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August 21, 2018

Mr. Bill Moseley, Chair
Town of Hollis
Planning Board
7 Monument Square
Hollis, NH 03049

RE: Hydrogeologic Investigation, 82 Runnels Road, Hollis, New Hampshire

Dear Mr. Moseley,

Pursuant to the request made by the Hollis Planning Board, Emery & Garrett Groundwater Investigations (EGGI), a Division of GZA has reviewed the report entitled "*Hydrogeologic Investigation, 82 Runnels Road, Hollis, New Hampshire*" (4/9/2018). The report was prepared for Team Yarmo International I LLC by Terracon Consultants, Inc. (Terracon). The objective of their investigation was to determine if the subject property, identified as a 4.2-acre parcel of land located on the east side of Runnels Road on Tax Map 5 Lot 28 in Hollis, New Hampshire, is located within the Hollis Aquifer Overlay Zone. The Hollis Aquifer Overlay Zone is defined in the Hollis Zoning Ordinance Section XI (A.) (1.) as follows: *"The extent of the Aquifer Protection Overlay Zone shall be the outermost edge of the surficial extent of all aquifer deposits presently designated as stratified drift in the USGS study, Hydrogeology of Stratified-Drift Aquifers and Water Quality in the Nashua Regional Planning Commission Area, South-Central New Hampshire,* 1987.

When the actual boundary of the Aquifer Protection Overlay Zone is in dispute, an owner of a property can conduct an independent hydrogeologic investigation to determine if a subject property is actually in a designated Aquifer Zone (Zoning Ordinance Section XI (A.) (1.) (a-b). Terracon was retained to conduct an investigation to determine if indeed the subject property was located in such an area.

Summary Review and Conclusions

Although the property is located on a stratified drift Aquifer according to the USGS 1987 maps, the Terracon report presents a good case for the site to not be overlying such an aquifer. The methods applied in this report are well documented and clearly presented. Terracon drilled seven test borings across the entire property from a northwest to southeast direction (Borings B-1 through B-7). Three of the seven boring locations did not intercept the water table above bedrock/refusal. Out of these seven (7) test borings, six (6) monitoring wells were constructed (Terracon Exhibit # 2). Depth to refusal ranged from 11.5 feet to 15 feet in the monitoring wells. Only four (4) of these wells intercepted the water table (i.e., had a water level that could be measured during this study). The collected hydrogeologic data on site demonstrates that the saturated sediments are very thin.

The uppermost sediments are sandy and loose, so it understandable why the USGS mapped them as part of an Aquifer based upon surficial mapping efforts only. The average hydraulic conductivity, as measured from the monitoring wells, was 18.45 feet/day, which is moderately-high. However, these deposits are very thin (less than 13.5 feet) as demonstrated by the borings and monitoring wells. The extremely limited saturated thickness of these surficial materials (0 - 5.18 feet) make these deposits unsuitable as an aquifer for any significant groundwater development or extraction. *Therefore, we concur with the conclusion of Terracon that this site be excluded from the Aquifer Overlay District as defined by the Town of Hollis Aquifer Overlay Ordinance.*

Recommendations

Although the water table is generally flat on the subject property, Terracon did not provide a groundwater flow map. EGGI anticipates that a portion of groundwater flow on site will likely migrate to the West toward the main body of the USGS mapped Aquifer (Terracon Exhibit #3) and provide some recharge to that Aquifer. It is unclear as to what the final land use will be on this site as final approvals have not been granted. In an effort to protect the Aquifer that is located further west of this site, EGGI recommends that a series of 3 monitoring wells be permanently installed and used to assess long term water quality and groundwater levels. Using existing wells for this monitoring program is acceptable, however we recommend that a monitoring plan be submitted to the Town for review and acceptance. Furthermore, if blasting will be required on this site at any point in the future, a formal blasting plan and construction management plan should also be submitted for review and acceptance by the Town. The groundwater monitoring plan must be designed to address any blasting that might be conducted. Therefore, in this case, VOCs , nitrate , TPH DRO, and other parameters would need to be evaluated as a minimum from the monitoring wells being used on site.

I hope you find this information responsive to your needs, if you have any questions regarding this information, please do not hesitate to contact me.

Best regards,

James M. Emery, P.G.
Principal