

MEMORANDUM

TO: Carlisle Zoning Board of Appeals

FROM: Steven Ventresca, PE, Nitsch Engineering
Stephen W. Smith, P.E., P.HGW., L.S.P.

DATE: June 15, 2015

RE: Septic Flows
100 Long Ridge Road ("The Birches")
Comprehensive Permit – 40B

The purpose of this memo is to provide a summary of the 165 gallon per day per bedroom requirement for the 40B Long Ridge Road project in Carlisle, Massachusetts. Nitsch Engineering used information from 310 CMR 15 (Title 5) and a summary of the rationale of the 165 gallon per day per bedroom from the Carlisle Board of Health (BOH).

The proposed 40B Long Ridge Road project is proposing three (3) shared septic systems with a total flow greater than 2,000 gpd. The Applicant proposes to send flows of less than 2,000 gpd to each septic system. A general plan has been submitted of the septic system with a proposed preliminary layout. Based on the information provided to Nitsch Engineering by the Applicant and Zoning Board of Appeals, septic details or septic calculations have not been provided at this time.

The Carlisle Board of Health By-law states the following:

- 1. The Carlisle Board of Health feels the long-term health interests in our town can only be served by adopting certain regulations, which are stricter than Title 5, which was written as a minimum protection standard in 1977, revised in 1995 and in 2006 and designed to cover all towns in Massachusetts utilizing subsurface disposal systems.*
- 2. Carlisle has no town water backup. Unlike a number of Massachusetts towns covered by Title 5, if a residence or a business loses a well to pollution, there is no town water which can be brought in.*
- 3. Carlisle geographically is an area of extensive wetland, high water table, and extensive ledge. Safeguards in the original septic system installations are necessary because alternative repair locations are often unavailable.*
- 4. Carlisle presently has no municipal sewerage to hook up to in cases of septic system failure.*
- 5. Current estimates indicate that the distance viruses and bacteria travel is much greater than previously estimated. In Carlisle, where groundwater travels some distance through bedrock crevices, pollution may not be adequately filtered in gravel or sand with Title 5 percolation rates used for design.*

Nitsch Engineering notes that Title 5 flow criteria for a residence is 110 gallons per day (gpd) per bedroom under Section 15.203. The Town of Carlisle Board of Health By-law requires 165 gallons per day (gpd) per bedroom.

Under Section 15.240 (4), Title 5 requires a 50% increase in design flows when a garbage grinder is installed for a residence. This 50% increase from 110 gpd is equivalent to 165 gpd which is the Carlisle Town standard for septic system design flows. Carlisle adopted this requirement in 1987 to protect owners from

installing garbage grinders on systems that were unknowingly undersized based on Title 5 requirements. Carlisle's requirement of 165 gpd per bedroom for a residence are in line with the Title 5 requirements for sizing a septic system with a garbage grinder.

Section 15.223 (1) (c) of Title 5 was updated in 1997 to require the use of a dual compartment tank or two tanks in series when a garbage grinder was installed in addition to requiring a 50% increase in the septic field area.

The Carlisle BOH changed their regulations in 2008 because septic systems were being oversized based on the large houses being built in Town. The BOH established the following design flows for single family residences:

1. Requiring 50% additional capacity for small systems with flows of 330 gpd;
2. Requiring 25% additional capacity for medium systems with flows between 440 and 550 gpd; and
3. No additional capacity requirements for systems flows of 660 gpd and above.

The BOH kept the requirement of for a dual tank or dual compartment system. The BOH also kept the requirement where the design flows had to meet 165 gpd if a garbage grinder was included in the design.

In addition to the changes for single family residences in 2008, the BOH also established design flows of 165 gpd for condominiums, shared systems and systems equal to or greater than 2,000 gpd. The BOH also required that any project meet a concentration of 5 milligrams per liter (mg/l) of nitrogen at the project's perimeter boundary.

The 165 gpd requirement also recognizes the fragile nature of using the subsurface in Carlisle for both wastewater disposal and water supply. In Carlisle, wastewater is disposed of in the overburden soils and can readily migrate great distances as a plume. The depth to fractured bedrock varies in Carlisle and in places is close to the surface where it could intercept a wastewater plume. Once in a bedrock fracture system, wastewater could migrate to a nearby well in less than a week. So, the use of 165 gpd provides a factor of safety for subsurface septic systems and water supply wells in Carlisle.

The Town of Carlisle used the Title 5 flow rates for systems with a garbage grinder of 165 gpd to establish the Town's minimum sewage flow rates. These flow rates and nitrogen concentrations of 5 mg/l were required on the Town's recently completed 40B Benfield Farms project. Nitsch Engineering recommends that the 40B Long Ridge Road project use a design flow rate of 165 gpd for the design of the proposed septic systems.