Brem #60 09-12-2014

Lifetime
GREEN HOMES

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September 12, 2014

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

Re: 100 Long Ridge Road
Water Supply – Wells
Hydrogeologic Study

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

As the manager for Lifetime Green Homes, LLC (Lifetime Green Homes, LGH), I have given a lot of thought as to how to allay the concerns of water quantity and quality. I've conferred with my legal counsel who advises that since the project will comply with all state statutes and regulations related to water supply and sewage treatment, it is legally presumed that the protections afforded in those laws and regulations are adequate to protect the community and the neighbors to the project. In essence, I do not have to provide hydrogeologic reports, studies, or analysis.

However, it is clear from the testimony provided to date that the overriding primary concern of this project is the impact that the project may have on the groundwater resources, both quality and quantity, and the availability of adequate water supply to the existing abutting private wells. Therefore, Lifetime Green Homes intends to be proactive in addressing the groundwater issue by addressing the concerns head on in a three prong approach by:

1. performing groundwater modeling studies,
2. proposing and agreeing to water supply conditions in parallel with local regulations, and
3. posting a security bond to ensure that the abutters do not have to pay to repair or replace an existing water supply well if impacted by this project.

Further details of this proposal is outlined below.

An important concept with water supply from drilled wells is that the water comes from many cracks, fissures and fractures of bedrock and is virtually impossible to accurately predict. Accordingly, the State Guidelines and those adopted by the Town of

Carlisle address the lack of real data and reasoned modeling by mandating that the applicant acquire the data during construction and after the well is drilled by conducting a monitored flow test prior to its permitted use.

Additionally, the issue of multiple drilled wells and their proximity is certainly a known phenomenon in this state and elsewhere. The Commonwealth of Massachusetts allows for public water supply drilled wells to be as close as 50 feet from each other when considering required protective well radii. That means that a series of wells, or a well field, can have multiple well radii as long as they are 50 feet from each other. Although these individual well offsets may seem exceedingly small, this is directly related to the limited zone of influence that drilled wells have on each other due to the supply of water from within the cracks and fissures. Conversely, the zone of influence for other types of wells, such as gravel packed wells (municipal water supply), dug wells, or point wells is often much greater on a per unit of water removed basis than drilled wells. It is important to recognize that the vast majority, if not all, of private wells in Carlisle are drilled wells.

Interestingly, the Town of Carlisle has adopted very stringent well regulations overall, but especially in the instance of when three or more dwelling units are intending to draw water from one drilled well. The applicable regulation is found in Town of Carlisle Well Regulations, Effective April 7, 2009, Section VII as follows:

> The well should be completed in a water bearing formation that will produce the required quantity of water under normal operating conditions without adversely impacting adjacent wells.
>
> A 24-hour monitored flow test is required for any proposed private well or combination of wells intended to serve three or more dwelling units. Existing private well within a 500' radius of the proposed well location, with permission of the well owner, shall be electronically monitored as part of and at the same time as the flow testing of the proposed well at the applicant's expense.

After much thought and consultation with others, in order to effectively and neighborly address the water supply issue Lifetime Green Homes is willing to commit to the following:

1. Quality - Nitrogen Loading and Pathogen Transport Analysis

   Lifetime Green Homes (LGH) will contract with an outside Hydogeologist to develop a mass-balance nitrogen loading model to estimate the post-development nitrogen concentration in groundwater to the downstream locations according to the Mass DEP Nutrient Loading Approach to Wastewater Permitting and Disposal (dated

August 20, 1999). The approach to be used is a dilution model that sums all nitrogen inputs from a particular facility and site, and dilutes that nitrogen load by the volume of rainwater from the respective drainage basin that percolates down to the water table annually.

The analysis conducted will include a variety of scenarios in order to understand not only theoretical impacts from the groundwater discharge under maximum system capacity but also under the typical flows, as well as with and without fertilizer application. Additionally, an analysis of the travel time and related pathogen impact to downstream receptors will also be analyzed.

2. Quantity – Wells

   a. Proposed Condition 1: Background Testing: Prior to the drilling of ANY new wells, and with specific homeowner's advance written permission, LGH will have the current status of any and all abutting existing wells within 500 feet of any of the proposed wells analyzed to determine scientifically based background yield and quality of the subject well water by contracting with a separate hydrogeologic firm. The firm will follow the protocol outlined in i-v below.

      i. Disinfect sample tap with sodium hypochlorite solution, flush for 10-15 minutes and collect sample for total coliform bacteria. This is to ensure that the consultant did not contaminate the wellhead.

      ii. Remove well cap and gauge depth to static water level with an electronic water level probe accurate to +/- 0.01 feet.

      iii. Open sample tap and pump to waste for approximately 20-40 minutes while recording water level drawdown and flow rate, collect baseline water quality samples (total coliform bacteria, pH, arsenic, chloride, sodium, iron, manganese, lead, sulfate, conductivity, and nitrate).

      iv. Close sample tap and record water level recovery.

      v. Disinfect well by adding approximately 1 tablespoon of sodium hypochlorite and replace cap.

   b. Proposed Condition 2, Local Multiple Dwelling Well Regulation: As one of the conditions of a Comprehensive Permit LGH will not seek to waive and will voluntarily accept the requirements of the Carlisle Board of Health, Section VII as outlined above for all proposed new wells even including those with less than three dwelling units; the only limitation being that only those abutting wells that submit to the Background Testing above will be analyzed during the drilling for these new wells. This background testing is what the regulation intends, this is what the State requires, and this is the only fair way to properly record any changes or effects. Background data is imperative.

c. Proposed Condition 3, Security Deposit: LGH will agree to a condition of the Comprehensive Permit to voluntarily secure the funding of repair or replacement of negatively impacted abutting existing wells with a deposit up to $12,000 in an interest bearing security bond to be administered by a neutral party (TBD) for purposes of mitigating any documented negative impact caused by the project to any neighboring well(s) within 500 feet. This is limited to only those properties that submit to the protocol outlined 2.b above. The use of these funds includes re-drilling, hydro-fracturing, or even replacement of the well and casing in a new location. (This would not affect non water supply related items such as the pumps, controls, or treatment system). A detailed and thorough process i) to define a negative impact, ii) to provide access to these funds, and then iii) to replenish them to the agreed limit will be developed and agreed during the Comprehensive Permit approval process. If no legitimate access to these funds occurs after an agreed timeframe, such as 12 to 24 months after project completion, then the bond security would be returned to the applicant.

3. Septic System Design: Groundwater Mounding Analysis

LGH will retain this same hydrogeological firm outlined above to prepare a groundwater mounding analysis using test pit data and percolation tests collected from the site, estimates of soil permeability, porosity, and specific yield from literature values, and Title 5 flow estimates for the proposed development. The data will be used to develop an analytical groundwater flow model to estimate the expected water level rise due to wastewater discharges from the development. This information will be a function of the final design of the wastewater leaching system.

Please consider this letter in your review of the project and include in any Conditions of Approval as you see fit. I am certain that we will be discussing the contents of this letter and the offer of conditions at subsequent public hearings.

Sincerely,
LIFETIME GREEN HOMES, LLC

Jeffrey A. Brem, Manager

Cc: Bill Risso, Chair, Carlisle Board of Health
Douglas Deschenes, Esq.
Steve Ventresca and Jennifer Johnson, Peer Reviewers