Appendix B

Private Well Water Supply Testing Ordinance

Appendix B - Private Well Water Supply Testing Ordinance

Part 1: Why Enact A Private Well Water Supply Testing Ordinance?

As part of their zoning, subdivision and land development application procedures, municipalities may require well water quantity testing to protect well water supplies. This is particularly important for areas where water-consumptive industrial use, such as gas drilling, is occurring or could potentially occur.

Such testing will help insure that well users will have a reliable and adequate amount of water to serve their needs. It will also provide important data about groundwater and aquifer conditions that will help the community plan for water resource sustainability.

Local groundwater supplies can be depleted and/or disrupted by water withdrawals from groundwater wells or surface water. For example, since the water used in gas drilling and hydraulic fracturing (fracking) is a consumptive loss (it is not returned to the source), water resource depletion can be substantial locally and regionally; cumulatively they can have significant impacts on watersheds (NY Draft Supplemental Generic Environmental Impact Statement, 2011). Water extraction for gas development can impact the yield and performance of water wells within a zone of influence.

To protect private individual water well supply a municipality can adopt a well water quantity testing requirement that must be followed by developers. The information produced by the test can be used to assess whether the proposed development is likely to impact or interfere with existing water wells in the region and can provide valuable baseline data that can protect existing water sources and aquifers.

The mapping of the aquifer to be tested needs to be set based on site-specific geologic analysis and current uses to assure the zone of influence is accurately measured. To help set the specific test protocol and to help with analysis of test results, the municipality can employ the services of a hydrogeologist on an as-needed basis. This sample ordinance suggests provisions that can be considered when developing a water well quantity testing ordinance. Any such provisions will require review by the municipal solicitor.

Part 2: Sample Water Well Quantity Testing Ordinance

ORDINANCE NO. _____

AN ORDINANCE OF THE TOWNSHIP/ OF PUREWATER, HEALTHY COUNTY, PENNSYLVANIA

GENERAL REFERENCES

§ XXX-1. **Purpose and Authority.**

A. It has been shown that groundwater supply and well performance are vulnerable to activities on adjoining properties, new commercial and industrial water demands and regional disruption in aquifer properties in Purewater Township and surrounding municipalities depending on geological and hydrological factors.

B. Purewater Township depends upon groundwater as its sole water resource. Municipal planning must act in a responsible fashion to protect this essential resource for present and future generations.

C. This chapter is designed:

(1) To ensure that proposed land uses seeking zoning or subdivision/land development approval will produce sufficient volumes of water to serve their intended use and to maintain acceptable standards of hygiene and sanitation;

(2) To ensure that proposed land development does not unduly infringe upon the performance of existing wells; and

(3) To collect data and information about local groundwater aquifers to determine aquifer characteristics and evaluate any long term changes to aquifer yield and water quality.

§ XXX-2. **Incorporation of state standards by reference; higher standards to prevail.**[1]

The following standards are hereby incorporated and made part of this chapter by reference: Pennsylvania Safe Drinking Water Act (Chapter 109) and the Public Water Supply Manual. If there are conflicts between any part of this chapter and any other applicable law, the more stringent of the two shall apply.

§ XXX-3. **Definitions.**

As used in this chapter, the following terms shall have the meanings indicated:

"Advance notice of test dates." Communications in writing or by telephone with the secretary of the Township or with a field witness designated by the Township. Messages left on answering machines are not binding advance notices.

"Alteration." Any physical change in the well and water supply distribution system, including deepening, modification, removal, adding additional water distribution lines, change of use, and additional use. The term "alter" shall be construed accordingly. Hydrofracturing shall be considered an alteration if it is not carried out as part of the construction of a new well. Replacement of pumps, installation of pitless adapters, or extension of the well casing above grade to conform to the state code shall be considered repairs and not alterations.

"Approve." Accepted or approved under applicable specifications stated or cited in this chapter, or accepted as suitable for the proposed use under procedures and powers of administration delegated in this chapter, and the word "approval" shall be construed accordingly.

"Authorized agent." Any qualified person who is delegated to function within specified limits by the Township.

"Available drawdown." The distance between the static water level and a water level five feet above the pump intake.

"Certification." A written statement by the Township attesting that the water supply facilities for the proposed realty improvement are in compliance with the requirements of this chapter.

"Commercial water use." The use of well water as an integral part of a commercial operation (e.g., landscaping, restaurants, laundries, or car washes) but not the incidental well water use associated with commercial operations.

"Construct a well." Creating physical access to groundwater-bearing strata for the purpose of providing a water supply.

"Development." The division of a parcel of land into two or more parcels, the construction, reconstruction, conversion, structural alteration, relocation, or enlargement of any building or structure, any mining excavation, landfill, or recreational facility, and any use or change in the use of any building or other structure, or land or extension of use of land.

"Drawdown." A decline in the water level in a well measured from the static level.

"Drilling discharge test (commonly known as "blowing the well")." An estimation of a well yield by measuring the discharge rate from the well bore during the drilling operation as described in § XXX-9.

"GPM" – Gallons per minute

"Cement grout." Portland cement mixed at a rate of six (6) gallons of water per 94 pounds of cement

"Industrial well." The use of well water as an integral part of an industrial operation (e.g., manufacturing, gas drilling supplies, or power generation) but not the incidental potable water use associated with industrial operations.

"Interference test." Performing measurements of water levels in designated observation wells to determine the change in water levels from those measured immediately prior to commencement of the well test.

"Multiple rate step test." A test consisting of four, one-hour long constant rate steps run at equal, increasing rate intervals. For example, the flow rates for a step test would be 3, 6, 9 and 12 gallons per minute (gpm), each step increasing by 3 gpm.

"New well." A newly constructed, altered, or an existing well prior to its certification for a new or expanded use.

"Non-residential water use." Any use of water not related to residential use.

"Observation well." Any nonpumped well utilized to obtain water level measurements during interference testing.

"Potable water." Water free from impurities in amounts sufficient to cause disease or harmful physiological effects and conforming in its bacteriological and chemical quality to the requirements of the Pennsylvania Safe Drinking Water Act regulations.

"Realty improvement." Any proposed new residence or other building the useful occupancy of which requires the installation or erection of a water supply system. Each family unit in a proposed multiple dwelling shall be construed to be a separate realty improvement.

"Repair." To fix, refurbish or replace one or more components of a water supply system in a manner that will restore and preserve the original location, design, construction and installation of the system.

"Residential replacement well." A well constructed to substitute for an existing residential well that has failed to provide sufficient water to adequately supply its existing residence or to provide water of potable quality.

"Specific yield" or "Specific capacity." The rate of discharge of a water well per unit of drawdown, commonly expressed in gallons per minute divided by feet of drawdown (gpm/ft).

"Static water level." The water level in the well either before or after pumping when all drilling and pumping effects on the aquifer have dissipated and the well is in equilibrium with atmospheric pressure.

"Step rate test." A pumping test conducted upon the well so that discharge remains constant with time.

"Test well." A well subjected to the Drilling Discharge Test, to the residential Step Rate Test in § XXX-10, or to the non-residential pump test in § XXX-11.

"Three part step test." The sequence of background test, Multiple Rate Step Test, and well recovery test as described in § XXX-10 for residential wells, and in § XXX-11 for non-residential wells.

"Three part aquifer test." The sequence of background test, Step Rate Test and recovery test as described in § XXX-11 for non-residential wells.

"Well." An artificial excavation that derives water from the interstices of the rocks or soils which it penetrates.

"Well recharge" or "Well recovery." The inflow of groundwater into a well from the aquifers in which the

well is drilled.

"Well yield." The rate at which it has been demonstrated that water can be withdrawn infinitely from the well.

§ XXX-4. **(Reserved).**

§ XXX-5. **(Reserved)**.

§ XXX-6. **Certification**.

A. All zoning, subdivision or land development applications that propose new or altered water wells shall require certification that the proposed use will satisfy the requirements of the residential Three Part Step Test as specified in § XXX-10, or the non-residential Three Part Aquifer Test as specified in § XXX-11. All zoning, subdivision or land development applications that propose new or altered non-residential water wells that are subject to the Three Part Aquifer Test and are located in proximity to existing producing water wells shall undergo the well interference test as specified in § XXX-12 to the satisfaction of the Township or its agent before certification.

§ XXX-7. **Applicability.**

A. General.

(1) The well performance requirements and the well interference requirements contained in this chapter shall be applicable in all zoning districts i f not specifically exempted in other sections of this chapter.

(2) The provisions of this chapter shall apply to all applications to the Township for: approval as to suitability for subdivision as specified in § XXX-7C with the exception of subdivisions performed solely for the purpose of merger, boundary adjustment or agricultural partition;

(3) Any such application submitted to the Township for approval or certification shall be made on forms prescribed by the Township and shall include but not be limited to all data as specified by this chapter.

(4) Any such application shall include a plot plan showing the location of all new wells, the location of all preexisting wells, the location of springs used for water supply, the location of all existing subsurface disposal areas, and the location of soil tests for potential subsurface disposal areas within the distances shown in Table 7-A-4 below.

Table 7-A-4

Lot Size	Minimum Spacing of New Wells from Other Wells*,†
Less than 1.5 acres	100 feet‡
1.5 to 3 acres	150 feet
More than 3 acres	250 feet

* The minimum spacing requirements for a replacement well for an existing use may be waived if there is no expansion or change of use.
† The spacing requirement may be waived for multiple wells on single lots that serve one individual residence with justification.
‡ The spacing requirement for very small lots may be reduced to not less than 50 feet with a minimum of 50 feet of casing to accommodate spacing for existing wells.

(5) Any such application shall include the technical specifications for new wells as needed for the Water Well Completion Report, such as casing depth, casing material, casing diameter, grouting material, proposed total depth and required or desired yield.

B. (Reserved).

C. Subdivisions.

(1) For all major subdivisions in all zoning districts, a hydrogeological report shall be submitted prior to granting approval as to the suitability for subdivision by the Township. This report shall include the information and data specified in § XXX-7E below.

(2) Certification under this chapter shall be required for each lot of any subdivision in allzoning districts before approval as to the suitability of such lot can be granted by the Township. For each of these wells, all wells on the other lots of the proposed subdivision located within the required distance from the test well, as shown in Table 11-B-6, must be available as observation wells according to the well interference test requirements as described in § XXX-12. Preexisting producing wells located within the required distance from any test well may be used as observation wells at the option of their owners.

D. Non-Residential Development.

(1) For nonresidential development proposals with a total projected water use for the project of 4,500 gallons per day (gpd) (slightly more than 3 gallons per minute [gpm] for 24 hours) or more, a hydrogeological analysis shall be required and shall include the information and data specified in § XXX-7E below prior to granting of approval as to the suitability of the proposal by the Township. Such analysis shall be performed by a qualified professional with experience in the field of hydrogeology and as a minimum shall include pump tests and well interference tests designed to show whether the water supply will be adequate for the intended use. Advance approval of all test protocols by the Township shall be required.

(2) For nonresidential development proposals with a total projected water use for the project of less than 4,500 gallons per day a simplified testing procedure consisting of a constant rate and recovery test shall be conducted as specified in § XXX-11B(2) below.

(3) Demand for industrial and commercial use shall be based on the Pennsylvania Public Water Supply Manual (see Table IV-1.2 Part IV).

E. Hydrogeological report.

(1) The preliminary hydrogeological report for the proposed major subdivisions specified in § XXX-7C(1) and non-residential developments specified in § XXX-7D(1) above shall be prepared by a qualified professional with experience in the field of hydrogeology. The qualifications of the persons and firm who will be performing the test shall be submitted for review to the Township. The hydrogeologic report shall include specifics as follows:

(a) A discussion of the hydrogeology of the site and its environs, including the review of available information in published maps and reports depicting the Township and surrounding municipalities. This review shall also include the attitude of formation strike and dip and a fracture trace analysis using aerial photographs showing the location and orientation of fractures beneath the site.

(b) An aquifer test plan shall be submitted including the location and technical specifications for the proposed test well and wells to be monitored for interference in accordance with § XXX-7E(2). Prior to conducting an aquifer test, the applicant shall submit the design of such aquifer test including the location of well(s) to be monitored for interference on adjacent lots. Such a review may include submission of such design to a qualified hydrogeologist representing the Township for review and recommendations. The Township may consider the comments and recommendations of this hydrogeologist prior to approving the aquifer test plan.

(c) The location of all disposal areas, active, abandoned and proposed, and the location of all soil tests for potential subsurface disposal areas within 250 feet of the proposed wells.

(d) A review of all well drilling results from the records of the Pennsylvania Geological Survey from lots located within 1,000 feet of the proposed development.

(e) A review of all gas well locations within one (1) mile of the proposed development.

(f) A summary projection of the hydrological impact (e.g., the projected long-term trend of the water levels in the available aquifers or other sources of potable water) that may be caused by the proposed subdivision or non-residential development and an outline of all measures that may reasonably be employed to minimize adverse impacts. This hydrological analysis shall at a minimum address the impacts of any existing and proposed wastewater disposal systems onto water supplies; impacts of any existing and proposed stormwater management practices onto any existing and proposed water supply and wastewater disposal systems; impacts of proposed water supplies and wastewater disposal systems onto stream baseflow and wetlands; and impacts regarding pollution of surface and groundwaters. The analysis shall also include an outline of all measures that may reasonably be employed to minimize any identified adverse impacts.

(2) As a basis for the required study, an adequate number of test wells shall be provided. The proposed location of these wells must be indicated on a plot plan and along with the aquifer test plan, shall be provided to the Township prior to installation of the wells. The fracture trace analysis should be used to identify all observation wells, which should be located along the primary geologic features. The first observation well, when required, shall be located along strike of the primary geologic fracture/ structures identified on or near the property. Table 7-E-2 is a guide to the number of test well(s) required:

Table 7-E-2

Residential Subdivisions:

Number of Proposed Lots	Number of Test Wells	Number of Observation Wells
4 – 10	1	2
11 - 25	2	4
26 – 49	3	6
50 and over	At the Township's discretion, but not more test wells than 20% of the number of proposed lots.	At the Township's discretion, but not more test wells than 20% of the number of proposed lots.
Public Community Systems	At the Township's discretion.	At the Township's discretion

Non-Residential Developments:

Number of Observation Wells		
Average Demand (gallons per day)	Low Yield Zones	High Yield Zones
4499 or less	1	0
4,500 to 14,999	1	1
15,000 to 50,000	3*	2*
50,000 to 100,000	4*	3*
100,000 or more	Obtain PADEP Water Allocation Permit	Obtain PADEP Water Allocation Permit

* Includes shallow piezometer to assess impact of vertical leakage on shallow ground water, on subsurface disposal units, or on surface waters bodies such as wetlands.

(3) Both test wells and observation wells may be installed in locations which can be utilized for future domestic groundwater supplies. The minimum number of observation wells can include existing wells if construction details are known. Observation wells and all existing wells within a distance from the test well as specified in Table 11-B-6 shall be monitored, but monitoring of existing wells may be performed only if their owners have so requested, following the outline in § XXX-12A.

(4) The qualified professional shall provide an outline of the proposed field work to the Township for review before the field work commences.

§ XXX-8. **(Reserved).**

§ XXX-9. **Test requirements for Drilling Discharge Test**.

A. General requirements. The capability of a residential well to meet the total water requirements of its user can be estimated by a Drilling Discharge Test, a procedure commonly known as "blowing the well." This test shall be conducted under the direction of a qualified professional geologist, a professional engineer or a well driller, licensed under the laws of the Commonwealth of Pennsylvania. The Township reserves the right to witness all Drilling Discharge Tests; the witness will certify the test results to the Township on the appropriate Township Well Testing Report forms. A minimum of two working days advance notice shall be provided to the Township. The well driller may be authorized by the Township to certify the results.

For applications that propose new residential wells, the Drilling Discharge Test is used to select the appropriate rates for the Three Part Step Test. For applications that propose new non-residential wells, the Drilling Discharge Test is used to select the appropriate rate for the Three Part Aquifer Test.

B. Test protocol.

(1) The Drilling Discharge Test may be performed at any time during the drilling operation after the well casing has been installed but preferably after a promising aquifer zone has been penetrated and the desired well depth has been reached. To initiate the test, the drill rotation must be stopped and the flow of any feed water from the drill rig terminated . With the drill bit remaining at the bottom of the well bore, compressed air flow through the drilling pipe is maintained to discharge all the water from the well bore until the overflow has cleared up completely but for at least 20 minutes or to the maximum that conditions allow.

(2) In the meantime, an annular catch basin is formed by mounding the drilling chips around the protruding well casing to collect the entire discharge. A short length of four-inch diameter pipe is imbedded into the wall of this catch basin to form a spout. The well discharge rate is then determined by timing the filling of a container of known volume (typically one gallon for lower well yields and five gallons for high well yields) under the spout with a suitable timer (e.g., a stopwatch). This timing is repeated in intervals of at least two minutes until three consecutive measurements do not differ by more than 10% or by not more than one second, whichever is greater. This flow test may also be performed by other methods such as a calibrated v-notch weir with the prior approval of the Township or the test witness.

(3) It is important to conduct the entire test sequence without interruptions.

(4) The static water level of all wells with a test yield of 10 gpm or more as estimated by the drilling discharge test shall be measured after completion of the drilling operation and the removal of the drilling rig. To allow sufficient time for well recovery, the static water level must be measured no sooner than two hours after removal of water from the well has stopped.

§ XXX-10. **Test requirements for Three Part Step Test**.

A. General requirements.

(1) The capability of a residential well to meet the daily requirements of its user shall be evaluated through a Three Part Step Test. The four rates of the step test are based on the Drilling Discharge Test. The estimated discharge of the Drilling Discharge Test is used as the rate for the third step of the test if the yield of the well is less than 10 gpm. The rates for the Three Part Step Test are at the digression of the driller for yields over 10 gpm. The driller should maximize the top rate of the step test to obtain the specific capacities of the well over a maximum range of flow. This is to maximize the possibility of observing variations with the specific capacity of the well if disruptions to the aquifer occur.

(2) All pump tests shall be conducted under the supervision of a qualified professional geologist, a professional engineer, or a well driller or a pump installer licensed under the laws of the Commonwealth of Pennsylvania, who shall certify the results to the Township if the tests were not witnessed by an agent of the Township. All test results shall be recorded on Township Well Testing Report forms to be issued by the Township.

(3) The Township reserves the right to witness all Three Part Step Tests. A minimum of two working days advance notice shall be provided to the Township, which reserves the right to allot testing dates in case of scheduling problems.

B. General technical requirements.

(1) The Three Part Step Test must be performed in one continuous operation as specified in § XXX-10C, D, and E. The well must be at its static level at the beginning of the test; i.e., the well has to be undisturbed for at least 18 hours before testing. If the test sequence has to be interrupted for technical reasons, the well test must be restarted the following day.

(2) A submersible pump shall be provided that is capable of pumping at least at the Drilling Discharge Test rate, if less than 10 gpm, and can be lowered to a sufficient depth in the well.

(3) Flow rates at the discharge line must be measured with a water flow meter. A valve must also be on the discharge line in order to permit adjustment of the flow rate. A means of verifying meter calibration during the test (e.g., a five gallon pail and a suitable timer), must be available to the witness. If a witness is not available, a calibration must be performed as soon as practical after the start of the test and during each step, and the results shall be made available to the Township.

(4) Water levels must be measured to the nearest inch or tenth of a foot from a fixed point; e.g., from the top of the casing. The equipment used to measure the water levels must have an audible signal and/or a light to register when water is encountered. Installation of a dip tube is recommended to protect the probe from cascading water.

(5) Failure to have the required equipment at the test well may result in cancellation of the test.

C. Background Test.

(1) General requirements.

(a) The Background Test is a standard aquifer test procedure to evaluate if the aquifer is at a steady state prior to the start of the Step Test.

(2) Test protocol.

(a) To perform the Background Test, the well is not used for a period of 16 hours. Water levels are measured at the end of the Drilling Discharge Test or 24 to 16 hours prior start of the Step Rate Test. The following morning (or the morning of the test if the Drilling Discharge and Step test are not on consecutive days) additional static water levels are obtained,

(b) The static water level is measured at 15 minute intervals the morning of the step test.

(c) The Step Test can be started when the water change over ½ hour is less than 0.05 feet.

D. Step Rate Test.

(1) General requirements. The Step Rate Pump Test is used to measure the well yield and to determine the change in specific capacity with variations in the flow rate. The data from the test is used to evaluate future changes in the yield of the well and yield of the aquifer.

(2) Test protocol.

(a) The Step Rate Test is undertaken immediately following the completion of the Background Test.

(b) The Step Rate Test is normally run for a full four (4) hours with rate changes occurring every hour. The four steps could also be conducted for 100 minutes each to make analysis on logarithmic graph paper easier.

(c) The initial rate of the test is selected to be approximately 1/3 of the rate observed in the Drilling Discharge Test. The last step is to slightly exceed the flow measured in the Drilling Discharge Test to stress the yield of the well over the largest possible range for the step test.

(d) The rate is increased every 60 minutes or 100 minutes at equal intervals.

(e) Water levels are recorded as indicated in Table 10-D-2.

Table 10-D-2

Time from start of step	Suggested Reading Intervals
1 to 10 minutes	Every 1 minute
10 to 20 minutes	Every 2 minutes
20 minutes to 1 hour	Every 5 minutes
Flow Rate measurements	Via totalizing flow meter and calibrated timed five gallon test twice per step

E. Well recovery test.

(1) The well recovery test has no minimum requirements; it is for information on the rate of recharge of the well only. However, failure of a well to recover 90% of the drawdown within a twenty-four-hour period raises doubts about the reliability of the well as a long-term water supply for residential use.

(2) Record the final water level from the Constant Rate Pump Test. Turn off the pump and record that time as the "zero time" for the start of the Well Recovery Test. Continue to record water level measurements as suggested in Table 10-E-2.

Table 10-E-2

Time Period of the Well Recovery Test	Suggested Reading Intervals
1 to 10 minutes	Every 1 minute
10 to 20 minutes	Every 2 minutes
20 minutes to 1 hour	Every 5 minutes
1 hour to 3 hours	Every 10 minutes

§ XXX-11. **Non-Residential requirements for Three Part Aquifer test**

A. General Requirements.

(1) The capacity of a proposed non-residential well(s) to meet the average and peak demand requirements of its user shall be evaluated through a Three Part Aquifer test. The aquifer test shall be conducted with a background phase, a constant rate pumping phase and a recovery phase. The pumping rate and total gallons pumped during the pumping phase should demonstrate that the required water is available without adverse impact on adjacent properties, the aquifer and related surface water features. If multiple production wells are required to meet development demands, the aquifer test plan must provide details for either conducting individual well tests for each proposed production well or on conducting the test using multiple production wells.

(2) The average demand shall be based on § XXX-7(D) above. The yield of the well shall be three times the average daily demand, which is designed to simulate peak demand. The pumping capacity for the Pump Test shall be at least 10 times the pumping rate. The volume of water pumped during the test shall be three times the average daily demand. Additional aquifer testing may be required if multiple supply wells are required to meet the demands of the facility

(3) The Township reserves the right to witness all Three Part Aquifer tests. A minimum of two working days advance notice shall be provided to the Township, which reserves the right to allot testing dates in case of scheduling problems.

B. Technical Requirements.

The Three Part Aquifer test must be performed in one continuous operation as specified in § XXX-11C, D, and E. The general outline of the aquifer test procedure includes a background period of water level data collection prior to the start of the Step Rate Test, a constant rate pumping portion of the test, and a final phase of monitoring recovery from the constant rate pumping portion of the test.

(4) For nonresidential development proposals with a total projected water use for the project of less than 4,500 gallons per day a simplified constant rate will be conducted without the requirements for the background test, the aquifer test plan and hydrogeologic report. The constant rate for the test is based on the requested certification volume. This constant rate is continued for a minimum of two hours until the drawdown has stabilized (i.e., the water level has not changed more than the greater of 1 ft. or 3% of the drawdown or at the discretion of the witness between twenty-minute readings). If the drawdown does not stabilize within this minimum time, pumping may be continued at the established rate until the drawdown stabilizes or the pump rate may be reduced to permit stabilization.

(5) The background phase of testing includes three days of monitoring static water levels in the wells immediately prior to the start of the constant rate portion of the test. A minimum of hourly water level measurements is required from each test and monitoring well during the 3-day period. It is recommended that a continuous water level monitor be used to read the readings. The purpose of the background period of the test is to collect data necessary to demonstrate that any antecedent influence can be removed from the Step Rate Test data. Antecedent effects can include rainfall events, barometric pressure changes, pumping influences from other users in the aquifer and long term seasonal water level trends.

(6) The water levels in the aquifer must be stable prior to the start of the constant rate aquifer test as determined by a final round of pretest background water level measurements. The pump and discharge pipe shall be equipped with a calibrated flow meter for all flows under 40 gpm and shall be verified with timed volumetric measurements (for example, the time required to fill a five (5) gallon pail). The discharge must be directed away from the site without infiltrating to the aquifer and affecting water levels in the monitoring wells. Any permits required by Pennsylvania Department of Environmental Protection (PADEP) for the discharge of water must be obtained prior to starting the test.

(7) The flow rate shall be immediately adjusted at the start of the test to the constant rate developed in the approved aquifer test plan. The flow rate may not vary for more than 10 percent throughout the duration of the test or the test may have to be repeated. Short duration pump failures are not allowed, and the test will have to be repeated.

(8) Water-level measurements during the pumping phase of the test will conform to the schedule in Table 11-B-6 below or shall be conducted in conformance with the approved aquifer test plan. The same requirement holds for water level measurements during the recovery portion of the test.

Table 11-B-6

Time Period of the Step Rate Test	Suggested Reading Intervals
1 to 10 minutes	Every 1 minute
10 to 20 minutes	Every 2 minutes
20 minutes to 1 hour	Every 5 minutes
1 hour to end of test	Every 10 minutes

(9) The water levels in the observation wells shall recover to static levels after conclusion of the Step Rate Test within a time period equal to the duration of pumping. If the observation wells do not fully recover, recovery measurements will be extended to 24 hours from the start of recovery.

C. Final Hydrogeologic Report.

(1) A final hydrogeologic report shall be provided with each non-residential site plan application including all data from the Three Part Aquifer test. Data shall be provided on a floppy disk or CD in Microsoft Word and Excel compatible format.

(2) The final hydrogeologic report shall provide calculations of important aquifer characteristics such as transmissivity and storage coefficient. The radius of influence for the test as determined from observation wells shall be provided. The impact on adjacent land owners shall be described. The overall assessment of the aquifer test compared to data developed in the preliminary hydrogeologic report shall be detailed, specifically variations in expected response of the aquifer.

(3) The final hydrogeologic report shall include a detailed evaluation of the water supply demand for the average and peak day of the facility. Evaluation of the long term use of the well on the ability of the aquifer to sustain the water demand as well as an analysis of the overall ability of the aquifer to meet existing demands of adjoining properties shall be detailed. Impact on the overall water budget from the operation of the facility including impacts on surface water bodies shall be provided.

(4) The report shall include an analysis of the potential impacts from subsurface sewerage disposal systems on the groundwater quality. This analysis shall consist of a site plan depicting the well, septic leach field, geologic features observed from the fracture trace analysis, and the radius of influence from the well.

D. Pass/Fail Criteria for non-residential tests

The proposed development well will be deemed to fail if more than five (5) feet of drawdown as observed in wells on adjoining properties during testing or is projected at any existing property boundary at the rate and duration equal to the peak daily demand over a 24-hour period. The applicant shall either decrease the average daily demand or the applicant's hydrogeologist must provide adequate justification to the Township that water use at average and peak daily demand will not adversely impact water resources and existing wells on affected properties.

§ XXX-12. **Well interference tests.**

A. Proposed new wells in proximity to existing producing wells.

(1) Whenever a proposed new residential water well within the Township is to be subjected to the Three Part Step Test, up to three producing wells existing within the maximum distance specified in Table 12-A-1 from the new well may be used as observation wells to determine well interference. If more than three wells qualify as observation wells, the Township will give preference to the nearest wells and to those located symmetrically around the test well or along known geologic structures.

Table 12-A-1

Size of Lot with New Well (acres)	Maximum Distance of Observation Wells from New Well* (feet)
Less than 3.0	300
3.0 to 10	500
More than 10	1,000

*There is no maximum distance when testing wells of a multiple well system intended to serve a single user; all those wells shall serve as observation wells in turn.

(2) Whenever a new non-residential water well within the Township is to be subjected to the Three Part Aquifer test, rates greater than 4,499 gallons per day, the maximum number of existing producing wells that may be used as observation wells for interference testing are specified in Table 12-A-2. The Township will give preference to the nearest wells and to those located along known geologic structures as determined by the fracture trace analysis.

Table 12-A-2

Average Demand (gallons per day)	Maximum Distance of Observation Wells from New Well (feet)	Maximum Number of Observation Wells
4,500 to 14,999	1,000	3
15,000 to 50,000	2,000	4
50,000 to 100,000	3,000	5
Over 100,000	As determined with PADEP or Applicable River Basin Commission	As determined with PADEP or Applicable River Basin Commission

(3) The applicant shall notify owners of real property within the maximum distance found in

Table 12-A-1 and 12-A-2 from the proposed new residential and non-residential wells, respectively, of the impending well test by certified mail on the forms available from the Township. Any owner of a producing well within the maximum distance from the proposed new well shall have one week from the date of the receipt of the certified letter to request monitoring of such producing well as an observation well at the applicant's expense. Locating and accessing the well shall be at the observation well owner's risk and expense. The owner of the observation well shall sign a release holding the well tester harmless for any inconvenience resulting from the monitoring of the well.

(4) To qualify as an observation well, at least three hours before the beginning of the test sequence, the owner shall not use the well water or shall agree to have the pump of the well electronically disconnected, to permit stabilization of the static water level. Appropriate measures must be taken to assure the agent of the Township of the disabling of the pumps in all observation wells throughout the pump tests.

(5) The water levels in the observation wells for residential well tests shall be monitored before the Peak Demand Test until the completion of the constant rate pump test of the new well at intervals of preferably not more than one hour. The water levels in the observation wells for non-residential well tests shall be monitored beginning at the conclusion of the background well test, for a minimum of two times at 30 minute intervals prior to the start of the Step Rate Test. The water level in the observation well shall not change more than 0.0.5 feet between consecutive measurements or the start of the Step Rate Test shall be delayed.

(6) If the drawdown in any properly monitored observation well during the pump tests of the new residential well exceeds the greater of five feet or of 10% of the maximum drawdown of the new well during the pump tests, significant well interference is likely, and the new well cannot be certified for use, as such.

(7) In such instances, the Township may require the applicant to show why the documented well interference is not significant. If a significant adverse impact of interference cannot be remedied, the Township may deny certification of the new well.

B. Multiple new wells.

(1) Interference testing as described in § XXX-12A(1) above shall be performed between new wells of a proposed subdivision of two or more lots. Wells located within the maximum distance of Table 12-A from a test well shall be tested in accordance with § XXX-12A(1).

(2) If the drawdown in any observation well during these residential pump tests exceeds the greater of five feet or 10% of the maximum drawdown of the test well during the pump tests, the well spacing is considered inadequate, and either the test well or the observation well showing excessive drawdown must not be certified, unless the applicant can show that the documented interference is not significant.

C. Multiple well water supply systems.

(1) If the use of more than one well for provision of the water supply for a residence is proposed, (e.g., for reasons of insufficient yield of individual wells according to § XXX-10(A) of this chapter), interference testing between all wells proposed for the system is mandatory.

§ XXX-12. **Retest procedures**.

A licensed well driller or a professional licensed engineer or pump installer must be present during retest; the entire procedure must be undertaken, even if only one section of the original test has failed.

§ XXX-14. **Violations and penalties.**

Any person or persons, firm or corporation violating any of the provisions of or any order promulgated under this chapter shall, upon conviction thereof, pay a penalty of not more than $500, nor less than $50 for each violation. Each day a particular violation continues may constitute a separate offense.

§ XXX-15. **Severability**

If any provision of this ordinance or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications, and to this end, the provisions of the ordinance are declared to be severable.

§ XXX-16. **Effective Date**

All provisions of this Ordinance shall be in full force and effect five (5) days after the approval and adoption.

ENACTED AND ORDAINED this __the day of _____, 2015.

ATTEST:

PUREWATER TOWNSHIP
BOARD OF SUPERVISORS
By:

_____ , Secretary

_____ , Chair