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January 21, 2019

Daniel Hill, Esq.
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Subject: Wetlands & Stormwater Review for Goodridge Estates 40B Project, Lancaster, MA

Dear Dan:

As requested, I am submitting an initial peer review for the Goodridge Estates Chapter 40B project application, proposed on land on Sterling Road in Lancaster, MA. I anticipate that I will have further comments as the technical data for this proposal develops. Please note that I walked the perimeter of the site on January 10, 2019, as well as observed adjoining areas.

DOCUMENTS

I have reviewed the documents as submitted by the applicant for this project, including project plans, stormwater calculations, ZBA peer review documents, MassGIS data for the site and surrounding properties, NRCS soil data, USGS mapping and other technical information.

My review also included the following:

-- Massachusetts Wetlands Protection Act (WPA) 310 CMR 10.00 effective October 24, 2014
-- Massachusetts Stormwater Handbook effective January 2, 2008 by MassDEP, and
-- Applicable federal, state and local regulations and/or bylaws

COMMENTS

I. Environmental Issues

A. *Wetlands*

There are extensive wetlands on the project site, including bordering vegetated wetlands (BVW) and streams. Vernal pools may exist on site. The project receives stormwater runoff from businesses and residences that exist on the northern side of Sterling Road, and that runoff has created additional wetlands on the project site. Specific comments follow:

- The wetlands shown on the plans are not consistent with wetland areas shown on MassGIS mapping (please see Figure 2 below). MassDEP has identified an extensive area of wetlands in the front northeast corner of the project beside Sterling Road. The plans show far less

wetlands than MassDEP indicates, which in my experience, is unusual. In practice, the MassDEP GIS mapping usually minimizes the extent of wetlands, and field confirmation often determines that far more wetlands exist than indicated on the state mapping.

- If the MassDEP GIS mapping is accurate, the project proposes roads, parking and housing within the wetlands to an extent not permitted under state law.

- Based on the existence of nearby vernal pools that lie offsite but within a short distance of the project, the project site may contain active vernal pools. At least two species of spotted salamanders have been photo documented in spring of 2018 along Deershorn Road to the immediate southeast of the project. The site is likely habitat for wood frogs, a species also associated with vernal pools.

B. *Lancaster Wetland Bylaw*

Under its wetland bylaw (Chapter 215 Wetlands Protection) the Conservation Commission does not allow alteration within 25-feet of the edge of BVW, streams, ponds and vernal pools. The applicant's design violates this regulation. The plan shows grading and other sitework within five and 10-feet of wetlands in numerous locations.

I strongly urge the Zoning Board not to approve any request to waive the 25-foot no-build requirement. The site contains extensive BVW and streams. The Bylaw was passed by the Town specifically to protect undeveloped wetlands from intense, high density projects.

This project, as submitted, would eliminate a majority of the existing upland habitat. The purpose of the Commission's restriction on the first 25-feet of buffer zone is to protect the values and functions of the wetland resources. The bylaw states its purpose is "to protect the wetlands, wildlife, water resources, flood-prone areas, and adjoining upland areas in the Town of Lancaster by controlling activities deemed … to have a significant or cumulative effect on resource area values."

Altering existing vegetation within the "no-build" zone creates multiple physical changes that directly impact adjacent BVW. Those changes include temperature fluctuations, surface runoff alterations and increased opportunities for invasive plants to impact BVW. I note that the Bestway site to the west is heavily impacted by invasives, particularly Japanese knotweed.

Lancaster is to be applauded for its foresight in adopting a scientifically valid "no-build" buffer. As I note, imposition of the Town buffer is particularly applicable to a site like this. Waiving it solely to increase arbitrary residential density is not justified by the applicant's documentation. I urge the Commission to reject any request to waive the bylaw's restrictions.

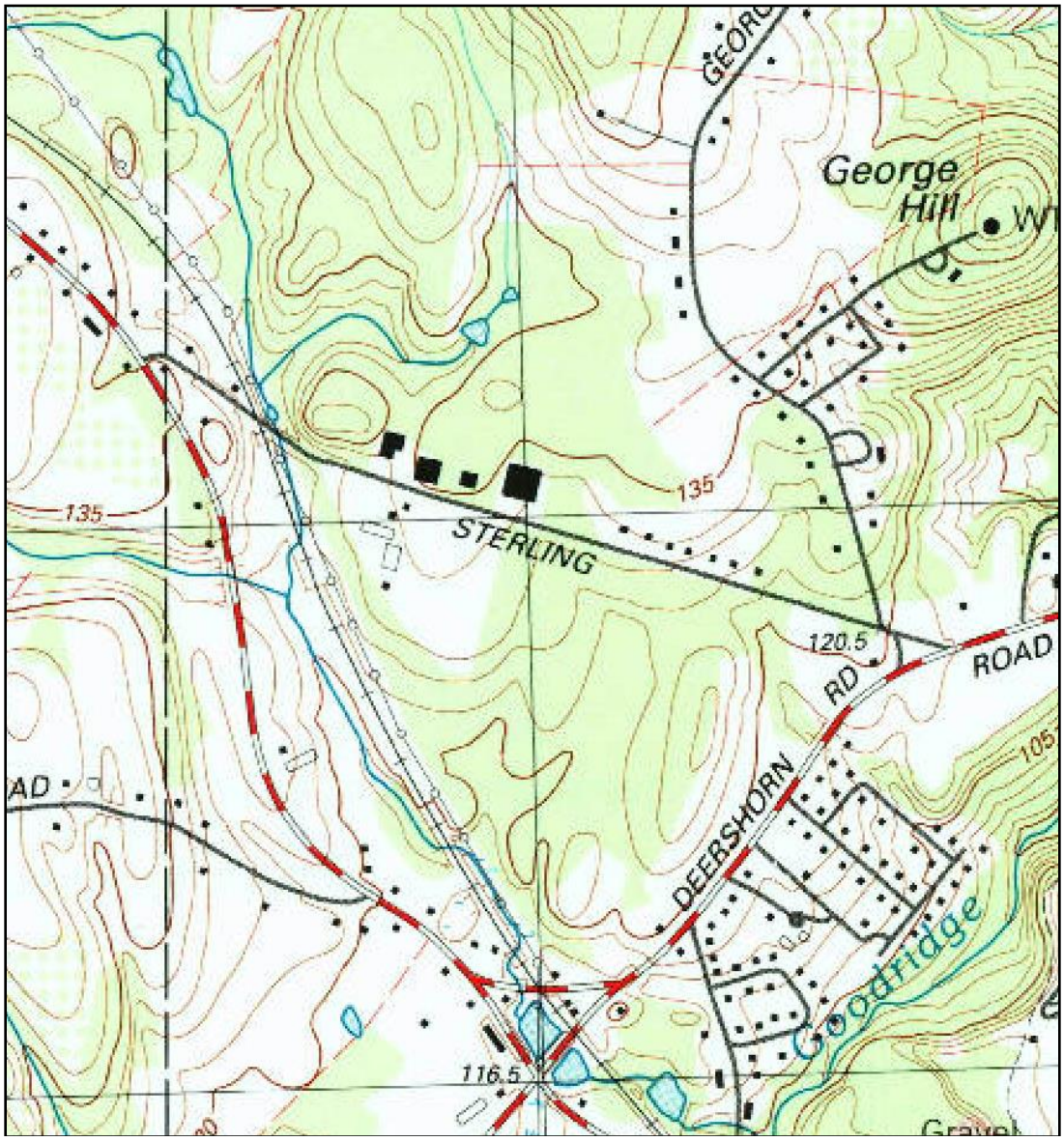

Figure 1. 1997 USGS map of vicinity; see Fig. 2 below for MassGIS view.

C. *Intermittent vs. Perennial Status of Stream*

The applicant's mapping shows a stream within a portion of the BVW on site. The plans indicate that the stream is intermittent. The WPA (see 310 CMR 10.58(2)(a)) defines a river as being *perennial* through a hierarchy that I summarize below:

- A river is perennial if it is shown as perennial on a current USGS quad map, or
- A river is perennial if it has a watershed area greater than or equal to one square mile, or
- If shown as intermittent on an USGS quad map and it has a watershed of at least 0.50 square miles and a predicted flow rate greater than or equal to 0.01 cubic feet per second at the 99% flow duration using the USGS Stream Stats method.

Regardless,

- The stream on the project site is not shown as perennial on the current USGS quad map, and

- The stream does not have a watershed area greater than or equal to one square mile.

Therefore, I concur the stream is not a WPA-protected perennial stream, and has no associated Riverfront Area.

Nevertheless, the wetland bylaw places a 200-foot zone on either side of a stream, whether a stream is perennial or not. The plans show no buffer for the stream. A large portion of the proposed improvements fall within the 200-foot zone. The bylaw is explicit:

> "Buffer zones are presumed significant to the protection of wetland resources and interests because activities undertaken in close proximity to resource areas have a high likelihood of adverse impact upon the wetland or other resources, either immediately, as a consequence of construction, or over time, as a consequence of daily operations or maintenance of such activities. Such adverse impacts from construction and use include, without limitation, erosion, siltation, loss of groundwater recharge, degradation of water quality and loss of wildlife habitat."

The project as designed ignores these findings. Its design is environmentally insensitive and will result, if approved as submitted, in numerous adverse impacts to wetlands, and other fragile resources.

D. *Endangered Species*

As noted, spotted salamanders have been observed near the site. These state-protected species may use portions of the site for their migratory patterns. The applicant has not submitted documents analyzing wildlife habitat; whether vernal pools exist is unknown.

- Given the habitat sensitivity of the entire site, a MassDEP Wildlife Habitat Assessment should be provided to both the Zoning Board and the Conservation Commission. Said assessment should include parts A and B and focus on habitat impacts to the buffer zones.

- Existing vernal pools should be survey-located and certified.

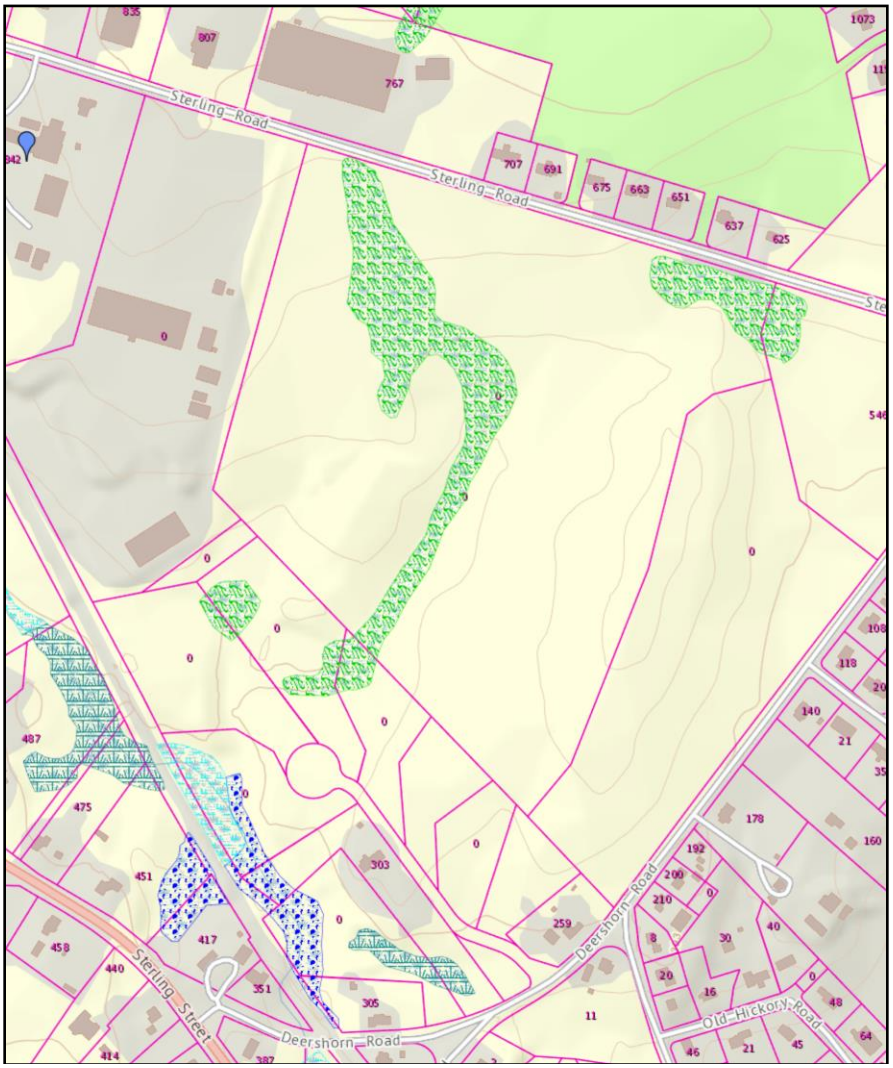

Figure 2. MassGIS view of overall site.

E. *Wetland Water Budget*

To avoid impacts to vegetation type and density, wetland scientists typically collaborate with a design engineer to balance pre- and post-development stormwater runoff when that runoff directly enters a wetland. Too little stormwater discharge after development will alter the vegetative regime; conversely, excess runoff will drive out some species that cannot tolerate increases in surface moisture. Thus, when not balanced, wetland (BVW) alteration occurs, which in turn impacts wetland functions and values.

The proposed project fails in this most basic requirement. As designed, proposed post-development water volume increases dramatically and runoff decreases. These volumetric fluctuations are due to the increase in impervious area.

In sum, the project proposes to alter surface runoff into the adjoining BVW, thus altering species that exist. Far more analysis than provided is required to determine the extent of alteration to BVW that may occur. The plans fail to account for probable impacts.

F. *Other*

Because no Notice of Intent has been filed with the Conservation Commission, the extent, type and location of protected resources are unknown. These should have been identified and approved prior to the Zoning Board filing. Without such approval the wetlands shown cannot be relied upon for design or permitting purposes.

II. Stormwater Issues

I note the following issues:

- The precipitation runoff numbers used in the HydroCAD calculation are apparently from the TP-40 atlas. The engineer indicates the 24-hour storm to be 7.0-inches. The NOAA Atlas 14--issued specifically to supersede the now obsolete TP-40--indicates a 100-year storm of 7.68 inches (see Figures 3 and 4 below). Use of a smaller rain event may lead to inadequately sized pipes and stormwater detention basins, among other impacts.

- The 7-inch storm used by the applicant is currently permitted by MassDEP, but best engineering practice dictates that scientifically accurate rainfall quantities be used. Calculations should meet regulatory requirements at a minimum, but should use updated data when precipitation quantities are known to be larger than required by regulation. All the HydroCAD stormwater calculations need to be rerun using scientifically valid data.

- Further, the watershed mapping provided for the project is inaccurate and should be revised. Bestway of New England, an industrial site directly to the west of the project, flushes stormwater runoff onto the site and that additional watershed is not reflected in the calculations. Instead, the engineer largely cuts off the watershed along the common property line, ignoring the physical reality, and thus minimizing the watershed size. When I walked the common property line between Bestway and the project site, I observed scouring and channelization from Bestway onto the project site; this additional runoff is excluded from the engineer's catchment areas.

- All calculations should be rerun to reflect accurate watershed areas and precipitation volumes.

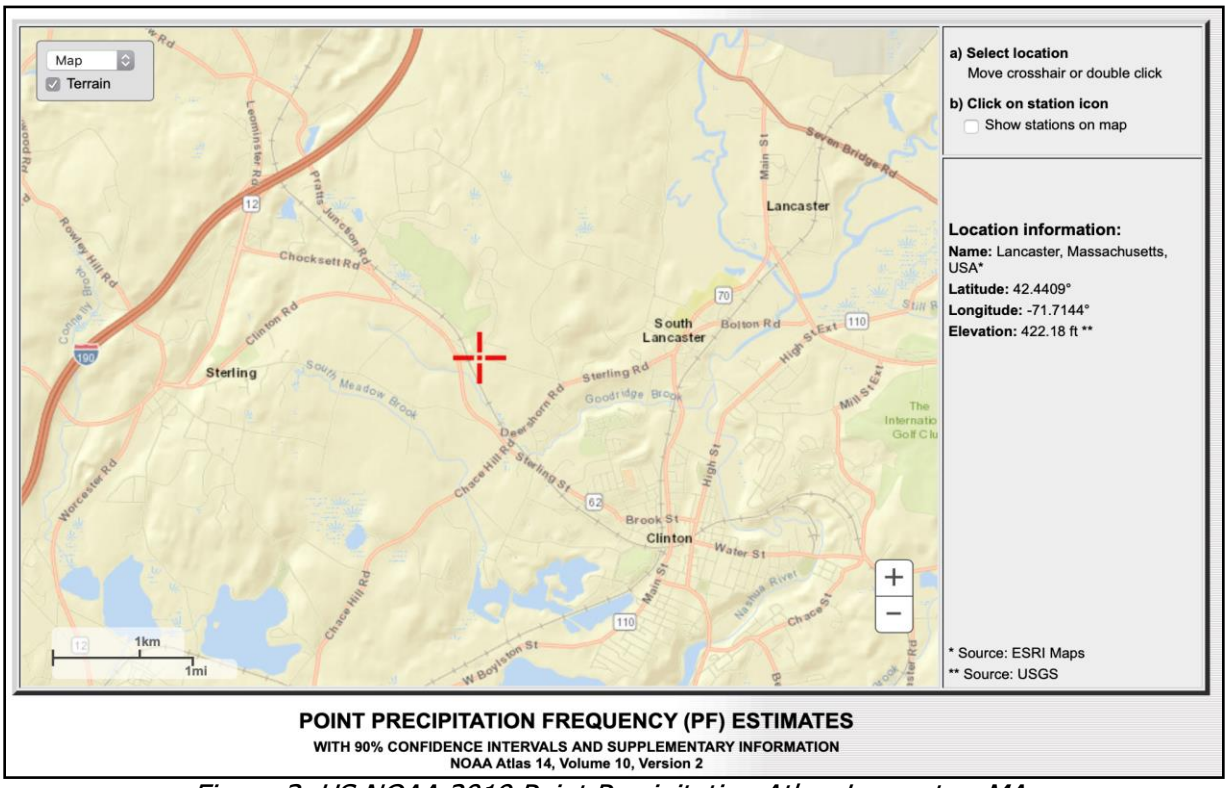

Figure 3. US NOAA 2019 Point Precipitation Atlas, Lancaster, MA.

PF tabular | PF graphical | Supplementary information

PDS-based precipitation frequency estimates with 90% confidence inte

Duration	Average recurrence interval (years)						
	1	2	5	10	25	50	100
5-min	**0.351** (0.272-0.442)	**0.411** (0.317-0.517)	**0.508** (0.391-0.641)	**0.588** (0.450-0.746)	**0.699** (0.518-0.919)	**0.784** (0.569-1.05)	**0.869** (0.612-1.20)
10-min	**0.498** (0.385-0.626)	**0.582** (0.450-0.733)	**0.719** (0.554-0.908)	**0.833** (0.638-1.06)	**0.990** (0.734-1.30)	**1.11** (0.807-1.49)	**1.23** (0.867-1.70)
15-min	**0.586** (0.453-0.737)	**0.684** (0.529-0.862)	**0.846** (0.652-1.07)	**0.980** (0.751-1.24)	**1.16** (0.863-1.53)	**1.31** (0.949-1.75)	**1.45** (1.02-2.00)
30-min	**0.781** (0.604-0.983)	**0.913** (0.706-1.15)	**1.13** (0.869-1.43)	**1.31** (1.00-1.66)	**1.55** (1.15-2.04)	**1.74** (1.27-2.34)	**1.93** (1.36-2.67)
60-min	**0.977** (0.755-1.23)	**1.14** (0.882-1.44)	**1.41** (1.09-1.78)	**1.64** (1.25-2.08)	**1.94** (1.44-2.56)	**2.18** (1.58-2.92)	**2.42** (1.70-3.34)
2-hr	**1.21** (0.947-1.51)	**1.44** (1.13-1.80)	**1.82** (1.42-2.28)	**2.13** (1.65-2.69)	**2.57** (1.92-3.37)	**2.90** (2.13-3.88)	**3.23** (2.31-4.48)
3-hr	**1.39** (1.09-1.72)	**1.66** (1.31-2.07)	**2.12** (1.66-2.64)	**2.49** (1.94-3.13)	**3.01** (2.27-3.94)	**3.41** (2.52-4.56)	**3.81** (2.75-5.28)
6-hr	**1.77** (1.40-2.18)	**2.14** (1.69-2.64)	**2.74** (2.16-3.39)	**3.24** (2.54-4.03)	**3.92** (2.99-5.10)	**4.45** (3.32-5.92)	**4.98** (3.62-6.88)
12-hr	**2.26** (1.81-2.76)	**2.73** (2.18-3.34)	**3.49** (2.79-4.29)	**4.13** (3.27-5.09)	**5.00** (3.84-6.45)	**5.67** (4.27-7.47)	**6.35** (4.64-8.69)
24-hr	**2.70** (2.18-3.27)	**3.27** (2.64-3.97)	**4.20** (3.38-5.11)	**4.97** (3.98-6.09)	**6.04** (4.68-7.73)	**6.86** (5.20-8.97)	**7.68** (5.66-10.4)

Figure 4. NOAA Atlas 14, 2019, Lancaster, MA. See 24-hr column for correct rainfall amounts.

- The proposed detention basins, designed to modulate stormwater flows, include pipe outfalls that terminate 10 to 15-feet from the edge of BVW--a violation of the 25-foot no-

build buffer zone required in the bylaw.

- Further, overflow from the proposed basins would contain herbicides and pesticides, vehicular heavy metals, hydrocarbons and brake dust. The project, as designed, does not filter out any of these pollutants, and as such, would contribute road and project runoff into the adjacent stream. The stream (or streams) on site flow southerly into a perennial coldwater stream (Goodridge Brook), which itself then flows into the Nashua River.

The applicant is silent on these issues. No analysis or data has been submitted that analyzes water quality impacts. The applicant should, at a minimum, provide the Town with analysis that proves that water quality in Goodridge Brook will not be impaired as a result of untreated stormwater from the project site.

III. Compatibility of Adjacent Land Uses

Bestway of New England, which adjoins this project directly to the west, is an EPA/ MassDEP Tier 2-designated industrial site. It is regulated by the Massachusetts State Emergency Response Commission (SERC), which is charged with implementing the EPA's Emergency Planning. Bestway, as a wood products manufacturer, is required to conduct regular water quality testing. Monitoring wells installed by Bestway exist beside and inside the project site. These are not indicated on the project plans.

Bestway operates a wood-kiln situated 20 to 30-feet from the project site. The active kiln lies less than 100-feet from a proposed multifamily building within the project That kiln generates both aerial emissions and surface water releases. Because the project site is downgradient of the Bestway operation, it may be directly impacted by both. The plans are silent on this issue.

Further, a proposed playground, sports area and school bus stop are proposed less than 100-feet from the Bestway property. Nearby residences have filed noise complaints with the Town over Bestway's all-season operations. The project's proposed residences will be dramatically closer to Bestway than the residences of the nearby complainants. Acerbating the Bestway operational issues, complaints about dust have been filed with the Town in the past. Developing a family residential area beside an industrial site--one under observation by the EPA and Town itself--is inappropriate. Yet the plans are silent on noise, dust and pollutant issues generated by Bestway. Noise, stormwater runoff, dust and air emissions should be examined and assessed.

IV. Summary

1. The plans should be approved by the Conservation Commission before the Zoning Board proceeds with its hearings. The site is extraordinarily sensitive, and the Town relies on the Commission and its expertise for all projects that may impact wetlands.

2. The wetlands shown are not consistent with wetland areas shown on MassGIS mapping. If the MassGIS mapping is accurate, the proponent proposes roads, parking and houses in wetlands.

3. The project site may contain active vernal pools.

4. The plans indicate numerous violations of the Town wetland bylaw, including the 25-foot no-build buffer and the 200-foot stream buffer zone. Strikingly, the following lots have a 25-foot no-build setback in their rear yards, which if the project is approved, will all be violated: 1, 32, 33, 34, 35, 36, 37, 38 and 42. Stormwater detention basins without exception are pushed up against the BVW edge--in many cases, grading is proposed within several feet of the wetland edge. Stormwater outlets from the basins discharge within a short distance of the wetlands, again in disregard of the Town wetland bylaw.

5. The 200-foot no-build stream zone is being violated over at least 25% of the southern portion of the site. Lots 27-33, two of the three apartment buildings, detention basins and other infrastructure all lie within the no-build stream zone.

6. Given the proximity of known endangered species to the southeast of the site, protected species may exist on the project site. A qualified firm should conduct a thorough analysis of habitat. Such an analysis can only be conducted in the spring.

7. No wetland water budget has been provided that analyzes impacts to wetlands due to changes in water inputs. Under the current design recharge may decrease and volume of runoff increase. Each of these changes may impact the wetlands in violation of both the state and local regulations.

8. Incorrect precipitation has been used to calculate stormwater impacts. Basin and pipe sizing may be inadequate.

9. Incorrect watersheds have been assumed, minimizing the actual volumetric flows entering the site.

10. The immediately adjoining Bestway industrial site creates noise, dust, emissions and stormwater runoff that may make the residential use proposed on the site inappropriate. Suitability should be examined and assessed.

Many of these basic issues could have been avoided if the applicant had: (1) worked first with the Conservation Commission to determine the full extent of wetland impacts; and (2) submitted a permit application to the Commission to resolve stormwater issues before submitting plans to the Zoning Board. Since the applicant did neither, the plans before the

Zoning Board cannot be relied upon to determine project density, lot and road placement, apartment building locations or infrastructure design.

I suggest the project be withdrawn until said issues can be properly adjudicated by the Commission.

Given the sensitivity of the site, with its multiple resources, including streams, bordering wetlands, isolated wetlands and potential endangered species, enforcement of the Town wetland bylaw (Chapter 215 Wetlands Protection) is imperative.

Please contact me with any questions or comments.

Very truly yours,

Patrick Garner
Wetland Scientist & Hydrologist