

Falmouth Conservation Commission
Town Hall Square
Falmouth, MA 02540

December 6, 2002

Honorable Commission members:

As you know, the Buzzards Bay Project has agreed to review stormwater designs contained in a Notice of Intent (NOI) before the Falmouth Conservation Commission (see attached letter dated December 3, 2002). This project entails the construction of a commercial retail building and parking lot (Douglas Shearer applicant), located at Clausons Corner near Rt. 151 and Sandwich Road. Portions of the project are located within the 100-foot wetland buffer, which also contains a Massachusetts Threatened Species--*Asclepias purpureascens* (Purple Milkweed).

The Buzzards Bay Project has conducted an evaluation of the plans prepared by Stephen J. Doyle dated June 13, 2002, with revisions dated 10/1/02 and 11/2/02, and a supplemental calculations report dated November 2002, to determine whether they comply with the Falmouth Wetland Bylaw and the supporting Falmouth Wetland Regulations (FWR), specifically FWR 10.16(3) (Stormwater Management) and FWR 2.00 (Standards and Specifications for Stormwater Management Systems). It is worth noting that, whether or not a threatened or endangered species is present at this site, these stormwater regulations must be adhered to because of the presence of the adjacent wetland.

It is also worth noting that the FWR Stormwater Management Standards and Specifications prescribe very specific standards for stormwater treatment, and system design objectives. These standards are very similar to the standards adopted by the Commonwealth of Massachusetts. The bylaw regulations also include very specific submittal requirements (FWR 2.04 Submittal Requirements), so that designs can be properly evaluated. The object of these stormwater standards is to minimize to the greatest extant practical stormwater runoff into wetland resource areas, and to meet a wide range of interests including groundwater protection, erosion and sedimentation control, water pollution control, and wildlife habitat protection to name a few. These stormwater designs and standards differ from stormwater designs that may be approved by planning boards or building departments where the reduction of flooding is often the only goal.

The applicant has not provided all the information required under the Falmouth Wetland Regulations, nor does it appear that the standards and guidelines specified in the regulations have been adhered to. The designs, as presented, either cannot be properly evaluated, or in other instances, do not comply with the Conservation Commission regulations. The designs submitted

therefore cannot be presumed to minimize adverse impacts to wetland resource areas, nor by inference, minimize potential impacts to the Purple Milkweed.

A summary of omitted information, and specific areas that appear inadequate with respect to the regulations are summarized below. We recommend that the applicant provide the omitted information, and address the specific issues identified below so that the stormwater designs can be properly re-evaluated.

Omitted Information

- 1) FWR 2.04.(2).11. Soil logs must be submitted for each proposed BMP location (Not provided)
- 2) FWR 2.04. (2).12. “Soil observation holes shall extend a minimum of four feet below the bottom of any stormwater BMP and be observed by the agent of the Board of Health.” (No documentation and confirmation by the Board of Health provided).
- 3) FWR 2.04. (2).13 Maximum groundwater levels at the proposed BMP locations must be shown; (Not provided, applicant should provide details according to FWR 2.04.13a, b, c, and d).
- 4) FWR 2.04.(3) A Stormwater Management Summary “of pre and post-development conditions shall be summarized for each watershed on the Stormwater Management Summary Form (FWR 2.15)”. (Form 2.15 was not submitted. This form requires an explicit summary of pre and post runoff calculations and site characteristics.)
- 5) The applicant provides a “Maintenance Plan”, but as per FWR 2.04.(4) “Maintenance Information,” they should also explicitly identify the parties responsible for maintaining the stormwater treatment structures. Because there appears to be more than one commercial property owner in the complex, and some driveways and roads appear to be shared-use areas (see attached parcel boundary aerial photograph map), this information is especially pertinent.

Note: The percolation rates, groundwater elevations, and soil data is essential information for determining the ability of the system to function as designed. This information is also needed to determine if there is adequate separation between the bottom of the infiltration system and groundwater, especially to the west of the building.

Design Issues

1) An inappropriate methodology was used to estimate runoff volumes

The engineering designs were based on estimated stormwater volumes. FWR 2.06 (1) (Stormwater Design Methodology Considerations for Stormwater Management) emphatically states that the “Rational Method” cannot be used to determine stormwater volume for the purposes of stormwater treatment. Nonetheless, the Rational Method is identified by the engineer as the method used.

More specifically, FWR 2.06 states “Runoff calculations for flood control shall be provided utilizing the rational formula, the NRCS TR-20 or TR-55, as appropriate for the site. The appropriate methodology shall be determined from the restrictions on each method described in Basic Hydrological Calculations for Conservation Commissioners: Runoff, Land Subject to Flooding, and Flow in Pipes and Channels, (DEQE 1987). The Rational Method cannot be used to determine volume.” The DEP 1987 guide to Conservation Commissions also specifies that

the Rational Method should not be used to determine volume, instead the TR55 program should be used.

The principal use of the Rationale Method today is for sizing pipes necessary to convey stormwater flow in pipes to prevent flooding. The Rational Method is not the method used by the EPA, USDA-NRCS, the Massachusetts DEP, the Cape Cod Commission, nor the Town of Falmouth Conservation Commission per your regulations for calculating stormwater volumes for evaluating or developing stormwater treatment systems. All use the TR-20 or TR-55 program.

2) Identified pretreatment is inadequate

In FWR 2.08 “Selecting a Water Quality BMP”, section (2), it is noted, “due to the high failure rate of conventional infiltration practices, they are not an accepted method of stormwater management unless redundant pretreatment for sediment removal is utilized.” The identified pretreatment mechanism in the plans submitted--catch basins-- have a maximum TSS removal rate of only 25%. FWR 2.09 (3)(a) requires at least 80% TSS removal for stormwater entering the infiltration structure. Different pretreatment structures need to be included in the designs.

3) Proposed stormwater infiltration treatment is inadequate or not per design requirements

In FWR 2.08 “Selecting a Water Quality BMP”, section (3), Infiltration Basins (IB) must provide 80% removal of suspended solids (TSS) and 90% bacteria, and shall be designed in accordance with FWR 2.05 through 2.08, plus the specific criteria stated below.

- “(a) three redundant pretreatment mechanisms (such as a sediment forebay or detention pond) adequate to remove and store 80% of the TSS;”
- “(b) adequate volume to infiltrate the first flush of runoff;”
- “(c) compliance with the specifications found in the State of Rhode Island Stormwater Design & Installation Manual, Sept. 1993, when not specified elsewhere in this Section.”

Comments: The Falmouth regulations, like the state stormwater policies, require adequate storage of stormwater volumes. The engineer has elected to utilize the infiltration basins to control the 100-year storm. However, volumes used to size the basins were based on incorrect design criteria and methodology (including the Rational Method). Moreover, the design of the infiltration structures was not based on the Rhode Island criteria. The Buzzards Bay Project recommends that the plans be revised to meet the FWR stormwater regulations for pollution, flow, volume, and peak run-off control as required.

4) Additional information must be provided about the storage capacity of the dry wells for the roof runoff to determine if it is adequate.

5) The location of the septic system should be specified to determine if there must be a separation between any stormwater infiltration system and the septic system.

Special Note on Falmouth Submittal Requirements

As a practical matter, the Falmouth Conservation Commission should carefully heed FWR section 2.04 “Submittal Requirements.” Note especially 2.04(1) Stormwater Management Plan requirements. For all projects that incorporate stormwater designs, the Conservation

Commission should, as a matter of policy, always mandate the submittal of FWR Form 2.13 “Applicant Check-off for the Submittal of Stormwater Management Plans.” Use of this form would have avoided the omissions and issues identified above, and expedite the permitting process for both the Commission, and the applicant. This check-off will allow your administrative staff to quickly determine basic compliance with the town’s stormwater regulations. For example, there is a check-off for whether the engineer calculated stormwater flows based on NRCS TR-55. There is no check-off for calculating stormwater volumes based on the “Rationale Method”.

Stormwater designs should always be reviewed by technical staff with expertise in stormwater treatment systems, and designs should always be evaluated to determine whether they are in compliance with the Falmouth Wetland Regulations. Required Form 2.15, which shows the pre- and post- construction summary stormwater volume data, is an essential form to determine if the designs meet the regulations. Form 2.14 (BMP Operation and Maintenance Inspection Report, another checklist) should be submitted after the project is done, or per the maintenance schedule in the order of conditions.

Special Note on Town of Falmouth Town Surveyor Comment letter dated 12/2/02

The Falmouth Town Surveyor wrote a brief comment letter on this project stating “The design appears to be adequate to contain runoff for a twenty five year storm with an intensity of 3.7 inches per hour.”

We are unclear as to the meaning of the statement. The Surveyor did not state the designs complied with the Town’s Wetland Bylaw and Regulations. We can only presume the statement implies adequacy of the conveyance system for stormwater. In the absence of stormwater volume estimates from TR-55, soil logs for the BMP sites, and other essential information, it is unclear how it can be determined whether the treatment system will address the stormwater treatment requirements specified in the regulations.

Purple Milkweed Issues

Asclepias purpurescens (Purple Milkweed) is a perennial species that propagates by seed dispersal. In Massachusetts it is a rare species that has continued to decline in abundance during the past 100 years (Farnsworth and DiGregorio, 2001¹), and faces extirpation in Massachusetts.

Stormwater impacts on any threatened species likely falls into three main categories.

- 1) Potential changes in soil hydrology and saturation
- 2) Potential impacts of erosion and sedimentation from severe storms.
- 3) Potential impacts of stormwater contaminants, including, but not limited to road salt and hydrocarbons.

Several considerations may be given to potential stormwater runoff impacts to the Purple Milkweed. For example, the Purple Milkweed is likely to be salt intolerant like the common

¹ Elizabeth Farnsworth and Mario DiGregorio. 2001. New England Conservation Program, Conservation and Research Plan: *Asclepias purpurascens L.* Purple Milkweed.” New England Wild Flower Society Framingham, MA, 55pp. Available at www.newfs.org.

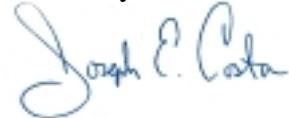
species, and the shallow root system may make it more sensitive to erosion and road and parking lot salting (Farnsworth, pers. comm.). The impacts of road salting can be seen in many wetlands along highways in Massachusetts. Salt intolerant species are often replaced by salt tolerant invasives like the common reed, *Phragmites australis*.

If these designs are modified to comply with the Falmouth Wetland Regulations, there is still the question of whether excess untreated stormwater volume and flow might affect the Purple Milkweed. To the credit of the Falmouth regulations, the required use of the Rhode Island method (which does not allow the use of soil infiltration to reduce the volume of storage in the calculations), results in larger stormwater storage systems that are expected to last longer. As written, the FWR Stormwater Section is designed to prevent any increase in stormwater flow over pre construction conditions for the 10-year storms, with nearly all stormwater treated through infiltration. More severe storms will have treatment of at least the “first flush,” with untreated overflow. This overflow must be discharged at a non-erosive rate so as not to impact the wetland or Purple Milkweed.

In conclusion, the plans submitted do not comply with the Falmouth Wetland Regulation Stormwater treatment requirements, and need to be revised. If the plans are changed so that they comply with your regulations for the treatment of stormwater, the Falmouth Conservation Commission must still request additional review from the Natural Heritage and Endangered Species Program. The town may wish to also consult with a hydrologist and botanist to determine whether excess stormwater will adversely affect the Purple Milkweed.

If you need further assistance from the Buzzards Bay Project, please do not hesitate to call me.

Sincerely,



Joseph E. Costa, PhD
Executive Director

cc. Paul Somers, NHESP
Steve Pisch, Falmouth Engineer
William Riley, Rycon Corporation



Aerial view of project site (red line, approximate) and approximate property bounds using Town of Falmouth GIS data layers from 2001.