

FWR 10.00 FALMOUTH CONSERVATION COMMISSION

Falmouth Wetland Regulations - Part II Coastal

July 15, 1998, Effective August 15, 1998

FWR 10.21: Introduction

FWR 10.21 through 10.40 apply to all work subject to Chapter 235 of the Code of Falmouth, which will remove, dredge, fill, build upon, degrade or otherwise alter any coastal beach, coastal dune, tidal flat, coastal wetland, land subject to coastal storm flowage, coastal bank, bank of an estuary, bank of a salt pond, land subject to tidal action, or land under an estuary, under a salt pond, under the ocean or under certain streams, ponds, rivers, lakes or creeks within the coastal zone that are anadromous/catadromous fish runs or the lands and waters within the Black Beach\Great Sappiest Marsh District of Critical Planning Concern or the lands and waters within the Waquoit Bay Area of Critical Environmental Concern. This Part is in addition to and does not change the provisions set forth in FWR 10.01 through FWR 10.19. FWR 10.21 through 10.40 are intended to ensure that development along the coastline is located, designed, built and maintained in a manner that protects the public resource area values in the coastal resources listed in Chapter 235 of the Code of Falmouth. The proponent of the work must submit sufficient information to enable the Commission to determine whether the proposed work will comply with FWR 10.21 through 10.40. Any proposed work may be subject to the requirements of sections concerning coastal beaches, coastal dunes, land subject to coastal storm flowage, and land containing shellfish. Thus, in order to determine which provisions apply to a proposed project, FWR 10.00 must be read in its entirety. Each coastal resource section begins with an introduction. The Introduction identifies the resource area values of Chapter 235 of the Code of Falmouth to which that resource is or is likely to be significant and describes the characteristics or factors of the resource which are critical to the protection of the resource area values to which the resource is significant. FWR 10.21 through 10.40 are in the form of performance standards and shall be interpreted to protect those characteristics and resources to the maximum extent permissible under Chapter 235 of the Code of Falmouth.

The performance standards are intended to identify the level of protection the Commission must impose in order to contribute to the protection of the resource area values of Chapter 235 of the Code of Falmouth. It is the responsibility of the Commission to order specific measures and requirements for each proposed project which will ensure that the project is designed and carried out consistent with the required level of protection. The Commission must then issue a Permit which is understandable and enforceable.

FWR 10.22: Purpose

FWR 10.21 through 10.40 are promulgated pursuant to Chapter 235 of the Code of Falmouth and are intended to implement it. They are further intended to establish criteria and standards for the uniform and coordinated administration of the provisions of Chapter 235 of the Code of Falmouth.

FWR 10.23: Additional Definitions for FWR 10.21 through 10.40

The definitions contained in FWR 10.23 apply to and are valid for FWR 10.21 through 10.40. The following definitions are for terms used throughout FWR 10.21 through 10.40. Other terms that are used only in specific sections of FWR 10.21 through 10.40 are defined in those sections.

Coastal engineering structure means, but is not limited to, any breakwater, bulkhead, groin, jetty, revetment, seawall, weir, riprap gabions, marine mattress, sandbags, or any other structure that is designed to alter wave, tidal or sediment transport processes in order to protect inland or upland structures from the effects of such processes.

DMF means the Division of Marine Fisheries.

Grain Size means a measure of the size of a material or rock particle that makes up sediment.

Improvement Dredging means any dredging under a license in an area which has not previously been dredged or which extends the original dredged width, depth, length or otherwise alters the original boundaries of a previously dredged area.

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Littoral processes means the movement of sediment, including gravel, sand or cobbles, along the coast caused by waves or

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currents.

Maintenance Dredging means dredging under a license in any previously dredged area which does not extend the originally-dredged depth, width, or length but does not mean improvement dredging or backfilling.

Marine Fisheries means any animal life inhabiting the ocean or its adjacent tidal waters or the land thereunder that is utilized by man in a recreational and/or commercial manner or that is part of the food chain for such animal life.

Mean High Water Line means the line where the arithmetic mean of the high water heights observed over a specific 19-year metonic cycle (the National Tidal Datum Epoch) meets the shore and shall be determined using hydrographic survey data of the National Ocean Survey of the U.S. Department of Commerce.

Mean Low Water Line means the line where the arithmetic mean of the low water heights observed over a specific 19-year metonic cycle (the National Tidal Datum Epoch) meets the shore and shall be determined using hydrographic survey data of the National Ocean Survey of the U.S. Department of Commerce.

Productivity means the rate of biomass production over a period of time.

Turbidity means the amount of particulate matter suspended in water.

Water circulation means the pattern of water movement in coastal waters.

FWR 10.24: General Provisions

(1) If the Commission determines that a resource area is significant to an resource area value of Chapter 235 of the Code of Falmouth for which no presumption is stated in the Introduction to the applicable section, the Conservation Commission shall impose such conditions as are necessary to contribute to the protection of such resource area value.

(2) When the Commission determines that a project in one resource area would adversely affect another resource area, the Commission shall impose such conditions as will protect the resource area value to which each resource are significant to the same degree as required in FWR 10.00 concerning each resource area.

(3) A determination which finds that a resource area is not significant to an resource area value to which it is presumed in FWR 10.21 through 10.40 to be significant, or is significant to a resource area value to which it is presumed to be not significant, shall be made on Form F.

(4) (a) FWR 10.21 through 10.40 do not change the requirement of any other Massachusetts statute or Falmouth Bylaw. A proposed project must comply with all applicable requirements of other federal, state, Barnstable County Ordinances, and Town of Falmouth bylaws, in addition to meeting the requirements of FWR 10.00. Examples of such laws which may be applicable are the Coastal Restrictions Act (M.G.L. c. 130, § 105), the Ocean Sanctuaries Act (M.G.L. c. 132A, §§ 13 through 16 and 18), the Mineral Resources Act (M.G.L. c. 21, §§ 54 through 58), the Massachusetts Clean Water Act (M.G.L. c. 21, §§ 26 through 53), the Waterways laws (M.G.L. c. 91), the Massachusetts Environmental Policy Act (M.G.L. c. 30, §§ 61 through 62H), the act establishing the Cape Cod Commission, the Wetlands Protection Act (M.G.L. c. 131 §40) and the Scenic Rivers Act (M.G.L. c. 21, § 2. 17B).

(b) If an NPDES permit for any new point-source discharge has or will be obtained prior to the commencement of the discharge, the effluent limitations established in such permit shall be deemed to satisfy the water quality standards established in any section of FWR 10.21 through 10.40 relative to the effects of the new point-source discharge on water quality. Such effluent limitations shall be incorporated or shall be deemed to be incorporated into the Permit.

(5) FWR 10.24 is not intended to prohibit the Commission from imposing such additional conditions as are necessary to contribute to the resource area values of Chapter 235 of the Town of Falmouth where the indicated minimizing measures are

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not sufficient.

(6) Notwithstanding the provisions of FWR 10.25 through 10.38, the Commission may issue a Permit and impose such conditions

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as will contribute to the resource area values identified in Chapter 235 of the Code of Falmouth permitting the following limited project (although no such project may be permitted which will have any adverse effect on habitat sites of rare species):

- (a) Maintenance and improvement of existing public roadways, sidewalks and bicycle facilities but limited to widening less than a single lane, adding shoulders, correcting substandard intersections, and improving drainage systems.
- (b) The routine maintenance and repair of road drainage structures including culverts and catch basins, drainage easements, ditches, watercourses and artificial water conveyances to insure flow capacities which existed on August 15, 1998.
- (c) Assessment, monitoring, containment, mitigation, and remediation of, or other response to, a release or threat of release of oil and/or hazardous material in accordance with the provisions of 310 CMR 40.0000 and the following general conditions (although no such measure may be permitted which is designed in accordance with the provisions of 310 CMR 40.1020 solely to reduce contamination to a level lower than that which is needed to achieve "No Significant Risk" as defined in 310 CMR 40.0006(10)):

1. There are no practicable alternatives to the response action being proposed that are consistent with the provisions of 310 CMR 40.0000 and that would be less damaging to resource areas. The alternatives analysis shall include the following:

- a. an alternative that does not alter resource areas, which will provide baseline data for evaluating other alternatives; and
 - b. an assessment of alternatives to both temporary and permanent impacts to resource areas; and
2. Such projects shall be designed, constructed, implemented, operated, and maintained to avoid or, where avoidance is not practicable, to minimize impacts to resource areas, and to meet the following standards to the maximum extent practicable:

- a. hydrological changes to resource areas shall be minimized;
- b. best management practices shall be used to minimize adverse impacts during construction, including prevention of erosion and siltation of resource areas in accordance with standard U.S.D.A. Soil Conservation Service methods;
- c. mitigating measures shall be implemented that contribute to the protection of the resource area values identified in the Bylaw;
- d. no access road, assessment or monitoring device, or other structure or activity shall restrict flows so as to cause an increase in flood stage or velocity;
- e. temporary structures and work areas in resource areas, such as access roads and assessment and monitoring devices, shall be removed within 30 days of completion of the work. Temporary alterations to resource areas shall be substantially restored to preexisting hydrology and topography. The surface of any area of disturbed vegetation shall be reestablished with indigenous wetland plant species immediately following work in said area and prior to said vegetative reestablishment any exposed soil in the area of disturbed vegetation shall be temporarily stabilized to prevent erosion in accordance with standard U.S.D.A. Soil Conservation Service methods. At least 75% of the surface of said area of disturbed vegetation shall be reestablished with indigenous wetland plant species within two growing seasons. Temporary structures, work areas, and alterations to resource areas are those that no longer are necessary to fulfill the requirements of 310 CMR 40.0000; and
- f. work in resource areas shall occur only when the ground is sufficiently frozen, dry, or otherwise stable to support the equipment being used.

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FWR 10.25 Land Under the Ocean^{1 2}

(1) Introduction. Land under the ocean is likely to be significant to fisheries, where there are shellfish, to shellfish,³ aesthetics, and recreation. Nearshore areas of land under the ocean are additionally likely to be significant to storm damage prevention, flood control, wildlife habitat, aesthetics, and recreation.

Land under the ocean provides feeding areas, spawning and nursery grounds and shelter for many coastal organisms related to marine fisheries. Nearshore areas of land under the ocean help reduce storm damage and flooding by diminishing and buffering the high energy effects of storms. Submerged bars dissipate storm wave energy. Such areas provide a source of sediment for seasonal rebuilding of coastal beaches and dunes. Nearshore areas of land under the ocean also provide important food for birds. For example, waterfowl feed heavily on vegetation (such as eel grass, widgeon grass, and macrophytic algae) and invertebrates (such as polychaetes and mollusks) found in shallow submerged land under the ocean. Land under the ocean provides water views that substantially increase property values and recreational opportunities such as fishing and boating which are critical to the economic base of Falmouth.

(2) Definitions and critical characteristics.

(a) Land Under the Ocean means land extending from the mean low water line seaward to the boundary of Falmouth's jurisdiction, but does not include land under estuaries.

(b) Nearshore Areas of land under the ocean means that land extending from the mean low water line to the seaward limit of a Falmouth's jurisdiction, but in no case beyond the point where the land is 80 feet below the level of the ocean at mean low water.

(c) When nearshore areas of land under the ocean are significant to storm damage prevention or flood control, the bottom topography of such land and the volume of sediment are critical to the protection of those resource area values.

(d) When nearshore areas or other land under the ocean is significant to fisheries or wildlife habitat, the following factors are critical to the protection of such resource area values:

1. water circulation,
2. distribution of sediment grain size,
3. water quality,
4. finfish habitat, and
5. important food for wildlife.

(e) When land under the ocean is significant to recreation or aesthetics the following factors are critical to the protection of such resource area values:

1. a clear line of sight,
2. navigable waters
3. water quality,
4. finfish habitat, and
5. shellfish habitat.

(3) Presumptions of Significance.

(a) When a proposed project involves the dredging, removing, filling, building upon, degrading or otherwise altering of a nearshore area of land under the ocean, the Commission shall presume that the area is significant to, and the proposed activity will have a significant or cumulative effect upon, the resource area values specified in FWR 10.25(1) .

(b) When a proposed project involves the dredging, removing, filling, building upon, degrading or otherwise altering of land under the ocean beyond the nearshore area, the Commission shall presume that such land is significant to, and the proposed activity will have a significant or cumulative effect upon, the resource area values specified in FWR 10.25(1),

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¹ Additional regulations regarding Land under the Ocean in the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern are found in FWR 10.39. Additional regulations regarding Land under the Ocean in the Waquoit Bay ACEC are found in FWR 10.40.

² See FWR 10.16(1) for regulations regarding docks proposed in Land Under the Ocean.

³ For regulations concerning land containing shellfish, see FWR 10.34.

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except for storm damage prevention, flood control or wildlife habitat.

(d) These presumptions are rebuttable and may be overcome only upon a clear showing that the Land Under the Ocean does not play a role in the protection of said resource area values. In the event that the presumptions are deemed to have been overcome, the Commission shall make a written determination to this effect, setting forth the grounds.

(4) General Performance Standards

(a) When land under the ocean underlies an anadromous/catadromous fish run, FWR 10.35 shall apply.

(b) When land under the ocean is land containing shellfish, FWR 10.34 shall apply.

(c) When land under the ocean or nearshore areas of land under the ocean are found to be significant to fisheries, wildlife habitat, storm damage prevention, flood control, recreation or aesthetics FWR 10.25(5) through (7) shall apply.

(5) Improvement dredging for navigational purposes affecting land under the ocean shall be designed and carried out using the best available measures so as to minimize adverse effects on such interests caused by changes in:

(a) bottom topography which will result in increased flooding or erosion caused by an increase in the height or velocity of waves impacting the shore;

(b) sediment transport processes which will increase flood or erosion hazards by affecting the natural replenishment of beaches;

(c) water circulation which will result in an adverse change in flushing rate, temperature, or turbidity levels; or

(d) marine productivity which will result from the suspension or transport of pollutants, the smothering of bottom organisms, the accumulation of pollutants by organisms, or the destruction of marine fisheries habitat or wildlife habitat.

(6) Maintenance dredging for navigational purposes affecting land under the ocean shall be designed and carried out using the best available measures so as to minimize adverse effects on such interests caused by changes in marine productivity which will result from the suspension or transport of pollutants, increases in turbidity, the smothering of bottom organisms, the accumulation of pollutants by organisms, or the destruction of fisheries habitat or wildlife habitat.

(7) Projects not included in FWR 10.25(5) or 10.25(6) which affect nearshore areas of land under the ocean shall not cause adverse effects by altering the bottom topography so as to increase storm damage or erosion of coastal beaches, coastal banks, coastal dunes, or salt marshes.

(8) Projects not included in FWR 10.25(5) or 10.25(6) which affect nearshore areas of land under the ocean shall not cause adverse effects by altering the bottom topography so as to impede navigation for recreational vessels, or by impeding an open line of sight.

(9) Projects not included in FWR 10.25(5) which affect land under the ocean shall if water-dependent be designed and constructed, using best available measures, so as to minimize adverse effects, and if non-water-dependent, have no adverse effects, on fisheries habitat or wildlife habitat caused by:

(a) alterations in water circulation;

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

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

(d) alterations of shallow submerged lands with high densities of polychaetes, mollusks or macrophytic algae.

(10) Notwithstanding the provisions of FWR 10.25(5) through (9), no project shall be permitted which will have any adverse effect on habitat sites of rare species.

(11) Notwithstanding the provisions of FWR 10.25(5) and (7) through (9), no project shall be permitted which will result in the destruction of eelgrass (*Zostera marina*) or widgeon grass (*Ruppia maritima*) beds;

(12) Where projects are proposed subject to the provisions of FWR 10.25(5) and 10.25(6) and the US Army Corps of Engineers dredged material disposal criteria are met, all dredged material must be disposed off so as to be available for transport to adjacent coastal beaches and dunes within the littoral transport system.

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FWR 10.26 Land Under Estuaries⁴

(1) Introduction Land under Estuaries is likely to be significant to fisheries, wildlife habitat, where there are shellfish, to shellfish,⁵ aesthetics, storm damage prevention, flood control, and recreation.

Land under estuaries provides feeding areas, spawning and nursery grounds and shelter for many coastal organisms related to marine fisheries. Land under estuaries help reduce storm damage and flooding by diminishing and buffering the high energy effects of storms. Submerged bars dissipate storm wave energy. Such areas provide a source of sediment for seasonal rebuilding of coastal beaches and dunes. Land under estuaries also provide important food for birds. For example, waterfowl feed heavily on vegetation (such as eel grass, widgeon grass, and macrophytic algae) and invertebrates (such as polychaetes and mollusks). Land under estuaries provides water views that substantially increase property values and recreational opportunities such as fishing and boating which are critical to the economic base of Falmouth.

(2) Definition, Critical Characteristics, and Boundary

(a) An estuary is the lower course of a river or stream where its current is met by the tides. Estuaries are characterized by a salinity of greater than 5 ppm or by fluctuations in water elevations due to rise and fall of the tides.

(b) When land under estuaries are significant to storm damage prevention, flood control, fisheries, or wildlife habitat, the following characteristics are critical to the protection of those resource area values:

1. bottom topography of such land
1. water circulation,
2. distribution of sediment grain size,
3. water quality,
4. finfish habitat,
5. important food for wildlife.

(c) When land under estuaries is significant to recreation or aesthetics the following factors are critical to the protection of such resource area values:

1. a clear line of sight,
2. navigable waters
3. water quality,
4. finfish habitat, and
5. shellfish habitat.

(d) The landward boundary of land under estuaries is the mean low water line seaward. The seaward boundary is where the estuary meets the ocean or a salt pond.

(3) Presumption

(a) When a proposed project involves the dredging, removing, filling, building upon, degrading or otherwise altering of land under estuaries, the Commission shall presume that the area is significant to, and the proposed activity will have a significant or cumulative effect upon, the resource area values specified in FWR 10.26(1). These presumptions are rebuttable and may be overcome only upon a clear showing that the Land Under estuaries does not play a role in the protection of said resource area values. In the event that the presumptions are deemed to have been overcome, the Commission shall make a written determination to this effect, setting forth the grounds.

(4) General Performance Standards

(a) When land under estuaries underlies an anadromous/catadromous fish run, FWR 10.35 shall apply.

(b) When land under estuaries is land containing shellfish, FWR 10.34 shall apply.

(c) When land under estuaries are found to be significant to fisheries, wildlife habitat, storm damage prevention, flood control, recreation or aesthetics FWR 10.26(5) through (7) shall apply.

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⁴ Additional regulations regarding Land under the Ocean in the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern are found in FWR 10.39. Additional regulations regarding Land under the Ocean in the Waquoit Bay ACEC are found in FWR 10.40.

⁵ For regulations concerning land containing shellfish, see FWR 10.34.

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(5) Maintenance dredging for navigational purposes affecting land under estuaries shall be designed and carried out using the best available measures so as to minimize adverse effects on such interests caused by changes in marine productivity which will result from the suspension or transport of pollutants, increases in turbidity, the smothering of bottom organisms, the accumulation of pollutants by organisms, or the destruction of fisheries habitat or wildlife habitat.

(6) Projects not included in FWR 10.26(5) which affect land under estuaries shall not cause adverse effects by altering the bottom topography so as to increase storm damage or erosion of coastal beaches, coastal banks, coastal dunes, or salt marshes.

(7) Projects not included in FWR 10.26(5) which affect land under estuaries shall not cause adverse effects by altering the bottom topography so as to impede navigation for recreational vessels or by impeding an open line of sight.

(8) Projects not included in FWR 10.26(5) which affect land under estuaries shall if water-dependent be designed and constructed, using best available measures, so as to minimize adverse effects, and if non-water-dependent, have no adverse effects, on fisheries habitat or wildlife habitat caused by:

- (a) alterations in water circulation;
- (b) alterations in the distribution of sediment grain size;
- (c) changes in water quality, including, but not limited to, other than natural fluctuations in the level of dissolved oxygen, temperature or turbidity, or the addition of pollutants; or
- (d) alterations of shallow submerged lands with high densities of polychaetes, mollusks or macrophytic algae.

(9) Notwithstanding the provisions of FWR 10.26(5) through (8), no project shall be permitted which will have any adverse effect on habitat sites of rare species.

(10) Notwithstanding the provisions of FWR 10.26(5) through (9), no project shall be permitted which will result in the destruction of eelgrass (*Zostera marina*) or widgeon grass (*Ruppia maritima*) beds;

(11) Where projects are proposed subject to the provisions of FWR 10.26(5) and the US Army Corps of Engineers dredged material disposal criteria are met, all dredged material must be disposed off so as to be available for transport to adjacent coastal beaches and dunes within the littoral transport system.

FWR 10.27: Coastal Beaches⁶

(1) Introduction. Coastal beaches, which are defined to include tidal flats, are significant to storm damage prevention, flood control, protection of recreation, aesthetics, and wildlife habitat. In addition, tidal flats are likely to be significant to the protection of marine fisheries and where there are shellfish, to shellfish.⁷

Coastal beaches dissipate wave energy by their gentle slope, their permeability and their granular nature, which permit changes in beach form in response to changes in wave conditions.

Coastal beaches serve as a sediment source for dunes and subtidal areas. Steep storm waves cause beach sediment to move offshore, resulting in a gentler beach slope and greater energy dissipation. Less steep waves cause an onshore return of beach sediment, where it will be available to provide protection against future storm waves.

A coastal beach at any point serves as a sediment source for coastal areas downdrift from that point. The oblique approach of waves moves beach sediment alongshore in the general direction of wave action. Thus, the coastal beach is a body of sediment
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which is moving along the shore.

⁶ Additional regulations regarding Coastal Beaches in the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern are found in FWR 10.39. Additional regulations regarding Coastal beaches in the Waquoit Bay ACEC are found in FWR 10.40.

⁷ For regulations concerning land containing shellfish see FWR 10.34.

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Coastal beaches serve the purposes of storm damage prevention and flood control by dissipating wave energy, by reducing the height of storm waves, and by providing sediment to supply other coastal features, including coastal dunes, land under the ocean and other coastal beaches. Interruptions of these natural processes by man-made structures reduce the ability of the coastal beach to perform these functions.

A number of birds also nest in the coastal berm, between the toe of a dune and the high tide line. In addition, isolated coastal beaches on small islands are important as haul out areas for seals.

Coastal Beaches are the most heavily used recreation areas of the town and serve the purpose of recreation. Important to this value is the ability to walk along or sit at the beach at high tide.

Coastal beaches are important to aesthetics when they are without imposing structures. They are part of the classic New England landscape.

Tidal flats are likely to be significant to fisheries and wildlife habitat because they provide habitats for marine organisms such as polychaete worms and mollusks, which in turn are food sources for fisheries and migratory and wintering birds. Coastal beaches are extremely important in recycling of nutrients derived from storm drift and tidal action. Vegetative debris along the drift line is vital for resident and migratory shorebirds, which feed largely on invertebrates which eat the vegetation. Below the drift line in the lower intertidal zone are infauna (invertebrates such as mollusks and crustacea) which are also eaten by shore birds.

Tidal flats are also sites where organic and inorganic materials may become entrapped and then returned to the photosynthetic zone of the water column to support algae and other primary producers of the marine food web.

(2) Definitions and Critical Characteristics.

(a) 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 man-made structures, when these structures replace one of the above lines, whichever is closest to the ocean.

(b) Tidal Flat means any nearly level part of a coastal beach which usually extends from the mean low water line landward to the more steeply sloping face of the coastal beach or which may be separated from the beach by land under the ocean.

(c) When coastal beaches are determined to be significant to storm damage prevention or flood control, the following characteristics are critical to the protection of those resource area values:

1. volume (quantity of sediments) and form,
2. the ability to respond to wave action, and
3. The distribution of sediment grain size.

(d) When coastal beaches are significant to fisheries or wildlife habitat, the following characteristics are critical to the protection of those resource area values:

1. distribution of sediment grain size,
2. water circulation,
3. water quality, and
4. relief and elevation.

(e) When coastal beaches are significant to recreation and aesthetics, the following characteristics are critical to the protection of those resource area values:

1. water quality,
2. an open line of sight , and
3. an exposed area of beach at high tide.

(3) Presumption of Significance

When a proposed project involves the dredging, removing, filling, building upon, degrading or otherwise altering of a coastal beach, the Commission shall presume that the area is significant to, and the proposed activity will have a significant

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or cumulative effect upon, the resource area values specified in FWR 10.27(1) . These presumptions are rebuttable and may be overcome only upon a clear showing that the coastal beach does not play a role in the protection of said resource area values. In the event that the presumptions are deemed to have been overcome, the Commission shall make a written determination to this effect, setting forth the grounds.

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(4) General Performance Standards

- (a) When tidal flats are significant to shellfish, FWR 10.34(4) through (7) shall apply.
- (b) When a coastal beach is determined to be significant to storm damage prevention, flood control, or wildlife habitat, FWR 10.27(5) through (8) shall apply.
- (c) When a tidal flat is determined to be significant to fisheries or wildlife habitat, FWR 10.27(7) shall apply.

(5) Any project on a coastal beach shall not have an adverse effect by increasing erosion, decreasing the volume or changing the form of any such coastal beach or an adjacent or downdrift coastal beach.

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

(7) In addition to complying with the requirements of FWR 10.27 (5), a project on a tidal flat shall have no adverse effects, on fisheries and/or wildlife habitat caused by:

- (a) alterations in water circulation,
- (b) alterations in the distribution of sediment grain size, and
- (c) changes in water quality, including, but not limited to, other than natural fluctuations in the levels of dissolved oxygen, temperature or turbidity, or the addition of pollutants.

(8) Notwithstanding the provisions of FWR 10.27(5) through (7), no project may be permitted which will have any adverse effect on habitat sites of rare species.

FWR 10.28 Coastal Dunes⁸

(1) Introduction. All coastal dunes are likely to be significant to storm damage prevention and flood control, and all coastal dunes on barrier beaches and the coastal dune closest to the coastal beach in any area are per se significant to storm damage prevention and flood control. Coastal dunes are also often significant to the protection of wildlife habitat, and the protection of aesthetics.

Coastal dunes aid in storm damage prevention and flood control by supplying sand to coastal beaches. Coastal dunes protect inland coastal areas from storm damage and flooding by storm waves and storm elevated sea levels because such dunes are higher than the coastal beaches which they border. In order to protect this function, coastal dune volume must be maintained while allowing the coastal dune shape to conform to natural wind and water flow patterns.

Vegetation cover contributes to the growth and stability of coastal dunes by providing conditions favorable to sand deposition.

On retreating shorelines, the ability of the coastal dunes bordering the coastal beach to move landward at the rate of shoreline retreat allows these dunes to maintain their form and volume, which in turn promotes their function of protecting against storm damage or flooding.

A number of birds, most commonly terns and gulls, nest at the base or sides of dunes. In some dune systems other birds also nest in the interdunal area, the species being determined by the plant community structure, topography, and hydrologic regime

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of the area. In a few dune systems, freshwater wetlands or vernal pool habitats occur, which serve as important feeding areas for a wide variety of bird species. Salt tolerate species such as *Rosa rugosa* can be an important food source for birds and other wildlife.

Coastal Dunes (RESERVED STATEMENT ON AESTHETICS)

⁸ Additional regulations regarding Coastal Dunes in the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern are found in FWR 10.39. Additional regulations regarding Coastal Dunes in the Waquoit Bay ACEC are found in FWR 10.40.

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Artificially constructed dunes are included in the definition because they also play a role in protecting inland properties from storm waves and flooding.

All coastal dunes are likely to be significant to storm damage prevention and flood control, and all coastal dunes on barrier beaches and the coastal dune closest to the coastal beach in any area are per se significant to storm damage prevention and flood control. Coastal dunes are also often significant to the protection of wildlife habitat, and the protection of aesthetics.

Coastal dunes aid in storm damage prevention and flood control by supplying sand to coastal beaches. Coastal dunes protect inland coastal areas from storm damage and flooding by storm waves and storm elevated sea levels because such dunes are higher than the coastal beaches which they border. In order to protect this function, coastal dune volume must be maintained while allowing the coastal dune shape to conform to natural wind and water flow patterns.

Vegetation cover contributes to the growth and stability of coastal dunes by providing conditions favorable to sand deposition.

On retreating shorelines, the ability of the coastal dunes bordering the coastal beach to move landward at the rate of shoreline retreat allows these dunes to maintain their form and volume, which in turn promotes their function of protecting against storm damage or flooding.

A number of birds, most commonly terns and gulls, nest at the base or sides of dunes. In some dune systems other birds also nest in the interdunal area, the species being determined by the plant community structure, topography, and hydrologic regime

10.28: continued

of the area. In a few dune systems, freshwater wetlands or vernal pool habitats occur, which serve as important feeding areas for a wide variety of bird species. Salt tolerate species such as *Rosa rugosa* can be an important food source for birds and other wildlife.

Coastal Dunes (RESERVED STATEMENT ON AESTHETICS)

Artificially constructed dunes are included in the definition because they also play a role in protecting inland properties from storm waves and flooding.

(2) Definition, Critical Characteristics, and Boundary

(a) 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 or flood control. Coastal dunes can be deposited on a coastal bank.

(b) When a coastal dune is significant to storm damage prevention, flood control or the protection of wildlife habitat, the following characteristics are critical to the protection of those interest(s):

1. The Ability of Coastal Dunes to Erode in Response to Coastal Beach Conditions - The erosion of coastal dunes by waves, usually during storms, supplies sand to the adjacent coastal beach. This sand helps maintain or increase the volume of the coastal beach as it loses sand during storms to nearshore areas of the ocean. Without the supply of sand from coastal dunes and banks, beaches will gradually be depleted of sediment and disappear. (The sand which moves from the dune to the beach originally was carried by wind from the beach to the dune);
2. Dune Form and Volume - The volume (height and width) and form of coastal dunes provide a buffer which resists the wave uprush during storms and retards stormline retreat. Coastal dune form and volume are the result of a combination of factors, the most important of which are wind and vegetation. Natural waters flow, which comes in the form of storm overwash, is also an important process in controlling the coastal dune form and volume, because through this mechanism, sand is carried landward to initiate dune formation;
3. Vegetative Cover - Vegetation contributes to the growth and stability of coastal dunes by providing conditions favorable to sand deposition. Coastal dunes often originate along the strand line of the beach. "Wrack" material, such as beach grass stems, is carried to the strand line by wind and wave activity where it accumulates and is often buried by sand blowing from the coastal beach. Seeds of many plants become mixed with these materials and subsequently germinate. As the strand line plants grow and begin trapping more sand, the strand line rises to a height above the high tide line. The beach grass then begins to act as a baffle, trapping sand moved by the prevailing winds, and producing the feeding areas for wildlife.
4. Landward Movement - On retreating shorelines, coastal dunes bordering the coastal beach move landward with the rest of the shoreline. This allows coastal dunes to maintain their form and volume. If the dune did not build landward, the dune would gradually be eroded away from the seaward side and the dune would become smaller and smaller, and

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therefore would be more likely to be completely washed away in a coastal storm;

5. the ability of the dune to move laterally; or

6. the ability of the dune to continue serving as bird nesting habitat.

(c) The landward extent of coastal dunes is the landward edge of the sediment deposited by wind or storm wave overwash. This is usually marked by a change in vegetation from dune type vegetation such as dune grass, beach pea, *rosa rugosa*, or beach plum to upland plants such as pine or hardwoods.

(3) Presumption. When a proposed project involves the dredging, removing, filling, building upon, degrading or otherwise altering of a coastal dune, the Commission shall presume that the area is significant to, and the proposed activity will have a significant or cumulative effect upon, the resource area values specified in FWR 10.28(1). These presumptions are rebuttable and may be overcome only upon a clear showing that the coastal dune does not play a role in the protection of said resource area values. In the event that the presumptions are deemed to have been overcome, the Commission shall make a written determination to this effect, setting forth the grounds.

(4) General Performance Standards. When a coastal dune is determined to be significant to storm damage prevention, flood control, the protection of wildlife habitat, or aesthetics, FWR 10.28(5) through (8) shall apply. FWR 10.28(5) through (8) shall apply to any dune that is deposited on land subject to coastal storm flowage or coastal bank, but only to the dune deposits in said area.

(5) 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:

(a) affecting the ability of waves to remove sand from the dune;

(b) disturbing the vegetative cover so as to destabilize the dune;

(c) causing any modification of the dune form that would increase the potential for storm or flood damage;

(d) interfering with the landward or lateral movement of the dune;

(e) causing removal of sand from the dune artificially; or

(f) interfering with mapped or otherwise identified bird nesting habitat.

(6) Notwithstanding the provisions of FWR 10.28(5), 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 in FWR 10.28 (5)(b) through 10.28(5)(e). Such an accessory project(s) may include, but is not limited to, a small shed or a small parking area for residences. It shall not include coastal engineering structures, and in no case shall cumulatively exceed over one hundred square feet (100 sq. ft.) in size from the altered area that existed as of August 15, 1998.

(7) The following projects may be permitted, provided that they adhere to the provisions of FWR 10.28(3):

(a) pedestrian walkways, designed to minimize the disturbance to the vegetative cover and traditional bird nesting habitat;

(b) fencing and other devices designed to increase dune development; and

(c) plantings compatible with the natural vegetative cover.

(8) Notwithstanding the provisions of FWR 10.28(5) through (7), no project may be permitted which will have any adverse effect on habitat sites of rare species.

FWR 10.29 Barrier Beaches⁹

(1) Introduction. Barrier beaches are significant to storm damage prevention, flood control, recreation, aesthetics and are likely to be significant to fisheries and wildlife habitat and, where there are shellfish, to shellfish.¹⁰ Barrier beaches protect landward areas because they provide a buffer to storm waves and to sea levels elevated by storms. Barrier beaches protect from wave action such highly productive wetlands as salt marshes, estuaries, lagoons, salt ponds and fresh water marshes and ponds, which are in

⁹ Additional regulations regarding barrier beaches in the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern are found in FWR 10.39. Additional regulations regarding barrier beaches in the Waquoit Bay ACEC are found in FWR 10.40.

¹⁰ For regulations concerning land containing shellfish see FWR 10.34.

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turn important to fisheries and wildlife habitat. Barrier beaches and the dunes thereon are also important to wildlife habitat, recreation and aesthetics in the ways described in FWR 10.27(1) (coastal beaches) and FWR 10.28(1) (coastal dunes).

Barrier beaches are maintained by the alongshore movement of beach sediment caused by wave action. The coastal dunes and tidal flats on a barrier beach consist of sediment supplied by wind action, storm wave overwash and tidal inlet deposition. Barrier beaches in Falmouth undergo a landward migration caused by the landward movement of sediment by wind, storm wave overwash and tidal current processes. The continuation of these processes maintains the volume of the landform which is necessary to carry out the storm and flood buffer function.

(2) Definition, Critical Characteristics and boundary.

(a) Barrier Beach means a narrow, generally low-lying strip of land generally, but not always, 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. A barrier beach may contain areas of glacially deposited materials.

(b) When a barrier beach is significant to storm damage prevention and flood control, the characteristics of coastal beaches, tidal flats and coastal dunes listed in FWR 10.27(1) and FWR 10.28(1) and their ability to respond to wave action, including storm overwash sediment transport, are critical to the protection of the resource area values specified in FWR 10.29.

(c) the inland boundary is the edge of the coastal or inland wetland that is protected by the barrier beach. The boundary of the barrier beach extends to that point laterally along the beach to where a perpendicular line to the beach no longer intercepts the coastal or inland wetland protected by the barrier beach.

(3) Presumption.

(a) When a proposed project involves the dredging, removing, filling, building upon, degrading or otherwise altering of a barrier beach including all of its coastal dunes, the Commission shall presume that the area is significant to, and the proposed activity will have a significant or cumulative effect upon, the resource area values specified in FWR 10.29(1). These presumptions are rebuttable and may be overcome only upon a clear showing that the coastal dune does not play a role in the protection of said resource area values. In the event that the presumptions are deemed to have been overcome, the Commission shall make a written determination to this effect, setting forth the grounds.

(4) Performance Standards.

(a) When a barrier beach is determined to be significant to storm damage prevention, flood control, fisheries, recreation, aesthetics, or wildlife habitat, FWR 10.27(5) through 10.27(10) (coastal beaches) and FWR 10.28(5) through 10.28(8) (coastal dunes) shall apply to the coastal beaches and to all coastal dunes which make up a barrier beach.

(b) When a portion of barrier beach system is not made up of coastal beaches or coastal dunes, in that portion of the barrier beach the following shall apply:

1. the project shall be minimized pursuant to FWR 10.05(7)(f)2.

(5) Notwithstanding the provisions of FWR 10.29(4), no project may be permitted which will have any adverse effect on habitat sites of rare species.

FWR 10.30 Coastal Banks¹¹

(1) Introduction.

Coastal banks are likely to be significant to storm damage prevention and flood control, and may be significant to wildlife habitat. Coastal banks that supply sediment to coastal beaches, coastal dunes and barrier beaches are per se significant to storm damage prevention and flood control. Coastal banks that, because of their height, provide a buffer to upland areas from storm waters are significant to storm damage prevention and flood control.

Coastal banks composed of unconsolidated sediment and exposed to vigorous wave action serve as a major continuous source

¹¹ Additional regulations regarding coastal banks in the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern are found in FWR 10.39. Additional regulations regarding coastal banks in the Waquoit Bay ACEC are found in FWR 10.40.

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

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

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resistance to wind and rain erosion cause cuts and gullies in the bank, increase the risk of its collapse, increase the danger to structures at the top of the bank and decrease its value as a buffer.

Bank vegetation tends to stabilize the bank and reduce the rate of erosion due to wind and rain runoff. Pedestrian and vehicular traffic damages the protective vegetation and frequently leads to gully erosion or deep "blowouts" on unconsolidated banks. Therefore, any project permitted by FWR 10.30 should incorporate, when appropriate, elevated walkways.

A particular coastal bank may serve both as a sediment source and as a buffer, or it may serve only one role.

(2) Definition, Critical Characteristics and Boundary.

- (a) Coastal Bank means the seaward face or side of any elevated landform, other than a coastal dune, which lies at the landward edge of a coastal beach, land subject to tidal action, or other wetland. Coastal Bank also means coastal engineering structures serving the purpose of storm damage prevention or flood control.
- (b) The slope of a coastal bank must be $\geq 10:1$ (see Figure 1).
- (c) An eroding coastal bank is one that serves as a sediment source.
- (d) When the Commission determines that a coastal bank is significant to storm damage prevention or flood control because it is a vertical buffer to storm waters, the stability of the bank, *i.e.*, the natural resistance of the bank to erosion caused by wind and rain runoff, is critical to the protection of that resource area value(s).
- (e) The boundary of the top of the coastal bank shall conform to one of the following models, as appropriate for the site:¹²
 1. For a coastal bank with a slope of $\geq 4:1$, the "top of coastal bank" is that point above the 100-year flood elevation where the slope becomes $< 4:1$. (see Figure 2).
 2. For a coastal bank with a slope $> 10:1$ but $< 4:1$, the top of coastal bank is the 100-year flood elevation. (see Figure 3).
 3. The top of coastal bank will fall below, the 100-year flood elevation and is the point where the slope ceases to be $\geq 10:1$. (see Figure 4).
- (f) There can be multiple coastal banks within the same, site. This can occur where the coastal banks are separated by land subject to coastal storm flowage [an area $< 10:1$]. (See Figures 5 and 6). (c) When the Commission determines that a coastal bank is significant to storm damage prevention or flood control because it supplies sediment to coastal beaches, coastal dunes or barrier beaches, the ability of the coastal bank to erode in response to wave action is critical to the protection of that resource area value(s).

¹² The calculation of slope for the determination of the top of the coastal bank shall not include minor artificial alterations in slope, such as top of a revetment, cart paths, foot trails etc.



Figure 1: Note that a 4:1 slope is greater than (steeper than) a 10:1 slope.

- ▶ 4:1 is equivalent to 14 degrees or 25 percent.
- ▶ 10:1 is equivalent to 6 degrees or 10 percent.

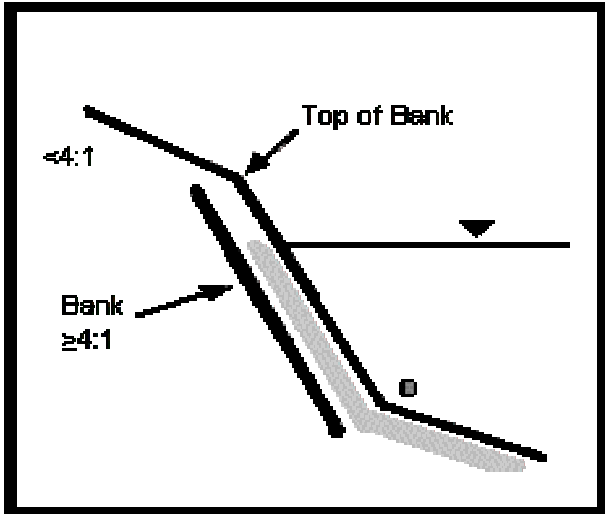


Figure 2

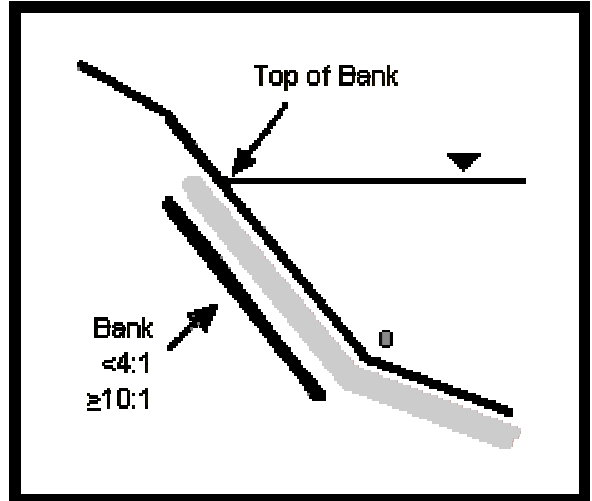


Figure 3

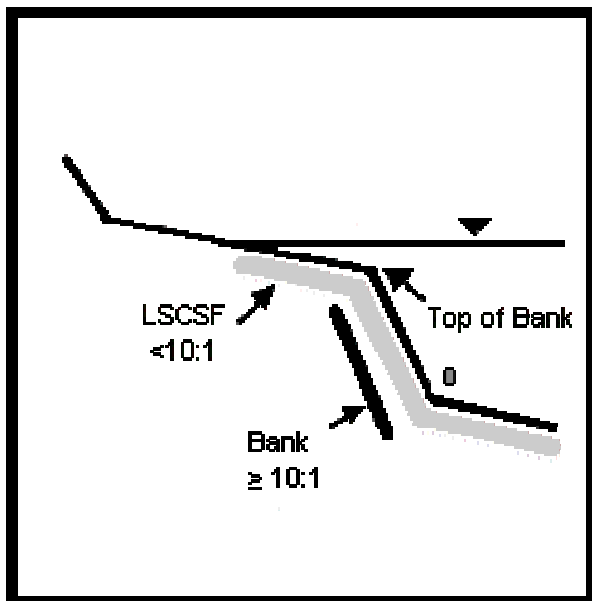


Figure 4

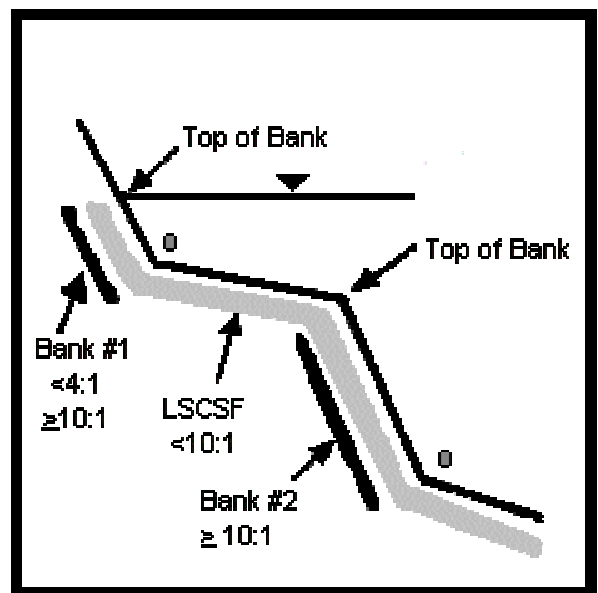


Figure 5

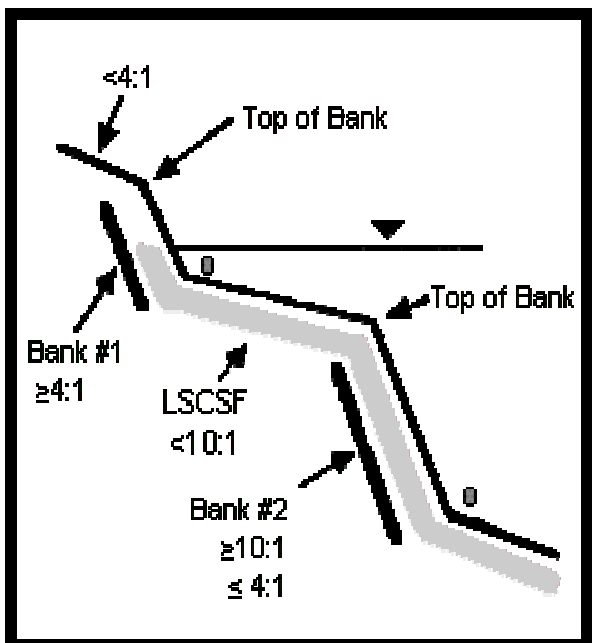






Figure 6

Legend - Figures 2 - 6 are not to scale

-  100 year flood elevation (as shown on community FIRM or storm of record)
-  Land subject to coastal storm flowage (LSCSF)
-  Coastal Bank
-  Toe of bank, which lies landward of a coastal beach, land subject to tidal action, or other wetland

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(3) Presumptions

(a) When a proposed project involves removal, filling, dredging, building upon, degrading or otherwise altering of a coastal bank, the Commission shall presume that the area is significant to, and the proposed activity will have a significant or cumulative effect upon, the resource area values specified in FWR 10.30(1). These presumptions are rebuttable and may be overcome only upon a clear showing that the coastal bank does not play a role in the protection of said resource area values. In the event that the presumptions are deemed to have been overcome, the Commission shall make a written determination to this effect, setting forth the grounds.

(b) A coastal bank subject to wave action and showing exposed (unvegetated) sand or soils shall be presumed to be a significant sediment source.

(c) Activity on a coastal bank steeper than 4:1 or on a coastal bank in a velocity zone shall be presumed to have an adverse effect on the stability of the coastal bank.

(4) General Performance Standards. When a coastal bank is determined to be significant to storm damage prevention, flood control, wildlife habitat, or erosion and sedimentation control, FWR 10.30(5) through FWR 10.30(11) shall apply.

(5) No new bulkhead, revetment, seawall, groin or other coastal engineering structure shall be permitted on such a coastal bank except that such a coastal engineering structure shall be permitted when required to prevent storm damage to buildings constructed prior March 22, 1989, or constructed pursuant to a Permit Application filed prior to March 22, 1989, including reconstructions of such buildings subsequent to March 22, 1989, provided that the following requirements are met:

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

(b) the applicant demonstrates that no method of protecting the building other than the proposed coastal engineering structure is feasible (Moving the building to an alternative location on the same lot or adjacent lot under the ownership or control of the applicant shall be presumed feasible.); and

(c) the best available measures utilized to minimize adverse effects on adjacent or nearby coastal beaches due to changes in wave action shall include beach nourishment activities.

(6) Any project on a coastal bank or within 100 feet landward of the top of a coastal bank, other than a structure permitted by FWR 10.30(5), shall not have an adverse effect due to wave action on the movement of sediment from the coastal bank to coastal beaches or land subject to tidal action.

(7) No project on a coastal bank, or within 100 feet landward of the top of a coastal bank, in a naturally vegetated condition, unless permitted under FWR 10.30(5), shall be permitted on:

(a) an eroding coastal bank, or within a certain distance of said portion of the Bank as specified in FWR 10.18(8),

(b) that portion of a coastal bank in a v-zone,

(c) that portion of a coastal bank with a slope greater or equal to 4:1, or with twenty-five feet (25 ft.) of the top of such area of said bank, or

(d) 1. that portion of a coastal bank that is within one hundred feet (100 ft.) of:

a. Land Under the Ocean;

b. Salt Marsh; or

c. Banks of Salt Ponds, Estuaries, and ponds, lakes, and streams which flow throughout the year [Bank (Inland)];

2. or within seventy-five feet (75 ft.) of:

a. Land Subject to Tidal Action;

b. Freshwater wetlands; or

c. Banks of Intermittent streams;

3. Notwithstanding the provisions of FWR 10.30(7)(d) 1. and 2., activities listed in FWR 10.18(9) may be permitted in said areas provided that all other provisions of FWR 10.30 are met.

(8) The Permit and the Certificate of Compliance for any new building within 100 feet landward of the top of a coastal bank permitted by the Commission under Chapter 235 of the Code of Falmouth shall contain the specific condition: FWR 10.30(5), promulgated under Chapter 235 of the Code of Falmouth, requires that no coastal engineering structure, such as a bulkhead, revetment, or seawall shall be permitted on an eroding bank at any time in the future to protect the project allowed by this

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Permit.

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

(10) Notwithstanding the provisions of FWR 10.30(5) through (8), protective planting designed to reduce erosion may be permitted.

(11) Notwithstanding the provisions of FWR 10.30(5) through (10), no project may be permitted which will have any adverse effect on habitat of rare species.

FWR 10.31: Rocky Intertidal Shores¹³

(1) Introduction. Rocky intertidal shores are likely to be significant to storm damage prevention, flood control, fisheries and wildlife habitat and where there are shellfish, to shellfish.¹⁴

Rocky shore environments are habitats for macroalgae and marine invertebrates and provide protection to and food for, larger marine organisms such as crabs, lobsters, and such fish species as winter flounder, as well as a number of birds. Most marine plants and animals found in rocky shore environments are uniquely adapted to survive there and cannot survive elsewhere. Harbor seals also use rocky intertidal shores, such as rock outcroppings or isolated shores of small islands, as haul out areas.

(2) Definition, Critical Characteristics

(a) Rocky Intertidal Shores means naturally occurring rocky areas, such as bedrock or boulder-strewn areas between the mean high water line and the mean low water line.

(b) When a rocky intertidal shore is determined to be significant to storm damage prevention, flood control, or wildlife habitat the form and volume of exposed intertidal bedrock and boulders are critical to the protection of those resource area values.

(c) When a rocky intertidal shore is significant to fisheries or wildlife habitat, water circulation and water quality are critical to the protection of those resource area values.

(3) Presumption. When a proposed project involves removal, filling, dredging, building upon, degrading or otherwise altering of a rocky intertidal shore, the Commission shall presume that the area is significant to, and the proposed activity will have a significant or cumulative effect upon, the resource area values specified in FWR 10.31(1). These presumptions are rebuttable and may be overcome only upon a clear showing that the rocky intertidal shore does not play a role in the protection of said resource area values. In the event that the presumptions are deemed to have been overcome, the Commission shall make a written determination to this effect, setting forth the grounds.

(4) General Performance Standards

(a) When a Rocky Intertidal Shore is determined to be significant to storm damage prevention, flood control, or wildlife habitat, any proposed project shall be designed and constructed, using the best available measures, so as to minimize adverse effects on the form and volume of exposed intertidal bedrock and boulders.

(b) When a Rocky Intertidal Shore is determined to be significant to fisheries or wildlife habitat, any proposed project shall have no adverse effects on water circulation and water quality. Water quality impacts include, but are not limited to, other than natural fluctuations in the levels of dissolved oxygen, temperature or turbidity, or the addition of pollutants.

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(5) Notwithstanding the provisions of FWR 10.31(4), no project may be permitted which will have any adverse effect on habitat sites of rare species.

¹³ Additional regulations regarding rocky intertidal shores in the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern are found in FWR 10.39. Additional regulations regarding rocky intertidal shores in the Waquoit Bay ACEC are found in FWR 10.40.

¹⁴ For regulations concerning land containing shellfish, see FWR 10.34.

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FWR 10.32 Salt Marshes¹⁵

(1) Introduction. Salt marshes are significant to protection of fisheries, wildlife habitat, and where there are shellfish, to shellfish¹⁶, water pollution control, and aesthetics and are likely to be significant to storm damage prevention and ground water.

A salt marsh produces large amounts of organic matter. A significant portion of this material is exported as detritus and dissolved organics to estuarine and coastal waters, where it provides the basis for a large food web that supports many marine organisms, including finfish and shellfish as well as many bird species. Salt marshes also provide a spawning and nursery habitat for several important estuarine forage finfish as well as important food, shelter, breeding areas, and migratory and overwintering areas for many wildlife species.

Salt marsh plants and substrate remove pollutants from surrounding waters. The network of salt marsh vegetation roots and rhizomes binds sediments together.

The sediments absorb chlorinated hydrocarbons and heavy metals such as lead, copper, and iron. The marsh also retains nitrogen and phosphorous compounds, which in large amounts can lead to algal blooms in coastal waters.

The underlying peat also serves as a barrier between fresh ground water landward of the salt marsh and the ocean, thus helping to maintain the level of such ground water.

Salt marsh cord grass and underlying peat are resistant to erosion and dissipate wave energy, thereby providing a buffer that reduces wave damage.

(2) Definition, Critical Characteristics.

(a) 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.

(b) Spring Tide means the tide of the greatest amplitude during the approximately 14-day tidal cycle. It occurs at or near the time when the gravitational forces of the sun and the moon are in phase (new and full moons).

(c) When a salt marsh is significant to one or more of the resource area values specified in FWR 10.32(1), the following characteristics are critical to the protection of such resource area values:

1. the growth, composition and distribution of salt marsh vegetation, (fisheries and wildlife habitat, water pollution control, storm damage prevention);
2. the flow and level of tidal and fresh water (fisheries and wildlife habitat, water pollution control); and
3. the presence and depth of peat (ground water supply, water pollution control, storm damage prevention).

(3) Presumption.

(a) When a proposed project involves removal, filling, dredging, building upon, degrading or otherwise altering of a salt marsh, the Commission shall presume that the area is significant to, and the proposed activity will have a significant or cumulative effect upon, the resource area values specified in FWR 10.32(1). These presumptions are rebuttable and may

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be overcome only upon a clear showing that the salt marsh does not play a role in the protection of said resource area values. In the event that the presumptions are deemed to have been overcome, the Commission shall make a written determination to this effect, setting forth the grounds.

(4) Performance Standards. When a salt marsh is determined to be significant to fisheries or wildlife habitat, water pollution

¹⁵ Additional regulations regarding salt marshes in the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern are found in FWR 10.39. Additional regulations regarding salt marshes in the Waquoit Bay ACEC are found in FWR 10.40.

¹⁶ For regulations concerning land containing shellfish, see FWR 10.34.

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control, ground water supply, aesthetics, or storm damage prevention FWR 10.32(5) through (9) shall apply.

(5) A proposed project in a salt marsh, on lands within 100 feet of a salt marsh, or in a body of water adjacent to a salt marsh shall not destroy any portion of the salt marsh and shall not have an adverse effect on the productivity of the salt marsh. Alterations in growth, distribution and composition of salt marsh vegetation shall be considered in evaluating adverse effects on productivity. This section shall not be construed to prohibit the harvesting of salt hay.

(6) Notwithstanding the provisions of FWR 10.32(4), a dock or elevated walkway as narrow as feasible may be permitted provided it meets the requirements of FWR 10.16(1), and of FWR 10.21 through 10.40

(7) Notwithstanding the provisions of FWR 10.32(5), a project which will restore or rehabilitate a salt marsh, or create a salt marsh, may be permitted.

(8) Notwithstanding the provisions of FWR 10.32(5) through (7), no project may be permitted which will have any adverse effect on habitat sites of rare species.

FWR 10.33 Land Under Salt Ponds¹⁷

(1) Introduction. Land under salt ponds is significant to fisheries and wildlife habitat, recreation and, where there are shellfish, to shellfish.¹⁸

Land under salt ponds provides an excellent habitat for fisheries. The high productivity of plants in salt ponds provides food for shellfish, crustaceans and larval and juvenile fish. Salt ponds also provide spawning areas for shellfish and are nursery areas for crabs and fish. In addition to the many birds which feed on fish found in salt ponds, waterfowl also eat invertebrates such as mollusks and crustaceans, which in turn depend on bottom sediment and vegetation. Some bird species also eat widgeon grass and eel grass which may be rooted in land under salt ponds.

(2) Definition, Critical Characteristics.

(a) Salt Pond means a shallow enclosed or semi-enclosed body of saline water that may be partially or totally restricted by barrier beach formation, or a barrier beach system. Salt ponds may receive freshwater from small streams emptying into their upper reaches and/or springs in the salt pond itself.

(b) When land under a salt pond is significant to fisheries or wildlife habitat, the following factors are critical to the protection of that resource area value:

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1. water circulation,
2. distribution of sediment grain size,
3. freshwater inflow,
4. productivity of plants, and

10.33: continued

5. water quality.

(c) The boundary of a salt pond is the bank of the pond or the landward edge of any wetland adjacent to the water.

(3) Presumption.

When a proposed project involves removal, filling, dredging, building upon, degrading or otherwise altering of land under a salt pond, the Commission shall presume that the area is significant to, and the proposed activity will have a significant or cumulative effect upon, the resource area values specified in FWR 10.33(1). These presumptions are rebuttable and may be overcome only

¹⁷ Additional regulations regarding land under salt ponds in the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern are found in FWR 10.39. Additional regulations regarding land under salt ponds in the Waquoit Bay ACEC are found in FWR 10.40.

¹⁸ For regulations concerning land containing shellfish, see FWR 10.34.

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upon a clear showing that the land under the salt pond does not play a role in the protection of said resource area values. In the event that the presumptions are deemed to have been overcome, the Commission shall make a written determination to this effect, setting forth the grounds.

(4) Performance Standards. When land under a salt pond is determined to be significant to fisheries, recreation, or wildlife habitat, FWR 10.33(5) through (7) shall apply.

(5) Any project on land under a salt pond, on lands within 100 feet of the mean high water line of a salt pond, or on land under a body of water adjacent to a salt pond shall not have an adverse effect on the fisheries, recreation, or wildlife habitat of such a salt pond caused by:

- (a) alterations of water circulation;
- (b) alterations in the distribution of sediment grain size and the relief or elevation of the bottom topography;
- (c) modifications in the flow of fresh and/or salt water;
- (d) alterations in the productivity of plants, or
- (e) alterations in water quality, including, but not limited to, other than normal fluctuations in the level of dissolved oxygen, nutrients, temperature or turbidity, or the addition of pollutants.

(6) Notwithstanding the provisions of FWR 10.33(5), activities specifically required and intended to maintain the depth and the opening of the salt pond to the ocean in order to maintain or enhance the fisheries or for the specific purpose of fisheries management, may be permitted.

(7) Notwithstanding the provisions of FWR 10.33(5) and (6), no project may be permitted which will have any adverse effect on habitat sites of rare species.

FWR 10.34 Land Containing Shellfish¹⁹

(1) Preamble. Land containing shellfish is found within certain of the resource areas under the jurisdiction of Chapter 235 of the Code of Falmouth. "Shellfish" is specifically one of the resource area values of Chapter 235 of the Code of Falmouth. The purpose of FWR 10.34 is to identify those resource areas likely to contain shellfish, to provide criteria for determining the significance of land containing shellfish, and to establish regulations for projects which will affect such land.

Land containing shellfish is, under FWR 10.34(3), significant to fisheries, recreation, aquaculture, as well as to the resource area value of shellfish. Any proposal that effects navigation in Land Containing Shellfish is likely to have a significant or cumulative adverse effect on aquaculture.

Shellfish are a valuable renewable resource. The maintenance of productive shellfish beds not only assures the continuance of shellfish themselves, but also plays a direct role in supporting fish stocks by providing a major food source. The young shellfish in the planktonic larval stage that are produced in large quantities during spring and summer are an important source of food for the young stages of marine fishes and many crustaceans.

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(2) Definitions and Critical Characteristics.

- (a) Land containing shellfish means land under the ocean, land under estuaries, land under salt ponds, tidal flats, rocky intertidal shores, salt marshes, banks of salt ponds, banks of estuaries and beaches when any such land contains shellfish.
- (b) Shellfish means the following species: Bay scallop (*Argopecten irradians*); Blue mussel (*Mytilus edulis*); Ocean quahog (*Arctica islandica*); Oyster (*Crassostrea virginica*); Quahog (*Mercenaria merceneria*); Razor clam (*Ensis directus*); Sea clam (*Spisula solidissima*); Sea scallop (*Placopecten magellanicus*); Soft shell clam (*Mya arenaria*).
- (c) Shellfish constable means the official in Falmouth, whether designated a constable, warden, natural resources officer, or by some other name, in charge of enforcing the laws regulating the harvest of shellfish.
- (d) When a resource area is found to be significant to shellfish under FWR 10.34(3), and is, therefore, also significant to

¹⁹ Additional regulations regarding land containing shellfish in the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern are found in FWR 10.39. Additional regulations regarding land containing shellfish in the Waquoit Bay ACEC are found in FWR 10.40.

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fisheries and recreation, the following factors are critical to the protection of those resource area values:

1. shellfish,
2. water quality,
3. water circulation,
4. the natural relief, evaluation or distribution of sediment grain size of such land, and
5. public access to those areas

(3) Significance. Land containing shellfish shall be found significant to shellfish, recreation, aquaculture, and to fisheries when it has been identified:

(a) and mapped by the Commission, based upon maps and/or other written documentation of the shellfish constable; or
(b) otherwise identified by taking into account and documenting: the density of shellfish, the size of the area, and the historical use of the area, current importance of the area and potential use of the area to recreational or commercial shellfishing.

1. The area shall be found significant to shellfish where shellfish sampling indicates a shellfish density per nine square feet greater than:

- a. one (1) quahog;
- b. one (1) clam;
- c. three (3) oysters; or
- d. three (3) mussels;

2. Where shellfish sampling indicates a shellfish density less than that specified in FWR 10.34(3)(b)1., the Commission shall consider the size of the area, and the historical use of the area, and current importance of the area and potential use of the area to recreational or commercial shellfishing.

(4) Shellfish Survey²⁰ Shellfish Surveys shall be performed in a manner consistent with the following guidelines:

(a) Samples shall be taken every five feet along the center line of the proposed structure starting at mean high water to five feet beyond the end of the proposed structure. Samples shall be taken every five feet under any docks or floats. The sample area size shall be one foot square. Similarly spaced samples shall also be taken spaced ten and twenty feet either side of the centerline sample at the same frequency as those taken on the centerline of the proposed structure.

(c) Samples at each site shall be placed in a sieve tray with 1/4 inch mesh and sorted. All live animals shall be counted and measured. Dead or the empty shells shall also be noted.

(d) A description of the sediments shall be stated for each sample taken.

(e) Results of the shellfish survey shall be recorded on Form SS of FWR 10.99.

(e) All shellfish shall be replanted in the sample area from which they were taken.

(5) Performance Standards. When a resource area, including rocky intertidal shores, salt marshes, land under the ocean, coastal beaches, land under salt ponds is determined to be significant to the protection of shellfish and therefore to the protection of

10.34: continued

recreation and the protection of fisheries, FWR 10.34(6) through (8) shall apply.²¹

(6) Any project on land containing shellfish shall not adversely affect any portion of such land or marine fisheries by a change in the productivity of such land caused by:

- (a) alterations of water circulation,
- (b) alterations in relief elevation,
- (c) the compacting of sediment by vehicular traffic,

²⁰ Persons conducting shellfish surveys must notify the shellfish constable as to the location, date, and time a survey will take place at least one week prior to the survey. Lack of notification may result in the issuance of a non-criminal citation for violation of shellfish regulations. Prior to the survey, the site must be marked with stakes on the shore and an orange buoy at the proposed end of the structure. Persons conducting shellfish surveys are advised to verify sampling method with the shellfish constable.

²¹ Regulations for the construction of docks and piers, which may be in Land Containing Shellfish, are found in FWR 10.16(1).

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- (d) alterations in the distribution of sediment grain size,
- (e) alterations in natural drainage from adjacent land, or
- (f) changes in water quality, including, but not limited to, other than natural fluctuations in the levels of salinity, dissolved oxygen, nutrients, temperature or turbidity, or the addition of pollutants.

(7) Notwithstanding FWR 10.34(6) and 10.34(7), projects approved by DMF that are specifically intended to increase the productivity of land containing shellfish may be permitted.

(8) Notwithstanding the provisions of FWR 10.34(6) and (7), no project may be permitted which will have any adverse effect on habitat sites of rare species.

FWR 10.35: Banks of or Land Under the Ocean, Estuaries, Ponds, Streams, Rivers, Lakes, or Creeks that Underlie an Anadromous/Catadromous Fish Run ("Fish Run")²²

(1) Introduction. The banks of and land under the ocean, estuaries, ponds, streams, rivers, lakes or creeks that underlie an anadromous/catadromous fish run are significant to protection of marine fisheries.

Anadromous and catadromous fish ("the fish") are renewable protein resources that provide recreational, aesthetic and commercial benefits. In addition, throughout their life cycle such fish are important components of freshwater, estuarine, and marine environments and are food sources for other organisms.

The spawning migrations of such fish also provide a direct link between marine and freshwater ecosystems. This link plays a role in maintaining the productivity of fisheries.

(2) Definitions, Critical Characteristics.

- (a) Anadromous Fish means fish that enter fresh water from the ocean to spawn, such as alewives, shad and salmon.
- (b) Catadromous Fish means fish that enter salt water from fresh water to spawn, such as eels.
- (c) Anadromous/Catadromous Fish Run means that area within estuaries, ponds, streams, creeks, rivers, lakes or coastal waters, which is a spawning or feeding ground or passageway for anadromous or catadromous fish and which is identified by DMF, has been mapped on the Coastal Atlas of the Coastal Zone Management Program or by the Cape Cod Critical Habitat Atlas (Association for the Preservation of Cape Cod 1990), or identified by evidence of the presence of anadromous/catadromous fish at a public hearing. Such fish runs shall include those areas which have historically served as fish runs and are either being restored or are planned to be restored at the time the Permit Application is filed.
- (d) When such a bank of a fish run, or land under an estuary or under a pond, stream, river, lake or creek which is a fish run is significant to fisheries, the following factors are critical to the protection of such resource area value:
 - (a) the fish,

10.35: continued

- (b) accessibility of spawning areas,
- (c) the volume or rate of the flow of water within spawning areas and migratory routes, and
- (d) spawning and nursery grounds.

(3) Presumption.

When a proposed project involves removal, filling, dredging, building upon, degrading or otherwise altering of a bank of a fish run, or land under estuaries, ponds, streams, rivers, lakes or creeks that underlie a fish run, the Commission shall presume that the area is significant to, and the proposed activity will have a significant or cumulative effect upon, the resource area values specified in FWR 10.35(1). These presumptions are rebuttable and may be overcome only upon a clear showing that said area does not play a role in the protection of said resource area values. In the event that the presumptions are deemed to have been overcome, the Commission shall make a written determination to this effect, setting forth the grounds.

²² Additional regulations regarding fish runs in the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern are found in FWR 10.39. Additional regulations regarding fish runs in the Waquoit Bay ACEC are found in FWR 10.40.

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(4) General Performance Standards.

When such land or bank is determined to be significant to fisheries, FWR 10.35(5) through (7) shall apply.

(5) Any project on such land or bank shall not have an adverse effect on the anadromous or catadromous fish run by:

- (a) impeding or obstructing the migration of the fish;
- (b) changing the volume or rate of flow of water within the fish run; or
- (c) impairing the capacity of spawning or nursery habitats necessary to sustain the various life stages of the fish.

(6) Dredging, disposal of dredged material or filling in any portion of a fish run shall be prohibited between March 15th and June 15th in any year.

(7) Notwithstanding the provisions of FWR 10.35(5), no project may be permitted which will have any adverse effect on habitat sites of rare species.

FWR 10.36 Banks of Estuaries²³

(1) Introduction Banks of Estuaries are likely to be significant to flood control, storm damage prevention, water pollution control, erosion and sediment control, to fisheries and wildlife habitat, recreation, aesthetics, and where there are shellfish, to shellfish²⁴. Where Banks are composed of concrete, asphalt or other artificial impervious material, said Banks of Estuaries are likely to be significant to flood control and storm damage prevention.

Where Banks of Estuaries are partially or totally vegetated, the vegetation serves to maintain the Banks' stability, which in turn protects water quality by reducing erosion and siltation.

Banks of Estuaries may also provide shade that moderates water temperatures, as well as providing breeding habitat, escape cover and food, all of which are significant to fisheries and wildlife habitat.

The topography, plant community composition and structure, and soil structure of banks together provide important food, shelter, migratory and overwintering areas, and breeding areas for wildlife. Topography plays a role in determining the suitability of banks to serve as burrowing or feeding habitat. Soil structure also plays a role in determining the suitability for burrowing, hibernation and other cover. Bank topography and soil structure impact the bank's vegetative structure, as well

10.36: continued

. Bushes and other undergrowth, trees, vegetation extending from the bank into the water, and vegetation growing along the water's edge are also important to a wide variety of wildlife. A number of tubers and berry bushes also grow in banks and serve as important food for wildlife. Finally, banks may provide important shelter for wildlife which needs to move between wetland areas.

Bank of estuaries act to confine floodwaters during the most frequent storms, preventing the spread of water to adjacent land. Because these banks confine water during such storms to an established channel they maintain water temperatures and depths necessary for the protection of fisheries. The maintenance of cool water temperatures during warm weather is critical to the survival of important game species such as brown trout (*Salmo trutta*). An alteration of a bank that permits water to frequently and consistently spread over a large and more shallow area increases the amount of property which is routinely flooded, as well as elevating water temperature and reducing fish habitat within the main channel, particularly during warm weather.

Banks of Estuaries may also be a coastal bank or coastal beach.

²³ Additional regulations regarding banks of estuaries in the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern are found in FWR 10.39. Additional regulations regarding banks of estuaries in the Waquoit Bay ACEC are found in FWR 10.40.

²⁴ For regulations concerning land containing shellfish, see FWR 10.34.

FWR 10.00 FALMOUTH CONSERVATION COMMISSION

(2) Definition, Critical Characteristics, and Boundary

(a) A bank of an estuary is the portion of the land surface which normally abuts and confines an estuary. It occurs between an estuary and a coastal or freshwater wetland and adjacent flood plain, or, in the absence of these, it occurs between an estuary and an upland. A bank of an estuary may be partially or totally vegetated, or it may be comprised of exposed soil, gravel or stone.

(b) The physical characteristics of a bank of an estuary, as well as its location, as described in the foregoing FWR 10.36(2)(a), are critical to the protection of the resource area values specified in FWR 10.36(1).

(c) The upper boundary of a bank of an estuary is the first observable break in the slope or the mean annual flood level, whichever is higher. The lower boundary of a bank of an estuary is the mean annual low flow level.

(3) Presumption

When a proposed project involves removal, filling, dredging, building upon, degrading or otherwise altering of a bank of an estuary, the Commission shall presume that the area is significant to, and the proposed activity will have a significant or cumulative effect upon, the resource area values specified in FWR 10.36(1). These presumptions are rebuttable and may be overcome only upon a clear showing that said area does not play a role in the protection of said resource area values. In the event that the presumptions are deemed to have been overcome, the Commission shall make a written determination to this effect, setting forth the grounds.

(4) General Performance Standards

When a bank of an estuary is determined to be significant to fisheries or wildlife habitat, water pollution control, erosion and sediment control, shellfish, aesthetics, flood control or storm damage prevention FWR 10.36(5) through (9) shall apply.

(5) In addition to the provisions of FWR 10.36(6) through (8), if the bank of an estuary is also a coastal bank, the project must also comply with the provisions of FWR 10.30.

(6) In addition to the provisions of FWR 10.36(5) and (7) through (8), if the bank of an estuary is also a coastal beach, the project must also comply with the provisions of FWR 10.27.

(7) Any proposed work on a bank of an estuary shall not impair the following:

(a) the physical stability of the bank;

(b) the water carrying capacity of the existing channel within the bank;

(c) ground water and surface water quality;

(d) the capacity of the bank to provide breeding habitat, escape cover and food for fisheries;

(e) the capacity of the bank to provide important wildlife habitat functions. A project or projects on a single lot, for which a Permit Application(s) is filed on or after (*effective date*), that (cumulatively) alter(s) up to 25 feet of the length of the bank found to be significant to the protection of wildlife habitat, shall not be deemed to impair its capacity to provide important wildlife habitat functions. Additional alterations beyond the above threshold may be permitted if they will have no adverse

10.36: continued

effects on wildlife habitat.

(8) Notwithstanding the provisions of FWR 10.36(7), structures may be permitted in or on a Bank when required to prevent flood damage to facilities, buildings and roads constructed prior to (*effective date*), including the renovation or reconstruction (but not substantial enlargement) of such facilities, buildings and roads, provided that the following requirements are met:

(a) The proposed protective structure, renovation or reconstruction is designed and constructed using best practical measures so as to minimize adverse effects on the characteristics and functions of the resource area;

(b) The applicant demonstrates that there is no reasonable method of protecting, renovating or rebuilding the facility in question other than the one proposed.

(9) Notwithstanding the provisions of FWR 10.36(5) through (8), no project may be permitted which will have any adverse effect on habitat sites of rare species.

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FWR 10.37 Banks of Salt Ponds²⁵

(1) Introduction. Banks of Salt Ponds are likely to be significant to flood control, storm damage prevention, water pollution control, erosion and sediment control, fisheries and wildlife habitat, and where there are shellfish, to shellfish.²⁶ Where banks of salt ponds are composed of concrete, asphalt or other artificial impervious material, said Banks are likely to be significant to flood control and storm damage prevention.

Where banks of salt ponds are partially or totally vegetated, the vegetation serves to maintain the Banks' stability, which in turn protects water quality by reducing erosion and siltation.

Bank of salt ponds may also provide shade that moderates water temperatures, as well as providing breeding habitat, escape cover and food, all of which are significant to the protection of fisheries.

The topography, plant community composition and structure, and soil structure of banks together provide important food, shelter, migratory and overwintering areas, and breeding areas for wildlife. Topography plays a role in determining the suitability of banks to serve as burrowing or feeding habitat. Soil structure also plays a role in determining the suitability for burrowing, hibernation and other cover. Bank topography and soil structure impact the bank's vegetative structure, as well. Bushes and other undergrowth, trees, vegetation extending from the bank into the water, and vegetation growing along the water's edge are also important to a wide variety of wildlife. A number of tubers and berry bushes also grow in banks and serve as important food for wildlife. Finally, banks may provide important shelter for wildlife which needs to move between wetland areas.

Banks of salt ponds act to confine floodwaters during the most frequent storms, preventing the spread of water to adjacent land. Because banks of salt ponds confine water during such storms to an established channel they maintain water temperatures and depths necessary for the protection of fisheries.

Banks of salt ponds may also be a coastal bank or coastal beach.

(2) Definition, Critical Characteristics, and Boundary

(a) A bank of a salt pond is the portion of the land surface which normally abuts and confines a salt pond. It occurs

10.37: continued

between a salt pond and a coastal or freshwater wetland and adjacent flood plain, or, in the absence of these, it occurs between a salt pond and an upland. A bank of a salt pond may be partially or totally vegetated, or it may be comprised of exposed soil, gravel or stone.

(b) The physical characteristics of a bank of a salt pond, as well as its location, as described in the foregoing FWR 10.37(2)(a), are critical to the protection of the resource area values specified in FWR 10.37(1).

(c) The upper boundary of a bank of a salt pond is the first observable break in the slope or the mean annual flood level, whichever is higher. The lower boundary of a bank of a salt pond is the mean low water line.

(3) Presumption

When a proposed project involves removal, filling, dredging, building upon, degrading or otherwise altering of a bank of a salt pond, the Commission shall presume that the area is significant to, and the proposed activity will have a significant or cumulative effect upon, the resource area values specified in FWR 10.37(1). These presumptions are rebuttable and may be overcome only upon a clear showing that said area does not play a role in the protection of said resource area values. In the event that the presumptions are deemed to have been overcome, the Commission shall make a written determination to this effect, setting forth the grounds.

²⁵ Additional regulations regarding banks of salt ponds in the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern are found in FWR 10.39. Additional regulations regarding banks of salt ponds in the Waquoit Bay ACEC are found in FWR 10.40.

²⁶ For regulations concerning land containing shellfish, see FWR 10.34.

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(4) General Performance Standards

When a bank of a salt pond is determined to be significant to fisheries or wildlife habitat, water pollution control, erosion and sediment control, shellfish, aesthetics, flood control or storm damage prevention, FWR 10.37(5) through (8) shall apply.

(5) In addition to the provisions of FWR 10.37(6) through (9), if the bank of a salt pond is also a coastal bank, the project must also comply with the provisions of FWR 10.30.

(6) In addition to the provisions of FWR 10.37(5) and (7) through (9), if the bank of a salt pond is also a coastal beach, the project must also comply with the provisions of FWR 10.27.

(7) Any proposed work on a bank of a salt pond shall not impair the following:

- (a) the physical stability of the bank;
- (b) the water carrying capacity of the existing channel within the bank;
- (c) ground water and surface water quality;
- (d) the capacity of the bank to provide breeding habitat, escape cover and food for fisheries;
- (e) the capacity of the bank to provide important wildlife habitat functions. A project or projects on a single lot, for which a Permit Application(s) is filed on or after (*effective date*), that (cumulatively) alter(s) up to 25 feet of the length of the bank found to be significant to the protection of wildlife habitat, shall not be deemed to impair its capacity to provide important wildlife habitat functions. Additional alterations beyond the above threshold may be permitted if they will have no adverse effects on wildlife habitat.

(8) Notwithstanding the provisions of FWR 10.37(4) though (7), no project may be permitted which will have any adverse effect on habitat sites of rare species.

FWR 10.38 Land Subject to Coastal Storm Flowage²⁷

(1) Introduction

Land Subject to Coastal Storm Flowage is significant to storm damage prevention and flood control. Land Subject to Coastal Storm Flowage is also likely to be significant to wildlife habitat, recreation, aesthetics, erosion and sediment control and water

pollution control.

Storm Damage Prevention, Flood Control & Erosion and Sediment Control:

Velocity zones (V-zones) and AO-zones of Land Subject to Coastal Storm Flowage (V-zones especially so) are areas which are subject to hazardous flooding, wave impact, and, in some cases, significant rates of erosion as a result of storm wave impact and scour. V- and AO-zones in coastal areas are generally subject to repeated storm damage which can result in loss of life and property, increasing public expenditures for storm recovery activities, historic taxpayer subsidies for flood insurance and disaster relief, and increased risks for personnel involved in emergency relief programs. Alteration of land surfaces in A-zones could change drainage characteristics that could cause increased flood damage on adjacent properties. A number of complex and inter-related factors determine the wave height and the landward extent of wave run-up in V- and AO-zones, including shoreline orientation, nearshore/off shore bathymetry, onshore topography, wave fetch, storm frequency and magnitude, and the presence of coastal engineering structures. The topography, soil characteristics (e.g. composition, size, density, - & shape of soil material), vegetation, erodibility and permeability of the land surface within V- and AO-zones are critical characteristics which determine how effective an area is in dissipating wave energy and in protecting areas within and landward of these zones from storm damage and flooding. The more gentle and permeable a seaward-sloping land surface is, the more effective that land surface is at reducing the height and velocity of incoming storm waves. Wave energy may be expended in eroding and transporting materials comprising the land surface within the V- and AO-zones, as well as by percolation or the downward movement of the stormwater through more permeable land surfaces, thereby lessening the

²⁷ Additional regulations regarding land subject to coastal storm flowage in the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern are found in FWR 10.39. Additional regulations regarding land subject to coastal storm flowage in the Waquoit Bay ACEC are found in FWR 10.40.

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effects of backrest, scour and erosion.

Development in V- and AO-zones poses environmental problems since construction and development activities can impair or destroy those characteristics cited above which are critical to the stated resource area values.

Dredging or the removal of materials within V- and AO-zones acts to increase the landward velocity and height of storm waves, thereby allowing storm waves to break further inland and to impact upland and wetland resource areas which might not otherwise be impacted. Filling and the placement of solid fill structures within V- and AO-zones may cause the refraction, diffraction and/or reflection of waves, thereby forcing wave energy onto adjacent properties, natural resources, and public or private ways potentially resulting in otherwise avoidable storm damage. When struck with storm waves, solid structures within V- and AO-zones also may increase localized rates of erosion and scour.

In some cases, the placement of fill in hydraulically constricted portions of the coastal floodplain may increase flood levels in conjunction with heavy rainfall events. The placement of fill in AH-zones, where ponding occurs generally as a result of overwash in coastal floodplains, may increase flood levels on the subject and adjacent properties above pre-fill flood levels.

Relative Sea Level Rise Considerations:

Those portions of coastal floodplains which are immediately landward of salt marshes, coastal beaches, barrier beaches, coastal dunes or coastal banks require special protection. These areas are likely to be in a state of transition as the entire complex of coastal, wetland resources gradually moves landward because of the fact that, "for the past thousands of years, relative sea level has been rising in Massachusetts, and it is still rising", (Smith, Clayton, Mayo and Giese, 1978), resulting in inundation of more landward area. As sea level rises, the shoreline may retreat and areas are successively inundated more frequently by storm and tidal activity. Activities carried out within these 'special transitional areas' of coastal floodplains may interfere with the natural landward migration of the adjacent coastal resource areas. Therefore, maintaining these special transitional areas in their natural state is necessary to protect the interests of other wetland resources.

Historical sea level measurements indicate that relative sea level in Massachusetts is rising at approximately 1 foot per 100 years. In FEMA designated A-zones, where stillwater flooding predominates, the increased flood elevations are proportional to that increase in the current relative sea level rise rate in Massachusetts. However, in FEMA designated V-zones, the increased flood elevations will exceed that of a proportional increase in sea level rise.

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Therefore,, buildings and other structures should be designed to incorporate a relative sea level rise of at least 1 foot per 100 years in A-zones and at least 2 feet per 100 years in V-zones.

(2) Definitions, Boundaries, and Critical Characteristics

(a) Definitions

1. Land Subject to Coastal Storm Flowage

Land Subject to Coastal Storm Flowage means land subject to any inundation caused by coastal storms up to and including that resulting in a 100 year flood, surge of record, or flood of record, whichever is greater. One hundred year flood (or base flood as it is also referred to) means the flood having a one percent chance of being equaled or exceeded in any given year.)

2. Velocity Zones (including V-, VE-, & Vi-30)

Velocity Zones are those portions of Land Subject to Coastal Storm Flowage which are coastal high hazard areas or areas of special flood hazard extending from the inland limit within the 100 year floodplain seaward supporting waves greater than three feet in height.

3. AO-Zones

AO-zones are those portions of Land Subject to Coastal Storm Flowage which are subject to inundation by moving water (usually sheet flow on sloping terrain) where average depths are between one and three feet. In Massachusetts, coastal AO zones are commonly associated with overwash and generally border on the landward side of V-zones.

4. A-Zone (including A-, AE-, AI-30, & A99)

A-zones are those portions of Land Subject to Coastal Storm Flowage which are subject to inundation by types of 100 year flooding where Stillwater flooding predominates.

5. AH-Zone

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AH-zones are those portions of Land Subject to Coastal Storm Flowage which are subject to shallow flooding, usually ponding resulting from overwash, where average water depths are between one and three feet.

6. Overwash

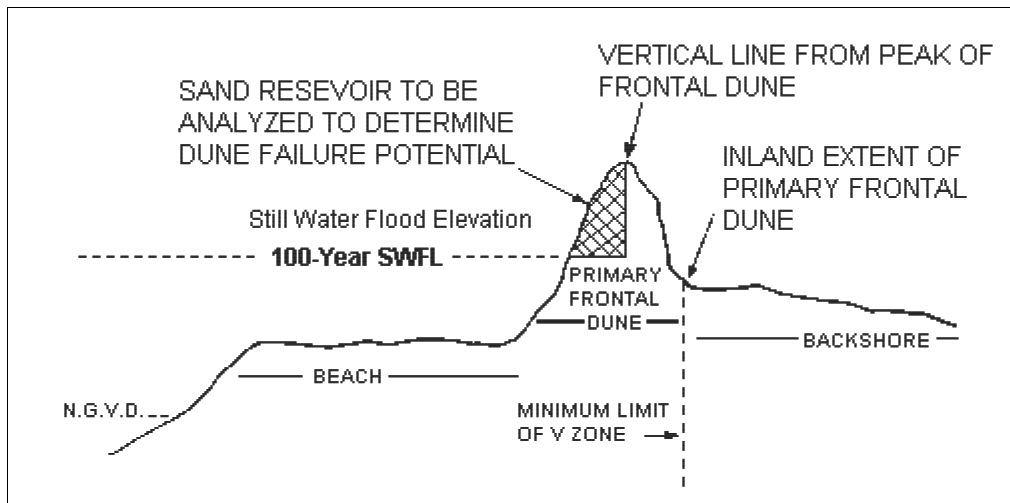
That portion of storm wave uprush that carries over the crest of a berm, dune, or man-made structure, oftentimes depositing sediment or other storm laden material.

(b) Boundary & Boundary Modification Procedure

1. The boundaries of the V-, AO- and AH-zones within Land Subject to Coastal Storm Flowage shall be determined by reference to the most recently available flood data prepared for the Town of Falmouth under the National Flood Insurance Program. The landward boundaries of the AO- and AH-zones shown on the Flood Insurance Rate Map (FIRM) for the community shall be presumed accurate

2. The landward boundary of the A-zone within Land Subject to Coastal Storm Flowage shall be determined by

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3. The landward boundaries of the V-zones shall be presumed to be twenty-five feet (25 ft.) landward of the boundaries shown on the Flood Insurance Rate Map (FIRM).

4. The landward boundary of the 10 year floodplain is the estimated maximum lateral extent of the flood water which will theoretically result from the statistical 10 year storm. Said boundary shall be determined utilizing the 10 year Stillwater elevation as published in the community Flood Insurance Study.

5. Where NFIP flood data are unavailable, the boundary of any zone within Land Subject to Coastal Storm Flowage shall be the maximum lateral extent of flood water typical of that zone which has been observed or recorded.

6. In the event of a floodplain boundary conflict, the Commission may require the applicant to determine the boundary by engineering calculations which shall be:

- a. based upon the 100-year Stillwater flood elevation published in the effective Flood Insurance Study for the community for the affected shoreline reach or a revised 100 year Stillwater flood elevation calculated to account for hydrologic changes occurring subsequent to the effective date of the community Flood Insurance Study;
- b. based upon the appropriate wave height or wave run-up methodology for the affected shoreline reach as set forth in the FEMA Publication, Guidelines and Specifications for Wave Envelope Determination and V-Zone Mapping,

10.38, continued

FEMA, 1989; and

c. prepared and certified by a registered professional engineer.

7. Notwithstanding FWR 10.38(2)(b)6.a. though c., where a V-zone has been depicted on the latest Federal Insurance Rate Map on a barrier beach with a frontal dune reservoir less than 540 square feet (as explained in the National Flood Insurance Program and Related Regulations [44 Code of Federal Regulations, Chapter 1, Section 65.11]), the V-zone shall be remapped pursuant to the provisions of FWR 10.38(2)(b)4.b. and c. (*see illustration*)

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(c) Critical Characteristics

1. The topography, soil characteristics (i.e. composition, size, shape & density of material), vegetation, erodibility, and permeability allow for the dissipation of storm wave energy and, therefore, are the physical characteristics of Land Subject to Coastal Storm Flowage which are critical to the protection of the statutory interests of flood control and storm damage prevention. In addition, for areas in AH-zones that are subject to ponding or A-zones that are hydraulically constricted areas, the ability to store a volume of flood water is a critical characteristic. Hydraulically constricted A - zones are those in which the base flood elevation is lower on the landward side of the constriction.
2. In addition to the above cited critical characteristics, the proximity of floodplain areas to water bodies and other wetland resources, makes them critical to water pollution control of these abutting resource areas.
3. In order to protect existing coastal or freshwater wetland resource area values, the geographic extent/area of the resource must be maintained. Thus, in order to maintain the ability of a resource area to migrate landward in response to relative sea level rise without loss of area the critical characteristics of Land Subject to Coastal Storm Flowage are topography; frequency, depth and duration of inundation; and proximity to a coastal or freshwater wetland.

(3) Presumptions

- (a) Where a project involves removing, dredging, filling, building upon, degrading or otherwise altering of Land Subject to Coastal Storm Flowage, the Commission shall presume that said area is significant to, and the proposed activity will have a significant or cumulative effect upon, the resource area values Specified in FWR 10.38(1).
- (b) The following activities proposed within Velocity zones of Land Subject to Coastal Storm Flowage shall be presumed to have a significant or cumulative adverse affect on the protected resource area values;

Construction of:

1. new structures, including buildings, sheds and garages, and additions and substantial improvements to existing structures;
2. new parallel/shear walls or vertical walls for existing structures;

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3. impermeable paving for new roads, driveways and parking lots;
4. new or proposed expansions of coastal engineering structures;
5. changes in grade including new mounded septic systems.

- (c) The following activities proposed within the AO-zone of a beach, dune or barrier beach of Land Subject to Coastal Storm flowage are likely to have a significant or cumulative adverse effect on the protected resource area values:

Construction of:

1. new structures, including buildings, sheds and garages, and additions and substantial improvements to existing structures supported on a solid foundation or proposed below the base flood elevation;
2. new parallel walls/shear walls, vertical walls or breakaway walls, foundation piers, grade beams, or foundation/structural slabs for existing structures;
3. new or proposed expansions of roads,, driveways or parking lots, or impermeable paving for existing unpaved roads, driveways or parking lots;

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4. new or proposed expansions of coastal engineering structures;
5. new septic systems.

(d) These presumptions are rebuttable and may be overcome only upon a clear showing that said area does not play a role in the protection of said resource area values. In the event that the presumptions are deemed to have been overcome, the Commission shall make a written determination to this effect, setting forth the grounds.

(4) General Performance Standards

(a) When the Commission determines that Land Subject to Coastal Storm Flowage (A, AO, AH and/or V zones) overlays other resource areas listed in FWR 10.00, the applicable performance standards for each resource area shall be independently and collectively applied and the project shall be appropriately conditioned to protect all stated resource area values.

(b) When Land Subject to Coastal Storm Flowage (A, AO, AH and/or V-zones) is significant to the resource area values of flood control and storm damage prevention, the following performance standards shall apply:

1. Any activity shall not have an adverse effect by increasing the elevation or velocity of flood waters or by increasing flows due to a change in drainage or flowage characteristics (e.g. change in direction) on the subject site, adjacent properties, or any public or private way.
2. a. Relative sea level rise and the landward migration of resource areas in response to relative sea level rise shall be incorporated into the design and construction of structures and other activities proposed in Land Subject to Coastal Storm Flowage.
b. At a minimum, for activities proposed in A-zones, the historic rate of relative sea level rise in Massachusetts of 1 foot per 100 years shall be incorporated into the project design and construction.
c. At a minimum, for activities proposed in the V-zone, a two foot elevation per 100 years shall be incorporated into the project design and construction.
d. Any activity within the 10 year floodplain of Land Subject to Coastal Storm Flowage shall not have an adverse effect by impeding the landward migration of other resource areas within this area of the floodplain.

(c) When the AH-zone (or an A-zone which is hydraulically constricted) is significant to the interests of flood control or storm damage prevention, the following additional performance standards shall apply:

1. A proposed activity shall not result in flood damage due to filling which causes lateral displacement of flood waters that, in the judgement of the Commission, would otherwise be confined within said area; unless,
2. Compensatory storage is provided for all flood storage volume that will be lost as the result of a proposed project within this area when, in the judgement of the Commission, said loss will cause an increase or contribute incrementally to an increase in the horizontal extent and level of flood waters.

Compensatory flood storage shall mean a volume not previously used for flood storage and shall be incrementally equal to the theoretical volume of flood water at each elevation, up to and including the 100 year flood elevation, which would be displaced by the proposed activity. Compensatory flood storage shall be provided within the same general area as the lost area and must maintain or create an unrestricted hydraulic connection within said area.

(d) A proposed project within a Velocity-zone shall not destroy or otherwise impair the function of any portion of said landform and/or shall not have an adverse effect on adjacent wetland resource areas. Activities and their ancillary uses in Velocity zones which result in alterations to vegetative cover, interruptions in the supply of sediment to other wetland

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resources, and/or changes to the form or volume of a dune or beach will have an adverse effect on said landform's ability to provide storm damage prevention and flood control and are, therefore, prohibited. These activities include, but are not limited to:

Construction of:

1. new structures, including buildings, sheds and garages, and additions or substantial improvements to existing structures;
2. foundations other than open pilings or columns;
3. new or proposed expansions of roads, driveways or parking lots, or impermeable paving for existing unpaved roads, driveways or parking lots;
4. new or proposed expansions of coastal engineering structures;
5. new septic systems.

(e) Notwithstanding the provisions of FWR 10.38(4)(a) through (d), the Commission may permit the following activities provided that the applicant demonstrates, to the satisfaction of the Commission, that best available measures are utilized to minimize adverse effects on all critical characteristics of Land Subject to Coastal Storm Flowage, and provided that all other

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performance standards in FWR are met:

1. Beach, dune and bank nourishment and restoration projects, including fencing and other devices designed to increase dune development and plantings compatible with natural vegetative cover;
2. Boat launching facilities used in the service of the public and navigational aids;
3. Improvements necessary to maintain the structural integrity/stability of existing coastal engineering structures;
4. A project which will restore, rehabilitate or create a saltmarsh or freshwater wetland;
5. Projects that are approved, in writing, or conducted by the Division of Marine Fisheries that are specifically intended to increase the productivity of land containing shellfish, or to maintain or enhance fisheries;
6. Projects that are approved, in writing, or conducted by the Division of Fisheries and Wildlife that are specifically intended to enhance or increase wildlife habitat.

(f) Notwithstanding the provisions of FWR 10.38(4)(a) through (e), the Commission may approve small additions to an existing structure provided:

1. All other provisions of FWR are met;
2. The structure is not in any resource area other than Land Subject to Coastal Storm Flowage;
3. The structure is not in an area subject to FWR 10.18 Resource Area Buffer; and
4. The cumulative size of addition(s) to the structure since (*effective date*) does not exceed 200 square feet.

(g) Notwithstanding the provisions of FWR 10.38(4)(a) through (f), no project may be permitted which will have any adverse effect on habitat sites of rare species.

FWR 10.39: Land or Waters within Black Beach/Sippewissett Marsh District of Critical Planning Concern²⁸

(1) Introduction. The land and waters within the Black Beach/Sippewissett Marsh District of Critical Planning Concern (the District) are likely to be significant to the prevention of flood damage by limiting of development in flood hazard areas, prevention of damage to structures and natural resources as a result of erosion, improvement of water quality, protection and enhancement of existing vegetative cover in order to maintain water quality and wildlife habitat, protection of wildlife, waterfowl, and plant habitat and the maintenance of existing populations and species diversity, prevention of loss or degradation 10.39: continued

of critical wildlife and plant habitat, prevention of new stormwater runoff discharges and the improvement of existing stormwater runoff discharges, protection of coastal ecosystems which support the continued viability of harvestable shellfish and finfish habitat, public access to water and land, improvement of groundwater recharge, and the minimization of the impact of new development, reconstruction and/or expansion on the resource area values listed above.

The land in this resource area may also be significant to protection of public and private water supply, protection of ground water supply, flood control, storm damage prevention, prevention of pollution, protection of land containing shellfish, protection of fisheries, protection of wildlife habitat, protection of aesthetics, prevention of erosion, protection of recreation, depending on what other resource area(s) may be present.

This resource area contains nationally significant ecological and natural resources including freshwater and tidal wetlands, waterfowl, shorebird and migratory bird habitat, rare species, shellfish and finfish, mud and sand flats, and a barrier beach/dune/marsh system which possess recreational, scientific, and educational values.

In recognition of the presence of these resources, the federal Fish and Wildlife Service completed an Environmental Assessment

²⁸ Pursuant to Barnstable County Ordinance 96-1 and Section 22(c) of the Cape Cod Commission Act, expansions and alterations of single-family residential dwellings in existence as of July 1, 1989, are not subject to the provisions of FWR 1.39 provided the total gross floor area of such expansion or alteration does not exceed 25% of the total gross floor area of the dwelling in existence as of July 1, 1989. Additions which exceed this threshold are subject to the provisions of FWR 10.39. Single-family dwellings constructed after July 1, 1989, multifamily dwellings, and nonresidential structures are subject to the provisions of FWR 10.39 regardless of the size of the expansion or alteration. Exemption from FWR 10.39 does not exempt the applicant from any other provision of FWR 10.00 or any other local bylaw, or state and federal statutes. The definition of total gross floor area is found in Section 240-13 of the Code of Falmouth under "GROSS (Leasable) FLOOR AREA."

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(1993) which proposed federal designation of the Sippewissett Marshes National Wildlife Refuge, encompassing a portion of the District. The District is also located on Buzzards Bay which has been designated by the Environmental Protection Agency as an estuary of national significance leading to a program to enhance water quality and natural resources through the Buzzards Bay Project National Estuary Program.

The marshes, Fresh Pond, and two other small ponds west of Great Sippewissett Marsh (the Marsh) are designated by the Association for the Preservation of Cape Cod as critical habitat due to their many functional values. In addition, the Sippewissett Marshes have been identified by the Northeast Coastal Areas Study as one of seven sites from the Cape and Islands Region that provide significant coastal habitat. According to the Fish and Wildlife Service, five coastal habitat types and approximately 40 species of special emphasis or management concern are supported by the Sippewissett Marshes ecosystem. These marshes provide breeding/spawning, nursery, feeding/staging, wintering and migratory habitat of importance to several species of regional or national significance.

The area is home to several state-listed rare and endangered species. The Massachusetts Natural Heritage and Endangered Species program has designated and mapped the area as a "high priority site of rare species habitat and exemplary natural community" and noted the presence of two state listed species within the proposed District: the federally listed piping plover (*Charadrius melodus*) Arethusa (*Arethusa bulbosa*) -- a perennial orchid- and New England Blazing Star (*Liatrix scariosa v. novae-angliae*). The Fish and Wildlife Service identify the presence of a number of state and federally listed species within the area including Least Terns (*Sterna albifrons*), Northern Diamondback Terrapin (*Malaclymys terrapin*), Saltpond Grass (*Diplachne maritima*), Bushy Rockrose (*Helianthemum dumosum*).

In addition to rare species present within the District, the Fish and Wildlife Service has conducted an extensive survey of plant and wildlife habitat found within the Sippewissett Marshes area. Their analysis notes that the area provides feeding and overwintering habitat for American Black Duck (*Anas rubripes*), Canada Geese (*Branta canadensis*), forage for terns, herons, egrets, and bitterns, nesting habitat for osprey and various songbirds, and migratory bird habitat for neotropical migrating birds. The marshes and associated creeks and shallows provide nursery areas for commercially important fish species including winter flounder, bluefish, striped bass and tautog. Menhaden and American sandlance use the marsh as a nursery area and a variety of smaller resident species provide a food source for larger sport and commercial fish species. Soft shell (*Mya arenaria*) and hard shell clams (*Mercenaria mercenaria*) occur on the mud flats and along the outer beach, and the area has supported occasional bay scallop (*Argopecten irradians*) fisheries providing a potential commercial and recreational shellfishing resource. The first shellfish closures of the area due to bacteriological contamination occurred in approximately 1983. The area is currently classified as "seasonally approved" and shellfishing is permitted during winter months.

It is important to maintain the features of the beach which make it critical habitat, and a Natural Heritage high priority site for these species, as well as essential habitat for all species that depend upon the marsh/barrier beach complex. However, the water quality and ecological values of the marsh/beach complex are threatened by increasing development and current management

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practices.

According to the Massachusetts Division of Marine Fisheries Sanitary Survey Report (1993) stormwater runoff, coupled with poor flushing, is one of the primary sources of shellfish contamination problems in the District. Site preparation and development activities including grading, clearing, alteration of topography and the construction of structures, roads and driveways may alter drainage patterns and introduce pollutants and sediment to the Marsh through runoff. Grading and filling activities increase the compaction of subsurface soils, decrease soil fertility and change permeability and drainage characteristics. Grading of areas contributing direct discharge to the marsh also causes increased turbidity, decreased pH, changes in salinity and reduced dissolved oxygen levels that will adversely affect fish and invertebrate populations. The Massachusetts Highway Department (MHD) storm drainage system on Route 28A has two drainage pipes that lead directly to the Marsh. Stormwater runoff has been indicated to be a primary source of fecal coliform contamination in the Marsh -- an important indicator of shellfish quality according to the 1993 Sanitary Survey. High fecal coliform counts have been particularly prevalent during the summer months.

Runoff from developed upland areas other than roads can also contribute significant amounts of contaminants to the Marsh. Runoff from upland areas can contain fertilizers and pesticides from lawns and contaminants from precipitation on roofs and driveways. Natural buffer strips can significantly reduce contaminant loads from developed areas. The efficiency of buffer

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strips depend on their width, slope and type and extent of vegetation.

Buffer strips are also important for the role that they play in protecting and maintaining wildlife habitat. According to the Fish and Wildlife Service, the alteration or elimination of surrounding upland and backdune habitat, and associated transition zones has a pronounced adverse impact on resident and migratory wildlife. Additional development within the District is likely to result in the removal of vegetation, particularly the wooded buffer areas bordering the Marsh and associated wetlands. This will result in alteration of vegetative structure, species composition and distribution patterns, and habitat fragmentation contributing to the direct loss of wildlife habitat and biodiversity.

According to the Fish and Wildlife Service, disturbance of piping plover and least tern nesting areas by human and domestic animal incursions is a serious problem throughout the region, and has led to the abandonment of many former piping plover and tern colonies. Human/animal disturbances are likely to have an adverse impact on many other species as well.

The District contains two barrier spits. These are known as Black Beach and the Saconnessett Hills Barrier Spit. They are designated as Fm-31 and Fm-30 respectively by the Massachusetts Coastal Zone Management's 1982 Barrier Beach Inventory Project. Black Beach is also a federally designated unit of the Federal Coastal Barrier Resource System.

The barrier spits protect the Marsh, shoreline areas, and upland areas behind the Marsh by serving as a buffer to storm waves and storm surges. It is a dynamic area where the beach and dunes are constantly changing as a result of wind and wave action, influenced by natural and human activities as well as relative sea level rise. Like most barrier beaches, Black Beach is attempting to move landward, as indicated by visible storm overwash fans deposited in the marsh behind the dunes. This landward migration is part of the natural cycle of barrier beaches and the process of overwash plays an important role in the dissipation of wave energy and protection of upland areas behind the barrier beach. As storm waves erode the seaward side of the barrier beach, overwashed material is carried into the marsh and provides a substrate for the formation of new dune areas, shifting the barrier beach landward.

On an undeveloped barrier beach, this process can occur unimpeded, however, development on barrier beaches including buildings, septic systems, roadways, seawalls, revetments, and groins alters this natural cycle. Such structures prevent overwash and interfere with beachgrass and dune growth, contributing to erosion in surrounding areas. These disturbances are damaging to the stability and function of the system as a whole and over the long term will interfere with the landward migration of the barrier beach and make the beach increasingly susceptible to breaching. According to "Guidelines for Barrier Beach Management in Massachusetts (1994)", "once the natural beach and dune rebuilding processes are interrupted, the barrier beach defenses against future storms are diminished. In an attempt to "stabilize" the barrier beach through 10.39: continued

armoring, such as building a seawall or revetment, the beach areas adjacent to and in front of the armoring erode or scour at an accelerated rate and may entirely disappear over time. The Guidelines recommend that "whenever possible, coastal banks serving as sediment sources for adjacent barrier beaches remain or be returned to an undeveloped, unarmored state in order to allow for healthy beaches and dunes." The same is true for coastal dunes that function in the same manner.

Existing houses, the marsh, adjacent shoreline and upland areas will become vulnerable to direct wave attack, in the event of a breach in Black Beach. Protecting the integrity and function of the barrier beach system requires attention to three components -- ensuring sediment supply to the area, maintaining vegetative cover and maintaining the beach elevation.

Existing and future development will continue to adversely affect the natural process of erosion and migration on the barrier beach. Expansion of existing houses and increased intensity of use of a property on the primary dune or barrier beach may weaken the integrity and elevation of the barrier itself. Septic systems and cesspools within this area may result in the introduction of bacteria and viruses to the Marsh due to shallow depth to groundwater and periodic flooding. In the V-zone, during catastrophic or extreme storms the septic system effluent can be released into the water. Development on the beach also results in the removal of stabilizing vegetation. The continued reliance on revetments, seawalls and jetties to protect property on the beach, will further starve downdrift areas of sediment and further weaken the barrier beach.

In addition, most of the District is within FEMA V and A flood zones. Approximately 50% of the District is in the mapped FEMA Velocity zone. This is an area which is subject to hazardous flooding, wave impact, and erosion as a result of storm wave impact and scour. Development in these areas is at extreme risk -- and can pose a hazard to nearby areas. For example, dredging

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or removal of materials within V-zones acts to increase the landward velocity and height of storm waves, thereby allowing them to break further inland and to impact adjacent upland and wetland areas which might not otherwise be impacted. Filling and the placement of solid structures within V-zones may cause the refraction, diffraction and/or reflection of waves, thereby forcing wave energy onto adjacent properties, natural resources, and public or private ways potentially resulting in otherwise avoidable storm damage and/or increased rates of erosion and scour. (U.S. Army Corps of Engineers, 1984)

Most of the remainder of the District is located in the FEMA A-zone. Alteration of land surfaces in FEMA A-zones will change drainage characteristics that can result in increased flood damage on adjacent properties. In addition, flooding within these areas leads to property damage. Loss of property resulting from wave and wind damage in V-zones, as well as from stillwater flooding within A-zones, is responsible for millions of dollars in flood insurance claims and taxpayer costs in Massachusetts. As a result of just three storms in 1991-1992, the repair of public roads, seawalls, sewer and water lines, buildings and other public facilities in Massachusetts cost to tax-payers over \$50 million (in addition to monies paid from the National Flood Insurance Program).

The area within the District received a significant amount of storm damage as a result of Hurricane Bob. In addition, the elevation of the dunes was lowered due to lack of sediment supply as a result of revetments and groins along the coastline and redistribution of sand from Hurricane Bob, leaving the area vulnerable to future storms. Future hurricanes will likely affect this area in a similar manner.

Finally, storm damage in the future is likely to be even more devastating as a result of relative sea level rise. Historical sea level measurements indicate that relative sea level is rising at approximately 1 foot every 100 years (Giese, et al., 1987). As a result, the Massachusetts Coastal Zone Management Program and the Barnstable County Regional Policy Plan both recommend that buildings, Septic systems, and other structures be designed to accommodate a relative sea level rise of at least 1 foot within FEMA A- and V-zones. More recent research, indicates that a 2 foot increase in elevation within V-zones is likely to be necessary due to increases in wave height within these areas. Research by the Cape Cod Commission on naturally vegetated areas adjacent to wetlands and waterbodies notes the importance of maintaining fringing upland areas around these resources in order to allow landward migration of both inland and coastal wetlands in response to sea level rise. If these areas are not protected, wetlands are likely to become flooded and lost as sea level rises.

Much of the available knowledge concerning the function and human value of the New England saltmarsh, including the information summarized in this preamble, has been learned from scientific research conducted in the Great Sippewissett Marsh. 10.39: continued

During the past two or three decades, over 100 scientific reports and theses have been published on all aspects of saltmarsh ecology, based on research at the Great Sippewissett Marsh. The accumulated scientific data is without equal in the world and the protection of this natural system will allow this important research work to continue to build upon past efforts.

The Black Beach/ Marsh area described above qualified under Section 10(a) of the Cape Cod Commission Act for designation as a District due to the following factors:

- the presence of significant natural, coastal, and scientific resources; and
- the presence of substantial areas of sensitive ecological conditions which render the area unsuitable for development.

As proposed by the Town, and in accordance with the District of Critical Planning Concern Guidance Document, dated December 1990, this District was designated as a Wildlife, Natural, Scientific and Ecological District; and a Hazard District. The Ecological District contains important and identifiable wildlife, natural, scientific and ecological resources including but not limited to, plant, animal and marine life and their habitats, as well as unusual geological features. The District is highly susceptible to hazards due to natural or man-made conditions including but not limited to, marginal soil, or topographic conditions which render it unsuitable for intense development, flooding, waste treatment, groundwater, erosion, construction problems, salt water intrusion, and pollution.

(2) Definition, and Boundary

- (a) Land or Waters Within the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern includes all areas within the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern that was created by Barnstable County Ordinance 96-1.
- (b) Unless otherwise stated or otherwise specified in the Falmouth Zoning Code, the definitions in Barnstable County Ordinance 96-1 shall apply to FWR 10.39.

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(c) Total cumulative resource area impacts means all areas of a lot and/or parcel of land not in a naturally vegetated condition and includes but not is limited to: rooftops, driveways, parking areas, gardens, lawns, paths, walkways, docks, and piers.

(d) Naturally vegetated condition means an area on a lot or parcel of land that:

1. is left in a natural, undisturbed vegetative state;
2. has existed in a primarily natural, undisturbed state, but has been enhanced with indigenous plantings conducive to improved wildlife habitat according to a plan approved by the conservation commission; or
3. has been disturbed; but is revegetated with indigenous plantings that will return the land to its predisturbance condition according to a plan approved by the conservation commission.

(e) The boundary of the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern is depicted on the attached map "Black Beach/Great Sippewissett Salt Marsh DCPC."

(3) Presumption.

(a) Where a project involves removing, filling, dredging, building upon or otherwise altering of land or waters within the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern, the Commission shall presume that such area is significant the resource area values specified in FWR 10.39(1). This presumption is rebuttable and may be overcome upon a clear showing that said land does not play a role in the protection of said resource area values. In the event that the presumption is deemed to have been overcome, the Commission shall make a written determination to this effect, setting forth the grounds.

(b) In the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern, the following activities shall be presumed to be significant to some or all of the resource area values specified in FWR 10.39(1). This presumption is rebuttable and may be overcome upon a clear showing that said land does not play a role in the protection of said resource area values. In the event that the presumption is deemed to have been overcome, the Commission shall make a written determination to this effect, setting forth the grounds.

1. The use of septic systems is significant to improvement of water quality and the protection of coastal ecosystems which support the continued viability of harvestable shellfish and finfish habitat;
2. The construction, use, and maintenance of docks and piers is significant to impacts on prevention of flood damage

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by limiting of development in flood hazard areas, prevention of damage to structures and natural resources as a result of erosion, protection and enhancement of existing vegetative cover in order to maintain water quality and wildlife habitat, protection of wildlife, waterfowl, and plant habitat and the maintenance of existing populations and species diversity, prevention of loss or degradation of critical wildlife and plant habitat, protection of coastal ecosystems which support the continued viability of harvestable shellfish and finfish habitat, public access to water and land, and the minimization of the impact of new development, reconstruction and/or expansion on the resource area values listed above.

(c) In the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern, the following activities shall be presumed to adversely affect some or all of the resource area values specified in FWR 10.39(1). This presumption is rebuttable and may be overcome upon a clear showing that said land does not play a role in the protection of said resource area values. In the event that the presumption is deemed to have been overcome, the conservation commission shall make a written determination to this effect, setting forth the grounds.

1. any proposed septic system or repair to an existing septic system proposed that is not in compliance with the setback requirements of FWR 10.03(3)(c)
2. existing stormwater discharges, where no mitigation is provided pursuant to FWR 10.39(25);
3. existing docks and piers; and
4. land not in a naturally vegetated condition.

(4) General Performance Standards. Work in the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern shall meet the performance standards for any other resource areas within which work is proposed and, where the presumption set forth in FWR 10.39(3) is not overcome, FWR 10.39 (5) through (29) shall apply.

(5) When the Commission determines that Land or Waters within Black Beach/Sippewissett Marsh District of Critical Planning Concern overlays other resource areas listed in FWR 10.21 through 10.60, the applicable performance standards for each resource area shall be independently and collectively applied and the project shall be appropriately conditioned to protect all stated resource area values.

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- (6) (a) Work on an undeveloped lot shall minimize the total cumulative resource area impacts pursuant to FWR 10.05(7)(f)1..
- (b) Work on a developed lot where the existing total cumulative resource area impacts are less than that specified in FWR 10.05(7)(f)1., shall be designed so that the total cumulative resource area impacts after the proposed project is completed, do not exceed those specified in FWR 10.05(7)(f)1.
- (c) Work on a developed lot where the existing total cumulative resource area impacts are greater than FWR 10.05(7)(f)1., may be permitted provided that the total cumulative resource area impacts after the proposed project is completed, have been reduced.
1. The conservation commission shall presume that an applicant has satisfied the requirements of FWR 10.39(6)(c) if 10% of the land area in excess of the amount specified in FWR 10.05(7)(f)1. is returned to a natural vegetated condition. The determination of which area of a lot is returned to a naturally vegetated condition pursuant to this presumption shall be at the discretion of the applicant.²⁹

(7) Notwithstanding the provisions of FWR 10.39(6), no project shall remove, fill, dredge, build upon, degrade, or otherwise alter land that is in a naturally vegetated condition and acts as a buffer to the following resource areas: land under the ocean; land under estuaries; salt marsh; land under a salt pond; land containing species that are endangered, rare, threatened, or of special concern; freshwater wetlands; land under waterbodies; or vernal pool. A buffer width of at least 200 and no more than 300 feet is required unless otherwise specified in FWR 10.39. The Commission shall determine the exact buffer width based on the following factors:
10.39: continued

- (a) existing wetland functions, values and sensitivity to disturbance;
- (b) buffer characteristics;
- (c) land use impacts; and
- (d) buffer functions.

(8) Notwithstanding the provision of FWR 10.39(7), the distances specified in FWR 10.39(7) may be modified in a manner consistent with the provisions of FWR 10.18, but in no case shall the buffer distance be less than one hundred (100) feet.

(9) Notwithstanding the provision of FWR 10.39(7), the Commission may permit the following in the area specified in FWR 10.39(7) and (8):

- (a) activities having minimal adverse impacts on buffers and no adverse impacts on the resource area for which the buffer is provided. These activities may include low intensity, passive recreational activities such as pervious trails, nonpermanent wildlife watching blinds, short term scientific or educational activities, and sports fishing or hunting.

(10) A building setback line of 15 feet is required from the edge of any land in its naturally vegetated condition pursuant to FWR 10.39(7). Minor structural intrusions into the area of the building setback may be allowed if the conservation commission determines that such intrusions will not negatively impact the resource area values specified in FWR 10.39(1). The setback shall be identified on a site plan which is filed as an attachment to the Order of Conditions.

(11) No new, or expansion and/or enlargement of an existing, bulkhead, revetment, seawall, or other coastal engineering structure shall be permitted on a coastal bank.

(12) Notwithstanding the provisions of FWR 10.39(6) through (11), no project shall be permitted which will have any adverse
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effect on land under the ocean, or if proposed on land under a salt pond, on lands within 100 feet of the mean high water line of a salt pond, or on land under a body of water adjacent to a salt pond, shall be permitted which will have any adverse effect on the marine fisheries or wildlife habitat of the salt pond, or ability of the public to access the land and waters of the salt pond.

²⁹ Commentary: A presumption has been created to provide certainty to the applicants of the maximum reduction in total cumulative resource area impact that would be requested by the conservation commission pursuant to FWR 10.39(6)(c). Notwithstanding this presumption, the conservation commission may determine that less area returned to its natural vegetated condition meets the requirement of FWR 10.39(6)(c).

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(13) Notwithstanding the provisions of FWR 10.39(6) through (12), the Commission may issue a permit for limited dredging for the purpose of improving tidal circulation and water quality, to improve or provide tidal flow through relict or existing tidal channels to openings through the railroad dike,

(14) Notwithstanding the provisions of FWR 10.39(6) through (12), no project, including the reconstruction or repair of existing coastal engineering structures, shall be permitted which will have any adverse effect on a coastal beach.

(15) Notwithstanding the provisions of FWR 10.39(6) through (14), no project, including the reconstruction or repair of existing coastal engineering structures, shall be permitted on a coastal dune or within 100 feet of a coastal dune which would have an adverse effect on the dune by:

- (a) affecting the ability of waves to remove sand from the dune;
- (b) disturbing the vegetative cover so as to destabilize the dune;
- (c) causing any modification of the dune form that would increase the potential for storm or flood damage;
- (d) interfering with the landward or lateral movement of the dune;
- (e) causing removal of sand from the dune artificially; or
- (f) interfering with mapped or otherwise identified bird nesting habitat.

(16) Notwithstanding the provisions of FWR 10.39(15), the Commission may permit a repair or replacement to an existing septic system on a coastal dune or within 100 feet of a coastal dune, provided best available measures are used to minimize any adverse effect on the dune caused by:

- (a) affecting the ability of waves to remove sand from the dune;

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- (b) disturbing the vegetative cover so as to destabilize the dune;
- (c) causing any modification of the dune form that would increase the potential for storm or flood damage;
- (d) interfering with the landward or lateral movement of the dune;
- (e) causing removal of sand from the dune artificially; or
- (f) interfering with mapped or otherwise identified bird nesting habitat.

(17) FWR 10.39(14) and (15) shall apply to all coastal beaches and to all coastal dunes which make up a barrier beach in the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern.

(18) Notwithstanding the provisions of FWR 10.39(14) through (17), the Commission may permit a project on a beach, dune, or barrier beach, provided:

- (a) the project is a resource area restoration project consistent with the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern Management Plan approved by the Cape Cod Commission pursuant to Barnstable County Ordinance 96-1;
- (b) the project meets the other provisions of FWR 10.00; and
- (c) the project meets the provisions of 310 CMR 10.00; or
- (d) the project is the repair or replacement, but not the expansion and/or enlargement, of a lawfully located structure in existence as of January 17, 1996, owned by the Town of Falmouth and used in the service of the public.

(19) Notwithstanding the provisions of FWR 10.39(6) through (18), when a project is proposed on a salt marsh, on lands within 100 feet of a salt marsh, or in a body of water adjacent to a salt marsh, the project shall not destroy any portion of the salt marsh and shall not have an adverse effect on the productivity of the salt marsh. Alterations in growth, distribution and composition of salt marsh vegetation shall be considered in evaluating adverse effects on productivity.

(20) Notwithstanding the provisions of FWR 10.39(6) through (18), no project, except for resource area restoration project consistent with the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern Management Plan approved by the Cape Cod Commission pursuant to Barnstable County Ordinance 96-1, shall be permitted which will have any adverse

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effect on land under a water body, an inland bank, freshwater wetland, or vernal pool habitat.

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(21) Notwithstanding the provisions of FWR 10.39(6) through (20), the Commission may approve the reconstruction of roads and common drives existing as of January 17, 1996, provided such road and common drives are constructed of crushed 3/8, 1/2, 3/4 stone, bank run gravel, or like material, and does not contain a binder material such as asphalt, "processed stone, "stone dust," or like material, or where a town way, private way or common drive was paved as of January 17, 1996, the commission may approve repaving provided the width of the paved surface does not increase.

(22) No new, or replacement, or substantial repair of an existing, dock or pier shall be permitted.

(23) Consistent with FWR 10.28, and 10.38, no septic tank may be placed in ground in a dune, and no changes in elevation may take place in the velocity zone.

(24) The design of the system for stormwater management for new projects shall be consistent with the provisions of FWR 10.16(3) unless otherwise specified in FWR 10.39(24)(a) through (d).

(a) No increase will be allowed in the peak rate of runoff for 2, 10, 25, and 100-year 24 hour storm events.

(b) The total volume of post-development runoff shall not exceed the pre-development runoff volume for storms up to the two year, twenty-four hour design storm.

(c) Treatment for the first flush shall be provided to achieve 80% removal of total suspended solids, and treatment processes to remove nitrogen at an efficiency rate of 30% or greater.

(d) No micropool extended detention basins or biofilter shall be approved.

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(25) Notwithstanding the provisions of FWR 10.14(3) and 10.39(24),

(a) any project that contains 10% impervious lot coverage or less shall not be required to meet the requirements of FWR 10.14(3) and 10.39(24), provided said impervious cover is not connected³⁰ to a resource area specified in FWR 10.39(7);

(b) any redevelopment/reconstruction project that contains more than 10% impervious lot coverage, or any impervious lot coverage, shall be required to meet the requirements of FWR 10.39(24)(b) through (d), and shall have a non-erosive discharge for the two year storm.

(26) Notwithstanding the provisions of FWR 10.39(6) through (25), the provisions of FWR 10.39(6) through (25) shall not apply to the routine maintenance of existing roads and driveways, provided that the overall width of the traveled surface is not widened. Routine maintenance shall be limited to winter sanding operations, regrading, and filling of potholes.

(27) Notwithstanding the provisions of FWR 10.39(6) through (25), no project shall be permitted which will have any adverse effect on habitat sites of rare species.

(28) Notwithstanding the provisions of FWR 10.39(6) through (27), no project shall be permitted which will have any adverse impact on land containing shellfish.

(29) Notwithstanding the provisions of FWR 10.39(6) through (28), the Commission may permit a research project that requires a location in the Lands and Waters of the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern.

FWR 10. 40 Land and Water in the Waquoit Bay Area of Critical Environmental Concern.

(1) Introduction. The Land and Water in the Waquoit bay Area of Critical Environmental Concern is likely to be significant to

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³⁰ Connected as defined in TR-55.

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the following resource area values: fisheries, shellfish³¹, water pollution control, storm damage prevention, flood control, and aesthetics.

Following an extensive nomination and evaluation process, the ACEC in Falmouth was designated by the Secretary of Environmental Affairs on November 26, 1979.

The natural components of the Waquoit Bay ACEC include a long barrier beach system, dunes and sandy beaches, acres of salt marsh, productive shellfish beds, a large estuary, anadromous fish runs, floodplain, and extensive areas for boating and swimming. The estuary is habitat for upland species and waterfowl as well as a spawning and nursery ground for many marine species. The beaches, dunes and marshes protect adjacent upland from storm damage.

This unpolluted estuarine system supports a wide range of fin fish and shellfish species. Clean water must be maintained to protect the fishery resource as well as the public health of recreational boaters, fishermen and swimmers. The biological product of this estuarine system is sustained by the contiguous salt ponds and salt marshes which contribute large quantities of nutrients, carbon and energy to the coastal food chain. Minimum alteration of the natural features of the ACEC will allow them to function at their natural capacity.

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These undeveloped expanses also contribute to the scenic beauty enjoyed by users of the ACEC.

Both the Moonakis and Childs Rivers are sensitive to pollution due to a limited flushing capability. Both have anadromous fish runs.

The Moonakis River's mouth is constricted by a large, shifting sand flat creating a narrow channel approximately two feet (2') deep at MLW. This flat is a productive shellfish bed harvested year round by commercial and recreational fishermen. There is a successful restoration program for sea run brown trout in the headwaters and upstream reaches of the Moonakis River, where it is called the Quashnet River.

(2) Definition, Critical Characteristics, Boundary

- (a) Area of Critical Environmental Concern (ACEC) means an area which has been so designated by the Secretary in accordance with 310 CMR 6.40 through 6.55 of the CZM Regulations.
- (b) The landward extent of the ACEC is the 11-foot contour.

(3) Presumption

Where a project involves removing, dredging, filling, building upon, degrading or otherwise altering of land or waters within the Waquoit Bay Area of Critical Environmental Concern, the conservation commission shall presume that said area is significant to, and the proposed activity will have a significant or cumulative effect upon, the resource area values specified in FWR 10.40(1). These presumptions are rebuttable and may be overcome only upon a clear showing that said area does not play a role in the protection of said resource area values. In the event that the presumptions are deemed to have been overcome, the Commission shall make a written determination to this effect, setting forth the grounds.

(4) General Performance Standards

Where the presumption set forth in FWR 10.40(3) has not been overcome, FWR 10.40(5) through (8) shall apply.

(5) No project proposed in the Waquoit Bay Area of Critical Environmental Concern shall be permitted which requires removal and/or replanting of shellfish.

(6) Notwithstanding the provisions of FWR 10.55(4), any proposed work shall not destroy or otherwise impair any portion of a Freshwater Wetland that is within the Waquoit Bay Area of Critical Environmental Concern.

(7) Notwithstanding the provisions of FWR 10.40(4) through (6), no project may be permitted which will have any adverse effect

³¹ For regulations concerning land containing shellfish, see FWR 10.34.

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on habitat sites of rare species.

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(NON-TEXT PAGE)