May 8, 2011

Mr. Chris Miles
Ms. Leslie Minasi
Coalition to Save Easton
Silver Hill Road
Easton, CT 06612

RE: Saddle Ridge Developers
Sport Hill, Silver Hill, Cedar Hill and Westport Roads
Easton, CT

Dear Mr. Miles and Ms. Minasi:

I am writing to report the results of my review of the revised plans for the referenced project, with respect to the impacts of the proposed affordable housing development on wetlands, watercourses, and the natural resources of the state. My findings are as follows:

A. Proposed Activities

The applicant proposes to construct a 99 unit, multi-family residential development on 110.5 acres (the balance of the site will be retained in an equestrian use of some kind). The gross density of the proposed development is 0.90 units/acre or 1.12 acres/unit. The site lies in public water supply watershed lands; the wetlands and watercourses drain to Easton Reservoir and Aspetuck Reservoir. All surface and groundwater is classified accordingly. The development will be served by public water and individual, sub-surface sewage disposal systems (aka septic systems). Runoff from paved and unpaved surfaces will be collected and discharged to a series of detention basins, which are also purported to treat and infiltrate stormwater to the ground. The overflow from the detention basins will discharge to wetlands and watercourses at the site. No separate infiltrators for roof run-off are proposed.

B. Wetland Approvals

I have reviewed the current plans, as well as the plans for the 22 lot subdivision that were approved by the Easton Conservation Commission, acting as the Easton Inland Wetlands and Watercourses Agency. My findings are as follows:

1. Virtually all runoff from paved and landscaped surfaces will discharge to the wetlands and watercourses at and adjacent to the site, and then to either Easton Reservoir or Aspetuck Reservoir.
2. The proposed development includes a substantial amount of vegetation removal, earth disturbance, grading, rock removal, installation of storm drainage and detention basins, construction of roads, driveways, and parking lots, installation of 99 sub-surface sewage disposal systems and construction of 31 buildings. Many of these activities are located within the 100' upland review area. Regardless of the distance between the activity and the nearest wetland boundary, virtually all of these activities generate a discharge to wetlands, watercourses or groundwater, during and after construction, thereby altering the physical, chemical and biological attributes of the wetlands and watercourses.

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3. The total area of site disturbance subject to erosion has increased from 33.6 acres approved by the Inland Wetland Agency to 41.3 acres in the current application. This 23% increase is substantial and represents a potential increase in soil erosion of 770-1540 tons/year[1].
4. Activities that are proposed to occur within, and cause a direct, adverse impact on, wetlands and watercourses include:
    a. Placing fill to support a new town standard road, to be known as Mane Road.
    b. Installation of a 3' x 3' concrete box culvert to carry flow through the filled wetland at Station 24 + 30, on Mane Road.
5. All of the activities noted above have the potential to cause an adverse impact to wetlands, watercourses, and water quality and therefore are within the jurisdiction of the local Inland Wetland Agency, regardless of their location with respect to the wetland boundary. I have reached this conclusion after considering the following:
    a. The extensive re-grading, removal of vegetation, blasting, drainage works and subsurface sewage disposal systems will alter the rate and volume of runoff, and alter the quality of the surface and groundwater feeding the wetlands and watercourses. For instance, septic effluent is high in nitrogen. Many of the biota that live in wetlands, and particularly species at the base of the food chain, are sensitive to nitrogen levels that are well below the human health criterion of 10 mg/liter.
    b. There is no information submitted that indicates that the box culvert proposed at Mane Road provides a dry area for passage of terrestrial animals between the two portions of the wetland, which will be bisected by the proposed road fill.
    c. Alteration of the grading, outlet control structure and piping for at least one detention basin located in the upland review area.
    d. Absence of roof runoff infiltration units, which were proposed in the subdivision plan.
6. The proposed wetland crossing still does not conform to the original plans for the 21 lot subdivision. The embedded 3' x 3' box culvert will require substantially more disturbance than the 7' wide x 3' high open bottom arch culvert originally proposed.
7. The proposed use of the site has changed. The existing approval specifically states that single family homes were the only use considered and that the approval is based on the impact of 21 single family homes. While wetland impacts are not always directly related to the land use or the density of the use, it can be reasonably inferred that the generation rate of septic effluent and road runoff related pollutants will be substantially higher for the newly proposed use than for the permitted use for a variety of reasons, including much higher motor vehicle use for 99 homes as opposed to 21 homes and an equestrian facility and a much higher sewage generation rate[2].
8. The proposed water quality treatment system has also changed in several ways. Most importantly, a significant element in the new plan is the use of permeable pavers in the driveways. The applicant has not provided the data necessary to make that determination. In actual fact, the soil testing data

[1] A brief search of the erosion control literature indicates that erosion from construction sites is generally estimated at 100-200 tons/acre/year.

[2] Sewage generation rate is not the same as the required design flows for septic systems. The former is based on actual occupancy, the latter is based on the number of bedrooms. Despite a similar number of bedrooms, and contrary to the contention of the applicant, it is not reasonable to believe that sewage flows from 21 single family homes will be similar to the flows from 99 townhouse units, even if the number of bedrooms is similar.

that was provided indicates that the soils in substantial portions of the site are limited in their ability to infiltrate water for a variety of reasons.

9. The application does not include any consideration of alternatives to the proposed townhouse development, nor is there any demonstration that there is no feasible and prudent alternative which would achieve the same basic objective (development of the site for a residential use).

The plans do not correspond to those that were previously approved by Conservation Commission, in either form or substance. The changes are substantial. I believe that the Conservation Commission has also determined that this is true and is treating the 99 unit townhouse site plan as a new application

I have reviewed the March 4, 2011 plans prepared by Milone and MacBroom and concur with GHD's May 5, 2011 letter. The plans and supporting documents are incomplete. Furthermore, it is my judgment that the proposed 99 unit housing development has a reasonable likelihood of causing unreasonable pollution of the waters and wetlands of the state, including Aspetuck and Easton Reservoir. Because the site drains to a public drinking supply reservoir, I further conclude that these activities have a reasonable likelihood of causing an adverse impact to public health and safety. I have considered the following, in arriving at my conclusion:

1. The proposed development density is approximately 1 dwelling unit per 1.06 gross acres.
2. The CT DEP Bulletin #11 (1990) specifically addresses the maximum density requirements for residential development in public drinking water watershed. This report concludes that the "…maximum development density of 1 dwelling per 2 acres will provide adequate protection of water quality…" The proposed density of Saddle Ridge Village is approximately twice that which is considered necessary to protect water quality in public water supply watersheds.
3. With respect to nitrogen concentrations in groundwater due to subsurface sewage disposal systems alone, Bulletin #11 concludes that densities no greater than 1 unit per 1.5 to 2 acres are required to protect drinking water quality in public water supply watersheds. The proposed development is 1.5 to 2 times denser than this standard.
4. Bulletin 11 goes on to note that "other factors [besides septic system discharges] associated with residential development (erosion and sedimentation, stormwater runoff, incidental non-point sources of pollution) may contribute to degradation of water quality" and that "sediment, with its affinity for adsorbed nutrients, as well as pesticides, heavy metals, and other toxins, appears to be the principal source of phosphorus enrichment of fresh water surface bodies [sic]." The proposed townhouses development will produce more stormwater runoff, more erosion and sedimentation, more non-point source pollution and more phosphorus enrichment than 21 single family homes.
5. The CT DEP concludes that the maximum density in public water supply watersheds should be 1 unit per 2 acres, exclusive of wetlands. The 9 lots proposed for multi-family housing encompass an area of 81.313 acres exclusive of wetlands, which yields a proposed density of 1 unit per 0.82 acres. This is 2.4 times denser than the **maximum** density the DEP determined would protect public drinking water supplies. Even including the open space, the density of the multi-family housing would be substantially greater than the maximum recommended.
6. The Connecticut Conservation and Development Policies Plan recognizes that the cumulative impacts of land development can degrade water quality and identifies protection of the integrity of public drinking water supplies as critical to public health and safety. This plan recommends a

maximum density of one unit per two acres of buildable area[3]. As noted above, the proposed development (depending on the method of calculation) is 2.3 to 2.6 times denser than this standard.

I would also note that the applicant's argument that the proposed residential use can be favorably compared to the existing equestrian use is specious for several reasons:

1. An equestrian use of some kind will continue on Parcel A.
2. The manure generation rate used in the applicant's water quality discussion (57 lbs/horse/day) is 14% higher than the rate used in the applicant's Drinking Water Management Plan. Typical values quoted in the literature give a range of 40-50 lbs/day. Without specific data to the contrary, it would be reasonable to use 45 lbs/day. The pollutant loadings quoted by the applicant are 29% higher than this mean value.
3. Horse manure rapidly looses nitrogen to the atmosphere as ammonia. Half of the total nitrogen in fresh manure can be lost as ammonium within 4-7 days. The release of the remaining N from the complex organic forms that are present in manure is very gradual. Finally, nitrogen released from manure is not directly discharged to watercourses. It is taken up by plants and also is attenuated by bacterial denitrification. Nitrogen discharged in septic effluent is typically not subject to these processes. Concentrations may be reduced by dilution, but the nitrogen that is discharged from the leaching trench, for the most part, passes through the system and enters surface waters. All of these factors work to exaggerate the significance of the nitrogen loading rates quoted by the applicant, when compared to septic effluent.
4. An alternative calculation is as follows:
    a. 45 lbs manure/horse/day x 41 horses yields 673.425 lbs or 337 tons/yr.
    b. Penn State Univ. Agronomy guide estimates average N content of horse manure at 12 lbs/ton (same as MMI's calculations) or 4040 lbs total N.
    c. If half of the N is lost to the atmosphere, the total N potentially available to be transported to the watercourses is 2020 lbs, which is 27% less than the 2782 lbs N generation rate estimated by the applicant.
    d. Some of the N from manure is attenuated by plant uptake and denitrification, further reducing the actual N loading from the existing facility.
    e. The MMI calculation does not include the manure generation from the relocated equestrian facility.[4]

Therefore, I do not give any credence to the argument that the proposed townhouse development will reduce N loading from the site.

Given the site's location in public watershed lands and the proximity of the stormwater basins to wetlands, proper treatment for stormwater is of paramount concern. I concur with GHD; the applicant has failed to demonstrate that their proposed stormwater treatment system meets the requirements of the CT DEP's Stormwater General Permit. Therefore, it cannot be considered to protect wetlands and water quality. I have reached this conclusion after considering the following:

[3] Buildable area typically defined as gross area minus wetlands, watercourses, floodplains, and steep slopes.

[4] This also assumes that the stormwater basins operate as per MMI's calculations, which I believe to be an overestimate of their effectiveness, as described below.

1. The plans rely on pre-treatment in sediment forebays and treatment in the stormwater basins. The basins are assumed to drain completely between storm events and do not contain any micropools or other extended detention elements. Absent a properly sized wet pond, wet extended detention pond, multiple pond system, or micropool extended detention pond, these basins do not provide water quality treatment in larger storms.
2. The plans and supporting documents do meet the requirements of the CT DEP 2004 Stormwater Manual which requires 3 field infiltration tests per stormwater basin, or one test per 5000 square feet (s.f.) of basin (whichever is greater).
3. The plans and supporting documents do not present the results of three test pits or soil borings within each basin or one test pit per 5000 s.f. of basin (whichever is greater), as required by the CT DEP 2004 Stormwater Manual. There are five basins proposed; one basin has two lobes connected by a very long, narrow channel, and could be considered to be two basins[5]. Regardless, a minimum of 15 test pits or borings (and perhaps as many as 18), excavated to 4 feet below the basin bottom, are required. These field tests are required to be performed by a Professional Engineer, a Professional Geologist, or a Soil Scientist.
4. A total of 6 test pits were excavated whereas a minimum of 15 are required. Only one of the 6 test pits was excavated to 4' below the basin bottom as required. No field infiltration test data were provided.
5. The DEP manual requires that the bottom of the basins be located a minimum of 3' **above** the seasonal high water table. The limited test pit data provided indicates that several of the basins extend **below** the seasonal high water table.
6. Two factors revealed by review of the limited test data submitted are troubling. First, seasonal high groundwater is present in the areas proposed for the stormwater basins (as indicated by mottling observed in the soil profile). Second, the soils at depth are silty and thus likely have a limited ability to accept and infiltrate the stormwater. The absence of free water in the pits, which was reported in Milone and MacBroom's letter describing the results of the testing, while technically correct, is irrelevant. The factors limiting the performance of the basin are depth to seasonal high groundwater (mottling) and infiltration rate, not free water. Depth to free water is influenced by several factors including precedent weather conditions, time of year, and the length of time the holes pits were left open.
7. Construction and operation of stormwater treatment basins that intercept the seasonal high groundwater table has a reasonable likelihood of altering the hydroperiod (length of saturation or ponding) in the adjacent wetlands, and will also not provide the required degree of treatment, resulting in a discharge of pollutants.
8. Even properly designed basins provide very little attenuation for dissolved pollutants such as plant nutrients. Although TSS removal is the design goal for the Stormwater Manual, a discharge to a public water supply watershed should address other water quality parameters.
9. A detailed examination of the septic testing soil data submitted by the applicant confirms that the soils at the site have significant limitations with respect to groundwater infiltration. Presence of fine-textured soils, high groundwater, hardpan and/or ledge will all adversely affect the ability of the stormwater basins to treat water quality. The test pit data on the plans shows the following:

[5] The applicant's engineer appears to support the interpretation that there are 6 basins (and thus the requirement for 18 test pits) by submission of the results of 6 test pits; one pit for each of the four discrete basins, as well as one pit in each lobe of the 5th basin.

LIMITING FACTOR	# TEST PITS PRESENT	% TEST PITS PRESENT
Silty (fine textured) soils	329	100
High groundwater	185	56
Hardpan	16	5
Ledge	120	36

10. The Water Quality Management Plan (DWQMP) proposed by the applicant has numerous deficiencies. It is not a full-fledged plan, but rather an outline of the basic elements of a plan. It has no funding, no enforcement mechanism, no definition of background levels, nor any definition of what constitutes a violation. The proposed creation of nine separate homeowners associations, coupled with stormwater management facilities that are shared between associations, makes for an administrative nightmare. For example, a final WQMP is to be completed prior to construction, with input from a Technical Advisory Committee. The Technical Advisory Committee is to include two representatives from the homeowners associations. However, none of the homes will have been built yet, let along sold. Four members are to be drawn from state and local governmental agencies without any indication that these agencies are willing to perform this task, and have the manpower and legal authority to do so. The Aquarion Water Company is also proposed as a member, again without any indication that they are willing and able to do so. The difficulties inherent in establishing an Advisory Committee and overseeing final drafting of the plan, let alone implementing the plan and any remedial measures that might be required, are overwhelming.

The March 4, 2011 plans for Saddle Ridge Village are not the same as those that were approved in 2009 by the Easton Conservation Commission. The change in the intensity of the proposed land use, as well as the substantial increase in disturbance of land draining to the wetlands, creates a high likelihood of indirect impacts to wetlands that were not considered in the agency's original proceedings. These factors point to a significant adverse impact on wetlands and watercourses, and support the Conservation Commission's decision to hold a new public hearing. The applicant has not demonstrated that the plans comply with the CT DEP's 2004 Stormwater Manual or the Stormwater General Permit and therefore cannot be deemed to be protective of water quality. Since the site is located in public water supply watershed lands, with surface and ground water standards reflective of that use, the failure to demonstrate the adequacy of the treatment system is a serious deficiency in the application.

The proposed development does not meet the requirements of the CT DEP's 2004 Stormwater Manual in terms of both the necessary technical back-up and the effectiveness of the treatment system. This will result in increased pollutant loading to inland wetlands and watercourses at the site, as well as the Aspetuck and Easton Reservoirs. The stormwater management plan does not contain sufficient data to demonstrate compliance with the CT DEP's Stormwater General Permit. Absent such a showing, there is a reasonable likelihood of unreasonable pollution of the wetlands and waters of the state. Because these wetlands and watercourses drain into Easton and Aspetuck Reservoirs, this pollution represents a threat to public health and safety.

Please feel free to call me if you have any questions regarding this analysis, or if you require further assistance in this matter.

Yours truly,

Michael S. Klein, Principal
Soil Scientist
Professional Wetland Scientist