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

In the 1990s, the US Geological Survey and the NH Department of Environmental Services 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, DES 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 DES.

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 DES 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

DES 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 at some distance (150 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.

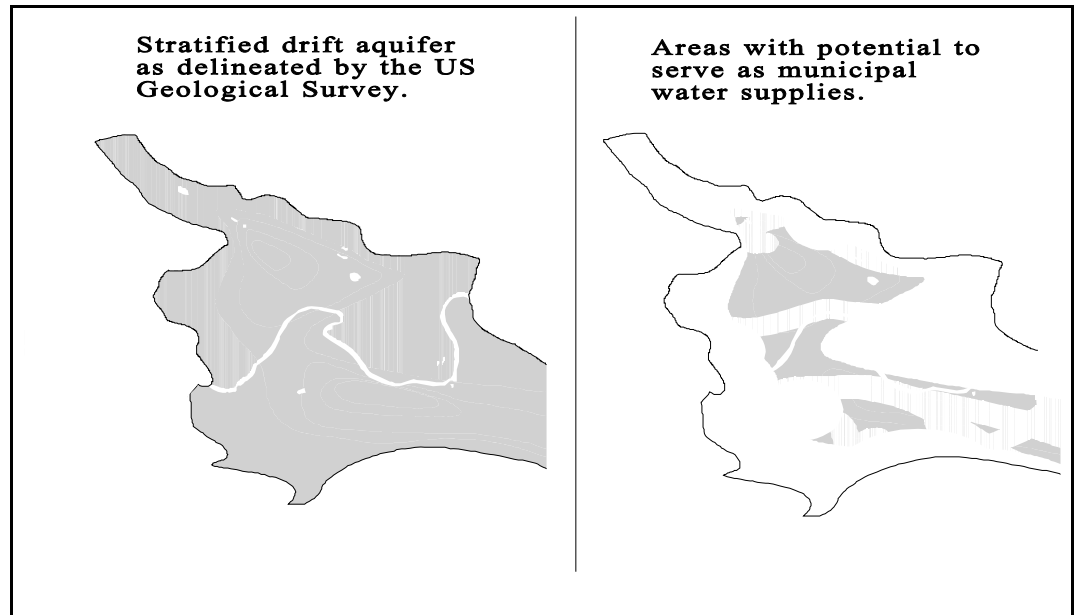
Using the Results of a Favorable Gravel Well Analysis

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 DES

DES has completed the favorable gravel well analysis statewide using its geographic information system (GIS), a computerized mapping and natural resources information management system. Electronic data or town-wide maps are available on request from DES. Also available are two guides to FGWA--one written for planners, water suppliers and municipal officials, and one for GIS operators.

For Additional Information

For more information, please visit the DES Drinking Water Source Protection webpage at <http://des.nh.gov/organization/divisions/water/dwgb/dwspp/index.htm>, or call (603) 271-7061 or (603) 271-0688. For additional information, please contact the Drinking Water and Groundwater Bureau at (603) 271-2513 or dwgbinfo@des.nh.gov or visit our website at <http://des.nh.gov/organization/divisions/water/dwgb/index.htm>. All of the bureau's fact sheets are on-line at <http://des.nh.gov/organization/commissioner/pip/factsheets/dwgb/index.htm>.

Note: This fact sheet is accurate as of November 2008. Statutory or regulatory changes, or the availability of additional information after this date may render this information inaccurate or incomplete.