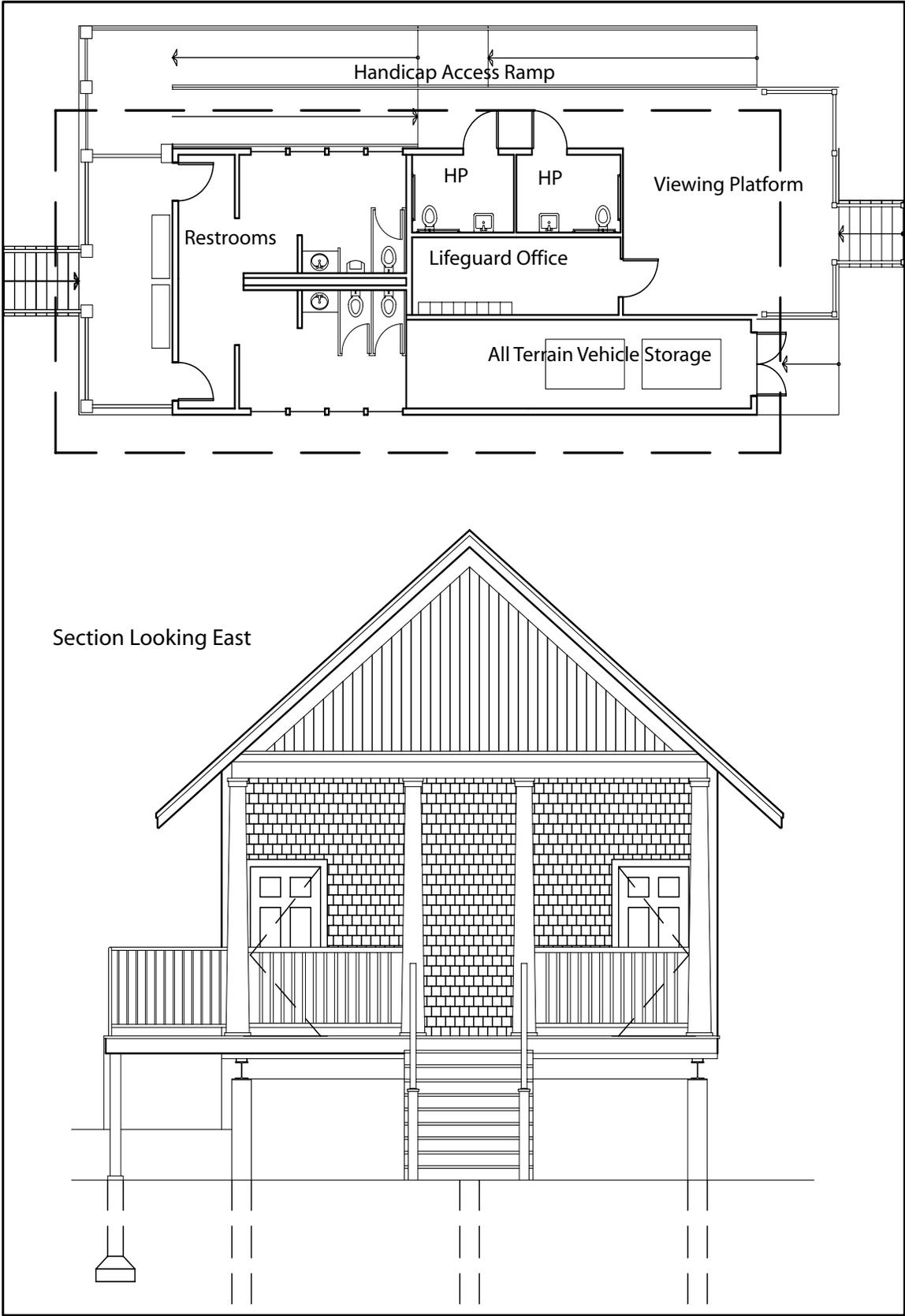


Figure 5
CONCEPTUAL PLAN VIEW AND SECTIONS NEWBURY LIFEGUARD AND RESTROOM FACILITY

The beach access will be relocated to a ten foot wide area on the northeastern end of the parking lot and will be surfaced with a nine +/- foot wide *Mobi Mat* that will allow pedestrian and emergency vehicular access to the beach. The existing pedestrian access will be closed and the area restored to allow the dune to rebuild.

6.5 Newburyport Point Parking Lot and Restroom Facility

Improvements proposed for the Newburyport Parking Lot located at Plum Island Point include re-striping of the parking lot, installation of additional fencing, replacement of the existing ticketing booth and interim improvements to the existing restroom facilities until that facility can be replaced with a new structure. The proposed improvements are shown on Figure 6, Newburyport Parking Lot Site Plan.

6.5.1 Site Layout and Utilities

The existing Newburyport Parking Lot is fenced with a ticket booth and has an entrance off of Point road and an exit at the northern edge of the lot. Parking fees are imposed for all users of the lot except for families using the playground.

The proposed site plan includes a parking lot layout with striping that can accommodate approximately 125 vehicles. A portion of the parking lot is located on property owned by the Commonwealth of Massachusetts which includes an access easement that extends to the communications tower maintained by the federal government.

The proposed fencing will be re-configured to separate the playground parking from the larger, fee based parking lot. Ten parking spaces will be provided at the playground site. By providing the fencing and on site parking, users of the playground can enter the area and park without having to pay a fee at the ticket booth. Access from the playground to the boardwalk will remain in its current condition. The existing ticket booth will be replaced with a 10 foot x 12 foot shed structure. There is existing electrical service to the site and the restroom facility will have modern connections to the proposed water and sewer system.

6.5.2 Restroom Facility

The existing restroom facility at the parking lot is in need of replacement. For the interim however, the facility will be rehabilitated by upgrading the stalls to meet current accessibility requirements and other improvements including replacement of exterior siding, interior walls, floors coverings and plumbing fixtures with materials that are easily maintained and in keeping with the context of the area. A conceptual layout of a replacement facility is shown on Figure 7.

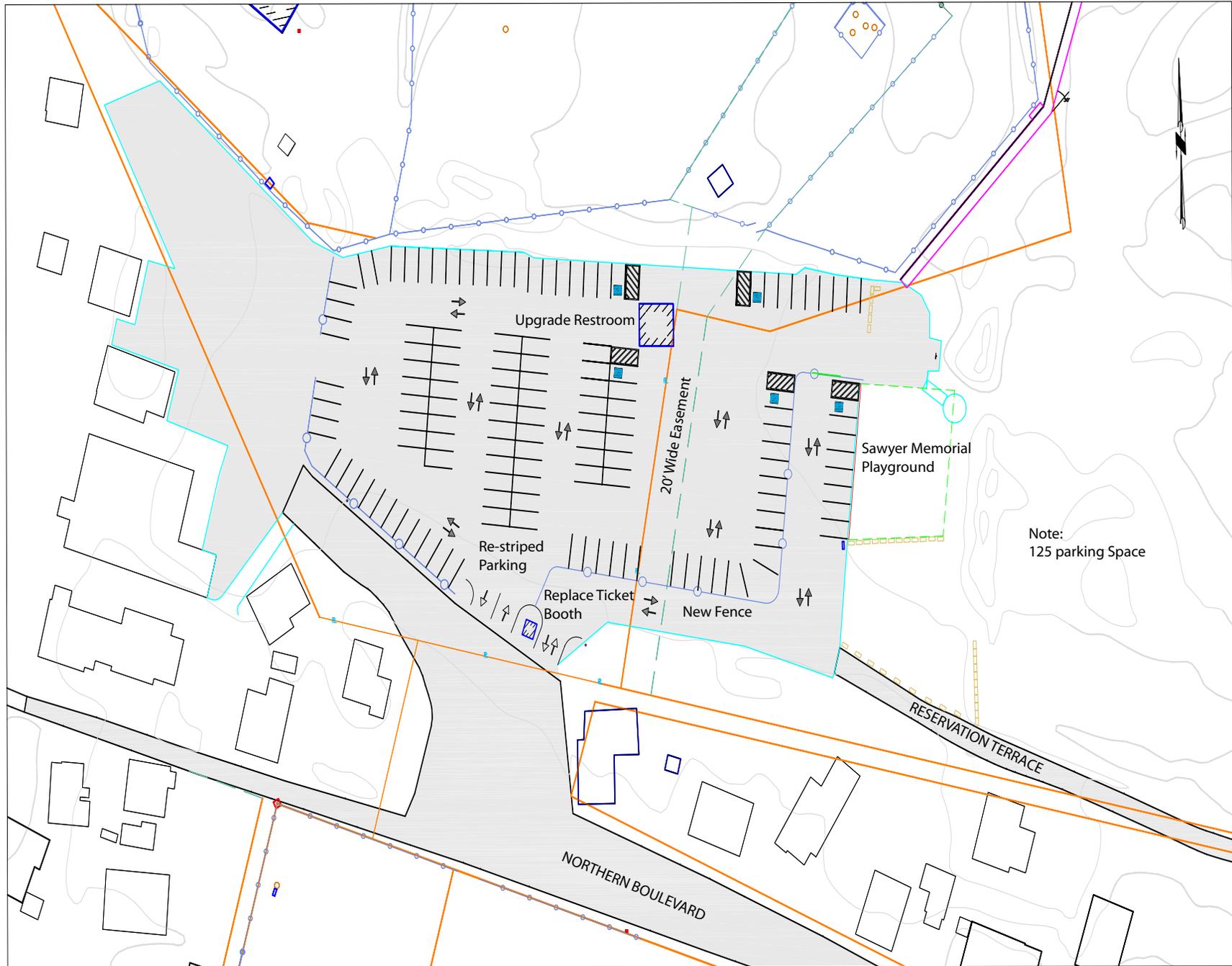


Figure 6
NEWBURYPORT POINT PARKING LOT SITE PLAN

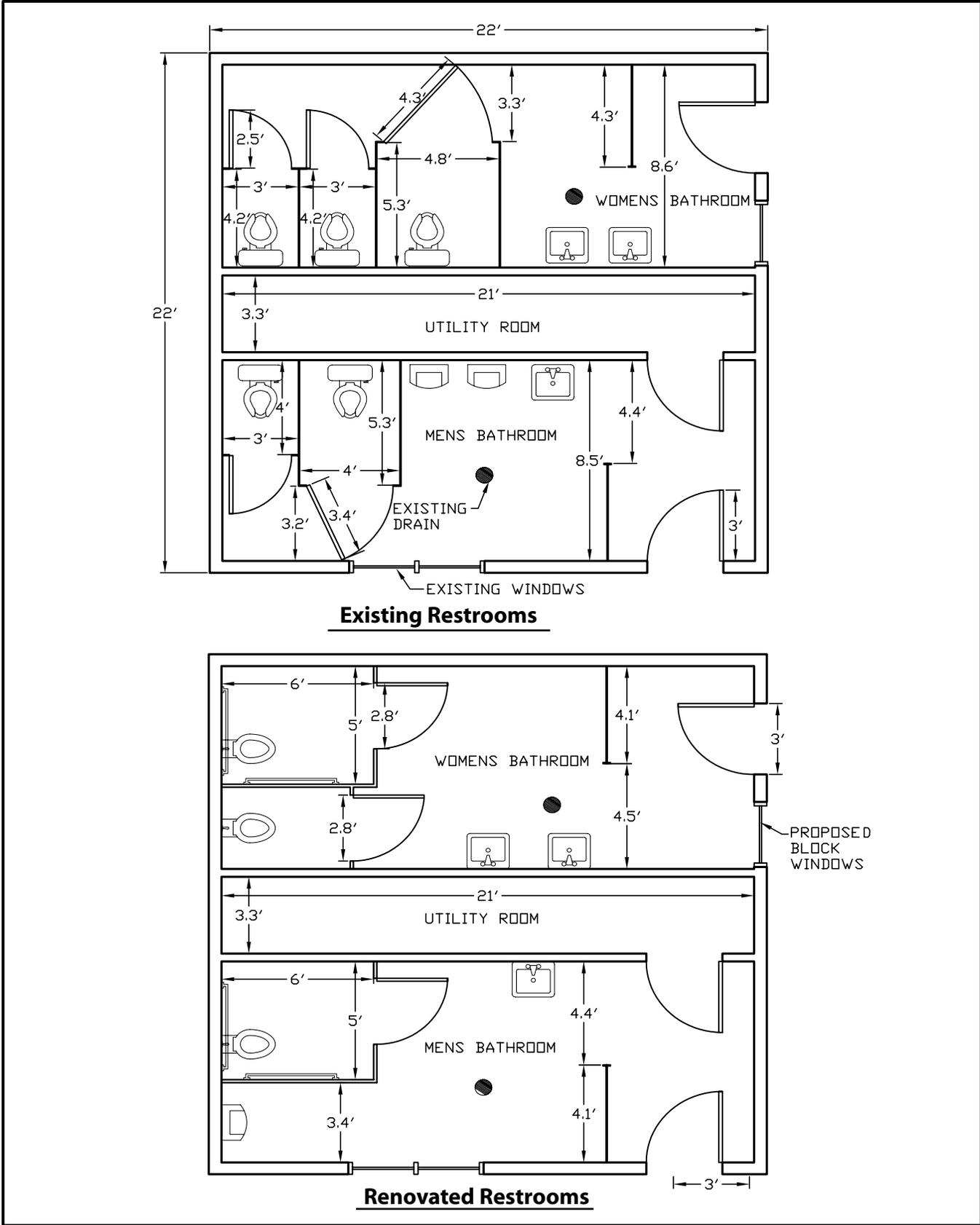


Figure 7
CONCEPTUAL PLAN VIEW NEWBURYPORT RESTROOM FACILITY

As shown in Figure 7, upgrading the existing restroom facility for universal access results in the elimination one stall each in the men and ladies rooms and one urinal in the men’s room. The facility will be connected to existing sewer and water.

7.0 COST ESTIMATES

Table 2 provides schematic cost estimates for the public access improvements described in this report.

**Table 1
Plum Island Public Access Improvements**

<i>Item No.</i>	<i>Location of Work</i>	<i>Item of Work</i>	<i>Unit</i>	<i>Cost</i>	<i>Total</i>
1	Plum Island	Public Access/Mobi-Mats (25 Locations)	8610 SF	\$ 10.89	\$ 93,762.90
		Signage	30 Each	\$ 200.00	\$ 6,000.00
2	Newbury	Restroom/Lifeguard Building	1230 SF	\$ 150.00	\$184,500.00
		Bike Rack	2 Each	\$ 1,200.00	\$ 2,400.00
		Site Work	Lump Sum	\$ 30,000.00	\$ 30,000.00
		Mobi-Mat	780 SF	\$ 18.00	\$ 14,040.00
3	Newburyport	Fencing	330 LF	\$ 20.00	\$ 6,600.00
		Ticket Booth	Lump Sum	\$ 12,000.00	\$ 12,000.00
		Site Work	Lump Sum	\$ 40,000.00	\$ 40,000.00
		Rehabilitation Restroom ¹	Lump Sum	\$ 60,000.00	\$ 60,000.00
Subtotal:					\$449,302.90
Engineering/Permitting (10%):					\$ 44,930.29
Admin/Construction Services (8%):					\$ 35,944.23
Construction Contingency (15%):					\$ 67,395.44
TOTAL:					\$597,572.86

Note 1: The project cost would increase by \$206,500 (including engineering/permitting; admin/construction services and construction contingency) if a replacement restroom facility is constructed versus rehabilitation of existing facility.

8.0 FUNDING SOURCES

In addition to private funding sources such as foundation grants and private fundraising, there are a few state grant programs that could be used to fund portions of the proposed improvements outlined in this report. Many of the grant programs require local matches and or formally adopted local open space and recreation plans as described below.

MA Seaport Bond Bill

The Seaport Bond Bill was adopted by the state legislature under Chapter 28 of the Acts of 1996. The bill specified a \$450,000 expenditure for public access improvements at Plum Island. The public access improvements outlined in this proposed observation deck at the Newbury Center Parking lot and other suggested public access related improvements may be eligible for funding under this program.

MA Executive Office of Environmental Affairs, Division of Conservation and Recreation

The State Division of Conservation and Recreation has several grant programs related to public access and/or open space as described below.

The Greenways and Trails Demonstration Grants Program (Not funded in 2006)

Provides \$5,000 grants to municipalities and non profits for greenway and trail planning, mapping and resource assessment, greenway related public education and outreach, and greenway and trail management, maintenance, and expansion.

Recreational Trails Grant (currently accepting grants for 2007 through October 2, 2006)

The Recreational Trails Program provides funding for a variety of trail protection, construction, and stewardship projects throughout Massachusetts. This national program makes funds available to develop and maintain recreational trails and trail-related facilities for both non-motorized and motorized recreational trail uses. The Program is funded through the Federal Highway Administration (FHWA) and administered in Massachusetts on a reimbursement basis by the Department of Conservation and Recreation (DCR), in partnership with the Massachusetts Recreational Trails Advisory Board, and the Executive Office of Transportation (EOT).

Rivers and Harbors Grant Program

A matching grant program under the Division of Conservation and Recreation Office of Waterways for local government for design and construction projects that address problems on coastal and inland waterways, lakes and great ponds. The purpose of this program is to enable municipalities to address various types of waterways-related problems and provide for financial and technical assistance during engineering, design, permit acquisition, construction management, construction and related efforts. Typical types of projects qualifying for the program are: dredging of channels, harbors and inland waterways for navigation, tidal flushing, flood storage and river, lake or pond restoration; provision of public access, including rehabilitation of publicly owned piers, seawalls, wharves, jetties, bulkheads and revetments; rehabilitation or construction of flood control measures,

including dikes, weirs, check dams, tide or floodgates and flood control internal drainage systems; lake and pond restoration or management activities for public access, water-dependent recreation or habitat enhancement purposes; beach nourishment for barrier beach maintenance, habitat enhancement or recreational purposes; coastal or inland wetlands restoration; and streambank and shoreline erosion control protection.

Federal Land and Water Conservation Fund

The Federal Land & Water Conservation Fund (P.L.88-578) provides up to 50% of the total project cost for the acquisition, development and renovation of park, recreation or conservation areas. Nearly 4000 acres have been acquired and hundreds of parks renovated using the \$94.2 million that Massachusetts has received from the state side portion of the federal program since 1965. Municipal Conservation commissions and park departments are eligible to apply for grant funds. Access by the general public is required.

Urban Self Help Grants

Provides grant assistance to cities and towns to acquire parkland, and also to develop or renovate existing outdoor public recreation facilities. Any town with a population of 35,000 or more year-round residents, or any city regardless of size, that has an authorized park /recreation commission and conservation commission, is eligible to participate in the program. Communities that do not meet the population criteria listed above may still qualify under the "small town," "regional," or "statewide" project provisions of the program. Municipalities must have a current open space and recreation plan to apply, and the land must be open to the general public. Municipalities must have a current open space and recreation plan to apply, and the land must be open to the general public.

Private Fundraising

Private Fundraising is another source of financial aid that has successfully been used for Plum Island improvements in the past.

APPENDIX L

**Dune Stability Program (2008/09)
(Illustration by Ross Wescott)**

DUNE REINFORCEMENT PROJECT

PLUM ISLAND, NEWBURY, MA
November-December 2008

The erosion of beach and dune immediately north of the center parking lot groin directly threatens public infrastructure and private property. The current effort to reinforce the remaining dune involves the construction of a “soft” biodegradable buttress. While it does not solve the erosion problem, it should greatly reduce the loss of sand from the dune during storms.

The proprietary system being installed by NETCO consists of a series of interlocking sand filled tubes of varying length and approximately 3-4 feet in diameter. The tubes are fabricated in place on the beach from three layers of “fabric”.



The exterior consists of two layers of a coconut fiber “coir” mat (approximate 1”x 1” mesh) that provide “structural” protection. The interior layer is a finely woven burlap fabric. These layers create an envelope that constrains the sand, allows water to drain away, and supports the growth of beach grass.

The tubes, when stacked and backed by the existing dune, provide a coherent structure of sufficient mass and flexibility to absorb and dissipate wave energy.

The structure is not invulnerable, however. Impact from large floating objects (e.g. tree trunks, limbs and lumber) can damage the envelope resulting in loss of sand and integrity. Human activity (walking or climbing on the structure) is another potential hazard..

A trench is excavated in the beach. Plywood forms are positioned along the seaward side to form a 4’ wall. Two mats of coconut fiber (coir) are rolled into the trench with the seaward side draped over the plywood forms. In this photo installers are positioning the inner burlap liner. Square panels of coir and burlap are stitched to close the ends and form the tube. A “BobCat” type front end loader carefully fills the space where the workers are standing with sand.



The burlap edges are pulled together and folded to form a seam that is closed with a portable electric sewing machine.



The coir edges are pulled together and hand stitched with curved needles and coir twine.



The installer sews the end closed.



Forms are moved into position to start another tube, and sand is back filled behind the tube.



A second team has started constructing layer 1 tubes in a southerly direction; and layer 2 is being added in the foreground.

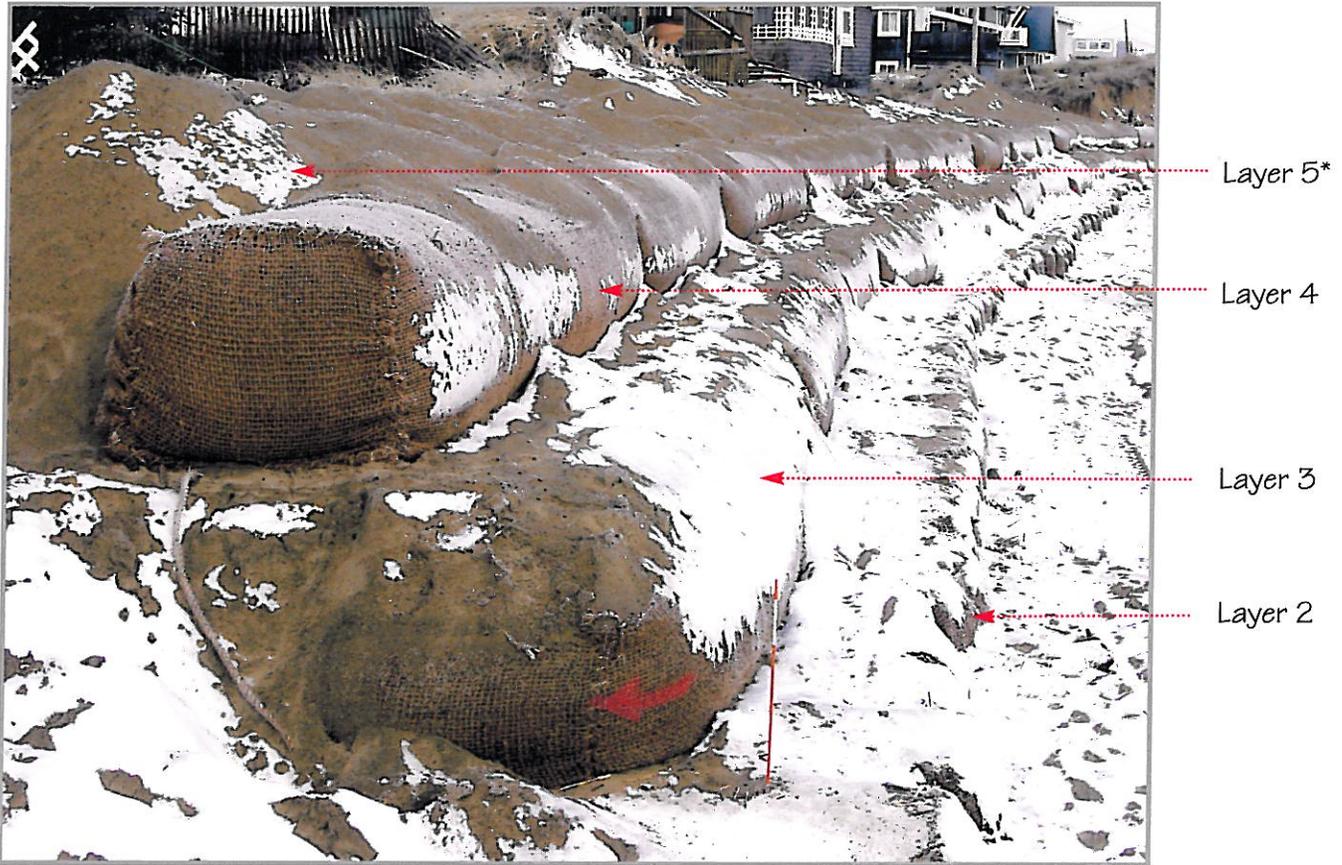


The 2nd layer consists of 6 foot long tubes constructed "in place" at a right angle to and on top of the layer 1 (base tubes).

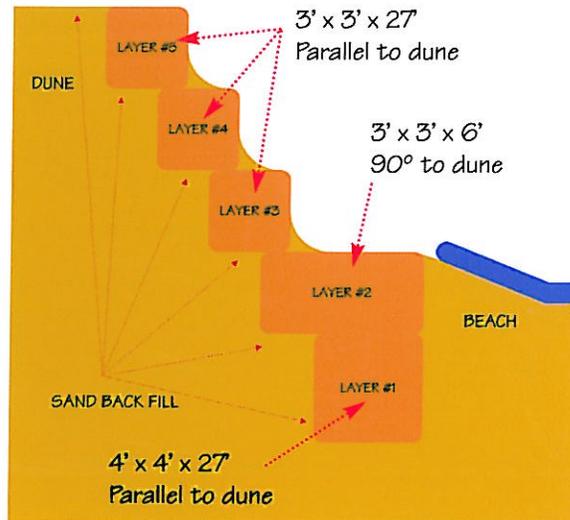


Layer 2 has been completed to the north and is being extended southward to the groin. The 3rd layer will consist of 27 tubes placed end to end and offset shoreward on top of these 6' tubes.





December 18, 2008: Three of the four layers are visible. * A 5th layer will be added to complete the structure



Structure cross section
(conceptual illustration)