



# TOWN OF GOSHEN

## **WATER TESTING PROTOCOLS FOR SUBDIVISIONS CHECKLIST**

Revised: March 19, 2012

Website: <http://www.townofgoshen.org>

### **CHECK ALL BOXES BELOW OR MARK N/A**

- 1. Subdivision involving three (3) or more lots (Hydrogeological study is required for three or more lots).
- 2. Determine water demand using NYSDEC, NYSDOH, or OCDOH requirements, whichever is more stringent.
- 3. Contact Town of Goshen.
- 4. Notify Town of Goshen Building Inspector of intent to obtain necessary approvals and;
  - a. A Complete Preliminary Application Form
- 5. Test / Observation Well Quantity, Location, Design:
  - a. Quantity: One (1) drilled well for the first three (3) lots; One (1) additional well for each additional three lots. (e.g. two wells for a four to six lot subdivision; three wells for a seven to nine lot subdivision)
    - N/A, if landowner demonstrates to the Planning Board, with approval from Town Engineer, that a lesser number of wells is likely to provide sufficient quantity and quality data. If approved the flow rate for test pumping shall be increased to 250% of maximum day demand.
  - b. Location: The location and construction of wells must meet all NYSDOH and OCDOH setback and construction requirements.
    - Identify potential well sites based on distribution of wells in all geologic and divergent topographic formations on site to provide a broad representation of site variables to assess production capabilities and water quality. Use published geological maps to assist in choosing well location.
    - Observation Wells – Representative Wells within 500 feet of the proposed subdivision shall be monitored. If existing are not accessible observation wells must be installed at the property boundary to identify impacts. Observation wells shall be shown on the well location plan, and quantity must be submitted with the preliminary application form.
  - c. Design: Test wells shall be standard private well design in accordance with the health department requirements.
  - d. Map: A well location map shall be prepared identifying all of the well & observation well sites.

**6. Aquifer Test Plan Proposal:**

- a. Prepare and submit an Aquifer Test Plan Proposal to the Town of Goshen.
- b. The aquifer test shall be conducted at a flow rate of at least 200% of the total maximum day demand of the subdivision.
  - N/A, if landowner demonstrates to the Planning Board, with approval from Town Engineer, that a lesser number of wells is likely to provide sufficient quantity and quality data. If approved the flow rate for test pumping shall be increased to 250% of maximum day demand.

**7. Obtain Permits prior to installing test wells and conducting any hydrogeological tests.**

**8. Well Installation**

- a. Install appropriately sized test wells and observation wells as needed per the guidance above and the approved plan at the locations selected. Well(s) shall **NOT** be installed until the Town of Goshen has approved the aquifer test plan
- b. Complete and file a Well Completion Report. Review the geologic log and yield during drilling to determine if the well(s) will be suitable for further investigation. Record field data during drilling, particularly fissure location, to facilitate analyses.

**9. Hydrogeologic Tests**

**1.0 Determine all external influences and methods for observation.**

**1.1 Test well(s) pumping rate**

- Each well shall be tested to confirm that there is a minimum yield of five (5) gallons per minute (gpm) as required by 10NYCRR Part 74, Section 74.5(c)
  - If sustainable yield of five gpm at a stabilized drawdown is not possible, the yield test may be performed at a rate between two and five gpm; however, an overdrilled borehole or enclosed storage structure (tank) of at least 400 gallons may be required.
- A test pump capable of providing a minimum of five gpm at the required head must be used to perform the test
- Measure the pumping rate via flow using an approved method as listed in the aquifer test plan (i.e. automatic data recorder (ADR))
- The discharge flow rate shall be monitored and recorded manually at least once every 10 minutes during the first hour of the test and every 60 minutes thereafter

**1.2 & 1.3 Test & Observation well(s) drawdown**

- Measure the test & observation well(s) drawdown using an approved method as listed in the aquifer test plan. Levels must be measured in decimal feet with an accuracy of 0.05 foot. Use the same reference point (relative to mean sea level) for each measurement. Backup manually monitored data shall be collected as well
- Water level measurements during the hydrogeologic tests shall be taken as follows or as agreed in the aquifer test plan:

Time Since Pumping Began	Time Between Measurements
0 – 2 minutes	10 seconds
2 – 5 minutes	30 seconds
5 – 15 minutes	1 minute
15 minutes – 1 hour	5 minutes

Time Since Pumping Began	Time Between Measurements
1 – 2 hours	10 minutes
2 – 8 hours	30 minutes
8 – 24 hours	1 hour
24 – 72 hours	2 hours

- 1.4 Barometric Pressure – Measure barometric pressure hourly during the hydrogeologic test and at four-hour intervals during the background and recovery period.
- 1.5 Precipitation – Manually record precipitation during the hydrogeologic test at one-hour intervals and provide local weather station precipitation data for the background, test and recovery periods.
- 1.6 Surface Water – Two monitoring procedures can be used for wetland and surface water measurements for water bodies and wetlands within 500 feet of the test well.
  - The first method involves installing two very shallow well points, with short (less than one foot) screens centered approximately three and six feet into the saturated zones, in or next to the surface water body. These well points shall be measured hourly during the test and at six-hour intervals during background and recovery.
  - The second method for standing bodies of water involves placing a staff gauge or measuring stake into the water and measuring the water height hourly during the test and at six-hour intervals during the background and recovery period.
- 1.7 Stream Flow – Stream flow measurements must be taken if the effect of the proposed diversion on nearby stream flow is of concern. Streams within 500 feet of the test well shall be evaluated.
  - The first method involves installing two very shallow well points, with short (less than one foot) screens centered approximately three and six feet into the saturated zones, in or next to the stream flow. These well points shall be measured hourly during the test and at six-hour intervals during background and recovery.
  - The second method is performed by gauging stream flow. It is normally expected that the diversion's effect on streamflow will be such a small percentage of total stream flow that this method is likely inaccurate for measuring stream depletion.
- 1.8 External Pumpages – External pumpages during background, testing and recovery shall be quantified.
- 2.0 **Background Monitoring Period** – All external influences shall be monitored at six-hour intervals during a forty-eight-hour background period just prior to the start of pumping.
- 3.0 **Hydrogeologic Testing Period** – Once the approval is obtained to proceed with testing of the proposed wells, the full-scale aquifer test of multiple wells shall begin.
  - 3.1 General Requirements for Hydrogeologic Test.
    - The test wells shall be pumped at the required withdrawal rate of 200% of maximum day conditions of such flow rate as agreed in the aquifer test plan.
    - The pumpage rate shall not be allowed to vary by more than 10% from the initial rate (unless otherwise specified below).
    - If a pump is turned off during the test, it must be restarted within 10 minutes. **NO MORE THAN ONE TEN-MINUTE BREAK SHALL BE ALLOWED** for every six hours of pumping.
    - The pump is **NOT** allowed to stop during the first two hours of an acceptable test. If a pump is stopped during this time, the test must be restarted after allowing for water levels in the test and observation wells to return to within 95% of pretest levels.
    - Water pumped from wells during testing shall be discharged to points where it cannot infiltrate into the ground and flow back to any test or observation well during the test.
    - The pump test shall not be performed when the prior 30 days precipitation is greater than 3.7 inches. The precipitation shall be calculated based on the gauge at the Middletown, New York climate station.
    - The test shall be designed to identify any impact to neighboring wells. It is the responsibility of the applicant to substantiate capacity through sufficient field data and hydrogeologic analyses.

3.2 Multiple-well (aquifer-stress) test.

- Background monitoring as described in Section 2 shall be conducted. After the background period, the proposed wells will be pumped at their maximum allowable pumpage rate for 72 hours for the 'stress' period. After the 'stress' period, the proposed well is shut off and allowed to recover. During this recovery, measurements are taken at all points every two hours.
- A minimum of six hours of stabilized drawdown must be displayed at the end of the test. Stabilized drawdown is defined as a water level that has not fluctuated by more than plus or minus 0.5 foot for each 100 feet of water in the well (i.e., static water level to bottom of well) over at least a six-hour period of constant pumping flow rate. The plotted measurements shall not show a trend of decreasing water level.
- If stabilized drawdown is not achieved, the test period shall be extended to 96 hours or more at the discretion of the Town Engineer in consultation with the developer's representatives. If it appears stabilized drawdown is not achievable, a semi-log extrapolation of drawdown versus time (or other similar methods) may be employed to project the ability of the aquifer to supply a pumping rate equal to the desired yield (which must be equal to or less than the pump test yield) on a long-term basis. Normally, an extrapolation of six months of pumping with no assumed recharge must be compared against the level of water remaining above the pump intake at the end of the period. The use of extrapolated data will be considered by the Town but will need to be weighed with other factors, including the expected reliability of the projection and the option of lowered demand by reduced development density or other controls.

- 4.0 **Recovery Monitoring Period** – Water level recovery in the pumping and observation wells must be measured. Unless otherwise specified, the recovery-monitoring period must last a minimum of eight hours or until water levels have recovered within 95% of drawdown. Recovery shall be monitored intensely immediately after the test well pump has been turned off. All observation points shall be observed at six-hour intervals or shorter where appropriate. If recovery is less than 90% within 24 hours, safe yield must be scaled back or the test rerun at a reduced rate as required by the Town Engineer.

**10. Water Quality Testing**

- A A water quality sample shall be taken within the last two hours of the hydrogeologic testing for contaminants in the water. The contaminants to be tested shall be in compliance with federal, state and local requirements for potable water use. Consideration shall be given to incorporate additional contaminants in locations where a known contamination site exists proximate to the property boundaries. Testing shall include all parameters in the NYSDOH Individual Water Supply Wells-Fact Sheet #3, Recommended Residential Water Quality Testing. Additionally a representative number of wells shall be tested for Arsenic, barium, fluoride, methane, radium, radon, uranium, MTBE, pesticides and POCs (EPA method 502.2) as agreed in the aquifer test plan based on the location of the subdivision in relation to known sources of pollution, farming operations and other factors.
- B Perform hydrogeologic analysis. After the hydrogeologic tests have been completed, the results must be analyzed. A description of information needed in the analysis is located below.
  - 1 Multiple-well test analysis. A multiple-well test analysis is conducted by evaluating the total drawdown at the observation points to determine the drawdown attributable to the proposed pumpage from multiple withdrawal points. A radius of influence shall be calculated using the data collected from this test.
  - 2 Hydrogeologic report. A hydrogeologic report prepared by a licensed professional engineer according to the outline in Attachment 3 shall be submitted to the Town. The hydrogeologic report shall be certified by the landowner to be a complete analysis and an accurate representation of the hydrogeologic condition. The report, data and certification shall be submitted to the Town of Goshen for review. The raw test data shall be submitted in Excel® or text format electronically on either a 3.5" diskette or CD ROM or other format as agreed in the aquifer test plan. The test or observation wells may be converted to production wells for the proposed development, provided they were properly constructed and meet NYSDEC requirements. The well location plan shall be included.