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# ENVIRONMENTAL Fact Sheet

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## Using Stratified-Drift Aquifer Maps to Plan for Potential Future Community Wells

In the 1990s, the United States Geological Survey (USGS) and the New Hampshire Department of Environmental Services (NHDES) completed a set of maps showing the extent of stratified-drift (sand-and-gravel) aquifers throughout the state. In many communities, these maps show large areas underlain by stratified-drift aquifers. In such cases, the maps might be interpreted to mean that a community has a wealth of potential future sites for community water supply wells. However, only a small fraction of the total area underlain by stratified-drift aquifers is likely to have the potential for high-yielding community wells. Recognizing this, NHDES developed a technique for analyzing the map information, taking into account the constraints to siting a community well, to help water suppliers and community planners make better use of the stratified-drift aquifer maps. This fact sheet describes the technique, called “favorable gravel well analysis” (FGWA), in general terms and explains how water suppliers and planners can obtain more information, including maps and manuals, and planning assistance from NHDES.

### **Constraints to Siting New Community Wells**

There are two kinds of constraints to siting a well for a community water system: quantity and quality. The well must supply a sufficient quantity of water (well yield) to reliably meet the system’s needs, and the well must be located far enough from any known or potential sources of contamination to minimize threats to the water’s quality. The necessary well yield depends on the circumstances of the water system and the community it serves, while the setbacks from contamination sources are determined by NHDES rules.

### **Well Yield and Favorable Gravel Well Analysis**

The starting point for an FGWA is determining the minimum well yield required by the community water system. The stratified-drift aquifer maps do not show potential well yield for each part of an aquifer, but they do show *transmissivity* (the product of the saturated thickness and the hydraulic conductivity), which is a rough measure of the aquifer material’s ability to allow water to flow to a well in any given location. Using transmissivity to estimate potential well yield, the FGWA begins by eliminating from consideration any stratified-drift aquifer area whose transmissivity is below a certain threshold. Therefore, the desired well yield determines the outcome of this step.

### **Known and Potential Contamination Sources**

NHDES rules for siting new community wells require that a sanitary protective area with a radius of 150 to 400 feet around a well be maintained in its natural state in order to minimize the potential for

contaminated groundwater or surface water to reach the well. Because the size of the sanitary protective area depends on the maximum permitted daily withdrawal from the well, the desired well yield affects the outcome of this step as well.

Because the sanitary protective area must be maintained in its natural state, any new community well must be located 150 feet to 400 feet from any existing man-made feature such as a building, septic system, or road. This requirement creates a buffer, or strip of land, around human-made features that is eliminated from consideration as a potential community well site. In addition to buffering most *potential* contamination sources by up to 400 feet, the analysis buffers *known* contamination sources, such as leaking underground storage tanks, by 1,000 feet. By the time these buffers are eliminated, there is often a dramatic difference between what is initially mapped as stratified-drift aquifer and the area that remains as potentially suitable for siting a new community well with a given yield.

#### **Using the Results of a Favorable Gravel Well Analysis**

*FGWA is not a well siting tool; it is a planning tool.*

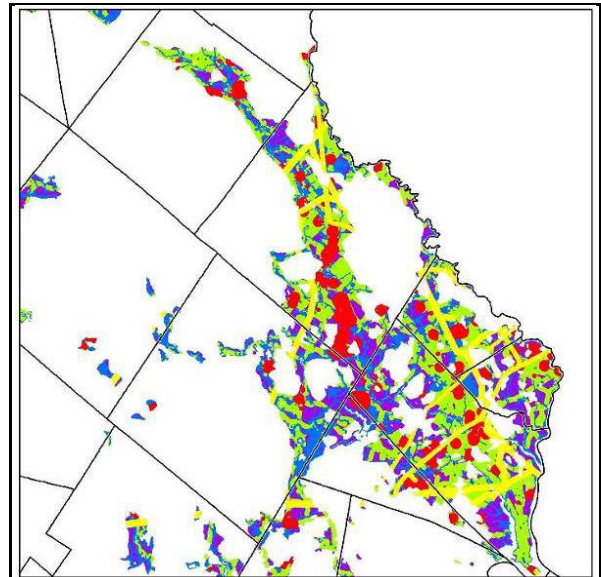
Before money is spent on land acquisition, a site-specific investigation should be done to ensure that a potential site indeed meets the well-siting requirements and is capable of producing the desired yield. FGWA was developed to help water suppliers and planners better understand the relative scarcity or abundance of potential high-yield well locations. The results of the analysis can also better inform a community about the need to protect future drinking water resources.

#### **Obtaining FGWA Maps and Guidance from NHDES**

The Society for the Protection of New Hampshire Forests (SPNHF), with support from NHDES, updated and enhanced the favorable gravel well analysis statewide in 2010. Electronic data or town-wide maps are available on request from NHDES. Also available is a report summarizing SPNHF's work, "A Guide to Identifying Potentially Favorable Areas to Protect Future Municipal Wells in Stratified-Drift Aquifers - Updated Methodology & Data" (SPNHF, 2010).

#### **Highlights of the Statewide FGWA:**

- The total mapped area of stratified-drift aquifers in New Hampshire is about 805,500 acres, or 14 percent of the state's total land area.
- The stratified-drift aquifer resources suitable for large municipal well development are scarce (only about 10 percent of the total mapped aquifer area) and scattered across the state.
- Many of the best high-yield stratified-drift aquifer resources are *not* located near population growth areas in the state.
- Between 2002 and 2010 approximately 19,600 acres of favorable gravel well area in New Hampshire was lost to development.
- Only one-fifth of the remaining favorable gravel well area is protected from future development.



Favorable gravel well analysis in Rochester-Dover area. Purple indicates favorable aquifer areas remaining after removing low-yield areas and constraints due to land uses. (Source: SPNHF, 2010)

**For More Information**

Please contact the Drinking Water and Groundwater Bureau at (603) 271-2513 or [dwginfo@des.nh.gov](mailto:dwginfo@des.nh.gov) or visit our website at [www.des.nh.gov](http://www.des.nh.gov).

Note: This Fact Sheet is accurate as of August 2019. Statutory or regulatory changes or the availability of additional information after this date may render this information inaccurate or incomplete.