

Perched Beaches Protect and Improve Lake Quality

Owners of waterfront property sometimes want to add a sandy beach for recreational enjoyment and incorporate it into a landscape design for the property. This may require modification of the natural shoreline by clearing vegetation. In accordance with state regulations (RSA 482-A), a permit from the New Hampshire Department of Environmental Services (DES) Wetlands Bureau is needed for



construction of a beach if the area is within the banks of a surface water body (even if no wetland is affected). Beaches that are permitted by DES must comply with the Comprehensive Shoreland Protection Act (RSA 483-B). DES Shoreland Protection rules require that a healthy, well-distributed stand of trees, shrubs, saplings, and ground cover remains and that stumps not be removed from the area surrounding the beach. Other local and federal regulations also may apply to construction of beaches.

The Impact of Sand on Lakes

Physical Impacts:

Lakes act as settling basins for their watersheds, collecting and accumulating materials that drain into them. This process results in the gradual filling-in of lakes over thousands of years until they become a marsh and then dry land. Any activity that adds material to a lake greater than would be supplied naturally will increase the rate of a lake filling-in. The regular addition of sand to a lake, or to the shoreline of a lake where it can erode into the lake, greatly accelerates the filling-in process.

If a shoreline does not have a natural beach, it is likely that conditions are such that a constructed beach will not remain indefinitely. The dumped sand will either drift away with shoreline currents or slowly settle through the soft, mucky bottom sediment. Although the sand disappears from view, it does not leave the lake. It is added to the natural sediment load to the lake and hastens the filling-in process.

Chemical Impacts:

The mineral composition of sand is not consistent. Although clean, washed beach sand is primarily quartz, which is relatively inert, 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 bacteria. Although not a health hazard, iron bacteria 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. Clay is a material that, if present in the deposited sand, can cause turbidity problems (reduced water clarity) in the lake. Also, if there is any phosphorus associated with the dumped sand, it will contribute to increased macrophyte, algae, and cyanobacteria growth in the lake.

Biological Impacts:

The physical process of filling-in a lake from deposited sand has major biological impacts. First, a shallower lake has a reduced volume of water to dilute and assimilate incoming contaminants, including phosphorus. At a given level of phosphorus loading, a lake's productivity (algae growth) will increase as the lake's average depth decreases, assuming all other factors remain constant. Secondly, as a lake becomes shallower, more of the bottom enters the sun-lit zone (photic zone) and thus the potential for increased rooted plant growth occurs.

Also, dumping sand along the shore of a lake can smother benthic (bottom dwelling) algae and invertebrates, causing a disruption in the food chain of higher organisms including fish. Spawning or nesting sites for fish may also be destroyed by deposited sand, and turbidity from the deposited sand may interfere with normal fish behavior by clogging gills.

Beach Location, Size, and Configuration

A beach should be placed in a location on the lake frontage that poses the least environmental impact. To select an appropriate location, look for an area that requires the least amount of tree, vegetation, rock and soil removal. Choose an area where the slope of the land is naturally more flat. Also, locate an area of the shoreline where the adjacent lakebed is not mucky and has little aquatic weed growth. This will provide better conditions for swimming and less disturbance to water quality and lake habitat.

Dredging of the lake bottom or placement of sand in the water for beach construction is rarely permitted. Beaches may not be constructed in wetland areas. A beach and associated construction activities must be located at least 20 feet from property boundaries unless written permission is received from the affected abutter.

Most beaches may be no larger than 20 percent of the entire contiguous frontage (up to a maximum of 50 linear feet) and may not alter more than 900 square feet. A beach for a single family residence must adhere to these size limits. Beaches larger than this are considered major impact projects and the need for a larger beach must be well documented.

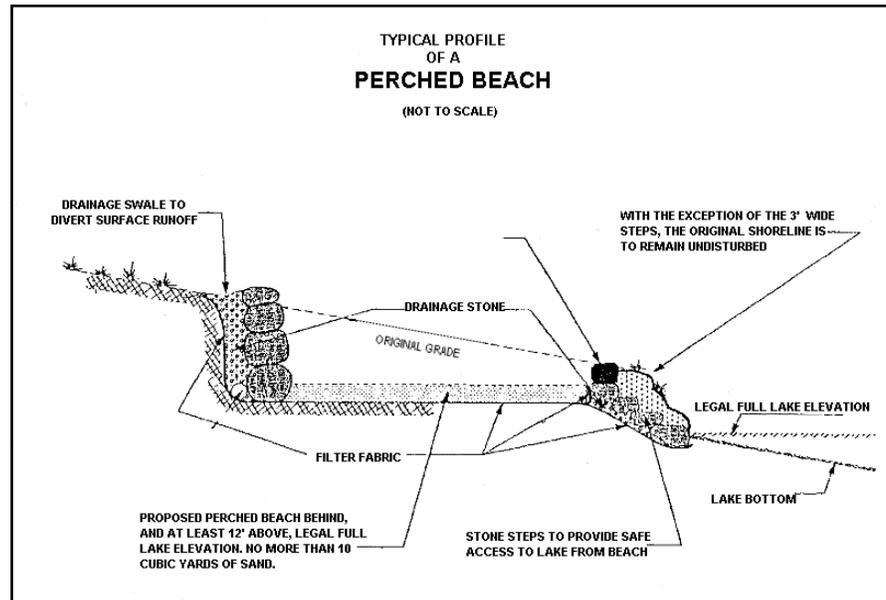
Perched Beaches:

Current DES policy requires that all new beaches must be constructed in a "perched" position on the waterfront. A "perched beach" must have little or no slope and must be located entirely out of the water, above and landward of the existing undisturbed natural shoreline. Narrow access steps to the water (4 feet wide) may be incorporated into the design. All sand must be placed above the high water mark and out of the water. The construction of a beach in a perched position helps prevent the

erosion of sand into the water and degradation of the lake environment. In addition, a perched beach requires less maintenance, which is a benefit to the homeowner.

Construction of a Perched Beach:

Construction should take place during the lake drawdown. If this is not possible, the work should be scheduled for when the lake is at its lowest level. Appropriate siltation controls need to be installed prior to construction and maintained until all disturbed areas are stabilized. Machinery should not enter the water during construction.



The perched beach should be constructed in a manner that disturbs no boulders on the shoreline. If the frontage is not naturally rocky, a barrier of no more than 12 to 18 inches should be constructed landward of the high water mark to separate 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 used often to stabilize this landward side.

Any sand placed in the beach area must be clean. Clean sand contains little or no silt or loam. Silt or loam can cause water quality problems if it enters the lake. No more than 10 cubic yards of sand may be placed on a new perched beach. To estimate the quantity of sand needed for a beach, the depth of sand on the beach should not exceed six inches.

Access to Water from Perched Beach:

Steps leading to the water from the beach may be included in the design. They should be constructed so that they are cut back into the bank, rather than extending into the lake. If removable wood stairs are used, they should be constructed over the existing grade. Stairs that are constructed over the existing grade and are removable at the end of the season are a preferred alternative. Steps should be no more than four feet wide. Very limited dredging (less than one cubic yard) beyond the steps may be permitted where the need is demonstrated.

Surface Water Runoff Diversion:

Beach projects must incorporate methods for diversion of surface runoff around the beach to prevent erosion of the sand into the lake during storm events. Many designs incorporate a shallow grass or stone-lined swale around the landward side of the beach.

Replenishment of Sand:

Replenishment of beach sand may be allowed once every six years, if needed. In general, it may not exceed more than 10 cubic yards. Placement of sand below the high water mark is classified as a major project and is usually not allowed, even on previously permitted or grandfathered beaches. Applications for beach 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 the migration of sand has resulted in the need to maintenance dredge the adjacent area.

Who to Contact

If you are interested in constructing a perched beach, please contact the New Hampshire Department of Environmental Services' Wetlands Bureau for permit application materials at:

PO Box 95
Concord, NH 03302
(603) 271-2147
wetmail@des.state.nh.us

References

Wetlands Permitting for Shoreland Structures, WD-WB-12, NHDES Fact Sheet, (603) 271-2147 or www.des.state.nh.us/factsheets/wetlands/wb-12.htm

Guidebook for Wetlands Permits, NHDES Wetlands Bureau, (603) 271-2147, or www.des.state.nh.us/wetlands/Guidebook

Comprehensive Shoreland Protection Act, RSA 483-B, WD-SP-5, NHDES Fact Sheet. (603) 271-3503 or www.des.state.nh.us/factsheets/sp/sp-5.htm