

January 13, 2003

Wareham Planning Board
54 Marion Road
Wareham, MA 02571

Re: Nitrogen loading standard for the Makepeace subdivision on Tihonet Pond, and future nitrogen standards under the Wareham Site Plan Review-Special Permit

Dear Board Members:

At our September 30 workshop on “Low Impact Development” strategies for managing stormwater, the Buzzards Bay Project National Estuary Program (BBP) also presented a summary of nitrogen management needs for Wareham. In this presentation, the BBP stressed the need for the town to adopt nitrogen management overlay districts for each sub watershed, and to establish nitrogen standards, and criteria and methods for applying those standards. The BBP agreed to begin the process of helping the Planning Board establish those standards.

On October 25, 2002, the BBP issued a report to the town entitled “Proposed Nitrogen Loading Limits for New Development in the Wareham River Estuary Watershed.” This report represented a preliminary assessment of nitrogen loading, and potential nitrogen loading limits for that watershed. Our goal was to stimulate discussion on nitrogen loading limits for the Tihonet Pond subdivision. However, we stressed in the report that the Planning Board must debate the various nitrogen loading options further, and that a consensus be formed for nitrogen management.

The principal conclusion of the report was that, left uncontrolled, nitrogen from future development (mostly from septic system wastewater disposal) would overwhelm the Wareham River system, which is already considered eutrophic. This conclusion was based on the assumption that, under existing zoning, approximately 3,000 additional housing units can be expected in the watershed, most of which would be located in the town of Wareham.

The Town of Wareham plans to upgrade its wastewater facility to accommodate an expansion of sewerage in the town. The upgrade of the facility will include reductions in nitrogen concentrations in the wastewater to less than 5 ppm to improve water quality in the Wareham River estuary. In our report, we noted that if new development in the watershed exceeds an average of 4.3 pounds of nitrogen per acre (lbs/ac) reaching the estuary, new development will exceed the nitrogen reduction benefits obtained from this wastewater plant upgrade. Presently, the water quality in the Wareham River is considered to be in poor condition (refer to the Coalition for Buzzards Bay’s *Baywatchers III*

poster¹). Thus, application of such a watershed-wide 4.3 lbs/ac limit² would merely result in the eventual return of poor water quality conditions in the Wareham River.

In the report, the BBP stated that the 4.3 pound per acre limit “might be too difficult to implement” and suggested a more “realistic limit” of 7.5 lbs/ac for this subdivision. These statements were not based on any technical limitation in achieving the necessary wastewater treatment to remove nitrogen. Rather, these comments were based on our belief at the time that no bylaw controls existed in Wareham for limiting nitrogen. The BBP was unaware that Wareham had amended its zoning bylaw in October 2001 to require a Special Permit for subdivisions over 30 acres (“Site-Plan Review,” page 36, Wareham Zone Bylaws). We apologize for any confusion we may have caused. It is important to recognize that a watershed-wide standard of 7.5 lbs/ac will not adequately protect the Wareham River watershed.

The site plan review process is a powerful tool that the Planning Board can use to establish nitrogen management standards. The Wareham Site Plan Review-Special Permit specifically requires that the applicant “reduce the pollutants reaching groundwater” in order to prevent offsite environmental impacts. However, this bylaw does not establish specific nitrogen standards and criteria. The BBP recommends that the Planning Board adopt water quality goals, which can be used as the basis of new standards.

To our knowledge, this is the first subdivision application reviewed under the Wareham Site Plan Review-Special Permit since its enactment in October 2001, so the standard chosen by the Planning Board has particular relevance. Before the Planning Board adopts a nitrogen standard, the Board must first establish a water quality goal. Once this water quality goal is adopted, then an overall acceptable loading rate can be determined, enabling the town to meet its water quality goal. Once the loading rate or rates are established, the BBP can recommend strategies and methodologies specific to the town zoning districts that will achieve the overall loading rate.

In December, the Wareham Planning Board requested that the BBP meet with representatives of A.D. Makepeace Inc. to discuss achieving nitrogen reductions for the proposed Tihonet Pond subdivision. On January 3, the BBP met with Mark Romanowitz (A.D. Makepeace Project Lead) and Mark Nelson (Horsley and Witten Inc.) to discuss their proposal to achieve a limit of 7.5 lbs/ac. The applicant uses a somewhat different nitrogen-loading model than that used by the BBP, but overall our methods agree. The one unresolved issue is that the BBP recommends using 1.0 person per bedroom as a planning occupancy, whereas the applicant wishes to use a Wareham average residential occupancy of 3.0 for an average of 0.75 persons per bedroom³.

The applicant has proposed to place 18 units on nitrogen removal septic systems⁴, and limit lawn size to 5,000 square feet per lot. The subdivision has 12 acres of proposed open space⁵, however, the

¹ *Baywatchers III: Nutrient-Related Health of Buzzards Bay Embayments 1992-2001*.

² This is the effective rate to the coastal waters after attenuation losses within the watershed.

³ In contrast to both approaches, the Cape Cod Commission uses the average of town occupancy and Title 5 occupancy (2 persons per bedroom), which results in a planning occupancy of 1.4 person per bedroom for a 4 bedroom house.

⁴ The proposed discharge of 15 ppm is presumed to achieve a presumed 50% nitrogen removal as compared to a conventional septic system. The use of nitrogen removal onsite and limits should be incorporated into the subdivision covenants and property deeds.

⁵ The applicant has proposed a Deed Restriction, which lasts only 30 years, whereas the BBP has recommended a Conservation Restriction, which is permanent.

applicant requested that only 8 of these 12 acres be credited to this subdivision so that they can bank the remainder to meet open space needs in a future subdivision. With only 8 acres of open space, the loading is 8.2 pounds lbs/ac⁶ using a one person per bedroom occupancy rate. With 12 acres of open space, the loading is nearly 7.5 lbs/ac using a one person per bedroom occupancy rate.

Of course, lower nitrogen loading rates in any particular subdivision can be achieved with other sewage options. For you to better understand the relationship between various sewage treatment options and nitrogen loading from new development, in Table 1 we use the Tihonet Pond subdivision (given the existing subdivision layout) with different sewage treatment options.

Table 1. Nitrogen loading of Tihonet Subdivision (Zoned R60⁷), with various sewage configurations (using 12 acres open space).

Wastewater treatment option	lbs/ac
All 35 units on conventional Title five systems	9.8
18 units on alternative systems, 17 conventional	7.8 ⁸
All 35 units on alternative systems	5.9
All units sewered to community system with 10-ppm groundwater discharge limit	4.1
All units sewered to community system with 5-ppm groundwater discharge limit	3.0

In summary, the Planning Board must first identify what water quality goal it wants for the Wareham River estuary, then adopt standards and limits to achieve these goals, then methodologies to apply those standards. Your most challenging step is the identification of your water quality goals. You should use the results of water quality monitoring programs like the Buzzards Bay Baywatchers program to establish your target. Once you have selected your water quality goal, the BBP can help you develop loading standards and procedures to achieve your goal.

Sincerely,

Joseph E. Costa, Ph.D.
Executive Director

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⁶ The applicant has proposed using a Town of Wareham unit occupancy of 3.0 or 0.75 person per bedroom to achieve their proposed 7.5 pounds per acre, whereas the BBP recommends using 1 person per bedroom.

⁷ A similarly sized subdivision zoned R130 would have loading rates that are somewhat more than half the values shown.

⁸ The effective loading rate to the estuary would be 7.8 lbs/ac if all 12 acres of open space are credited. If the applicant “banks” 4 acres of open space, the effective loading rate is 8.2 lbs/ac. In this scenario, 24 units would require nitrogen removal septic systems to achieve 7.5 lbs/ac.