

July 11, 2021

Ms. Kimberly Reed, Planning and Zoning Administrator  
Town of Rye  
10 Central Road  
Rye, NH 03870

Re: Preliminary Aquifer Protection District Hydrogeologic Study Review  
Tuck Realty Corporation, 355 Lafayette Road, Rye, NH

Dear Ms. Reed,

As requested by the planning board, I have reviewed the hydrogeologic study report dated June 17, 2021 completed by GeoInsight for the Tuck Realty Corporation Proposed Condominium Development. This preliminary review letter includes a brief summary of findings and additional data and analysis requests for GeoInsight.

The focus of the subject hydrogeologic study is the southerly portion of the original Hector's Motel lot, which has recently been subdivided via lot line revision from the original lot. The remaining northerly lot is proposed for the expansion of the Benchmark Senior Living and Evolve Memory Care (Benchmark) facility. As I understand it the hydrogeologic study for the Benchmark parcel is also being conducted by GeoInsight and will be submitted separately for that project. The study included installation of wells on the Hector's and Benchmark parcels and also utilized existing wells on the Evolve property. Groundwater elevation, hydraulic property, and water quality data were collected from both parcels.

I walked the Hector's condominium and Benchmark parcel with Tuck Realty Project Manager Mike Garrepy on Wednesday, July 7, 2021 and had a phone conversation with Darrin Santos of GeoInsight on Thursday July 8, 2021 regarding the hydrogeologic studies.

**Groundwater Flow Direction** - The study finds that groundwater flows from northeast to southwest towards the Rye/North Hampton town line on the south and the Coakley landfill property on the west. There is a convergence of flow lines towards the GEO-4 well area. This type of convergence can indicate discharge or the presence of a subsurface feature with differing hydraulic properties than the surrounding area. *Please provide additional discussion of this feature and relevance to contaminant transport/water quality.*

**Water Quality** - The water quality testing included measurement of field parameters on May 23 and 28, 2021 and laboratory analyzed parameters on May 23, 2021. Elevated nitrate-N and chloride are present in several new and existing wells. The specific

conductivity, dissolved oxygen and oxidation-reduction potential values were significantly different at wells between the two round of measurements. *Please provide additional discussion of these differences and complete a second round of water quality sampling for field and laboratory parameters to confirm the results from the initial round of sampling.*

**Nitrate Loading Analysis** - The groundwater flow directions estimated in the study illustrate that groundwater from the existing and proposed Benchmark facility flows from northeast to southwest towards the Hector's parcel. The wastewater discharge from a new community leach field on the Benchmark expansion parcel may therefore impact the downgradient water quality on the Hector's parcel.

*The Hector's hydrogeologic study should include the characteristics of the existing and proposed Benchmark septic systems and the resulting upgradient nitrate-N concentrations demonstrated or estimated by nitrate loading. This information should then be used to refine the Hector's nitrate loading analysis.*

*Please include the existing Benchmark/Evolve leach field and the new Benchmark leach field location on the Hector's groundwater contour plans (Figures 2 & 3). Please also include a summary of water quality sampling data reported for the existing Evolve Groundwater Discharge Permit.*

The nitrate loading analysis assumes the use of Septi-Tech treatment systems, which the reports states will reduce the nitrate-N concentration by 85 to 90% resulting in an assumed septic system post-treatment effluent nitrate-N concentration of 6 mg/L. This nitrate-N concentration is low compared to actual post treatment effluent data from recently installed Septi-Tech systems in Rye. In particular Marjorie Way off Grove Road was developed with Septi-Tech systems. As part of the conditions of approval for the project, Septi-Tech completes annual post treatment effluent testing including nitrate-N for each system. Data is available from 2017 to 2020. These are individual systems that have a lower flow but provide a reference for actual nitrate-N reduction from Septi-Tech systems. A total of 28 samples have been taken. Averaging these data results in a concentration of 16.3 mg/L nitrate-N concentration in treated effluent. *Please use this more conservative effluent value instead of the 6 mg/L concentration assumed for Hector's analysis unless Septi-Tech has provided test data that indicates that the proposed systems are more efficient. If so please provide that additional justification in the report.* I can provide the Marjorie Way data for your individual analysis.

The nitrate-N loading methodology used for this study is a mass balance approach that includes the nitrate-N inputs from fertilization and septic discharge to estimate nitrate-N concentrations on the parcel as a whole. This may underestimate the actual concentration at the southwestern boundary due to the upgradient water quality influences from the proximate western leachfields. *Please provide additional discussion/analysis to address this concern.*

**Mounding Analysis** - The mounding analysis suggests that there will be a localized increase in ground water levels at each septic leachfield. This increase may also result in localized radial flow around each system can may increase the area of influence of each septic field. *Please provide an estimate of the mound footprint around each field and its influence on water quality.*

In summary, additional data or analyses on the following topics are requested:

- Groundwater flow convergence near the western property line.
- Water quality parameter differences between rounds and an additional round of sampling
- Water quality/nitrate-N loading impacts from the existing and new Evolve/Benchmark facility on Hector's water quality
- Placement of existing and proposed Evolve/Benchmark leachfields on the groundwater contour plans
- Summary of existing Evolve groundwater discharge permit sampling results
- Refinement of nitrate loading analysis to include more realistic post-treatment effluent nitrate-N concentrations.
- Additional discussion of proximate leachfields and influences on water quality at the property boundary.
- Additional discussion /analysis of the leachfield mounding on water quality.

Please also provide additional discussion of:

- Project impervious surface percent coverage
- Proposed road salt impact reduction measures

Much of the information requested will likely be included in the Benchmark Expansion hydrogeologic study report. As they are immediately adjacent properties I feel it is important to review the proposed Benchmark hydrogeologic study in tandem with the Hector's study to evaluate the combined water quality impacts of the proposed projects. A comprehensive review will be provided after receipt of they supplemental discussions, data and Benchmark study report.

Sincerely,



Danna B. Truslow, PG  
Principal Hydrologist

Cc: Mike Garrepy, Tuck Realty  
Darrin Santos, GeoInsight  
Steve Harding, Sebago Technics