STEVEN WINKLEY, P.G. – NY RURAL WATER ASSOCIATION
PROPOSED PUMPING TEST PLAN
TOWN OF STERLING LARGE DIAMETER WELL (≈ WELL 3)
VILLAGE OF FAIR HAVEN WELL FIELD

Hydrogeologic Framework

The Village of Fair Haven well field is situated within a relatively narrow valley (one-half mile wide) bounded by drumlin hills underlain by relatively impermeable glacial till (Figure 1). The valley in the vicinity of the well field is covered from the surface to a depth of 20 to 28 feet by fine sand, silt, and clay deposited into Glacial Lake Iroquois (the light greenish color area mapped on Figure 1). Underlying these finer-grained glaciolacustrine deposits is stratified sand and gravel, cobbles, and occasional boulders deposited by glacial meltwater. These coarse-grained deposits are the aquifer source of water for the present Fair Haven wells and the future Sterling well. They are and are confined where they occur beneath the fine-grained glaciolacustrine deposits and outcrop at the land surface to the south of the well field (see orange color on Figure 1) and to the northeast along a drumlin. Associated with these sand and gravel deposits is a pronounced ridge known as an esker (Figure 1). This ridge is composed of sand and gravel deposited in a tunnel at the base of the melting glacial ice. This esker possibly extends northward beneath the finer-grained sediments into the well field. The sand and gravel aquifer in the vicinity of the well field is highly productive. In 1967, Well 1 produced 349 gpm with only one foot of drawdown.

Recommended Pumping Test Measures

The 72-hour pumping test on the new large diameter production well (hereafter referred to as Well 3) to be installed approximately 100 feet southwest of Well 1 at the Fair Haven Wellfield (see Figure 1) shall follow the NYSDEC's Recommended Pumping Test Procedures for Water Withdrawal Applications (https://www.dec.ny.gov/docs/water_pdf/pumptest2019.pdf). In addition to these procedures, I recommend the following measures should be completed in order to adequately identify the zones of influence and contribution for Well 3 (and Wells 1 and 2), as well as the safe yield of not only Well 3 but the entire aquifer supplying the well field.

1. To adequately stress the aquifer, the pumping test must take place when Well 1 and 2 are in normal operation. Pre-test water level monitoring lasting at least one week (preferably longer) prior to the start of the test of the 72-hour test should be taken on all pumping wells and observation wells. Water levels must be measured and correlated to pumping rate(s) including times on and off during this time period.

2. The location of each observation well (and the three pumping wells) is to be mapped and the horizontal distance between each observation well and the pumping well shall be measured to the nearest 0.1 foot. The vertical elevation of a fixed reference point on each observation well and on the pumping well (e.g., "top of casing") must be established to the nearest 0.01 foot.

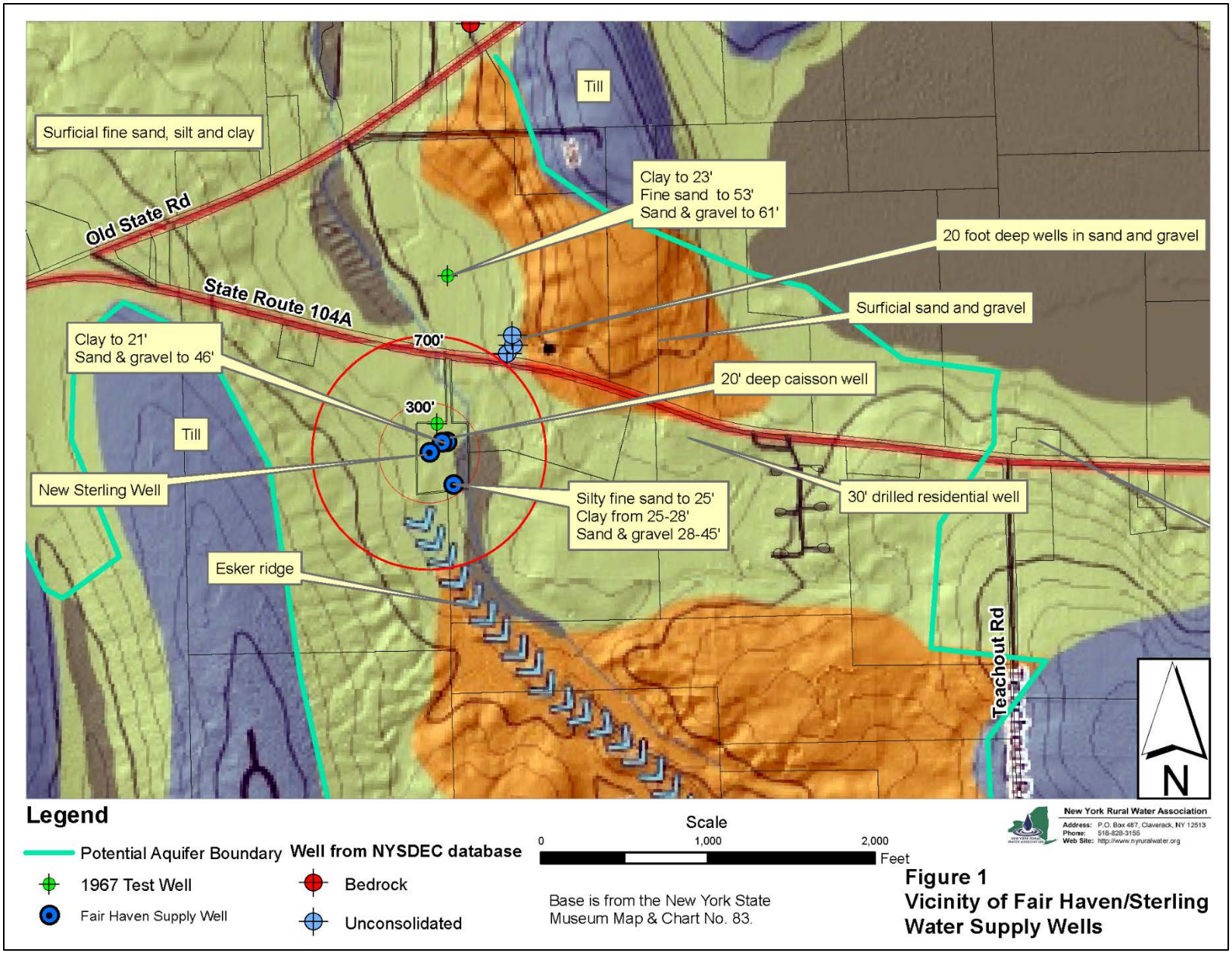

Figure 1
Vicinity of Fair Haven/Sterling Water Supply Wells

3. At least five observation wells in addition to Well 1 and 2 should be monitored during the 72-hour pumping test as well as the pre-test and recovery periods. One well should be located less than 30 feet from the pumping well, a second well should be no farther than 300 feet from the pumping well, a third observation well should be within 300 to 700 of the pumping well, and a fourth observation well is to be located further than 700 feet from the pumping well (see Figure 1). In addition, an observation well must be located outside of the expected influence of the pumping well to determine background conditions during the pumping test. The other observation wells must be located in a representative manner to best define the hydrogeologic characteristics of the aquifer with respect to the new production well and other on-site and off-site pumping wells. If possible, a representative sample of nearby homeowner wells and other neighboring wells (such as those north of Route 104A) are to be monitored during the pre-test, pumping test, and recovery periods as well.

4. Wells that can be utilized for observation wells can include a combination of existing test wells and new wells. Observation wells must be screened in, or open to, the same formation as the pumping well (e.g. the sand and gravel aquifer). A comprehensive survey of existing on-site and off-site observation wells must be conducted prior to selection of observation wells. This includes test wells installed in 1967-68 in association with Well 1 and possibly in 1986 in association with Well 2. The depth of the wells should be determined, the horizontal location accurately mapped, and the vertical elevation of the top of casing (measuring point for water levels determined). Every attempt should be made to locate the drilling logs for such wells. If existing observation wells cannot be utilized or are not suitable for use during the pumping test, additional observation wells are to be drilled and constructed at distances consistent with item 3 above.

5. As indicated in item 13c of the NYSDEC's Recommended Pumping Test Procedures for Water Withdrawal Applications, the zone of influence of the new production well is to be determined as should the zone of contribution, 60-day time of travel area, aquifer boundary and recharge area. Additional time of travel areas, including the 1-year and the 5-year periods should be mapped in order to be consistent with New York State's Framework for Creating a Drinking Water Source Protection Program Plan. Every attempt should be made to map the zones of influence, zones of contribution, and time-of-travel zones for Well 1 and 2 based upon observed pre-test water levels in observation wells. In addition, delineation of the protection area should not only be based upon conditions during pumping test period but should take into account drought conditions.

6. Based upon the analysis of the pre-test water level data, pumping test and recovery test data by a hydrogeologist or a professional engineer with hydrogeologic training, a safe yield for the well field consisting of existing Well 1, 2 and new Well 3 should be established. Again, such projections should take into account drought conditions.