



# **Chapter Five: New and Expanding Marinas**

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Special considerations must be made when planning a marina construction project.

# New and Expanding Marinas

New and expanding marinas present different environmental challenges than existing marinas. These marinas are constructed in coastal areas where no facilities currently exist or existing facilities are obsolete. There are both positive and negative consequences of new and expanded marina construction. On the positive side, engineers are constrained only by natural conditions and not existing uses, which provides for greater design flexibility. Additionally, new marinas can employ current techniques, such as stormwater systems built in compliance with current regulations. However, negative impacts from work in undeveloped coastal areas are often unavoidable. In either case, these new marina projects must be sited and designed to minimize environmental impacts.

Taking on a marine construction project is a complex process. The information in this guide gives context for the issue and provides basic information. It may be necessary, however, to hire a consultant to help you design and permit a project. While new construction can result in new impacts, it can be designed to blend with natural conditions, provide environmental benefits, and avoid long-term environmental problems.

This chapter discusses the natural conditions that occur in protected coves and how marinas must be designed to protect these conditions. Environmental considerations related to new construction in marine waters are discussed, followed by an introduction to the primary federal and state laws that apply to most marina construction projects. This is followed by a discussion of best management practices (BMPs), organized under the following siting and design considerations:

- marina flushing
- water quality
- habitat
- shoreline stabilization

Many other BMPs discussed in Chapter 4 are applicable to the siting and design of new marinas. For example, proper site planning and design for new marinas must consider BMPs related to fuel station design, stormwater management infrastructure, designated maintenance areas, waste disposal, and boat sewage facilities. Project proponents of new and expanding marinas should refer back to Chapter 4 during the project's planning phases to incorporate relevant BMPs.

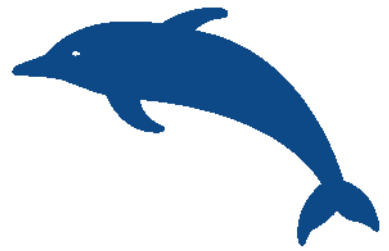
## 5.1 Environmental Considerations

Natural landforms, such as salt marsh or tidal flats, provide important biological and physical benefits to the marine environment. Salt marsh, for example, provides habitat for fish and shellfish; protects inland areas from wave energy and flooding; and acts like a sponge to capture, hold, and neutralize many pollutants. Development that impairs or destroys these functions will harm the local environment.

Marine habitats are dependent on the natural conditions typical of nearshore coastal waters. Such conditions include daily flushing by the tides; seasonal variations in salinity, temperature, and nutrients; and natural sediment transport. Activities associated with marina construction can cause temporary and permanent impacts to marine habitat. Temporary impacts can occur during construction when turbidity (cloudy water caused by sediment disturbance) and sedimentation is produced by activities such as pile driving and dredging. Turbidity can resuspend pollutants that have been trapped in the ocean bottom and expose marine life to them. Cloudy water also prevents light needed for growth by aquatic plants such as eelgrass from penetrating through the water column. When the sediment particles fall out of the water column, marine organisms including shellfish, may become buried. Permanent impacts result when shorelines are converted from natural banks to concrete bulkheads, or when bottom habitats are dredged. New structures in coastal waters can also affect currents and tidal flow, which may alter sediment transport, pollutant flushing, and the delivery of nutrients to existing habitats.

Marinas, once constructed, can support marine habitats. Scientific studies have shown that the in-water parts of marina structures do provide habitat for juvenile fish, crabs, mussels, and other species. Seaweed colonizes pilings, floating docks, riprap, chains, and other structures located below the waterline, which feeds and protects many marine organisms. Some marinas have even raised or farmed shellfish using aquaculture techniques underneath docks and piers.

Ironically, both marshes and marinas require the low energy protective environment of coves and bays to exist successfully. The challenge is for the designers of new or expanded marinas to consider the natural environment in the area of proposed work and design and site the marina facility to preserve and, where possible, enhance the natural features.



## 5.2 Applicable Regulations

Proper siting and design of new and expanding marinas will lessen impacts on the marine environment. The process of obtaining regulatory permits will require that your project show minimal environmental impacts. Anyone considering expanding an existing marina or building a new one should meet with state and federal regulatory staff and become familiar with the applicable regulations. It would also be advisable that you hire a consultant to design an environmentally-sensitive project and help you navigate through the regulatory process.

The following laws apply to the construction of new or expanded marinas. Please read the summary of these regulatory programs in Chapter 6 and contact the listed Agency or the Massachusetts Office of Coastal Zone Management (CZM) for more information.

- 1. Clean Water Act – Section 404 Permit:** The U.S. Army Corps of Engineers (ACOE) administers the Section 404 Program. Section 404 of the Federal Water Pollution Control Act (also known as the Clean Water Act) requires that any project that proposes to place structures or fill material, or dredge material below the high tide line must apply for and obtain a Section 404 Permit from the ACOE. Since nearly all marina projects necessitate that construction activity occur below the high tide line, the new or expanding marina will likely require a Section 404 Permit. Contact the U.S. Army Corps of Engineers/New England District, Regulatory Branch at (978) 318-8000.
- 2. Clean Water Act – Section 401 Water Quality Certification:** The Massachusetts Department of Environmental Protection (DEP) administers the Section 401 Water Quality Certification Program. Section 401 of the Clean Water Act requires that any project that includes a discharge of pollution to a wetland or water body, and is also required to obtain a permit from the U.S. Army Corps of Engineers or other federal agency, must receive a certification from the state that the project will not violate state water quality standards. Therefore, if the project requires a Section 404 Permit, it automatically requires a Section 401 Water Quality Certification. Contact the Massachusetts DEP at (617) 292-5500.
- 3. Massachusetts Environmental Policy Act:** The Massachusetts Executive Office of Environmental Affairs administers the Massachusetts Environmental Policy Act (MEPA) through its MEPA Office. The MEPA law requires that all agencies of the Commonwealth determine the impact on the natural environment of all works, projects, or activities they conduct and use all practicable means and measures to avoid or minimize the environmental harm that has been identified. MEPA applies to projects directly undertaken by state agencies and to private projects for which state permits are sought, or for which state funding or land transfer is involved. MEPA does not apply to projects needing only local approvals. Review thresholds

are provided in 301 CMR 11.03, which identifies categories of projects of nature, size or location that have the potential to cause “Damage to the Environment.” Thresholds have been established for the following categories: land; rare species; wetlands, waterways, and tidelands; water; wastewater; transportation; energy; air; solid and hazardous waste; and historical and archaeological resources; and Areas of Critical Environmental Concern. Projects that surpass any threshold must comply with MEPA. Activities related to marina construction that may trigger MEPA include dredging; filling of salt marsh, altering coastal dunes or coastal banks; or location of a construction project within an Area of Critical Environmental Concern. Contact the MEPA Office at (617) 626-1020.

**4. Massachusetts Waterway Regulations – Chapter 91 Program:** DEP administers the Chapter 91 Waterways License Program. A Chapter 91 license is required for any new construction that proposes the placement of a structure or dredging below mean high water; or any project being constructed on land that was historically subject to tidal flow but has since been filled. These areas are known as “tidelands.” All existing marinas with structures below mean high water or on “tidelands” must hold a current Chapter 91 license for those structures. Specific provisions of the Waterways Regulations apply requirements on new construction, such as documenting that fuel spill control equipment is available (see the Waterways Regulations, 310 CMR 9.39). In addition, fill and structures are categorically restricted and do not meet the statutory test for approval under Chapter 91 in certain situations (see 310 CMR 9.32). Projects are also governed by any approved Municipal Harbor Plan under 301 CMR 23.00. Specific standards are also included in the regulations that preserve water-related public rights and water-dependent uses. Contact the Massachusetts DEP, Wetlands and Waterways Program at (617) 292-5500 if an existing facility does not have a Chapter 91 license or if a proposed project requires a license.

**5. Massachusetts Wetlands Protection Act:** DEP administers the state Wetlands Protection Act through municipal “Conservation Commissions.” The local Conservation Commission reviews all activities that occur within 100 feet of a wetland resource area. Coastal wetland resources including coastal banks, coastal beaches, coastal dunes, land under the ocean, and land subject to coastal storm flowage. After its review, which includes a public hearing, the commission issues a permit, known as an Order of Conditions, which allows the project to proceed in accordance with the conditions of the permit. Applicants may appeal the decision to the DEP. Many construction activities at marinas, both on land and in the water, require an Order of Conditions. Contact the Conservation Department in your local town hall or contact the Massachusetts DEP, Wetlands and Waterways Program at (617) 292-5500 for more information.

**6. CZM Federal Consistency:** CZM reviews certain projects to ensure that they are consistent with the Commonwealth’s federally-approved Coastal Zone Management Program. Any project undertaken by a federal agency, requiring a federal permit, occurring on the Outer Continental Shelf, or receiving federal funding that is in or may affect the land or water resources or uses of the Massachusetts coastal zone is subject to a federal consistency review. The Commonwealth of Massachusetts has adopted enforceable coastal policies that are based on existing Massachusetts statutes and regulations. These policies provide the criteria for federal consistency review. Policies cover issues central to the management of the state’s coastal zone including water quality, marine habitat, protected areas, coastal hazards, port and harbor infrastructure, public access, energy, ocean resources, and growth management. The project-specific federal activity cannot take place until CZM concurs that the project is consistent with state coastal policies. Any marina construction project that proposes work below the high tide line and triggers review by the Army Corps of Engineers under a Section 404 permit, or requires any other federal permit, will also be subject to CZM federal consistency review. Contact CZM’s Project Review Coordinator at (617) 626-1200 for more information.



Marinas can be found in a variety of waterfront settings.

## 5.3 Siting and Design Considerations

For Massachusetts and federal regulators to approve projects under the law, they will expect that you have sufficiently studied the marine environment where your project is to be built, and that your proposed design is in balance with the marine environment. Other design considerations not specifically required by law will help the marina blend into the surrounding coastal environment. Specifically, marina flushing, water quality, habitat, and shoreline streambank stabilization must be considered. Many of the BMPs listed in Chapter 4 may also be required as part of the siting and design of a new or expanding marina.

The following symbols are provided to help you identify which BMPs may be required during the permitting process and which are recommended.

► **May Be Required by Law**

▷ **Recommended**

Specific BMPs for each of these topics are discussed below.

### **Marina Flushing**

Water quality within the marina basin depends on how well the basin is flushed, which depends on how well water circulates within the marina. The movement of water is controlled by tides and is influenced by currents that are formed by the shape of the shoreline and underwater landforms. It is important to understand how man-made structures such as pylons and piers affect the movement of water during a typical tidal cycle, because obstructions to water circulation can affect natural processes such as sediment transport and distribution of dissolved oxygen. These impacts can,

in time, affect navigation and marine habitats. Constrictions can also decrease flushing of the cove, and prevent pollutants or excess nutrients from being carried out to sea.

Marinas should be designed so that their structures do not significantly restrict the natural circulation of water caused by tidal action. BMPs include:

- ▶ **Marina Bottom and Entrance Channel Placement:** Try to avoid having bottoms of the marina and their entrance channels that are deeper than adjacent navigable harbor channels. If the marina bottom is significantly below that of the main channel, bottom water exchange might be reduced. This can restrict the flow of dissolved oxygen to waters around the marina and lead to fouling and odor problems.
- ▶ **Minimize Dead Water in Marina Designs:** Dead water develops when bacteria consume all the dissolved oxygen in the bottom waters and the movement of oxygen rich water for replenishment is restricted. Dead water can form in isolated areas under the marina and where marina structures block water flow. Design new marina areas without structures that will lead to the development of dead water areas, thereby ensuring water movement and exchange throughout the entire marina basin and avoiding traps for floating trash and seaweed.
- ▷ **Open Marina Designs and Wave Attenuators:** Consider using open designs and wave attenuators where possible to improve flushing. Open designs avoid the use of structures in bottom waters that restrict water flow. Wave attenuators are structures that dampen wave energy, but still allow water to pass through and into the protected area. Wave attenuators may not sufficiently protect the marina in areas subject to significant wave action, and the need for wave protection may make solid breakwaters the only practical alternative for some marinas. Site specific study is required to reach the appropriate solution.
- ▷ **Promote Flow-Through Currents:** If feasible, without compromising wave protection, provide openings at opposite ends of the marina to promote flow-through currents.
- ▷ **Mechanical Aerators:** Use mechanical aerators to improve oxygenation and mixing in marina basins where and if flushing appears to be a problem, particularly during hot summer months.

## Water Quality

Assess water quality at the marina during the design phase to identify any potentially significant water quality impacts that can be improved through siting and design.

Possible BMPs include:

- ▶ **Water Quality Sampling:** Complete a water quality baseline for the marina site. Compile a record of basic environmental conditions of the water such as temperature, salinity, and dissolved oxygen at various locations around the marina. Both

## Please Note

The Commonwealth of Massachusetts, through its Brownfields Initiative, is encouraging the redevelopment of Brownfields rather than development of green spaces or areas containing natural vegetation. For more information, call DEP's Brownfields Coordinator at (617) 292-5500.

surface waters and bottom waters could also be sampled, and the samples sent to a lab to analyze contaminants such as nutrients and bacteria. Sampling should also be done in both dry and wet weather periods. This data will help document existing water quality conditions which will be useful for developing design alternatives and evaluating the effects on water flow and water quality from each alternative.

- ▷ **Volunteer Monitoring:** Establish a volunteer monitoring program to conduct regular monitoring prior to, during, and for a short time after construction. Many local volunteer groups currently monitor local waters where they live. You could contact such groups and request that they sample near the marina. You could pay for any laboratory analysis, and the marina site could be an important part of their sampling effort to monitor water quality within a larger cove or bay.

### Habitat

Natural habitats that provide a variety of important functions and values to the local coastal environment may be located near the marina. During new and significantly expanded marina siting and design, negative impacts on existing habitat should be minimized. Consider the following practices:

- ▷ **Select Degraded Habitats for Marina Development:** Redevelop sites degraded by development in the past, such as in old urban areas, industrial brownfields, declining fishing ports, or surplus naval base waterfronts, rather than developing in undisturbed areas. Brownfields are a term for abandoned lots of land that were once developed by heavy industry.
- ▶ **Inventory Existing Habitats:** Conduct an inventory of existing marine habitats near the proposed work. Habitats may include salt marsh, eelgrass, rocky intertidal habitat, mudflats, clam beds, and oyster beds. Some of this information can be collected through a visual analysis. Information on local shellfish populations may also be available from the local shellfish warden or by calling the Massachusetts Division of Marine Fisheries at (617) 626-1520. The inventory will be useful for developing an environmentally-protective marina design. For permitting purposes, a more detailed inventory may be required.
- ▷ **Enhance Surrounding Natural Habitats:** Establish new habitat or expand existing habitat where feasible, such as using dredged bottom soils for beach nourishment or to expand adjacent marshes. This work will require a permit and should be included in your permit applications.
- ▷ **Proper Boat Storage:** Use dry stack storage to decrease pressure for in-water docking for small boats. Any time components of the marina can be moved away from the water, potential impacts on nearby marine habitats can be decreased. Some marinas store boats off-site at a location away from the water. Such land is usually cheaper than waterfront land, making this option more cost-effective to the marina.



- ▶ **Structures Above Habitat:** All marina structures, such as piers and docks, should be constructed away from marine habitats. Where elevated walkways must be constructed over habitats such as salt marsh and eelgrass, design considerations should maximize the amount of sunlight that reaches the plants. This can be achieved by minimizing the breadth of the walkway and the shadow it creates, or by providing slots in the walkway.

### Shoreline Streambank Stabilization

Unstable sections of the shoreline subject to wave action can erode and lead to sedimentation, which may cover nearby eelgrass beds, or fill in natural channels requiring more frequent maintenance dredging. Where feasible, new or expanding marina projects should help stabilize the shore as part of their development plans. Specific BMPs include:

- ▷ **Vegetative Planting and Natural Buffers:** Use vegetative plantings, wetlands, beaches, and natural shorelines to keep streambanks from eroding. Natural solutions to bank erosion rather than hard structures improve the view of the marina and provide benefits to wildlife.
- ▷ **Riprap Structures:** Where stabilization of a streambank with a hard structure is necessary, choose riprap in preference to a vertical wall, where practical. Riprap is composed of varying sized stones selected by an engineer and sized to site specific conditions. It is used where a bank has a potential for erosion due to its proximity to wave action and/or instability caused by the bank's soil composition. Riprap is preferable because the spaces in between the rocks of riprap provide more suitable habitat for marine organisms than flat surfaces like concrete. Riprap also generally absorbs and decreases wave energy better than "smooth" walls.
- ▶ **Assess Effects of Marina Structures:** Consider the effects inside the marina basin of reflected waves from vertical bulkheads and their consequences when reviewing options for stabilization.
- ▷ **Minimize Boat Ramp Impacts:** At boat ramps, retain natural shoreline features and design to avoid erosion. Work with, rather than against, prevailing winds, currents, and sunlight. Narrow channels with cross currents can be treacherous, as can narrow channels with currents that run directly into typically heavy winds. In Massachusetts, the southwest wind is the prevailing wind, while the northeast wind is the dominant or strongest wind direction.



Riprap is commonly used to secure the shoreline where erosion is a problem.

## 5.4 More Information

A significant amount of information will be required to design and permit a new marina construction project. Contact the agencies listed in Section 5.2 above for more information about the regulatory process. Contact a marine engineering and consulting firm to find out how their services will help in developing the project. Contact your local shellfish warden or state resource agencies such as CZM and the Massachusetts Division of Marine Fisheries to collect information about the marine resources around your marina. A short list of potential contacts is provided here.

- 1. Society of Naval Architects and Marine Engineers** — This professional organization can help you locate a marine engineering consultant. Call (800) 798-2188 or log-on at [www.sname.org/](http://www.sname.org/).
- 2. Massachusetts Division of Marine Fisheries (DMF)** — for information about fisheries and fish habitat near the project, call DMF at (617) 626-1520 or log-on at [www.state.ma.us/dfwele/dmf/dmf\\_toc.htm](http://www.state.ma.us/dfwele/dmf/dmf_toc.htm) to find the location of the nearest DMF field office.
- 3. Massachusetts Geographic Information Systems (MassGIS)** — to collect digital information about marine resources, such as eelgrass, near your marina, call MassGIS at (617) 626-1000 or log-on at [www.state.ma.us/mgis/massgis.htm](http://www.state.ma.us/mgis/massgis.htm).