
ENVIRONMENTAL Fact Sheet



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Permitting Non-Tidal Beaches

Owners of waterfront property often want to add a sandy beach for recreation along their property's shoreline. This involves modification of the natural shoreline by clearing vegetation, excavating to prepare the surface, and adding sand. In accordance with state regulations (RSA 482-A), a permit from the New Hampshire Department of Environmental Services (NHDES) Wetlands Bureau is required for construction of a beach because it impacts areas within the banks of a surface water body. Beaches permitted by NHDES must also comply with the [Shoreland Water Quality Protection Act](#) (SWQPA). SWQPA requires, among other things, that a vegetated waterfront buffer be left intact in order to preserve the integrity of the shoreline and protect water quality. Other local and federal regulations may also apply to beach construction. This document explains some of the impacts that beach construction may have on the environment as well as the concept of "perching" a beach to reduce these impacts in freshwater lakes.

The Multiple Impacts of Sand in Lakes

Physical Impacts

Lakes act as settling basins for their watersheds, collecting and accumulating materials that move downslope and drain into them. This process, which results in the gradual filling-in of lakes over thousands of years, is known as "lake aging." Lake aging is a natural succession from lake to shallower lakes, to marsh, to meadow, and eventually to dry upland. The processes that cause lake aging cannot be stopped or reversed but can certainly be accelerated.

Any activity that adds more material to a lake than would be supplied naturally increases the rate at which a lake is filled-in, and thus reduce the storm water storage capacity of that lake. Periodically adding sand to beaches greatly accelerates lake aging. If one cubic yard of sand erodes from a beach into the water each year, the equivalent of an entire dump truck load of sand is added to the lake over a decade. When one considers the cumulative effects of sand being added to several properties around a lake and over the years, the quantities add up quickly. For this reason, beach sand replenishment is regulated.

If a shoreline *does not* have a natural beach, this is a clear indication that natural erosive forces, such as wind and water, will work to destroy any beach constructed on site. The eroded sand will either be carried along the shoreline until deposited on someone else's frontage or will settle out along the frontage it was placed upon. The sand may disappear from view, but it does not leave the system. It is added to the natural sediment load in the lake and accelerates the lake aging process. Compounding this problem, it often accumulates in channels or coves where it disrupts boat navigation and renders some frontages inaccessible by boat.

Biological Impacts

The physical process of accelerated lake aging has major biological impacts. When sand builds up in lakes, lakes becomes shallower. Shallower lakes then have less water to dilute and process incoming contaminants, such as phosphorus, which easily attaches itself to sand particles. In turn, increases in phosphorous, combined with shallower lakes, often result in accelerated growth of aquatic vegetation and algae. In some circumstances, this rapid growth can cause water oxygen levels to decrease, which can suffocate aquatic animals such as fish. In addition, as lakes becomes shallower, lakebeds are exposed to greater sunlight, which results in increased water temperatures. In turn, warmer waters become even less

capable of holding oxygen. Oxygen depletion, combined with increased nutrients reaching the water, results in increased aquatic plant growth and may exacerbate exotic species growth, such as milfoil.

Although many owners want to spread sand below the water level, depositing sand in the lakebed can smother bottom dwelling algae, invertebrates and critical habitats, causing a disruption in the food chain of higher organisms that depend on them, including fish. Also, rather than sandy bottoms, many fish species rely on stony bed habitats for nesting and spawning purposes, which may be lost due to sand build-up into the lake. Finally, an increase in turbidity (reduced water clarity) caused by the addition of sand rich in fine sediments may also interfere with normal fish behavior by clogging gills and impairing vision. Depositing sand in the lakebed is therefore prohibited.

Chemical Impacts

The mineral composition of sand is not consistent. Clean, washed beach sand is primarily made of quartz, which is relatively inert. However, sand can contain other materials. In New Hampshire, iron is a common component of sand and gravel. Iron-rich sand will frequently result in the presence of iron-fixing bacteria. Although iron-fixing bacteria do not pose a health hazard, they do cause aesthetic problems by creating rust-colored slime deposits and oil-like films on the sand as they oxidize the iron. Sand may also contain contaminants other than iron, all of which have the potential to wash out of the sand and into the water and may reduce water quality.

Beach Location, Size and Configuration

A beach should be placed in a location on the lake frontage that poses the least environmental impact. Beach construction in a wetland or priority resource area is prohibited. Priority resource areas include areas with documented occurrences of protected species or habitat, bogs, designated prime wetlands, duly-established 100-foot buffers, sand dunes, tidal wetlands, tidal waters or undeveloped tidal buffer zones, and/or certain floodplain wetlands.

When selecting an appropriate location, look for an area that requires the least amount of tree, shrub, ground cover, rock and soil removal. If tree removal is necessary, upon completing the tree removal, each affected waterfront buffer grid segment must meet the minimum required tree and sapling point score. Please refer to the [“Vegetation Management for Water Quality”](#) fact sheet for details on scoring waterfront buffer grid segments.

Additionally, beaches must be located at least 10 feet from property boundaries, unless written permission is obtained from the affected abutter(s) (Figure 1).

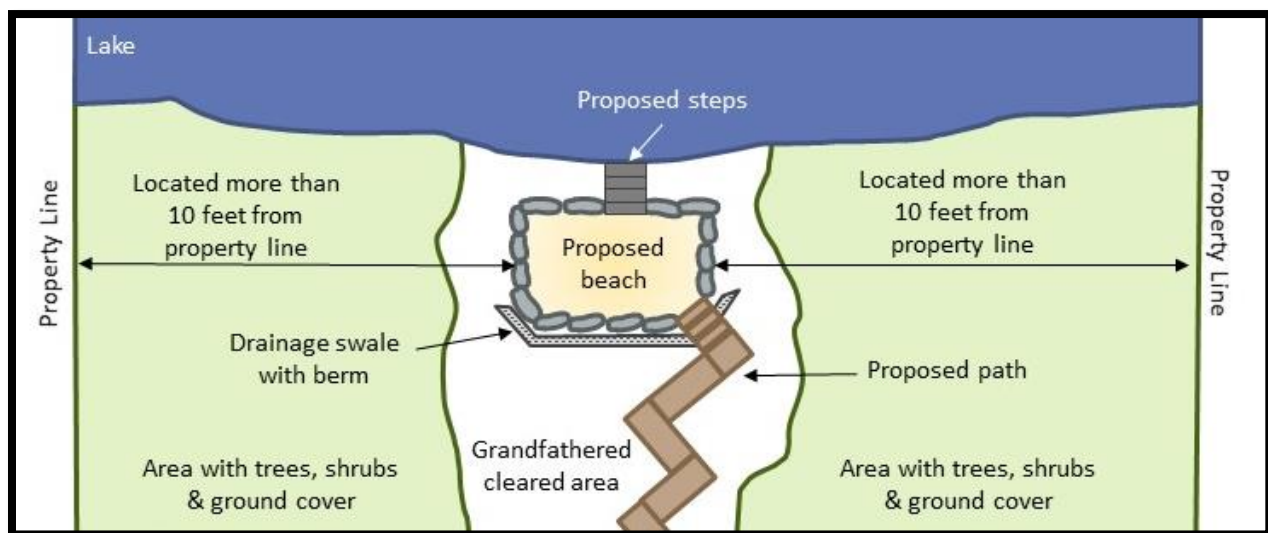


Figure 1 – A beach is proposed in a cleared area that will not require vegetation removal and will not require abutter permission.

A proposed beach cannot be permitted if it's designed and constructed in a way that will contribute sand or sediment to the adjacent surface water. All new beaches must be constructed in a “perched” position on the waterfront. A “perched beach” must be flat and must be located entirely out of the water. Wherever a hardened shoreline exists, whether due to naturally-occurring stones, installed rip-rap, or constructed retaining walls, a new beach must be located landward and above the hardened shoreline (Figure 2). This hardened shoreline must remain intact with the exception of material

that must be removed for the installation of steps to access the water (if necessary). Where hardened shorelines do not exist, water access surfaces shall be located at least 12 inches landward of the normal high water line or ordinary high water mark, as applicable.

Ideally, you should choose an area where the slope of the land is naturally flat. Rules associated with the SWQPA prohibit the construction of beaches in or on slopes steeper than 25%. Slope is calculated using the following formula:

$$\text{Slope} = \frac{\text{Total increase in the height of the land within project area}}{\text{Horizontal distance of the project}}$$

If a proposed project includes a beach with steps to the water, the steps must be included in the calculation of the slope. For example, the existing slope in Figure 2 is:

$$\text{Slope} = \frac{4 \text{ feet}}{20 \text{ feet}} = 0.2 = 20\%$$

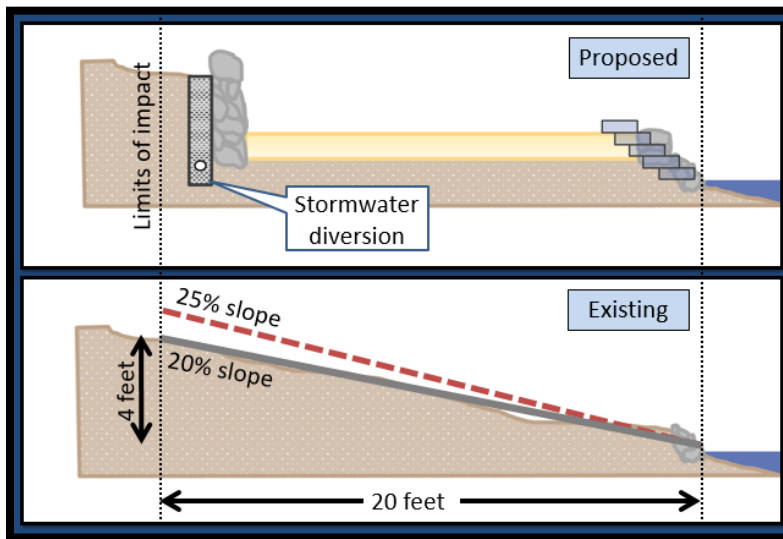


Figure 2 - Cross-section of a proposed perched beach. Note that the slope calculation includes the location of the proposed swale and steps and that the beach is located landward and above the hardened shoreline.

Be certain to locate the beach in an area of the shoreline where the adjacent lakebed is not mucky and has little aquatic vegetation. In addition to being an area for which a permit may be granted, it will provide better conditions for swimming and less disturbance to the lake habitat and water quality. Note that dredging lake bottoms and placing sand in water for beach construction for private residential use is not permitted as these are environmentally damaging activities.

Other restrictions apply to the size and location of beaches. For more information, refer to the "[Shoreland Accessory Structures Fact Sheet](#)".

Construction of a Perched Beach

Appropriate erosion and siltation controls must be installed prior to construction. They must be maintained until all disturbed areas are stabilized. Moreover, all machinery must stay outside the water during construction.

The perched beach must be constructed in a manner that does not disturb any boulders along the shoreline, except for the construction of steps. If the frontage is not naturally rocky, then a barrier may be permitted and constructed landward of the high water mark. This barrier may be of wood or stone and should present a rough face to the lake in order to dissipate wave energy. Such a barrier often helps to raise the front edge of the beach, allowing it to be level, and separates the perched beach from the water.

If excavation into the bank is required, the project must incorporate an appropriate method to stabilize the landward side of the cut. A stone retaining wall is often used to stabilize this landward side.

Beach projects must incorporate methods for diverting surface runoff around the beach to prevent erosion of the sand into the lake during storm events. Some designs incorporate a shallow grass or stone-lined swale around the landward side of the beach. In areas where a high volume of run-off may occur, a combination of both a swale and planted berm should be considered. It is far more cost-effective and beneficial to the lake to incorporate sound stormwater diversions in the initial design phases than having to reconstruct beaches and replenish beach sand in the future.

Any sand placed in the beach area must be clean. Generally, not more than 10 cubic yards of sand may be placed on a new perched beach. Use of more than 10 cubic yards will result in a higher wetlands project impact classification such as minor or major.

Access to Water from Perched Beach

Stairs made of wood or wood-like materials that are constructed over the existing grade and are removed at the end of the season are the preferred design for access to and from the water, as they typically are the best option to avoid and minimize impacts surface waters and resources (Figure 3). Stairs constructed to and from water access structures must not exceed 6 feet in width, from edge to edge (i.e., maximum total width). If these stairs are installed or constructed to provide access to the water, they must be removed from the lakebed prior to ice-in and not be re-installed until ice-out.



Figure 3 - Access stairs to and from water access structures, viewed as a cross-section.

Beach Sand Replenishment

Replenishment of beach sand may be allowed, but in general, must not exceed more than 10 cubic yards of sand and must not occur more frequently than once every six years. Permit applications for beach sand replenishment should incorporate methods for diversion of surface runoff around the beach area. This is required if requests for beach replenishment are too frequent or migration of sand has resulted in frequent maintenance dredge requests. To replenish beach sand, a [Wetlands Permit-by-Notification](#) may be used if all **criteria** are met.

Who to Contact

If you are interested in constructing a perched beach, please visit the Docks and Shoreline Structures webpage for more information and for permit application materials. You may also contact the Wetlands Bureau by phone at (603) 271-2147, via email at shoreland@des.nh.gov, or by mail at 29 Hazen Drive; P.O. Box 95, Concord, NH 03302-0095.