Lifetime
GREEN HOMES
142 Littleton Road
Westford, MA 01886
978.692.1313

May 13, 2015

Lisa Davis Lewis
Carlisle Board of Appeals
Town Hall
66 Westford Street
Carlisle, MA 01741

Re: "The Birches"
Application for Comprehensive Permit

Dear Ms. Lewis and the members of the Board of Appeals:

As the developer of the above referenced project I am quite upset following the presentation of Jim Vernon of Nobis Engineering on May 4, 2015 to the Board of Appeals (Board) of his report entitled "Phase 2 Report, Independent Hydrogeologic Study, 100 Long Ridge Road, Carlisle, MA" (Nobis Report or Report). The Board was presented with incorrect, misleading, and erroneous information in the Report, but especially in the presentation. It is disheartening, at the least, to have been presented a pile of technical information which is wrong, is not appropriate for the project, does not conform to the documented guidelines of Mass DEP, and is simply misguided. One questions the skewedness in the motivation of this information.

The following listing is the basis for my objection to the Nobis Report.

1. As stated at the hearing on May 4, the Nobis Report incorrectly computes the Wastewater Yearly Volume Existing (L/yr) = WE in Table 4.
2. The Nobis Report computed a site specific mass balance analysis which is not appropriate for this development. Apparently, this fact has been reported back to the Town (to a lawyer calling on behalf of the Town) by Mass DEP in a specific request to the Northeast Regional Office.

   The project, as proposed, is not intending to utilize any "nonfacility credit land". Therefore pursuant to Title 5, 310 CMR 15.214(2) and 310 CMR 15.217 (enhanced nitrogen removal) Mass DEP only requires a straightforward area equivalency computation for determination of required lot area and thus the nitrate loading. This equivalency computation has been presented by the applicant to the Board previously, but is again presented in Attachment A herewith. Since the project meets the equivalency calculation limits of Mass DEP, Title 5, none of the hydrogeologic analysis presented in the Nobis Report is relevant.
3. In the site specific mass balance analysis prepared in the Nobis Report the analysis does not conform to the Mass DEP Guidelines for Title 5 Aggregation of Flows and Nitrogen Loading, 310 CMR 15.216 [2-11-15] (Guideline).

The analysis uses the wrong recharge rate, a critical component, as the dilution factor. The correct recharge rate per the Guideline is 18 inches per year rather than the 8.2 inches[1] used in the Nobis Report[2]. This has a dramatic effect on the results. Further, the Nobis Report errors by not removing buildings and pavement from the computation of recharge area as outlined specifically in the Guideline, regardless of the intention to recharge the runoff from these impervious surfaces (admittedly resulting in an increase of the nitrogen load - less dilution).

Although while acknowledging that it is not appropriate, if one were to use the Mass DEP Guidelines correctly, the resultant site specific mass balance analysis for the entire property would be 8.81 mg/L as detailed in Attachment B. This is below the required 10 mg/L which, in the stated words of the Guideline, "allows the project to proceed.[3]

4. The Nobis Report computes a nitrate dispersion analysis to various selected points and presents a slew of assumptions and qualifications rendering the analysis as irrelevant. Further, the groundwater flow direction used in the cited model is linear only and does not conform to the groundwater contour map based on the in-situ data. The Report even states that not enough data is generated to verify this obscure assumption in flow direction. Nobis used a flow direction in the northeastern portion of the site which is almost perpendicular to the groundwater flow based on the actual testing and not simply by following the surface contours. Also, the model employed by Nobis, the Domenico Method, does allow for adjustments for offset to the flow line, which generally have steep drop offs, but were mistakenly not utilized.

   Additionally, the Report specifically qualifies the results in the statement that "the quantitative results shown by the dispersion analysis are not directly comparable to the mass balance results." Therefore, the results cannot be compared to the site specific mass balance analysis outlined by the Mass DEP Guideline requirements and thus have no regulatory value. In the specific example of the verbally presented predicted nitrate concentration of 17.8 mg/L at the "property line to east", this: i) cannot be used as a reliable figure based on the above, ii) is not a regulatory figure, iii) is not based on a proper point of analysis, and iv) is certainly not a figure that is based on proper science.

5. Even if the Nobis Report is used simply as informational, the Report does not conform to the Guideline in the use of the "downgradient credit land property boundary". Per the Guideline this point of analysis would be at the "credit land" boundary. But there is no "credit land", so there is no downgradient credit land property boundary. It is not appropriate to use the "facility boundary" in this computation. The Guideline only requires analysis at the credit land boundary, not the facility boundary.

---

[1] It is noted that Northeast Geoscience (NGI) used 20% of 41 inches or rainfall of 8.2 inches for their study, however, their study is not a computation pursuant to the Mass DEP Guidelines (see footnote 2) but was rather a comparison of pre development vs. post development conditions, being ultra conservative.

[2] Mass DEP Guidelines for Title 5 Aggregation of Flows and Nitrogen Loading, 310 CMR 15.216 [2-11-15], pp 11-13.

[3] IBID, p. 13

Rather, in this hypothetical exercise, the "nearest downgradient sensitive receptor" should be the point(s) of analysis. Continuing in this exercise and using the computations in the Nobis Report (albeit which are certainly questionable at this point), the nearest downgradient sensitive receptors are listed in Table 5 as private wells. And, importantly - in this non-regulatory exercise – according to the Nobis Report-Table 5, all sensitive downgradient sensitive receptors, both existing and proposed, will be below the limit of 10 mg/L and are summarized below.

Table 1: Existing Sensitive Receptors

| Line No. | Description of Sensitive Receptor | C (mg/L) |
|---|---|---|
| 3 | 90 Long Ridge Road Well | 1.95 |
| 5 | Ringheiser #68 Well | 3.39 |
| 6 | Hanauer #200 Well | 2.42 |
| 11 | Higgins #55 Well | 1.37 |

Table 2: Proposed Sensitive Receptors

| Line No. | Description of Sensitive Receptor | C (mg/L) |
|---|---|---|
| 2 | A11 | 4.73 |
| 8 | Well A4 | 2.69 |
| 9 | Well A5 | 1.74 |

Based on the above, I request that the Board reject the Nobis Report in its entirety and remove it from the evidence presented for this project. That is the only reasonable action to be taken.

Signed:

_____

Jeffrey A. Brem, PE

Cc: Douglas Deschenes
Mark Bobrowski
Joel Frisch

Attachment A

"The Birches"

Title 5, 310 CMR 15.217 Equivalency Calculations

| No. Units | Bedrooms | Rate per Day (GPD) | Total Flow Rate (GPD) | Equivalency | Area (Ac)[1] |
|---|---|---|---|---|---|
| 1 | 4 | 110 | 440 | 440 | 0.92 |
| 2 | 2 | 110 | 440 | 660 | 0.61 |
| 17 | 3 | 110 | 5610 | 660 | 7.81 |
| | | | 6490 | | 9.34 |

Site Area = 9.84 Acres > 9.34 Acres OK

[1] 1 acre = 40,0000 square feet per Mass DEP Guidelines for Title 5 Aggregation of Flows and Nitrogen Loading, 310 CMR 15.216 [2-11-15], p.5.

**ATTACHMENT B**

Determination of Site-specific Mass Balance Analysis - Entire Site
with Roads and Buildings Removed from Recharge

**"The Birches", 100 Long Ridge Road, Carlisle, MA**

Site Data:

| | | | |
|---|---|---|---|
| Site Area | 9.84 | AC | 428,630 sf |
| Lawn Area | 2.3 | AC | 100,188 sf |
| Road | 0.85 | AC | 37,026 sf |
| Building | 0.78 | AC | 33,977 sf |
| Septic System 1 | 1980 | GPD | (I/A Technology) |
| Septic System 2 | 1980 | GPD | (I/A Technology) |
| Septic System 3 | 1980 | GPD | (I/A Technology) |
| Septic System 4 (ex Hse) | 440 | GPD | (Conventional) |

Mass DEP Assumptions:

| | | | |
|---|---|---|---|
| Wastewater Load - I/A Technology | 19 | mg/L | |
| Wastewater Load - Conventional | 35 | mg/L | |
| Fertilizer Load (Lawns) | 933 | mg/1000 sf | |
| Recharge Rate per Mass DEP (p. 12)[1] | 18 | in/Ac = | 5062 L/day |

A. Find Nitrogen Load (mg/L) per Mass DEP Guidelines

$$\text{Nitrogen Load (mg/L)} = \frac{\text{Wastewater Load + Fertilizer Load}}{\text{Wastewater Volume + Recharge}}$$

$$\text{Nitrogen Load (mg/L)} = \frac{\{[(1980+1980+1980)\ \text{GPD} * 19\ \text{mg/L} * 3.7854\ \text{L/gal}] + [440\ \text{GPD} * 35\ \text{mg/L} * 3.7854\ \text{L/gal}] + [100188\ \text{sf} * 933\ \text{mg/1000 sf/day}]\} * 365\ \text{days/yr}}{\{[(1980+1980+1980+440)\ \text{GPD} * 3.7854\ \text{L/gal}] + [(9.84-0.85-0.78) * 5062\ \text{L}]\} * 365\ \text{days/yr}}$$

$$\textbf{Nitrogen Load (mg/L)} = \frac{\textbf{211,331,645}}{\textbf{23,984,103}} = \textbf{8.81}$$

*Conversions:*

*43,560 Square Feet (sf) = 1 Acre (AC)*

*3.7854 Liters (L) = 1 Gallon (gal)*

*GPD = Gallons per Day*

1 From Mass DEP "Guidelines for Title 5 Aggregation of Flows and Nitrogen Loading (310 CMR 15.216), P.12