



June 9, 2022

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RE: Potential Impact of Fire-sprinkler Systems on Abutter's Water Supply
Proposed Sutton/Douglas Subdivision
CEA Project No. 1208-21

Dear Wayne:

The intent of this letter is to address a recent question from one of the abutters regarding the potential impact of the proposed fire sprinkler systems on the water supply available to neighboring homes. For background we understand that the Developer, Sutton-Douglas Development, LLC is considering the installation of dedicated fire sprinkler systems in the new homes to be constructed. Specifically, we understand that the sprinkler system will be fed by a 280-gallon pressurized tank that would provide flow to two sprinkler heads for a 10-minute period. The water needed for the sprinkler system would initially be provided by the private water supply well on each property, and after use of the sprinkler system, makeup water would be provided by the private domestic well. We understand that 29 of the new homes will have the fire sprinkler systems. To address the questions raised, we will first provide some background from the previously prepared Hydrogeologic Assessment Report.

As described in the Hydrogeologic Assessment Report submitted on December 17, 2021, Corporate Environmental Advisors (CEA) provided a Conceptual Hydrogeologic Model (CHM) to predict the impact that the new development would have on water supply from the bedrock aquifer. The following are the predicted usage for each home in the development and the estimated discharge to each septic system:

Typical Domestic Water Usage: The resources available suggest that typical domestic usage of water is 80 to 100 gpd per person. We assumed that the typical family contains 3.23 (Wikipedia) persons in Central Massachusetts, and we would expect daily usage to be from 258.4 to 323 gallons per day per household.

Estimated Septic System Discharge. The USEPA estimates that discharge to septic systems average 50 to 70 gpd per person. Thus, we would expect discharges to be 161.5 to 226.1 gpd per household.

This CHM suggested that the average daily net groundwater withdrawals per household will be approximately 96.8 gal per day (gpd), which we rounded up to 100 gpd for ease of estimation. Thus, within the model area the existing residential use will consume approximately 10,000 gpd for domestic use, which equates to 3.65 million gallons per year (gpy). With the addition of 31 homes the annual usage in the model area will increase to 4.71 million gpy. The recharge estimate for the modeled area suggests that the available water would be approximately 187 million gpy. Thus, the available water flux through the modeled area is approximately 40 to 50 times what is required for the domestic use based on the above assumptions. These estimates are intended to be order of magnitude in nature, and there is of course variability both spatially and temporally in the physical parameters, and with trends in climate and precipitation.

Thus, the amount of water required to fill all of the 280-gallon storage tanks for the 29 individual fire sprinkler systems would total 8,120 gallons. The filling of these tanks would happen as each home was completed and would be a one-time withdrawal. Thus, on any given day that one of the 280-gallon tanks is filled, the additional volume of water withdrawn from the bedrock aquifer would equate to a 2.8% increase in total water withdrawn. Filling the fire sprinkler tank from the domestic well will result in a short-term increase in water usage and would not be greater than the typical daily withdrawal from one home (258 to 323 gallons). To further put this in perspective, if the fire sprinkler tanks were all filled during one 12-month period, the additional groundwater withdrawal would equate to 0.02% of the expected annual withdrawals, and 0.0004% of the available groundwater within the model area for a given year.

As the pumping required to fill the 280-gallon tank would be similar to the daily domestic usage, we would not expect any significant impacts to neighboring property owner's water supply availability. As discussed at the Sutton Planning Board public meeting on April 11, 2022, this withdrawal will result in very short-term drawdown of the bedrock potentiometric surface in the vicinity of the private domestic well. Normally this withdrawal will have a zone of influence of tens to perhaps hundreds of feet, but the rebound will occur over a very short time frame of minutes to a few hours. In most instances, the pumping at the private domestic well would likely result in drawdown of a few inches to a few feet of head on neighboring properties and then the rebound would resolve this transient condition very quickly. In summary, we do not believe that filling and later use of the fire sprinkler systems will have a noticeable impact on the use or availability of water supply in the new development or on abutting properties.



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Please let me know if you have any further questions regarding this response. I can be reached at (978) 380-2509.

Sincerely,

CORPORATE ENVIRONMENTAL ADVISORS

Joseph S. Campisi
Principal Hydrogeologist