Buzzards Bay
National Estuary Program

Ian A. Bowles, Secretary
Executive Office of Energy and Environmental Affairs
Attn: Aisling Eglington, MEPA Office
EOEA No. 13580
100 Cambridge Street, Suite 900
Boston, MA 02114

April 13, 2007

RE: Draft Environmental Impact Report for Wareham Road Mixed-Use Development, EOEA No. 13580

via electronic mail and hard copy

Dear Secretary Bowles:
The Buzzards Bay National Estuary Program has completed its review of the above-referenced Draft Environmental Impact Report, noticed in the Environmental Monitor dated February 20, 2007. The applicant, ADM Agawam Development LLC, proposes a mixed-use development on a 1,320-acre site along the Agawam River in the Buzzards Bay watershed. The mixed-use development consists of 1,075 residential units, a 90,000 square foot commercial space in an 800,000 square foot village center, with the entire development served by two wells with a combined permitted withdrawal of 660,000 gpd, and with nearly all wastewater being treated in a 344,000 GPD wastewater treatment facility.

The Buzzards Bay National Estuary Program is an advisory and planning unit of the Office of Coastal Zone Management. Our mission is to protect and restore water quality and living resources in Buzzards Bay and its surrounding watershed through the implementation of the Buzzards Bay Comprehensive Conservation and Management Plan, a watershed plan approved by the US Environmental Protection Agency and the Commonwealth of Massachusetts as state policy. We have conducted our review based upon the goals and recommendations contained in the Buzzards Bay Comprehensive Conservation and Management Plan, particularly those recommendations that relate to nitrogen loading and eutrophication of Buzzards Bay.

While the Buzzards Bay NEP supports the use of smart growth techniques, including the clustering of development, open space set asides, and transfer of development right strategies to mitigate environmental impacts from this development, the proposed effort to limit nitrogen loading impacts from this development is inadequate, especially in light of the generous density bonus being provided through the Plymouth TDR bylaw. Specifically, this project is far from nitrogen neutral when compared to the expected nitrogen inputs from the default conventional 2.75-acre zoning for this parcel.

As we highlight below, the Town of Wareham's efforts to expand its sewering system and provide advanced nitrogen removal treatment at its wastewater facility, are expected to greatly improve water quality in Wareham's coastal waters. However, because of the tremendous growth potential of the Wareham-Agawam River Watershed, nitrogen from new development in the upper watershed (including loadings from wastewater, impervious surfaces, and lawns), has the potential to negate the nitrogen reduction efforts by the Town of Wareham[1]. This is true even when generous nitrogen attenuation losses for upper watershed areas are applied in various nitrogen loading models. For this reason we feel that, at a minimum, nitrogen loading from this development must not exceed the projected nitrogen loading from a conventional subdivision of the land. Even more desirable, we feel that additional nitrogen offsets elsewhere in the watershed may be necessary to maintain current water quality conditions, or possibly achieve slight improvements in Wareham's coastal waters.

Overview of Nitrogen Concerns for the Watershed

The Agawam River and Wareham River estuaries are now impaired by nitrogen. Water quality monitoring of Buzzards Bay embayments conducted by the Coalition for Buzzards Bay Water Quality Monitoring Program shows that the Agawam and Wareham River Estuaries are among the most eutrophic estuaries in Buzzards Bay[2]. Both estuaries are on the state's 303(d) list for impaired waters, and the Agawam is classified as SB waters. State and federal action has already mandated nitrogen removal at the Wareham municipal wastewater treatment facility downstream, and since 2006, total nitrogen discharge from the Wareham facility has been limited to 4.0 ppm between April 1 - October 31 [3]. This is the strictest nitrogen limit for a municipal discharge in the Commonwealth. We further expect that DEP will issue a nitrogen Total Maximum Daily Load (TMDL) for the Wareham-Agawam river watersheds later this year or in 2008, which will undoubtedly have stringent nitrogen limits, and will have important implications for this development.

As noted above, if left unmanaged, cumulative nitrogen discharge from new development in the watershed, including this parcel, will help negate the benefits that will be achieved by the Town of Wareham through its efforts to expand sewering and provide advanced nitrogen removal treatment of its wastewater.

In the sections below we have prepared a preliminary analysis to compare nitrogen loading from the proposed development to conventional development that would be allowed under existing zoning. Based on this analysis we identify the specific additional nitrogen reduction levels needed to make this development, at a minimum, become nitrogen neutral as compared to a conventional development of the land under existing zoning. We further stress that nitrogen neutrality alone will not restore degraded estuaries like this one, and such a restoration can only occur with nitrogen reduction offsets that exceed inputs from any new development. The Buzzards Bay NEP recommends that these issues, and others described below, be addressed in the Final Environmental Impact Report (FEIR).

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[1] Sewering and advanced wastewater treatment will reduce nitrogen loading to the Wareham-Agawam River estuary by at least 24,000 pounds annually.

[2] Howes et al., 1999. Baywatchers II: Nutrient related water quality of Buzzards Bay embayments: a synthesis of Baywatchers monitoring 1992-1998, and 2001 and 2005 update maps.

[3] See: http://www.epa.gov/ne/npdes/permits/warehampermit.pdf.

Overview of Parcel

The parcel is sited wholly within the Town of Plymouth in an area zoned as "Rural Residential," with a minimum lot size of 120,000 sq. ft. (2.75 acres). This land was zoned to protect drinking water supplies and coastal waters of Buzzards Bay. The parcel covers 1,320 acres, and the applicant asserts that this would yield a "by-right" number of 484 residential units. However, this number appears flawed because 300 acres of this parcel in fact consists of large ponds and cranberry bogs, which cannot be developed (Figs. 1 and 2). Based on Figure 2.1 in the DEIR (developable area by conventional subdivision development alternative 2.3.2, shown as magenta line in Figs. 1 and 2), only 822 acres could be developed, which would likely yield only approximately 269 residential units[4], not the 484 units claimed in their alternatives analysis in the DEIR. Even when we included all non-water and non-bog land in our own analysis (assuming such that it would be practical to create a road layout to reach all these areas), this would still only provide 1,020 buildable acres, which would yield only 333 residential units. For the purposes of our nitrogen loading calculations, we have digitized road lengths of both the conventional subdivision and the proposed mixed-use development. We found that 14.3 miles of road would be constructed in the conventional development, and roughly 15.9 miles of road would be constructed in the mixed-use development.

From a nitrogen management perspective, the most important feature about this parcel is that it straddles two major Buzzards Bay sub-basins: the Buttermilk Bay sub-basin, and the Agawam River-Wareham River Estuary subbasin. Approximately 61% of the total land (811 acres) and 39% of the developable land (per DEIR fig 2.1, or 321 acres) actually falls within the Agawam River watershed, with the balance falling primarily within the Buttermilk Bay watershed[5]. This means that if this land were to be developed with conventional 2.75-acre residential development, only about 105 residences could have been built in the Agawam River drainage basin (based on the layout in the alternatives analysis), or 175 units based on a theoretical maximum layout (our calculation)[6].

Equally important is the fact that nearly all wastewater from the mixed use plan would be treated by a wastewater facility that would discharge to the Agawam -Wareham Rivers subbasin. While this is desirable to prevent interbasin transfers outside the recharge area of the Agawam-Wareham Rivers subbasin (the same subbasin where the wells are proposed), it does mean that wastewater from development in the Buttermilk Bay subbasin will be discharged to the Wareham-Agawam subbasin, and therefore must meet the watershed nitrogen loading limits for that subbasin.

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[4] Calculation: 10% dedicated to roads and easements; with remaining acreage divided by 2.75 acres per house.

[5] In this analysis we use groundwater based subbasin delineations of Buttermilk Bay developed by USGS. This delineation is superior to land surface based watershed delineations used in the DEP Major basins and subbasins which are based on land surface topography. The land surface topography watershed delineation methodology is incorrect for this watershed because this portion of the Buzzards Bay basin is composed of deep glacial outwash materials, and estuary subbasins need to be defined by actual groundwater elevations and flow directions, and must be consistent with DEP approved Zone 2s. The boundary used in Figs. 1 and 2 in this letter differs somewhat Fig. 4.1 of the DEIR. This issue is discussed in detail at: http://www.buzzardsbay.org/buzzards-bay-boundary.htm.

[6] Same calculation as footnote 2. Using a more generous buildable area we developed (blue line in figs, 1, and 2, equals 1,020 acres), this would yield an estimated 175 units in the Agawam River subbasin using 2.75 acre zoning.

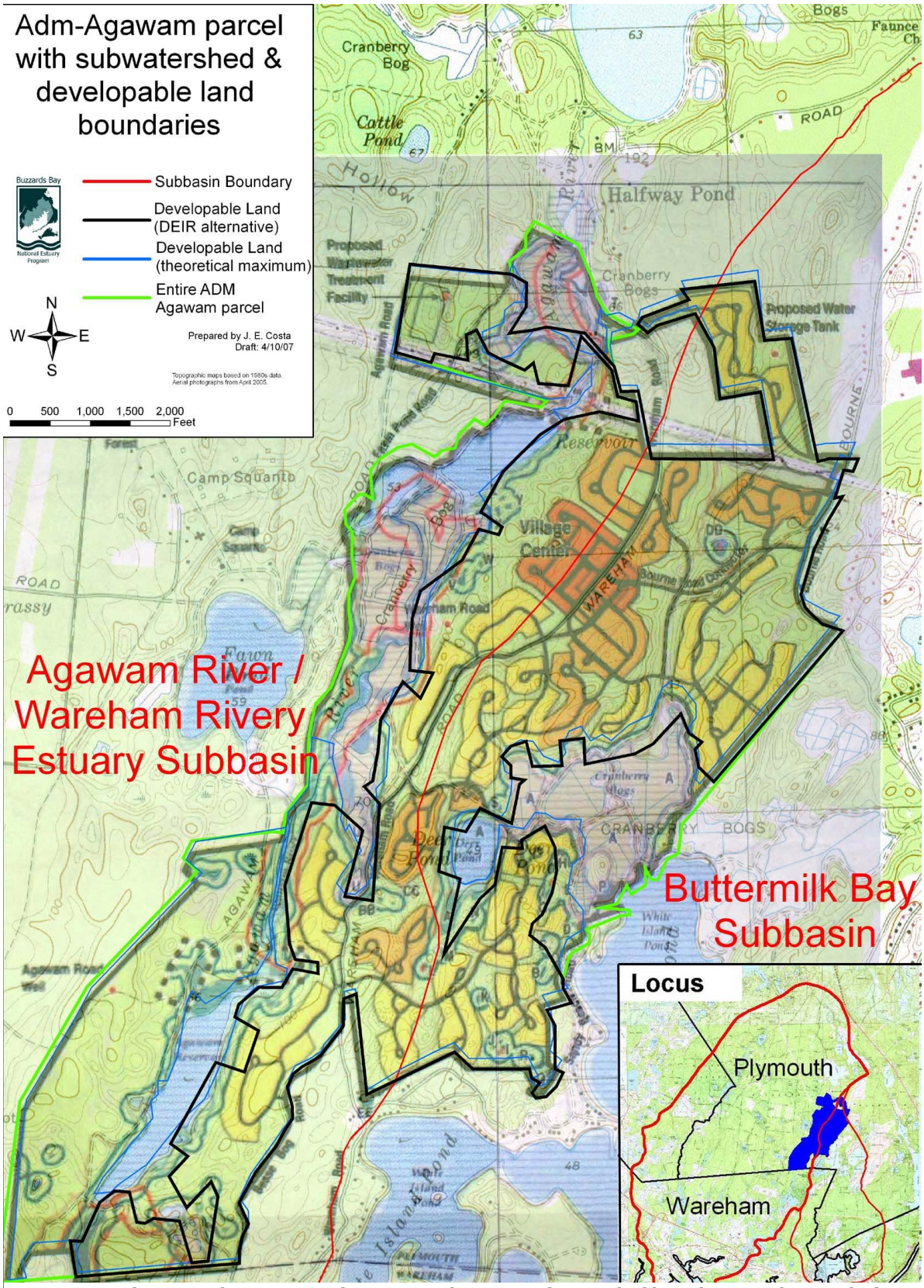

Figure 1. Mixed use parcel superimposed on topographic map with watershed boundaries, with watershed boundaries, DEIR conventional development area alternative boundary, and maximum potential theoretical development area for the site.

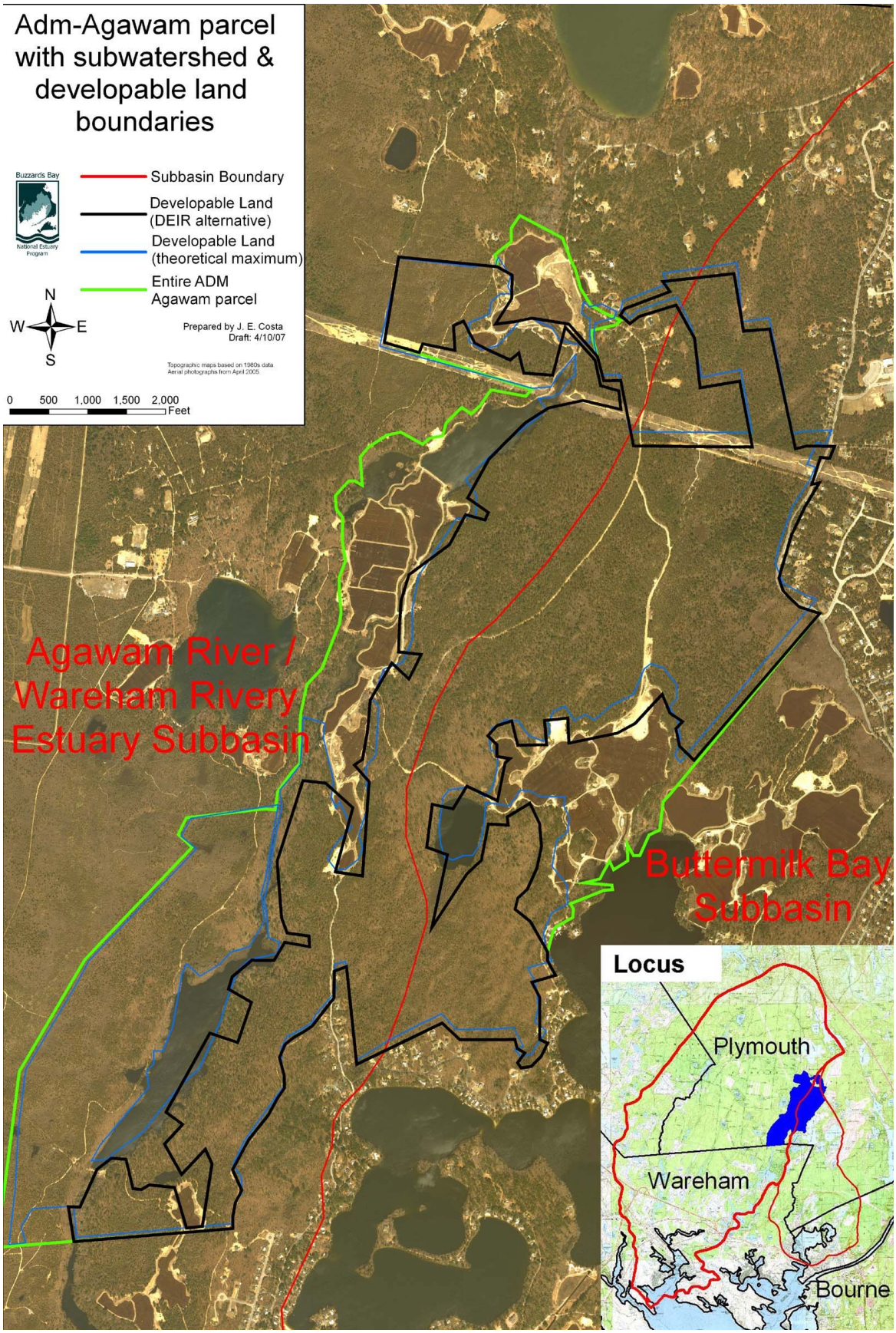

Figure 2. Mixed use parcel superimposed on a 2005 aerial orthophotograph with watershed boundaries, with watershed boundaries, DEIR conventional development area alternative boundary, and maximum potential theoretical development area for the site.

Estimated nitrogen loading from entire parcel with conventional development vs mixed use
Based on an assumed 333 residential units in the as of right subdivision that would be permitted under the existing underlying zoning, and using other planning assumptions the BBNEP and Cape Cod Commission use for nitrogen loading analysis, the conventional subdivision produces roughly 4,800 lbs per year reaching the estuary (Table 1; includes an attenuation factor of 40% for non-point sources of nitrogen). This contrasts with the total nitrogen load for the entire parcel under the proposed mixed-use development, which amounts to roughly 10,600 lbs of nitrogen per year reaching the estuary (Table 2). Although an average conventional septic system might discharge 33 ppm nitrogen, whereas the proposed wastewater facility for the mixed use development is proposed to discharge only 10 ppm, because there will be more than three times the residential units constructed, together with a larger area of roofs, commercial wastewater, sidewalks, more roads, and lawns, the proposed mixed use development will in fact generate triple the nitrogen load. Furthermore, it is more likely that the nitrogen from a large groundwater discharge of wastewater near a river will reach receiving coastal waters than the hundreds of individual septic systems spread around a large area of land as might occur with conventional development (a 30% attenuation factor was used for the wastewater treatment facility discharge).[7]

While this difference between the mixed use and conventional development may seem appreciable, the difference between conventional development and the mixed-use development is even greater if one considers only the nitrogen loading within the Agawam River subbasin. This is because the mixed-use development has disproportionately higher loading to the Agawam River basin because nearly all the wastewater from the entire development is disposed in Agawam River watershed. A comparison between the loading estimates are summarized in Table 3 (annual nitrogen loading in the Agawam River subbasin with conventional development maximum theoretical of 175 units) and Table 4 (annual nitrogen loading in the Agawam River subbasin with the proposed mixed use development). As shown, these scenarios produce an annual load of 2,500 lbs of estuary nitrogen loading for conventional, and 8,366 lbs of nitrogen for the proposed mixed use development.

Sensitivity Analysis with more advanced wastewater treatment
An obvious potential solution to reduce nitrogen loading from the mixed-use development would be to require more advanced wastewater treatment than that proposed. If the proposed wastewater facility were to have a discharge limit comparable to the Wareham Wastewater facility at the mouth of the Agawam (a weighted average of about 5 ppm = 7 months at 4 ppm, and 5 months at 6.5 ppm estimate), nitrogen loading to groundwater from the facility would be halved, or provide a net reduction of about 5,240- pounds annually. Using the 30% attenuation factor for the wastewater plume in the calculations, this would provide a net change of 3,670 pounds in Tables 2 and 4.

[7] Removal of nitrogen down to 10 ppm in the proposed will likely remove most of the carbon in the wastewater (which is a needed element for any additional denitrification). Therefore such a large plume of water would have less opportunity for attenuation in groundwater as compared to a conventional and dispersed onsite wastewater discharges. In our calculations we assumed a 40% attenuation for non-point sources and 30% attenuation of the wastewater plume.

Table 1. Estimated annual nitrogen loading for entire parcel with conventional development.

Buzzards Bay Project Subdivision worksheet -4/12/07 at www.buzzardsbay.org/bbpnitro.htm						*report errors to jcosta@buzzardsbay.org*
Scenario: annual loading conventional subdivision -entire parcel						
Sources			**Total**		**Pounds/yr**	**Notes**
Subdivision area (land only)			1029.0	acres		Developable area on parcel excluding water and bogs. Used for calculating net pounds per acre
Buildable lots, 1 house per lot	333	lots				This is number of lots on the parcel-used for the calculation of lawn and imperv NPS N-loading.
Bedrooms (average number)	3	per house				not used in these calculations, used assumed occupancy
Total Bedrooms	999					predicted
assumed occupancy, planning	1	per bedroom				used for septic system calculations
assumed occupancy, planning	3.0	per/unit				actual number used for calculation
units with conventional systems	333	units	999	persons	**5934.1**	
units with N removal systems	0	units	0.0	persons	**0.0**	
Total onsite wastewater N					**5934.1**	
village center roof +sidewalk		sq. ft.	0.0	acres	**0.0**	
village center landscaped areas		sq. ft.	0.0	acres	**0.0**	
Road Length	75383	feet	14.3	miles		
Paved road width	30		51.9	acres	**707.2**	
driveway area, per lot and total	2100	sq. ft.	16.1	acres	**218.7**	
sidewalks, per lot and total	0	sq. ft.	0.0	acres	**0.0**	
roof area, per lot and total	3300	sq. ft.	25.2	acres	**164.0**	
lawn size, per lot and total	5000		38.2	acres	**1000.5**	
other disturbed, per lot and total	1000	sq. ft.	7.6	acres	**49.7**	
wetlands in subdivision	0.0	acres	0.0		**0.0**	n loading from wetlands is zero (a sink)
Total NPS Sources					**8074.1**	predicted flow times concentration
Total Nitrogen Loading					8,074	before attenuation losses
net lb/acre					7.8	pounds per acre to groundwater
Upper Watershed Transmission =(1-attenuation factor)	0.6					NPS adjustment for attenuation
Total Nitrogen Loading to Bay					**4,844**	after attenuation losses
effective net lb/acre					4.7	pounds per acre to receiving waters

Table 2. Estimated annual nitrogen loading for entire parcel with mixed-use development.

Buzzards Bay Project Subdivision worksheet -4/12/07 at www.buzzardsbay.org/bbpnitro.htm
Scenario: annual loading for mixed use development -entire parcel

Sources			**Total**		**Pounds/yr**	**Notes**
Subdivision area (land only)			1029.0	acres		Developable area on parcel excluding water and bogs. Used for calculating net pounds per acre
Buildable lots, 1 house per lot	1084					This is number of lots on the parcel- used for the calculation of lawn and imperv NPS N-loading.
Bedrooms (average number)	4	per house				not used in these calculations, used assumed occupancy
Total Bedrooms	4336					predicted
assumed occupancy, planning	1	per bedroom				used for septic system calculations
assumed occupancy, planning	3.0	per/unit				actual number used for calculation
units with conventional systems	0	units	0	persons	**0.0**	
units with N removal systems	65	units	195.0	persons	**579.2**	
Alternative N removal factor	0.5	loading factor				use 0.5 for best rated systems
Total onsite wastewater N					**579.2**	
village center roof +sidewalk	810216	sq. ft.	18.6	acres	**120.9**	
village center landscaped areas	135036	sq. ft.	3.1	acres	**81.1**	assume 60% of village center area
Road Length	84214	feet	15.9	miles	**417.5**	assume 10% of village center area
Paved road width	30		58.0	acres	**790.1**	
driveway area, per lot and total	500	sq. ft.	12.4	acres	**169.5**	
sidewalks, per lot and total	300	sq. ft.	7.5	acres	**48.5**	
roof area, per lot and total	3300	sq. ft.	82.1	acres	**533.7**	
lawn size, per lot and total	4000		99.5	acres	**2605.5**	lawn size only somewhat smaller with small parcels
other disturbed, per lot and total	1000	sq. ft.	24.9	acres	**161.7**	
wetlands in subdivision	0.0	acres	0.0		**0.0**	n loading from wetlands is zero (a sink)
Total NPS Sources					**5507.8**	predicted flow times concentration
Point Sources					**10474.4**	
package facility design flow	344000	gpd				predicted actual flow
package facility discharge limit	10	ppm nitrogen				proposed annual average
expected transmission of plume (=1-attenuation)	0.7					adjustment for wastewater facility only
Total Nitrogen Loading					**15,982**	before attenuation losses
net lb/acre					**15.5**	pounds per acre to groundwater
Upper Watershed Transmission =(1-attenuation factor)	0.6					NPS adjustment for attenuation
Total Nitrogen Loading to Bay					**10,637**	after attenuation losses
effective net lb/acre					10.3	pounds per acre to receiving waters

Table 3. Annual nitrogen loading in the Agawam River subbasin with conventional development.

Buzzards Bay Project Subdivision worksheet -4/12/07 at www.buzzardsbay.org/bbpnitro.htm
Scenario: annual loading conventional subdivision -Agawam Basin only

Sources			**Total**		**Pounds/yr**	**Notes**
Subdivision area (land only)			582.0	acres		Developable area in Agawam basin excluding water and bogs. Used for calculating net pounds per acre
Buildable lots, 1 house per lot	175	lots				This is number of lots in Agawam basin for the calculation of lawn and imperv NPS N-loading.
Bedrooms (average number)	3	per house				not used in these calculations, used assumed occupancy
Total Bedrooms	525					predicted
assumed occupancy, planning	1	per bedroom				used for septic system calculations
assumed occupancy, planning	3.0	per/unit				actual number used for calculation
units with conventional systems	175	units	525	persons	**3118.5**	
units with N removal systems	0	units	0.0	persons	**0.0**	
Total onsite wastewater N					**3118.5**	
village center roof +sidewalk	0	sq. ft.	0.0	acres	**0.0**	
village center landscaped areas	0	sq. ft.	0.0	acres	**0.0**	
Road Length	37202	feet	7.0	miles		
Paved road width	30		25.6	acres	**349.0**	
driveway area, per lot and total	2100	sq. ft.	8.4	acres	**114.9**	
sidewalks, per lot and total	0	sq. ft.	0.0	acres	**0.0**	
roof area, per lot and total	3300	sq. ft.	13.3	acres	**86.2**	
lawn size, per lot and total	5000		20.1	acres	**525.8**	
other disturbed, per lot and total	1000	sq. ft.	4.0	acres	**26.1**	
wetlands in subdivision	0.0	acres	0.0		**0.0**	n loading from wetlands is zero (a sink)
Total NPS Sources					**4220.5**	predicted flow times concentration
Total Nitrogen Loading					**4,221**	before attenuation losses
net lb/acre					**7.3**	pounds per acre to groundwater
Upper Watershed Transmission =(1-attenuation factor)	0.6					NPS adjustment for attenuation
Total Nitrogen Loading to Bay					**2,532**	after attenuation losses
effective net lb/acre					**4.4**	pounds per acre to receiving waters

Table 4. Annual nitrogen loading in the Agawam River subbasin with the proposed mixed use development.

Buzzards Bay Project Subdivision worksheet -4/12/07 at www.buzzardsbay.org/bbpnitro.htm
Scenario: annual loading mixed use -Agawam Basin only

Non-Point Sources			**Total**		**Pounds/yr**	**Notes**
Subdivision area (land only)			582.0	acres		Developable area in Agawam basin excluding water and bogs. Used for calculating net pounds per acre
Buildable lots, 1 house per lot	380	lots				This is number of lots in Agawam basin for the calculation of lawn and imperv NPS N-loading.
Bedrooms (average number)	3	per house				not used in these calculations, used assumed occupancy
Total Bedrooms	1140					predicted
assumed occupancy, planning	1	per bedroom				used for septic system calculations
assumed occupancy, planning	3.0	per/unit				actual number used for calculation
units with conventional systems	0	units	0	persons	**0.0**	
units with N removal systems	0	units	0.0	persons	**0.0**	65 units in Buttermilk Basin
Alternative N removal factor	0.5	loading factor				use 0.5 for best rated systems
Total onsite wastewater N	0.0				**0.0**	
village center roof +sidewalk	243064.8	sq. ft.	5.6	acres	**36.3**	30% of village center in Agawam basin
village center landscaped areas	40510.8	sq. ft.	0.9	acres	**24.3**	assume 60% of village center is roof, sidewalk other imperv.
Road Length	29915	feet	5.7	miles	**148.3**	assume 10% of village center area
Paved road width	30		20.6	acres	**280.7**	
driveway area, per lot and total	500	sq. ft.	4.4	acres	**59.4**	
sidewalks, per lot and total	300	sq. ft.	2.6	acres	**17.0**	
roof area, per lot and total	3300	sq. ft.	28.8	acres	**187.1**	
lawn size, per lot and total	4000		34.9	acres	**913.4**	lawn size only somewhat smaller with small parcels
other disturbed, per lot and total	1000	sq. ft.	8.7	acres	**56.7**	
wetlands in subdivision	0.0	acres	0.0		**0.0**	n loading from wetlands is zero (a sink)
Total NPS Sources					**1723.2**	predicted flow times concentration
Point Sources					**10474.4**	
package facility design flow	344000	gpd				predicted actual flow
package facility discharge limit	10	ppm nitrogen				proposed annual average
expected transmission of plume (=1-attenuation)	0.7					adjustment for wastewater facility only
Total Nitrogen Loading					**12,198**	before attenuation losses
net lb/acre					**21.0**	pounds per acre to groundwater
Upper Watershed Transmission =(1-attenuation factor)	0.6					NPS adjustment for attenuation
Total Nitrogen Loading to Bay					**8,366**	after attenuation losses
effective net lb/acre					14.4	pounds per acre to receiving waters

Based on this analysis it is apparent that even if the wastewater facility were to have an annual discharge of 5 ppm, the parcel as a whole will still not make this development nitrogen neutral over conventional 2.75 residential development (Table 1 versus Table 2, and Table 5). Nitrogen neutrality is even more difficult to achieve when one considers only the loading changes to the Agawam River subbasin (Table 3 versus Table 4), and would require a zero ppm discharge.

These estimates are approximate and based on methodologies of the type used by the Buzzards Bay NEP and the Cape Cod Commission. For our calculations, we assumed that each residence would have an average of a 3-person occupancy irrespective of the parcel size, and this . We recommend that the applicant use the Cape Cod Commission methodology (converted to total pounds per year) to calculate total annual nitrogen load from the parcel for the various land use alternatives, based on their actual detailed data and information about the proposed development.

Table 5. Sensitivity analysis summary of nitrogen loading to coastal waters, using various scenarios of wastewater facility discharge limits

Entire Parcel	**lbs N/yr**
conventional development	4,844
proposed mixed use, 10 ppm discharge	10,637
proposed mixed use, 5 ppm discharge	6,971
proposed mixed use, 3 ppm discharge	5,504
proposed mixed use, 0 ppm discharge	3,305

Contributions to Agawam Subbasin	**lbs N/yr**
conventional development	2,532
proposed mixed use, 10 ppm discharge	8,366
proposed mixed use, 5 ppm discharge	4,700
proposed mixed use, 3 ppm discharge	3,234
proposed mixed use, 0 ppm discharge	1,034

Recommended Nitrogen Reduction

Based on this analysis, we believe that at a minimum, the proposed development is wastewater treatment should be improved to ensure that the mixed-use project does not result in any more nitrogen loading to the Agawam River subbasin than conventional development. Because the advanced nitrogen removal performance cited above is close to the practical limits for wastewater treatment facilities, nitrogen neutrality for the Agawam basin can only be achieved by further offsets in the watershed, such as new sewering, or setting aside additional lands as protected open space, or by reducing the total number of units or commercial space in the development. It should be kept in mind that even adopting a nitrogen neutrality approach will result in a decrease in water quality to the receiving coastal waters.

Summary

Watershed nitrogen management requires a comprehensive assessment of all nitrogen sources including lawns, impervious surfaces, and wastewater. In this comment letter we promote the concept of nitrogen loading neutrality as a minimum standard for cluster development and TDRs. That is to say, no matter how well a project meets the goals of "Smart Growth", at a minimum, the new development cannot exceed the expected nitrogen loading rates of the underlying

zoning. It is important that MEPA and other state agencies adopt such a policy because municipalities throughout the coastal zone are developing strategies to address nitrogen total maximum daily loads (TMDLS) being established by the Department of Environmental Protection through the Massachusetts Estuaries Project. These difficult local decisions are being based on an analysis of future growth potentials based on existing underlying zoning. Allowing cluster and TDR projects to exceed the expected nitrogen loading contributions from these undeveloped areas, will undermine these local efforts, as well as DEP's efforts to promulgate effective TMDLs.

While stressing the importance of nitrogen neutrality as a minimum standard for projects like this, it is equally important to recognize that there are estuaries around the Commonwealth, that, like the Agawam River estuary, are so overloaded with nitrogen, these ecosystems can only be restored with dramatic reductions in nitrogen throughout the watershed. This means that municipalities in these watersheds must not only implement ambitious sewering programs of existing development, but all new development might need to be 100% offset by additional sewering elsewhere in the watershed, or by land protection efforts. The Cape Cod Commission has already adopted a "no-net increase" in nitrogen loading to Cape Cod. In practice this would mean that for every septic system installed or wastewater discharge created, another home must be tied into a sewer system elsewhere, or a unit of buildable land be permanently protected as open space.

Given the impairments to the Agawam and Wareham River estuaries, we recommend that MEPA require the applicant to include an alternative analysis strategy in their FEIR that would meet a "nitrogen neutrality" goal for the Agawam River drainage basin, as compared to conventional development. We also recommend that MEPA require the applicant to provide another alternative analysis to achieve a "no net increase of nitrogen" goal for the Agawam River drainage basin. Such an alternative might include sewering additional areas or protecting additional open space beyond the boundary of the applicants parcel. These alternatives should not include strategies to displace the location of the wastewater facility discharge to the Buttermilk Bay drainage basin, as this would just relocate potential nitrogen impacts to another estuary.

Our review did not consider potential phosphorus impairments to the freshwater river sand pond systems, and we will provide comments on that issue during the groundwater-permitting phase of the project.

Sincerely,

Joseph E. Costa, PhD
Executive Director

cc: David Janik, CZM So. Coastal Coordinator
Elizabeth Kouloheras, Section Chief, Southeast Regional Office, MA DEP
Brian Dudley, MA DEP
Kenneth Tavares, Chair, Plymouth Board of Selectmen
Evelyn Strawn, Chair Plymouth Conservation Commission
Nicholas Filla, Chair, Plymouth Planning Board
Lee Hartman, Director of Planning, Plymouth
Bruce Sauvageau, Chair, Wareham Board of Selectmen
Douglas Westgate, Chair, Wareham Conservation Commission
Anthi Frangiadis, Chair, Wareham Planning Board
Michael Hogan, A.D. Makepeace Company