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May 8, 2011

Coalition to Save Easton
c/o Mr. Chris Miles
Silver Hill Road
Easton, Connecticut 06612

RE: Saddle Ridge
Easton, CT

Dear Mr. Miles,

At your request, I have reviewed the revised plans for the Saddle Ridge development which were submitted to the Town of Easton Conservation Commission. My review has focused on water quality issues and follows up the comments made in two prior letters from my office to the Town of Easton Planning and Zoning Commission last fall. It is my understanding that you have provided my prior letters to the Conservation Commission and therefore this letter should be read in conjunction with those.

After reviewing the plans and submitted reports, I have the following comments:

Stormwater Management:

1. Water Quality Issues and Pollutant Loads:
    a. Applicant stated at initial wetland meeting that the 41 horses on this site will generate 426 tons of manure on an annual basis. For 41 horses, this equates to 20,780 pounds/horse. This information is in conflict with information found in Section 8.0 – HORSE FARM MANAGEMENT FOR PARCEL A of the Saddle Ridge Village Drinking Water Quality Management Plan of November 2010 as prepared by Milone and MacBroom, Inc. This section states that each of the 41 horses generate 50 pounds of manure per day. This equates to 18,200 pounds of manure per horse per year. By using the figure quoted at the public hearing, it is over estimating the manure loads by approximately 14% for current conditions. By over estimating the nutrient loads generated by the horses at the current time, it minimizes the difference for post-development loads for the same pollutants of concern, namely phosphorous and nitrogen.
    b. While the CT DEP at the current time only considers the reduction of TSS for post-development conditions by 80%, it is very important to consider typical other pollutants in non-point source runoff from this development

as it is located with a drinking water supply watershed. These pollutants include metals and hydrocarbons.

c. The grading shown for the all of the water quality basins do not conform to the typical section of the stormwater quality basins (Sheet D-4).

d. I continue to concur with the technical comments made by GHD regarding the proposed stormwater quality basins that they are not in compliance with the CT DEP 2004 Storm Water Quality Manual. Conservation Commission members should review all technical reviews submitted by GHD for more information of this point.

e. The applicant makes a blanket statement on Sheet D-4 that the addition of a layer of leaf compost will provide an "excellent growing media and acts like a carbon filter to renovate stormwater", however, no supporting documentation or analyses are provided to support how the presence of the leaf compost will renovate stormwater.

2. Interlocking concrete pavers on service driveways: The applicant proposes to use interlocking concrete pavers set on a base consisting of various types and sizes of crushed stone.

a. The gaps between the paver stones are to be filled with pea gravel (3/8" stone). The applicant claims that this system will primarily provide the required Groundwater Recharge Volume (GRV) as required by the CT DEP 2004 Storm Water Quality Manual. While the various aggregate layers will provide the GRV, the paver systems are being placed over soils which are filled a minimum by 2', and in some location significantly more than 2'. This fill material (assumed to consist of on-site material) will be compacted to provide a structural base for these roads. It has not been demonstrated that the GRV will fully infiltrate this fill layer and enter the natural underlying soils which is the intent of the GRV.

b. The detail for the pavers state that the bottom of the pavers will be set on a zero slope (dead level). As all of the service driveways are pitched, how will the zero slopes be provided as shown on the detail? This is a particular concern for the one driveway with a 10% grade as any infiltrated runoff will follow the underlying slope of the compacted subgrade and not infiltrate as water will always seek the path of least resistance.

c. The applicant represented at the Conservation Commission public hearing that sweeping of the pavers will be done to remove sediment from the open pea gravel strips between the pavers. At least one member of the Conservation Commission expressed concern about the practicality of sweeping the pavers. This is a legitimate concern. Fine sediment particles from sanding operations, organic decomposition (leaf matter), and pollen to name a few are all considered suspended solids as the particle size is very small. This type of material will migrate through the void spaces of the pea gravel and will not be trapped on the surface. Over periods of time, this material will build up in the void space and may affect the functionality of this system. As these fine particles will migrate into the stone, how will they be removed without removing the stone itself?

d. The applicant claims on page 2 of March 4, 2011 Engineering Report and Stormwater Design Narrative that the total impervious coverage on the site

is being reduced from 10.1 acres to 6.4 acres as a result of installing the pavers on the individual driveways. The detail for the paver stones show very small gaps relative to the size of the paver stones, so the majority of the surface is impervious. While some reduction of impervious coverage is justified, it is my professional opinion that you cannot claim the quoted reduction as it has not been demonstrated that runoff will fully infiltrate into the underlying soils, thus showing that there will be no runoff from the interlocking pavers for the analyzed storm events.

e. Do all of the areas proposed for interlocking pavers have a minimum of three (3) foot depth to the seasonally high groundwater table and four (4) foot depth to bedrock as required by the 2004 Storm Water Quality Manual (page 11-S6-4).
f. The Conservation Commission should pay attention to the following reasons for Limited Use of Permeable Pavement application as stated on Page 11-S6-2 of the 2004 Manual.
    i. Not recommended in areas of high traffic volumes (generally greater than 500 ADT),
    ii. Susceptible to clogging by sediment,
    iii. Does not provide significant levels of pollutant removal. Some treatment is provided by the adsorption, filtration and microbial decomposition at the base-subgrade interface,
    iv. Snow removal is difficult since plows may not be used, sand application can lead to premature clogging, and salt can result in groundwater contamination,
    v. Applicable to small drainage areas,
    vi. Not applicable to low permeability soils or soils prone to frost action,
    vii. Potential failure due to improper siting, design, construction and maintenance,
    viii. Risk of groundwater contamination depending on subsurface conditions, land use and aquifer susceptibility. Should not be used in public drinking water supply aquifer recharge areas except in certain “clean” residential settings where measures are taken to protect groundwater quality,
    ix. Not suitable for land uses or activities with the potential for high sediment or pollutant loads or in areas with subsurface contamination,
    x. May not be suitable for areas that require wheel chair access due to pavement texture.
g. On page 3 of the Narrative, it is stated that there will be “No increase in runoff rate or volume”. This is not factually correct. While the detention basins will maintain rates of runoff for various storm events, there will be a fairly significant increase of runoff volume from the directly connected impervious areas on the site. The intent of the GRV is simply to match pre-development infiltration rates of a natural site and providing or exceeding the GRV does not mean that there is no increase of runoff volume.
h. A water quality issue not addressed by the use of interlocking pavers is the transport and fate of metals and hydrocarbons. As the aggregate layers

only provide for the storage of runoff, there is no treatment of the metals and hydrocarbons from the vehicles which travel over these surfaces.

3. "Saddle Ridge Village Drinking Water Quality Management Plan" of November 2010.
    a. This plan simply seems to outline the possible elements for a DWQMP that would meet the guidelines set forth by the CT DPH.
    b. It is not a legally binding DWQMP plan that clearly defines the individuals who would be responsible for the implementation of the plan both during and after site construction.
    c. Sampling locations as shown in Figure 9 are not appropriate to assess the water quality of the post-development stormwater runoff as they appear far away from the proposed stormwater basins at points where site runoff will be mixed with runoff from off-site locations.
    d. No limits on the levels of the various pollutants in runoff during and after construction are defined. Without defined limits, how can the project be determined to be in compliance with water quality goals or not.

Please contact me if you have any questions concerning this information.

Very Truly Yours,
Trinkaus Engineering, LLC

Steven D. Trinkaus, PE, CPESC, CPSWQ