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November 30, 2021

Peter Hughes
Planning and Development Director
Marlborough Town Hall
26 North Main Street
Marlborough, CT 06447

Subject: Lake Terramuggus Watershed & Shoreline Overlay District

Dear Mr. Hughes:

We have reviewed the draft Lake Terramuggus Watershed & Shoreline Overlay District text and agree with both its need and scope. The management practices recommended by the overlay district promote a proactive approach to watershed protection. The long-term monitoring of the lake prescribed and overseen over the last 20+ years by the town shows that the lake is in good condition. The proposed regulations provide extra measures throughout the watershed to keep it that way. The regulations continue the focus of making decisions on a site-by-site basis along with regulations guiding general watershed disturbance limits.

The shoreline practices promoted by the overlay district are consistent with current science and best management practices for lake management. A description of some of the more important best management practices are discussed below.

Each property in the watershed affects or contributes to the condition of the entire lake. What the overlay district does is require a conscious effort to maintain a functional vegetated buffer around the lake. Buffers are a transition between upland terrestrial environments (typically developed properties) and aquatic environments such as ponds, lakes and watercourses. This transitional area is essential in "buffering" the two. Buffers are essential in taking up, restricting or attenuating excessive nutrients such as nitrogen and phosphorous and in infiltrating precipitation. As water flows across the land within the watershed, it carries with it a variety of pollutants: sediment, chemicals, nutrients, bacteria, litter, etc. These pollutants are filtered and absorbed by the plants and soils growing in riparian buffers, and therefore prevented from entering the water.

Vegetative buffers provide flood water storage and help to prevent soil erosion during high rain events and along high motion waters such as streams and lake shores. They also provide cooling shade which helps heat-sensitive aquatic organisms survive (such as brook trout), and control algal growth by blocking sunlight.

Trees and shrubs, grasses and forbs (wildflowers), and sedges and rushes, have strong root systems that lock in the soil and are adapted for surviving in our seasonal weather changes. Trees are the most beneficial because they establish long-term roots, continue to grow over time, and provide the most shade, food and shelter proportional to the space they occupy.

Trees, shrubs and the canopy they provide are beneficial for many reasons, a couple of the most important are that their roots, which extend out extensively from the trunk or stem: 1) take up nutrients in the soil and keep them from migrating into the lake, and 2) are very efficient at maintaining soil in place. By taking up nutrients and preventing erosion, roots prevent excessive nutrients from migrating into the lake. This is important not only along the shoreline but within the entire watershed. When taking down a tree or removing a shrub, the plant should be cut at grade, allowing the root zone to stay intact. Grubbing out the roots not only disturbs the soil but it also removes the fabric which holds the soil in place.

When situated along the lake shore, trees and shrubs help shade the shoreline keeping the water cool which maintains appropriate conditions for fish, mollusks and other aquatic animals.

The leaf duff layer produced by the woody vegetation has benefits in some areas and can contribute nutrients in other areas. In wooded area, leaves insulate plant roots, store carbon, and break down over time contributing to the production of topsoil. In addition, leaves provide important attachment sites and cover for invertebrates and small mammals. Therefore, the leaf duff layer should be maintained in wooded and other non lawn areas.

Leaves however contain nitrogen, phosphorous, potassium and carbon. These nutrients are great for gardens and forest floors but when excessive amounts of these nutrients enter the lake water, they provide food for nuisance aquatic plants such as algae. Lake Terramuggus is an oligotrophic lake meaning that it does not contain very many nutrients. This condition provides a natural control on aquatic plant growth limiting their ability to become abundant which provides the clear water quality that the lake is known for. One of the best ways to maintain this condition is by limiting the amount of nutrients entering the pond. This has to be done at the watershed level. Fallen leaves should be removed from lawn areas however it is important not to rake or blow leaves into the lake.

Impervious surfaces should be kept to a minimum along the shoreline. As the word implies, impervious surfaces do not allow water to penetrate through it. Any water hitting these surfaces, cannot infiltrate into the ground and be filtered by the soil and microbial processes. If the impervious surface is along the shoreline, the stormwater is concentrated as runoff, picks up pollutants deposited on the impervious surfaces, and is directed to the lake as a point source with attendant pollutants and potential soil scour/sediment deposition from concentrated flow.

Minimizing impervious surfaces allows more storm water to percolate into the ground which contributes to the groundwater supplying the lake. Allowing stormwater to percolate into the ground also allows the soil to adsorb nutrients inhibiting them from entering the lake and reduces the potential for thermal impacts from direct discharge of heated stormwater runoff. Nutrient control cannot be done if stormwater is forced to flow directly to the lake over concrete or other impervious surfaces. Any impervious surface in the watershed which directs water to roads and catch basins or otherwise prevents stormwater from infiltrating into the soil, prevents the recharge of groundwater.

Shorelines should remain vegetated. Shoreline and aquatic plants take up nutrients in the water limiting the nutrients available for nuisance species. The construction of retaining walls restricts plant growth along the water soil interface and reduces the water's interaction with the soil in that area.

In summary, the Watershed & Shoreline Overlay District proposed for Lake Terramuggus is consistent with current science and the proven best management practices described above. Its goal is to provide a reminder that all properties in the watershed affect the water quality of the lake and is complementary to the long-term monitoring program directed by and overseen by the town.

Please contact me on 203-454-2110, ext. 120 or at [redacted] if you have questions or require clarification.

Very truly yours,
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Thomas Ryder, Certified Ecologist