

**TOWNSHIP OF HOPEWELL
MERCER COUNTY, NEW JERSEY**

ORDINANCE NO. 03-1298

**AN ORDINANCE AMENDING AND SUPPLEMENTING
CHAPTER X, ENTITLED "FEES AND PERMITS," AND
CHAPTER XVII, ENTITLED "LAND USE AND DEVELOPMENT,"
OF THE REVISED GENERAL ORDINANCES OF THE
TOWNSHIP OF HOPEWELL IN ORDER TO PROVIDE
REGULATIONS FOR WATER SUPPLY ANALYSIS AND TESTING**

BE IT ORDAINED, by the Township Committee of the Township of Hopewell, County of Mercer and State of New Jersey, as follows:

Section 1

Section 10-7.1 entitled "Application Fees and Escrow For Review," of ARTICLE CHAPTER X entitled "FEES AND PERMITS" of the Revised General Ordinances of the Township of Hopewell, is hereby amended and supplemented by adding a new paragraph h. as follows:

- h. Aquifer test and analysis.
 - 1. Review of design of aquifer test
 - (a) Residential subdivisions and site plans. \$1,000 for the first lot or dwelling unit and \$100 for each proposed additional lot or dwelling unit. These fees do not apply to existing dwelling units.
 - (b) Non-residential site plans. \$1,000 for the first 1,000 gallons of average daily demand and \$100 for each additional 1,000 gallons of average daily demand.
 - 2. Hydrogeologic report review.
 - (a) Residential subdivisions and site plans. \$2,000 for the first lot or dwelling unit and \$200 for each additional proposed lot or dwelling unit. These fees do not apply to existing dwelling units.
 - (b) Non-residential site plans. \$2,000 for the first 1,000 gallons of average daily demand and \$200 for each additional 1,000 gallons of average daily demand.

Section 2

Section 17-69 entitled "Application Forms; Plat Details " of ARTICLE V entitled "SUBDIVISION AND SITE PLAN REQUIREMENTS, PLAT DETAILS" of Chapter XVII entitled "Land Use and Development" of the Revised General Ordinances of the Township of Hopewell, is hereby repealed and replaced as follows:

The applicant shall complete the appropriate application forms and the checklists for completeness set forth in Appendix A. In addition, applicant shall submit all

materials required by the rules and regulations of the approving authority. In the event that the applicant requests waivers from the submission requirements, applicant shall complete the checklist to advise of the submission waivers requested and shall comply with the rules and regulations of the approving authority and the instructions in Appendix A with regard to such submission waivers.

Section 3

Section 17-69.1 entitled "Application Forms and Other Documents" of ARTICLE V entitled "SUBDIVISION AND SITE PLAN REQUIREMENTS, PLAT DETAILS" of Chapter XVII entitled "Land Use and Development" of the Revised General Ordinances of the Township of Hopewell, is hereby amended and supplemented by adding a new paragraph s as follows:

- s. Residential subdivision applications and all site plan applications shall submit information required to satisfy Section 16-6 entitled "WELLS, WELL TESTS, AND WATER SUPPLIES" of CHAPTER XVI entitled "HEALTH" and Section 17-149 entitled "Water Supply and Analysis Requirements".

Section 4

Section 17-69.2 entitled "Data For All Plats" of ARTICLE V entitled "SUBDIVISION AND SITE PLAN REQUIREMENTS, PLAT DETAILS" of Chapter XVII entitled "Land Use and Development" of the Revised General Ordinances of the Township of Hopewell, is hereby amended and supplemented by adding a new paragraph q as follows:

- q. Applications subject to the water supply analysis requirements of Section 17-149 shall submit the information required in Appendix A regarding Water Supply and Analysis Requirements and the information required by Chapter XVI.

Section 5

Section 17-149 entitled " Water Supply and Analysis Requirements " is added to ARTICLE VIII entitled "ZONING-GENERAL PROVISIONS," of Chapter XVII entitled "Land Use and Development" of the Revised General Ordinances of the Township of Hopewell, as follows:

17-149 WATER SUPPLY AND ANALYSIS REQUIREMENTS

A. *Purpose and Intent.* The purpose and intent of this Section is to ensure that residential development of two new lots or more and all site plan applications demonstrate that adequate water supply is available without adverse effect on neighboring wells and other resources including but not limited to wetlands and streams.

B. *Applicability.*

1. The provisions of this ordinance are applicable to all residential subdivision applications of two new lots or more and all site plan applications. These applications must also satisfy the requirements of Chapter XVI, Section 16-6.

2. Residential subdivisions of one new lot and wells installed for non-essential use must satisfy the requirements of Chapter XVI, Section 16-6 of the Hopewell Township Code. A tract of land exempt from these provisions because it creates

only one new lot shall be entitled to this exemption only once. Uses defined as nonessential and wells defined as nonessential wells are required to satisfy the testing and analysis requirements of Chapter XVI, Section 16-6.

3. In the event that the municipal agency waives the requirements of this Section, then the provisions of Chapter 16 are applicable.

C. *Prohibition.* Based on the limited groundwater resources within Hopewell Township as outlined in M² Associates March 2, 2001 report entitled “Evaluation of Groundwater Resources of Hopewell Township, Mercer County, New Jersey”, no wells shall be permitted to be connected to a permanent irrigation system except if that system is used entirely for commercial agricultural purposes. In addition, no wells can be used for the filling of swimming pools.

D. *Definitions.*

Abandoned well- Any well which is not in use, has been illegally installed or improperly constructed, has been improperly maintained or is damaged, has not been maintained in a condition that ensures that the subsurface or percolation water of the State are protected from contamination, has been replaced by another well or connection to a public supply, is contaminated, is nonproductive, or no longer serves its intended use pursuant to the State Act.

Abandonment or decommissioning of a well-The permanent closure or sealing of a well in accordance with N.J.A.C. 7:9D-3 et seq.

Alter- To enlarge, deepen or replace any portion of an existing water supply system. The terms "alteration" and "altered" shall be construed accordingly.

Aquiclude – A low-permeability unit that forms either the upper or lower boundary of a groundwater flow system.

Aquifer – Rock or sediment in a formation, group of formations, or part of a formation which is saturated and sufficiently permeable to transmit economic quantities of water to wells and springs.

Aquifer, confined – An aquifer that is overlain by a confining bed. The confining bed has a significantly lower hydraulic conductivity than the aquifer.

Aquifer, perched – A region in the unsaturated zone where the soil may be locally saturated because it overlies a low-permeability unit.

Aquifer, semi-confined – An aquifer confined by a low-permeability layer that permits water to slowly migrate through to the aquifer. Also termed leaky artesian or leaky confined aquifer.

Aquifer, unconfined – An aquifer in which there are no confining beds between the zone of saturation and the ground surface. Water-table aquifer is a synonym.

Aquifer Test – A three-part test conducted to obtain background, pumping, and recovery data from a pumping well and observation wells in order to determine aquifer characteristics and assess potential well interference.

Aquitard – A low-permeability unit that can store groundwater and also transmit water

slowly from one aquifer to another.

Applicant- A developer or property owner submitting an application for development or permit to install or use a well.

Application for development- The application form and all accompanying documents required by ordinance for approval of a subdivision plat, site plan, planned development, conditional use, zoning variance, or direction of the issuance of a permit pursuant to N.J.S.A. 40:55D-34 or N.J.S.A. 40:55D-36.

Application for well permit- The application form and all accompanying documentation required by the Township for approval to locate, construct or alter a water supply in accordance with subsection 16-6.5 of Chapter 16 and as authorized by N.J.A.C. 7:10-12.40.

Barrier Boundary – An aquifer-system boundary represented by a rock mass that is not a source of water.

Building lot- A designated parcel, tract or area of land established by plat or otherwise permitted by law, to be used, developed or built upon as a unit and for which the water supply is obtained from a private on-site well.

Community water supply system-A source and distribution system for potable water subject to the requirements of N.J.S.A. 58:12A-1.1 et seq. and N.J.A.C. 7:10-1.1 et seq.

Cone of Depression – The area around a pumping well in which the head in the aquifer has been lowered.

Confining bed – A body of material of low hydraulic conductivity that is stratigraphically adjacent to one or more aquifers.

Developer- The legal or beneficial owner or owners of a lot or of any land proposed to be included in a proposed development including the holder of an option or contract to purchase, or other person having an enforceable proprietary interest in such land.

Drawdown – The lowering of the water table of an unconfined aquifer or the potentiometric surface of a confined aquifer caused by pumping of groundwater from wells. Drawdown is determined by subtracting the depth to water from the static water level determined prior to the start of pumping.

Fracture Trace – The surface representation of a fracture zone.

Groundwater – Water in the saturated zone that is under a pressure equal to or greater than atmospheric pressure.

Groundwater Mining – The practice of withdrawing groundwater at rates in excess of natural recharge.

Head – The height above a datum plane of a column of water. In a groundwater system, it is composed of elevation head and pressure head.

Hydraulic Conductivity – The capacity of a rock to transmit water. It is expressed as the volume of water at the prevailing density and viscosity that will move in unit time under a unit hydraulic gradient through a unit area measured at right angle to the direction of flow.

Hydraulic Gradient – Change in head per unit of distance measured in the direction of the steepest change.

Hydrogeology – The study of the interrelationships of geologic materials and process with water, especially groundwater.

Infiltration – The flow of water downward from the land surface into and through the upper soil layers.

Interflow – The lateral movement of water in the unsaturated zone during and immediately after a precipitation event. Water moving as interflow discharges directly into a surface-water body.

Irrigation System- Equipment including but not limited to pumps, piping, and sprinkler heads used to distribute water to grasses, landscape materials, and other vegetation.

Local Enforcement Officer- The Township health officer or other technical representative of the Township as may be designated by the Hopewell Township Board of Health.

Local agency- The Board of Health, which is the municipal agency responsible for review and approval of an application for well operation.

NJDEP- The New Jersey Department of Environmental Protection.

Observation Well – A non-pumping well used to observe the elevation of the water table or the potentiometric surface. An observation well is generally constructed similar to a pumping well. Also known as monitoring well.

Porosity – The voids or openings in a rock. Porosity may be expressed quantitatively as the ratio of the volume of openings in a rock to the total volume of the rock.

Porosity, primary – The porosity that represents the original pore openings when a rock or sediment formed.

Porosity, secondary – The porosity that has been caused by fractures or weathering in a rock or sediment after it has been formed.

Pumping Test – A test made by pumping a well for a period of time and observing the change in hydraulic head in the aquifer.

Pumping Test, constant rate – A pumping test during which the discharge rate from the pumping well is maintained at a constant rate for the duration of the test.

Recharge Area – An area in which there are downward components of head in an aquifer. Infiltration moves downward to deeper parts of an aquifer in a recharge area.

Recharge Boundary – An aquifer system boundary that adds water to the aquifer such as a stream or lake.

Recharge, aquifer – The volume of water that infiltrates to an aquifer.

Recharge, groundwater- The volume of water that infiltrates to a saturated zone.

Recovery – The rate at which the water level in a well rises after the pump has been shut off. Recovery is the inverse of drawdown.

Specific Capacity – An expression of the productivity of a well, obtained by dividing the pumping rate by the drawdown level. Should be described on the basis of the number of hours pumping prior to measurement of drawdown. Value will generally decrease with increased time of pumping.

Saturated Zone – The zone in which the voids in the rock or soil are filled with water at a pressure greater than atmospheric. The water table is the top of the saturated zone in an

unconfined aquifer.

Static Water Level – The depth to water in the well prior to the commencement of pumping.

Storage Coefficient – The volume of water an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in head. It equals the product of specific storage and aquifer thickness. Also known as storativity.

Transmissivity – The rate at which water of a prevailing density and viscosity is transmitted through a unit width of an aquifer or confining bed under a unit hydraulic gradient.

Transmissivity equals hydraulic conductivity times aquifer thickness.

Unsaturated Zone – The zone between ground surface and the water table. Pore spaces in the unsaturated zone contains water at pressures less than atmospheric.

Water Table – The surface in an unconfined aquifer or confining bed at which the pore water pressure is atmospheric.

Well Interference – The result of two or more pumping wells, the drawdown cones of which intercept. At a given location, the total well interference is the sum of the drawdowns due to each individual well.

E. *Aquifer Test and Analysis*

1. The testing procedures for a subdivision of two or more new lots and all site plans shall be based on a hydrogeologic analysis and a minimum of one aquifer test. The hydrogeologic analysis shall include the review of available information including but not limited to published maps and reports depicting Hopewell Township and surrounding municipalities, stereo pairs of aerial photographs, New Jersey Geological Survey (NJGS) Geology of the Groundwater Resources of Mercer County Geologic Report Series No. 7 and the M² Associates report entitled “Evaluation of Groundwater Resources of Hopewell Township, Mercer County, New Jersey”. In addition, the hydrogeologic analysis will include the design, execution and analysis of aquifer test(s). The data collection shall be designed and evaluated by a qualified hydrogeologist. A geologic and hydrogeologic report containing appropriate maps, well logs, aquifer test data and observation well data and complying with the requirements of Section 17-149 of this Article shall be prepared and submitted. Prior to conducting any aquifer test, a preliminary hydrogeologic evaluation and the design of the aquifer test(s) shall be submitted for review and approval by the Township Planning Board or Board of Adjustment herein after referred to as Board.

2. The aquifer test shall consist of at least one constant-rate pumping test conducted at a sufficient rate and duration to be able to determine aquifer characteristics such as transmissivity and storage coefficient. As part of the aquifer test, observation wells are to be monitored to determine and evaluate the cone of depression and aquifer parameters, and predict the effect of long term pumping on existing and future wells.

F. *Aquifer Test and Analysis Submission Requirements*

1. Submission Requirements

- a. Aquifer Test Plan
 - b. Property Owner Notification
 - c. Hydrogeologic Report
2. Aquifer Test Plan
- a. Prior to conducting an aquifer test, the applicant shall submit the design of such aquifer test and qualifications of the persons and firm who will be performing the test, to the Board.
 - b. The design of the aquifer test shall be developed using the applicable guidance from "Guidelines for Preparing Hydrogeologic Reports for Water Allocation Permit Application with an Appendix on Aquifer - Test analysis Procedures" NJGS GSR 29 (1992 or most recent edition) or successor document.
 - c. The aquifer test will be conducted in three phases: the background phase, the pumping phase, and the recovery phase.
 - (1). The first phase will involve the collection of background water levels prior to the start of the test. The second phase will involve the pumping of water from the well and the monitoring of water-level drawdown in the observation and pumping wells. The third phase will involve the recovery of water levels in the observation and pumping wells after the pump has been shut down. This third phase of the test should be, at a minimum, the same length as the pumping phase.
 - (2). The aquifer test (all three phases) shall not be conducted during a precipitation event or events in which total precipitation exceeds or equals 0.5 inches. Precipitation must be recorded with a National Weather Service acceptable rain gauge on site during all phases of testing and measurements for each day must be included in the hydrogeologic report. If precipitation occurs during the test, the applicant should provide precipitation amounts and sufficient data to show that the precipitation did not recharge the aquifer during the test and adversely impact the testing results. If precipitation amounts exceeding 0.5-inches are recorded, the test must be repeated.
 - (3). The pump must be installed in the pumping well at least 48 hours prior to the start of the background phase.
 - (4). Prior to starting the background phase, water levels in the test well and observation wells must be permitted to stabilize for a minimum of three days after all drilling activities are complete.
 - (5). During the background phase, water levels should be collected at a minimum once per hour for the 24 period prior to the start of pumping. It is the applicant's responsibility to collect sufficient data to determine background conditions and to ensure that

antecedent influences can be fully characterized. Barometer measurements and additional water-level measurements can be made by the applicant to evaluate the change in water levels resulting from barometric pressure changes and/or influences from off-site pumping.

(6). On the day of the pumping phase, water levels shall be collected from all wells to determine static water levels prior to the start of pumping. Water levels in wells on neighboring properties should be allowed to stabilize at or near static water level prior to the start of pumping. For any observation well which has been pumped within the 24 hours preceding the test, two depth to water measurements at least 1 hour apart shall be collected to show that the well has fully recovered prior to the start of pumping.

(7). When the pump is started the flow rate shall be adjusted immediately to a uniform pumping rate as required for a constant-rate test and in accordance with the approved aquifer test plan. The flow rate shall not vary more than 10 percent throughout the test. If the flow rate fluctuates more than 10 percent, the test may be deemed invalid and the applicant required to repeat the notification and testing process.

(8). Water-level measurements during the pumping phase of the test shall be collected in accordance with Table 1. This same schedule shall be followed for the recovery phase of testing upon shut down of the pump in the test well.

Table 1: Minimum Frequency of Water-Level Measurements in Wells During Pumping and Recovery Phases of Aquifer Test

Time Since Pumping Began or Stopped	Test Well	Observation Wells
0 to 5 minutes	0.5 minutes	0.5 minutes
5 to 10 minutes	1 minute	1 minute
10 to 30 minutes	2 minutes	2 minutes
30 to 60 minutes	5 minutes	5 minutes
60 to 120 minutes	10 minutes	10 minutes
2 to 24 hours	30 minutes	30 minutes

d. *Rate and Duration* - The rate and duration of the aquifer test will depend upon the size of the proposed development and expected average and peak daily demands for water.

(1). The average daily and average yearly water demand for human consumption within the subdivision or site plan must be determined according to the guidelines in N.J.A.C. 7:10-12.6. Demand calculations must include irrigation systems if proposed and water usage for filling of swimming pools and all other demands. Demand is to be determined based on N.J.A.C. 7:10-12.6. The peak-day demand is twice the average daily demand. For non-residential developments, peak-day demand must include seasonal factors.

(2). The pumping phase will be equal to the greater time duration of the following: i) the volume of water removed from the aquifer is equal to the peak-day demand; or ii) 8 hours.

(3). The pumping phase must simulate peak-day demand and therefore, the pumping phase duration is not to extend more than 24 hours. The minimum pumping rate is calculated by dividing the peak-day demand by 1440 minutes per 24-hour period.

(4). If the demand exceeds 100,000 gallons per day, a New Jersey Water Allocation Permit must be obtained from the New Jersey Department of Environmental Protection.

(5). For mixed developments containing both residential and nonresidential properties, each portion will be tested separately. Wells installed for the residential portion must be used as observation wells for the nonresidential testing and wells installed for nonresidential use must be used as observation wells for the residential testing.

(6). The pumping rate will be determined by equipping the discharge pipe with an orifice/manometer apparatus and calibrated flow meter to instantaneously measure flow rate and determine total volume pumped from the well.

(7). The discharge shall be directed so that it leaves the site without infiltrating to the aquifer. Any and all permits required by the NJDEP for the discharge of water must be obtained prior to starting the test.

e. *Location*. The aquifer test shall be conducted at a location most representative of site geologic conditions.

(1). For residential subdivisions and site plans, biasing of testing toward areas of increased fracture density may result in the Township requiring additional testing in areas of lower fracture density to ensure that adequate yield is available throughout the proposed subdivision.

(2). If the proposed site is underlain by two or more geologic formations, then an aquifer test will be required for each portion of the site underlain by

each formation. The test requirements for each formation will depend on the number of lots and size of units per formation.

(3). In the event that the preliminary hydrogeologic evaluation indicates that a surface-water and/or groundwater divide separates the subdivision, an aquifer test will be required for each side of the divide.

f. *Observation Wells*

(1). The number of observation wells required per aquifer test will depend on the number of dwelling units and/or commercial units. New and existing observation wells may be located such that they can be used as future water-supply wells but they shall be located in such a manner that will yield the most accurate information concerning the aquifer.

(2). Observation wells should be completed to similar depths as the pumping well.

(3). Observation wells must be located parallel and perpendicular to strike of the primary regional fractures and those intersected by the tested well. Additional observation wells should be located to evaluate potential secondary fractures and impacts to adjacent properties.

(4). A fracture trace analysis showing the location and orientation of fractures beneath the site must be included with the aquifer test plan. This same analysis with additional information regarding septic system locations must be included in the hydrogeologic report. This fracture trace analysis must be used to identify all observation wells on the site and should be used to identify neighboring property owner wells to be monitored during the test.

(5). All wells must be located in accordance with the minimum distances required by N.J.A.C. 7:10-12.12.

(6). One observation well should be located within 200 feet but no more than 500 feet of the pumping well. If required, a second observation well must be within 1,000 feet of the pumping well.

(7). For non-residential developments with an expected average daily demand less than 800 gallons per day, one observation well is required. For residential subdivisions of two lots, on which one new single-family residence will be constructed, one observation well is required.

(8). For residential developments of two new residential units or more, the number of observation wells shall be as shown in Table 2.

Table 2. Number of Observation Wells Required for Residential Subdivisions/Site Plans

No. of Proposed New Units	No. of Observation Wells
2 to 5	3 (minimum of 1 new well within proposed development)

6 to 25	3 (minimum of 2 new wells within proposed development)
26 to 49	6 (minimum of 4 new wells within proposed development)
50 or more	Test proposal submitted to Board and NJDEP for review and approval

(9). For non-residential developments with anticipated daily demands exceeding 800 gallons per day, the number of observation wells shall be as shown in Table 3:

Table 3. Aquifer Test Requirements for Nonresidential Developments

Average Demand (gallons per day)	No. of Observation Wells
800 to 1,999	3 (minimum of 1 new well within proposed development)
2,000 to 9,999	3 (minimum of 2 new wells within proposed development)
10,000 to 99,999	6 (minimum of 2 new wells within proposed development)
100,000 or more	Obtain NJDEP Water Allocation Permit

(10). The observation wells and pumping well must have a geologic log describing the depth and types of soils and rocks encountered and the depth and yields of all water-bearing fracture zones. Furthermore, the logs must include static water-level measurements and total yield estimates for each well.

g. Water Quality Evaluation

- (1). Groundwater samples must be collected during the pumping phase from the pumping well.
- (2). The samples must be collected in accordance with the NJDEP Field Procedures Manual.
- (3). At a minimum, the samples shall be analyzed by a NJDEP-certified laboratory for hardness, Gross Alpha Particle Activity, arsenic, iron, manganese, copper, lead, nitrate, and total and fecal coliform bacteria. The samples shall also be analyzed for volatile organic compounds for which the USEPA or NJDEP has determined maximum contaminant levels using USEPA Method 524.2.
- (4). Field measurements of pH, conductivity, and total dissolved solids shall be made with calibrated instruments.
- (5). If site conditions indicate potential historic use of pollutants such as,

heavy metals, pesticides, herbicides, or other volatile or semi-volatile organic compounds at or near the site, these analyses must be conducted.

(6). Based on past historical operations at the site or at nearby properties, the Board, at its discretion, may require additional analyses of groundwater to assess potential future and current impacts.

(7). The results of the water sample analyses will be used to assess background water quality.

h. *Property Owner Notification*

(1). Notice

(a). Owners of existing wells on lots located within 500 feet of the subdivision/site plan boundary shall be given an opportunity to have their wells monitored during the aquifer test.

(b). Such opportunity shall be given by the applicant by notice via certified mail and shall give the time and place of the aquifer test.

(c). A notice acceptable to Hopewell Township is included in Appendix A. This notice may be modified with approval of the Township attorney and the local enforcement officer. If the application is pending before a board, the board with jurisdiction must also approve the change.

(d). The notice shall indicate that such existing well may be monitored if agreed to by the well owner provided the well is readily accessible. Such notice shall indicate that the existing well owner must respond within seven (7) days and the applicant's responsibility is to monitor up to three (3) wells on properties within 500 feet of the subdivision boundaries.

(e). The applicant shall provide a certificate of insurance for itself and all contractors utilized and pay all costs associated with the monitoring of any existing residential well.

(f). Prior to monitoring, all buried wells must be raised to a minimum of twelve inches above grade to allow access and retrofitted with pitless well adapters etc. per N.J.A.C. 7:10-12.20 well head requirements.

(g). All wells shall be chlorinated each time they are opened for service or monitoring, unless the owner specifically waives the requirement of chlorination in writing. Bottled water shall be provided to the homeowners during the monitoring period and while the chlorine is detected above the acceptable limits of chlorination in the public water standards.

(h). The costs of extending, restoring or replacing a well damaged as a result of testing shall be the responsibility of the applicant.

(i). The applicant shall indemnify and hold the Township and its

consultants and representatives harmless from any liability in connection with these testing requirements.

(2). Response

(a). If the owner of the lot within 500 feet of the subdivision boundaries decides to participate by agreeing to have their existing well monitored, they shall notify the applicant by certified mail.

(b). Such response shall be provided within 7 days of receipt of the certified notice from the applicant.

(c). If the applicant receives no response within the time provided, the response shall be deemed to be negative.

i. *Protection of monitored wells.* All reasonable efforts must be made to protect the potability of water from the monitored well.

j. *Selection of Wells for Monitoring*

(1). In the case when more than three property owners within 500 feet of the subdivision boundaries decide to participate and to have their existing wells monitored, only three must be monitored.

(2). However, if any of the property owners requesting monitoring have wells completed to a depth less than 100 feet, these wells must also be monitored in addition to the three other wells.

(3). A map depicting the location of all wells to be monitored and a list of all property owners within 500 feet of the subdivision boundary that requested monitoring is to be submitted to the Board for review and approval prior to implementing the test.

(4). The observation wells on neighboring properties should be selected to assess if the cone of depression from the pumping well will extend beyond the subdivision boundary in any direction.

(5). The Board reserves the right to retain a professional hydrogeologist to review the proposed monitoring locations and to make recommendations to revise the locations to be monitored.

k. *Hydrogeologic Report*

(1). A hydrogeologic report must be submitted with each application for subdivision of two or more lots and all site plans.

(2). The report shall document the design and implementation of the aquifer test.

(3). The report shall include all water-level data collected during the three phases of testing.

(4). The report must include calculations of aquifer characteristics such as transmissivity and storage coefficient, calculations of the cone of influence, potential impacts to adjacent well owners, and the long-term sustained yield for the wells.

(5). All water-level measurements obtained during the aquifer test shall

be included with the report in electronic format acceptable to the Township.

(6). The report shall include a detailed hydrogeologic description of the aquifers encountered beneath the site and adjacent properties.

(7). The report must include a detailed evaluation of the water-supply demand for an average and peak day, and this demand should be supported with information on anticipated population, expected unit density, and size of units.

(8). An inventory of all wells within 1000 feet of the proposed subdivision/site plan boundaries should be appended. This inventory should be submitted in electronic format acceptable to the Township.

(9). Figures depicting site geology, topography, water-level elevations, groundwater flow, and development plans shall be included.

(10). In addition, all water-quality sampling data shall be tabulated and summarized in the report. Only one copy of the laboratory reports is necessary for filing with the Township.

(11). The report should include a detailed evaluation of potential impacts from subsurface sewage disposal systems on groundwater quality. A site plan depicting well, septic leach field, and fracture trace locations at a minimum scale of 1-inch equals 200 feet should be included. For any and all locations where a fracture or set of fractures intersects one or more wells and/or septic leach fields, a detailed assessment of treatment technologies should be included. The treatment technologies should provide adequate assurances that any and all groundwater pumped from the wells will satisfy Federal and New Jersey Drinking Water Standards and will not be adversely impacted by the septic leach field discharges.

(12). The hydrogeologic report shall be prepared and signed by a qualified hydrogeologist using applicable sections of GSR 29 or successor document as a guide. A Qualified Hydrogeologist shall be an individual who has received a minimum of a bachelor's degree in Geology at an accredited institution or has completed an equivalent of thirty (30) semester hours of geological education while obtaining a Bachelor's or Master's degree in a related field of engineering or science at an accredited institution. Such a person must also demonstrate five years of professional work experience in the practice of applying geologic principals to interpretation of groundwater conditions. The individual shall provide a resume or curriculum vitae to document education and experience requirements.

(13). The hydrogeologic report shall include the name and license number of the well driller and pump installer. The report shall include the names of the persons and firm responsible for collecting the water-level measurements. In addition, the report shall include copies of the completed NJDEP Well Records.

1. Evaluation of Results

(1). Precipitation - A test conducted during a period in which 0.5 inches or more of precipitation are recorded at or near the site must be repeated.

(2). Background Phase-Antecedent influences must be determined, and, if necessary, pumping phase and recovery phase data must be corrected. Insufficient data to assess these influences will require repetition of all three phases of the aquifer test.

(3). Pumping Phase

(a) If the pumping rate does not exceed the average daily demand by 120 percent or the peak-day demand cannot be pumped within a 24-hour period, the aquifer beneath the site will be deemed insufficient to meet the proposed demands and the applicant must reduce site demands and development units.

(b) If the pumping rate varies by more than 10 percent of the average flow rate, the entire test shall be repeated.

(c) If the pump shuts down during the pumping phase, the entire test must be repeated.

(d) If water levels in the pumping and/or observation wells exceed the measurement capacity of the devices used for measuring changes in water levels and measurements are not recorded with other devices in accordance with the schedule listed in Table 1, the test must be repeated.

(e) If the pumping data indicate a change in aquifer transmissivity as a result of fracture dewatering, all analyses of the potential radius of influence and impacts to neighbors, streams, and wetlands must be conducted using the lowered aquifer transmissivity. If this lowered transmissivity indicates that the anticipated demand cannot be supported by the aquifer beneath the site, the applicant must reduce the site demand and development units.

(4). Recovery Phase

(a) For purposes of evaluating water-level recovery, the recovery phase duration will be equal to the pumping phase duration. For example, if the pumping phase is 8 hours in duration, water levels 8 hours after the pump has been turned off will be compared to the pre-pumping static water level to assess recovery rates and residual drawdown.

(b) If residual drawdown in the pumping well or any observation wells exceeds 10 percent but is less than 20 percent of the total drawdown at the end of the recovery phase, the applicant must show through standard/recognized aquifer test analytical procedures and calculations that the well or wells are capable of full recovery. If full recovery cannot be shown or groundwater mining/dewatering has occurred, the applicant must reduce site demands and development units.

(c) If residual drawdown in the pumping well or any observation well exceeds 20 percent of the total drawdown at the end of the recovery phase, the aquifer will be deemed insufficient to meet the proposed site demands and the applicant must reduce site demands and development units.

(5). Neighboring Wells

(a) If the drawdown is measured or projected to be more than 1 foot at any existing adjacent property well or along the subdivision boundary, the applicant's hydrogeologist must evaluate long-term potential impacts to adjacent properties based on the actual condition of wells in that zone or along that portion of the subdivision/site plan boundary.

(b) If a drawdown of 5 feet or more is noted in any existing adjacent property well, or is projected at any property boundary, then the aquifer will be deemed to have insufficient transmissivity to support the proposed subdivision/site plan. The applicant must reduce demand and development units to ensure that drawdown will not exceed 5 feet at any site boundaries.

(6). Impacts to Streams and Wetlands

If drawdown is measured or projected to induce leakage from streams or wetlands such that baseflow in these streams will be reduced or wetlands partially or entirely dewatered, then the demand and development units must be reduced to prevent adverse impacts to streamflow and wetlands.

(7). Additional Testing

Any test that must be repeated, restarted, or reconducted at a reduced demand, must satisfy all the requirements of this ordinance including but not limited to re-notification of all property owners within 500 feet and resubmission of an aquifer test plan for Board approval prior to implementation of the test.

Section 6

Appendix A entitled "Checklists" of CHAPTER XVII entitled "LAND USE AND DEVELOPMENT" of the Revised General Ordinances of the Township of Hopewell, is hereby amended and supplemented as follows to add a new checklist entitled "Aquifer Test and Analysis".

INSTRUCTIONS:

1. *Applicability*

This checklist shall be completed by all applicants for residential subdivision applications of two new lots or more and all site plan applications and shall be completed with the application review package.

2. *Submission Waiver*

If an applicant can show that, given the expected average daily demand and distance to other nearby wells and other resources, such as, but not limited to, wetlands and streams,

the subdivision will not induce drawdown in any existing or future wells or other resources adjacent to the subdivision boundaries or any existing or future wells or other resources within the subdivision, then the applicant can request a waiver from the Planning Board or Board of Adjustment for all or some of the requirements of this ordinance.

3. *Other Requirements*

The instructions pertaining to the type of application, i.e. minor subdivision, major subdivision or site plan, shall be incorporated herein by reference.

NOTE: Checklist requirements are to be finalized after review of the ordinance by the planning board.

Section 7

If the provision of any article, section, subsection, paragraph, subdivision, or clause of this Chapter shall be judged invalid by any Court of competent jurisdiction, such Order or Judgment shall not effect or invalidate the remainder of any such article, section, subsection, paragraph or clause, and, to this end, the provisions of this Ordinance are hereby declared to be severable.

Section 8

All other provisions of the said ordinance shall remain in full force and effect.

Section 9

This ordinance shall take effect immediately upon adoption and publication in accordance with the laws of the State of New Jersey and filing with the Mercer County Planning Board.

Date Introduced: November 6, 2003
Date Advertised: November 13, 2003
Date Adopted: December 4, 2003

Francesca A. Bartlett
Mayor

Attest:

Annette C. Bielawski
Municipal Clerk