Date: April 17, 2015

To: John F. Lyons, Grant & Lyons, LLP

From: Steven Winkley, New York Rural Water Association

Re: Town of Cairo Planning Board Comments on Proposed Zoning Law
Pages 12-14

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General Thoughts

I had a chance to review the Planning Board's comments and reacquaint myself with my 2009 study/plan for the Town of Cairo. This study was innovative if I do say so because it was a unique opportunity to establish zoning minimum lot sizes and/or housing densities (whatever one wants to call them) based upon scientific criteria, not just random numbers that "sound right". The scientific criteria chosen in this instance are the protection of ground water resources. How much ground water can be withdrawn from an area without causing undesired consequences? How many septic systems can be constructed in an area without causing excessive loading of nitrates to ground water? These questions were addressed in the 2009 study/plan and I believe there was substantial documentation concerning the methodology in the plan's appendices.

Response to Comments Regarding Lot Dimensions and Septic Systems

I take exception with the note on the bottom of page 12 that said that the surficial geology "characteristics" were not determined by on-site inspection. I literally drove **every** road in the Town of Cairo, making observations regarding soils, bedrock outcrops, etc and documenting the locations of these observations using GPS. I used these observations, together with the detailed USDA NRCS 1:24,000-scale soil mapping for Greene County (which originally was done using a lot of on-site field work), published and unpublished studies from the New York State Geological Survey, and compiled data from over 200 water wells to produce a highly detailed surficial geologic map of the Town of Cairo. This surficial dataset is certainly very appropriate for Town planning purposes and was subsequently used to calculate ground water recharge rates

It appears that the RR1 district and the minimum lot size in this proposed zoning district are largely based upon my recommendations based upon nitrate loading analyses in the 2009 plan. The premise is that there should be an adequate area to dilute septic system effluent. I am glad to see that the Planning Board does not question the "mathematical accuracy of the result", but they essentially question the ground water recharge rates used to calculate the area necessary to dilute the effluent from a lot's septic system effluent to acceptable levels. The ground water recharge rates that I calculated across the Town of Cairo were based upon two factors: the highly-detailed surficial geology dataset that I previously described and a GIS runoff dataset published by the United States Geological

Survey (USGS). This USGS runoff dataset is the best available resource for this purpose. The recharge rates that I determined for Cairo are completely consistent with the expected values for similar hydrogeologic settings and materials found across the Northeastern United States. If the Planning Board disagrees and disputes the "accuracy of the underlying data" I suggest that they retain a hydrogeologist to review the resultant recharge rates that I determined for Cairo.

Response to Comments Regarding Lot Dimensions and Water Availability

The area designated as RR2 in the proposed zoning appears to coincide closely with the area I identified as having a very low sustainable housing density based upon the conservation of stream drought baseflow. In this area, I am projecting that if housing density exceeds a certain amount, it will negatively impact the drought baseflow of streams. Baseflow is the flow that sustains streams between rainfall events and is from ground water. The RR2 areas were not designated on the basis of ground water availability as the Planning Board seems to state and the identified well drillers discuss. The merits of cable-tool versus rotary drilling is an issue that is completely irrelevant to the identifying areas that are susceptible to excess ground water withdrawals leading to undesired consequences. These undesired consequences in this case are the loss of stream flow.

I did identify an area of lower than average well yields northeast of Catskill Creek. However, this was not the basis of the delineation of the RR2 district. I noticed in the draft zoning law that the recommended minimum lot size in the RR2 district was reduced from 8 acres (from my plan recommendation) to 5 acres. I understand that 8 acres probably seemed too large to many and that is why it was reduced. However, that number was derived from a sound scientific approach.

If you have any questions, please let me know. I will address your questions regarding those definitions in a separate email.

Thanks!