Comments on Preliminary Hydrogeological Report & Large-Diameter Well Development and Testing Plan for Well #3

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I appreciate the opportunity to provide some feedback on the above-entitled document. In general, I found the report and testing plan to be reasonable. However, I have some comments on specific aspects of the report and plan where I have concerns. I would hope that these would be addressed prior to submittal to the New York State Department of Environmental Conservation (NYSDEC) and New York State Department of Health (NYSDOH). In some cases, there needs to be additional follow up to be performed by HydroSource, C2AE, and/or the Town of Sterling. My comments are organized based upon the format of HydroSource's Preliminary Hydrogeological Report & Large-Diameter Well Development and Testing Plan for Well #3.

WELLFIELD - Pre-Existing Wells

In its description of the existing wells and wellfield, HydroSource indicates on page 5 of its report and testing plan that "*less information exists for Well #2, ….and the well is reported to be 54 feet deep. The top of the screen assembly is at 35.5 feet, but the screen length and slot size are not known.*" Figure 1 below is the well log and completion report for Well #2. This well is 50 feet deep and is screened from 33 to 50 feet deep. However, hardpan (till) was encountered at 45 feet and bedrock at 50 feet. Upon completion, the well reportedly produced 300 gallons per minute with 30 feet of drawdown. A correction should be made to the report.

WELLFIELD - Recharge

To determine the sustainability of the wellfield's withdrawal rate, HydroSource estimated the fraction of precipitation that is available for recharge in the wellfield's watershed (recharge area). These estimates range widely from an available recharge to the wellfield of 313 gallons per minute (gpm) based upon a topographically defined watershed to as much as 2,338 gpm based upon a considerably larger recharge area that extends some four miles beyond the surface water divide that exists just north of Simmons Road. This widely varying estimate is problematic.

Given my mapping of the local aquifers in this area (Figure 2) based upon compiled well data, the local surficial geology, and the bedrock topography, I think extension of the watershed southward to that shown in Figure 15 of HydroSource's report and testing plan is not justified. In relatively shallow glacial aquifers such as in the Fair Haven/Sterling area, surface topography is generally a good predictor of the groundwater (water table) topography. However, it is conceivable that the groundwater divide separating northwestward flow towards the supply wells may not coincide precisely with the topographic divide situated near Simmons Road. I agree with HydroSource that "*it is reasonable to expect that the wellfield may capture groundwater from an area larger than the confines of the topographically defined watershed."*

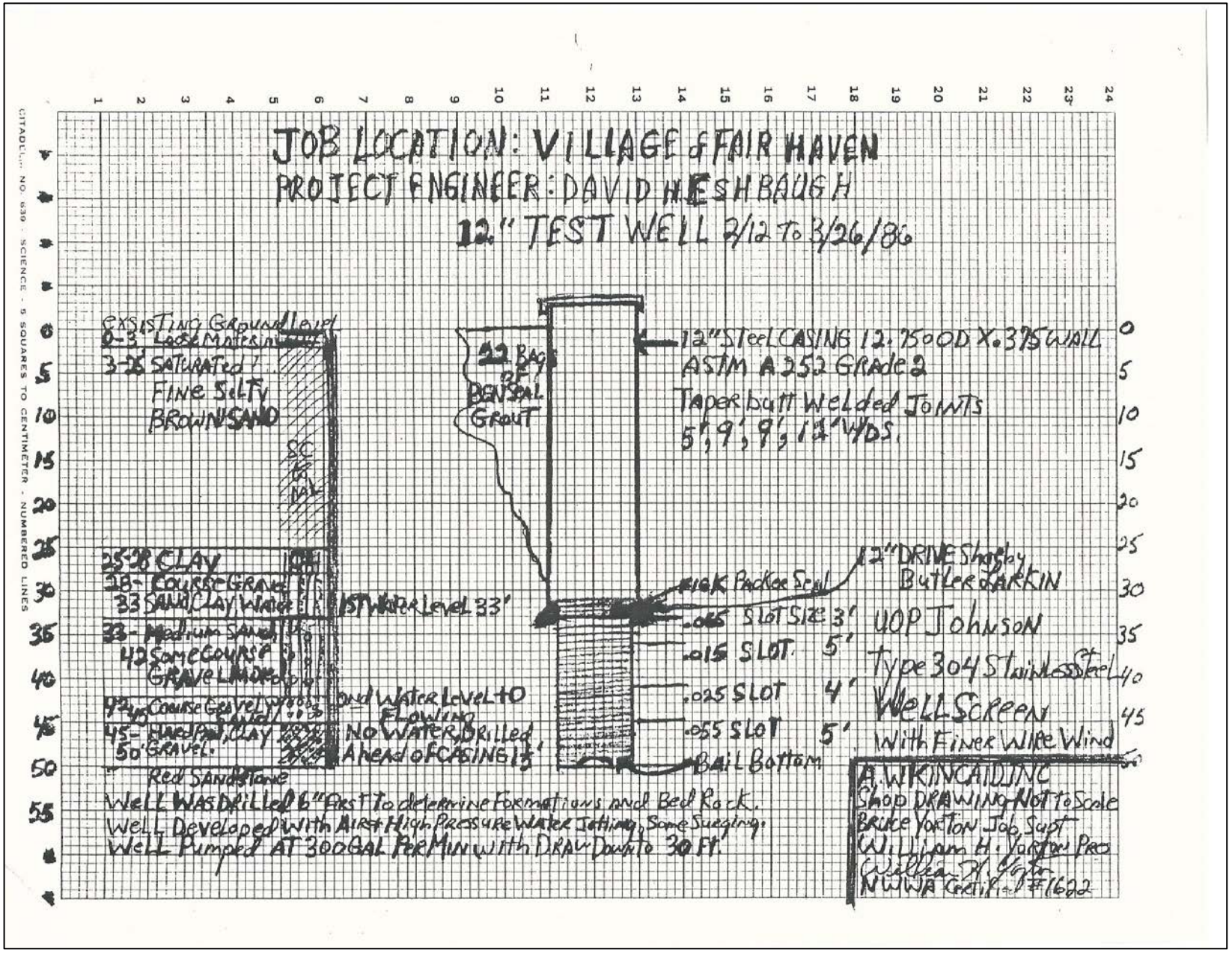

Figure 1. Well 2 Log

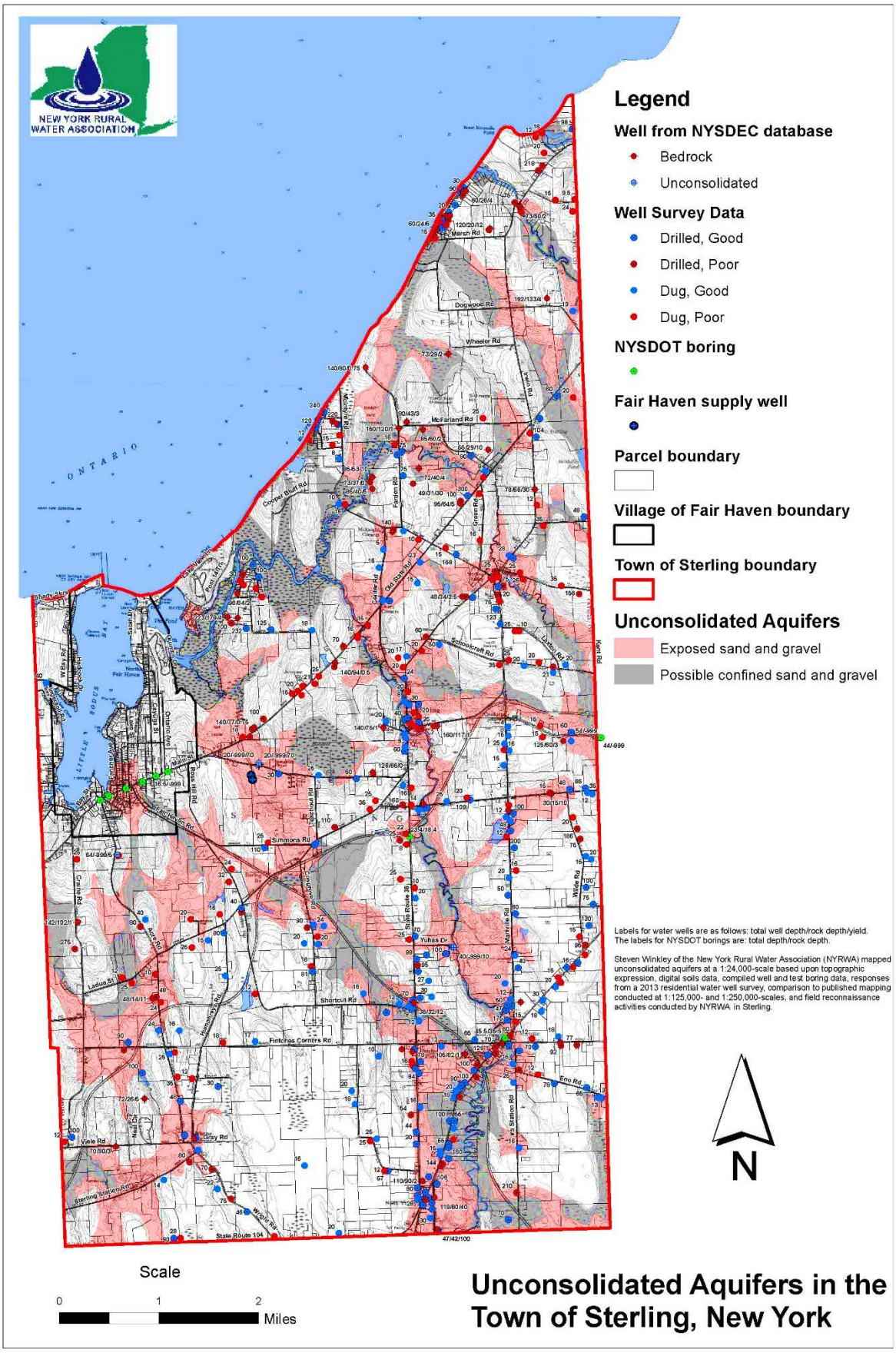

Figure 2. Local Aquifer Mapping

Realistically, the groundwater divide may extend some unknown distance southward to perhaps the area of Sterling Station and/or Cosgrove Roads. However, the much more extensive regional contribution area drawn by HydroSource is simply not supported by available surficial geology and water well data. More information on the aquifer's depth, areal extent, geometry, and hydrology are necessary to support the expanded watershed delineated by HydroSource on Figure 15 of their report and testing plan.

The so-called safe yield of an aquifer and a wellfield that taps it should not exceed the available recharge. Thus, the true recharge to the wellfield is likely somewhere in the range of 313 to 2,338 gpm. Careful consideration of the aquifer water levels observed before, during, and after the prolonged (72-hour) pumping test together with projection of these levels under drought conditions should help better refine the safe yield of the aquifer and wellfield. I would expect that the safe sustainable pumping rate of not only Well #3, but the entire wellfield, will be addressed in the hydrogeological report following the 72-hour pumping test. This should be noted by HydroSource.

LARGE-DIAMETER WELL SPECIFICATIONS

It is standard practice in designing a water well to ensure that there is an adequate screen open area to allow the desired yield to enter a well at a velocity of 0.1 foot per second. This hydraulic characteristic of the screen is known as the transmitting capacity. With the projected screened interval and slot size, what is the projected transmitting capacity of the proposed preliminary well design? This is not a measure of the well's safe yield. However, the well's desired yield should not exceed the well's transmitting capacity.

PUMPING TEST - Pumping Test Specifications

The recently found test well south of Well #2 (very approximately located on Figure 3) must be surveyed and vertically sounded to determine its suitability for monitoring. In addition, a second small diameter well some 50 feet east of Well #2 has been referred to in several reports (see Figure 3). This should be searched for as well.

The elevation of the measuring point for all the on-site monitoring points, as well as any off-site monitoring points, should be determined to the nearest 0.01 foot as called for in

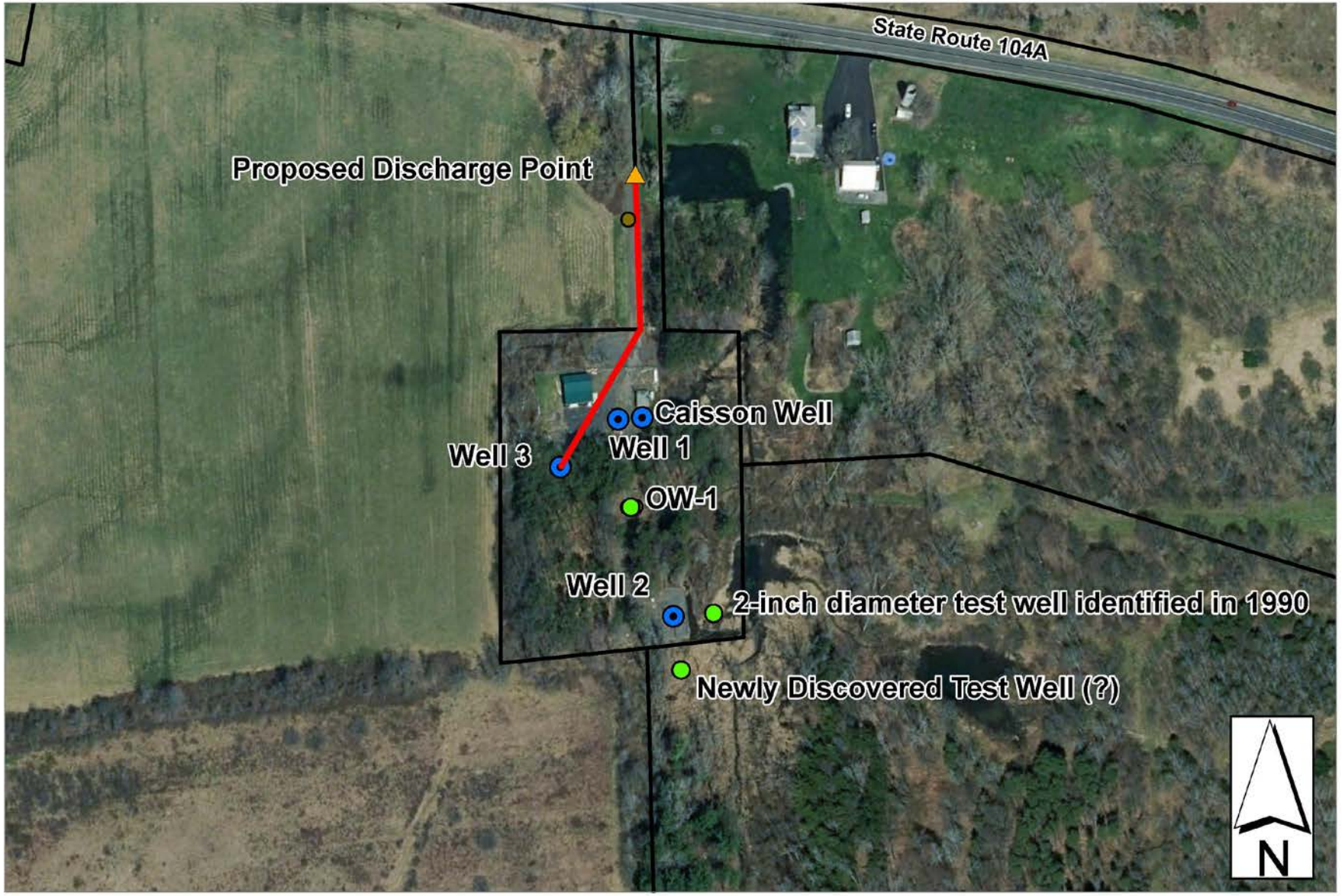
State Route 104A
Proposed Discharge Point
Caisson Well
Well 1
Well 3
OW-1
Well 2
2-inch diameter test well identified in 1990
Newly Discovered Test Well (?)
N
Scale
Proposed Discharge Line
0
200
400
600
800
Feet

Figure 3

NYSDEC's pumping test protocols. The monitoring points should be placed on the scaled site plan and the distance to Well #3 determined to the nearest 0.1 foot. This should be detailed in the plan.

Water levels are being currently monitored by the Village in Well #1 and Well #2 using a portable manual water level probe that can fit inside a ½-inch hole. However, the existing openings in these wells are not believed to be large enough for transducers which commonly are at least 7/8-inch diameter. Either plans must be made to modify these wells to permit transducer probes (which is a sound long-term plan for wellfield management) or Table 3 – Monitoring Schedule must be modified to show frequent manual measurements in Well #1 and Well #2 before, during, and after the pumping test. The frequency of manual measurements is critical in these existing production wells and ideally should be like those of transducer readings during the pumping and recovery periods. Multiple daily manual readings should be taken in the supply wells during the pre-test period as well.

A staff gage is to be installed on the shore of the pond east of Well #2 to monitor surface water elevations. Sometimes a piezometer in the form of a shallow well point is installed instead. This would enable the collection of both groundwater elevations (inside the piezometer) and surface water elevations (outside the piezometer). Such data will also provide key information on vertical hydraulic gradients. Has this been considered? Also, in accordance with the NYSDEC protocols, surface water measurements must be read and recorded at least once daily prior to the start of the test and at least twice per log cycle after the first ten minutes for the duration of the test. The monitoring schedule (Table 3) should be updated to reflect this.

According to the pumping test plan, water pumped during the test is to be discharged near the stream approximately 230 feet northeast of Well #1. The NYSDEC pumping test protocols indicate that the discharge water should be conducted at least 300 feet down gradient unless it can be demonstrated that discharged water will not recharge the aquifer being tested. Since the thickness and texture of the overlying lacustrine sediments has been observed to vary across the wellfield site, I believe the discharge water from the test should be conducted approximately 400 feet north directly into the stream where it exits the wellfield property and starts flowing northward towards Route 104A (see Figure 3). This location also reduces the threat of flooding to the immediate wellfield area since the stream is much narrower and closer to the water system infrastructure at the discharge point proposed by HydroSource.

PUMPING TEST - Potential Offsite Well Monitoring

Every attempt should be made to monitor the water levels in off-site wells that intersect the local aquifer. As NYSDEC pumping test protocols indicate *"the remaining observation wells must be placed to best define the hydrogeologic characteristics of the*

aquifer with respect to the pumping well. In some circumstances a representative sample of nearby homeowner wells must be monitored during the pumping test including nearby wells that may be outside the anticipated zone of influence."

Residences closest to the wellfield along Route 104A are supplied by the Village water system. However, several test wells exist on the former McIntyre's Bait Farm now owned by Sterling Spring Water LLC (see Figure 4). The precise location of these wells is unknown. However, they are likely located 800 to 1,500 feet from the wellfield. It is important to monitor water level response here to help determine the extent of the wells' zones of influence and contribution.

The Sterling Pines Community LLC mobile home park is supplied by a 28-foot deep drilled well (Figure 4). I have not had the opportunity to locate this well or determine its suitability for water level monitoring. However, given the fact that it is a public water supply well and is some 1,500 feet away from the production wells it is important to attempt to monitor this well. Although it is likely that this well would show little to no drawdown response during the 72-hour test, it is important to define the elevation of the aquifer water level surface (known as the potentiometric surface).

Lastly, there are two wells that I propose should be monitored that are located in the sand and gravel aquifer that are situated south of the topographic divide defining the watershed (see the NYRWA-delineated wellhead protection area on Figure 4). One is a 20-foot deep drilled residential well near the corner of Simmons Road and Sterling Station Road. This well was identified based upon a residential well survey that was conducted prior to the inception of the Town water districts. The other well is a highly productive well known as the Cosgrove Road Well (Figure 4). This well formerly supplied a local canning factory and water company. Again, these two wells are likely to be outside of the zone of pumping influence of Well #3 but are significant to define the aquifer's characteristics and the zone of contribution for the production wells.

It is important that someone from HydroSource, C2AE, and/or the Town of Sterling contact the owners of these properties and determine if the monitoring of well water levels is agreeable and feasible. The pumping test plan should then be revised accordingly before submittal to NYSDEC and NYSDOH. The location of off-site wells to be monitored must be surveyed, and the elevation of measuring points determined like the on-site points.

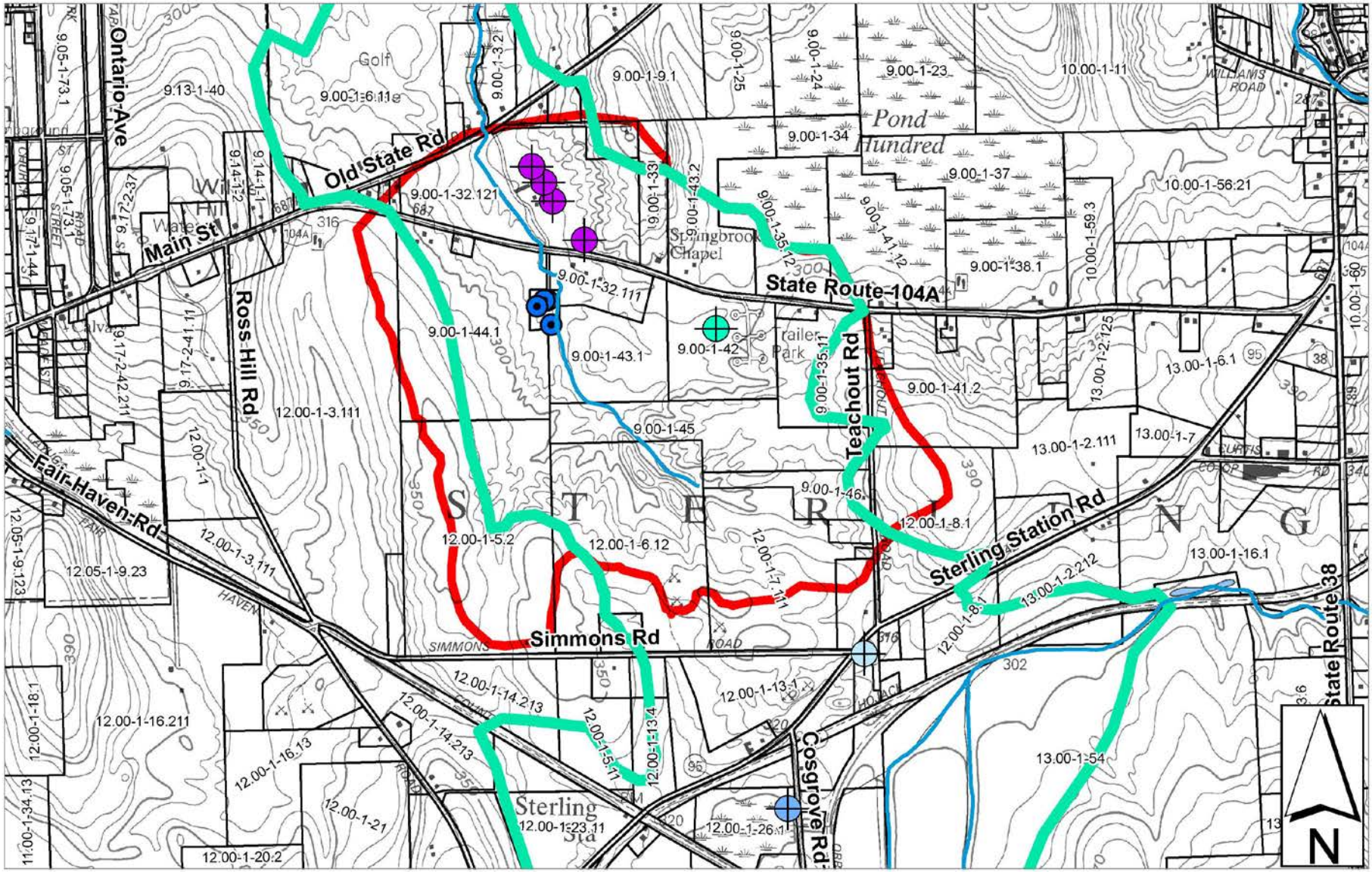

Figure 4
Potential Off-Site Observation Wells