

Justification for the USGS Study

The 2014 Fauquier County Water Summit

During the 2014 Fauquier County Water Summit, a number of issues and challenges to moving forward in the development of the County's water supply and the professional management of its water resources were discussed. Most of these identified challenges would be effectively addressed by the initiation of this USGS study, including the following:

- *Short-term operational needs are not based on strategic and comprehensive studies and investigations.*
- *Long-term strategic needs often take lower priorities to short-term operational needs.*
- *Groundwater programs and protocols should be flexible and dynamic, since groundwater needs have evolved over the years, and our institutional understandings of groundwater has increased.*
- *We currently have little understanding of the extent of our groundwater aquifers and their long-term sustainability.*
- *Many County policies may have unanticipated consequences upon groundwater quality and quantity, since these considerations may or may not have been evaluated when the policy was adopted.*
- *We currently have little understanding how our groundwater may be managed in a way that promotes or supports other county initiatives and emphases, such as economic development.*
- *The County has invested large sums of money developing groundwater resources, but we have committed little resources in protecting those investments from threats.*
- *Land-use decisions affecting a potential well site's suitability are often made long before a community's explores its water supply expansion options.*
- *The County has no active plans or programs focused on groundwater protection.*

Also in this same Water Summit, EGGI's James Emery cited key issues facing Fauquier County. This USGS study begins to address most of these key issues, such as:

- *Certain Service Districts... are potentially threatened by either the presence of land uses that could, or have, adversely impact groundwater quality and/or are within the areas where groundwater withdrawals (needed to meet future growth) may exceed groundwater recharge rates. Those areas designated as "Sensitive" will require additional detailed investigations.*

Response: In order to identify and prioritize these threats and sensitive areas would require a more fundamental understanding of our groundwater aquifers. This study begins to address this deficiency.

- *Have not defined the groundwater recharge areas for their existing wells*

Response: This study will lay the foundation that will aid future groundwater delineation, and it directly addresses the nature and characteristics of the recharge within these recharge areas once they are delineated.

- *Has few land-use policies that serve to protect the groundwater resources that the County depends entirely upon.*

Any policies directed at protecting our aquifers must be based upon a fundamental understanding of the characteristics of these aquifers. This study directly deals with this deficiency.

- *Spills and Leaks of chemicals into the ground can go unnoticed until they contaminate public water sources*

Having a better understanding of how our groundwater aquifers flow, forms the basis for beginning to address this deficiency.

- *Changes in Land use can adversely impact groundwater quality*

This study directly deals with this deficiency.

- *It is necessary to understand the impacts that land uses can have on groundwater quality and use BMPs to the extent that is reasonable to prevent spills and leaks of contaminants into the groundwater system.*

Response: This study will begin to address this deficiency.

Potential Uses of the USGS Study

There are many efficiency, cost-saving, strategic, professional, and long-term benefits to gaining a broad understanding of Fauquier County's groundwater resources. There are also short-to-mid-term, practical and applied benefits as well. These can be grouped in three categories: Land-use; Resource Protection, and "other." Some of the dominant uses are as follows:

Land-Use Applications:

- Zoning and overlays

Having an understanding of our groundwater recharge characteristics and how groundwater flows through the County is informative for the development of proposed zoning changes or the creation of related overlay districts, such as wellhead or recharge area protection zones.

- Large development project review

Having an understanding of where the best recharge zones are would be informative to large development projects and Site Plan review.

- Large drainfield siting assessments

Along a similar vein, knowing where the best areas of groundwater recharge are located would be informative to reviewing large drainfield siting proposals.

- More information to better inform decisions such as service boundary adjustments

Service Districts were established without a comprehensive understanding of where cost-effective water supplies are located, especially considering that our current policy is locating public water supply wells in the Service Districts. In the future any new Service District boundary modification proposal, or any decision relative to the placement of new wells in proximity to Service Districts could be greatly aided by allowing informed decision-making based upon a credible prioritization.

- Inform the selection of stormwater BMPs

Stormwater BMP designs, some more than others, rely up local groundwater recharge. Therefore, knowing if stormwater facilities are being placed on good-quality recharge zones, or poor ones, would be of value to Fauquier County and the development community.

- Quantifying delineated areas

While this study does not delineate groundwater aquifers, it does establish the framework in which future delineations can build upon. In addition, for any accurate quantification of ground water supply and availability, we would need not only the area of an aquifer's recharge zone, but also the rate of recharge within this zone. There may be orders of magnitude difference between an aquifer that receives ten inches of recharge versus eight inches. If decisions are based upon an assumption of ten inches of recharge, but in actuality it receives only eight inches, then this community would likely be plagued with water shortages and problems for years to come. It is too costly to base these decisions upon assumptions. This study would provide a defensible recharge rate.

- Prioritize new water supply well locations

This study would be informative by enabling us to prioritize potential new water supply studies. Previously, we may have funded detailed hydrologic investigations and geophysical surveys in ten areas with the hope that at least one site will prove suitable. However, if we were to know what areas had inherent recharge challenges up front, it may save money and time in the long-run because there may not be a need to conduct expensive geophysical surveys in areas of low groundwater recharge.

- Predictive

The Soil Water Balance Model has a powerful tool that enables scenario analysis and predictive modeling. For instance, if there is a proposed large development, we would be able to run the model upon the current baseline condition and again on the development's full build-out. This would provide a reliable estimate of the recharge changes that would result if the proposal was

built. This model would allow a better evaluation of the project's impact to the county and better recommend reasonable and appropriate conditions of development. This same analysis could be used on proposed full build-out scenarios with respect to Service Districts. It would also be more responsive, accountable, and defensible to concerned citizens. These simulations would also be able to be run on tree/forest cover losses (and be able to quantify Chesapeake Bay credits more easily).

Resource Protection Applications:

- Wellhead protection

The same analysis discussed earlier can be used for assessing wellhead protection zones.

- Effects of urbanization

One part of the study assesses the degree of impact that Fauquier County's aquifers may be experiencing as a result of urbanization impacts. This information, along with the predictive analysis tool discussed earlier, would be a powerful mechanism to protect sensitive resources, land-use planning, and decision-making based upon professional data and information rather than best guesses and untried assumptions.

- Contaminant threat assessment

Determining the threat that groundwater contamination poses is based upon understanding the nature and character of groundwater flow within our aquifers. This is a key question that this study is designed to address.

Other Applications:

- Prioritizing PDRs and conservation easement

- Drought management

- Connectivity between surface and groundwater

Surface water is a combination of new surface water run-off and surfacing groundwater. Conversely, groundwater is water that was not lost by surface water run-off or evaporation. Therefore, to understand and properly manage these systems, we need to have a better understanding of the relationship between Fauquier County surface and groundwater systems. If we withdraw more groundwater it will likely mean less surface water available. To what extent will groundwater withdrawals affect surface water or how will surface water drought conditions affect groundwater supplies? These are all questions that the study is designed to better assess.

- Water supply operations

Water supply operations are highly influenced upon the dynamic changes occurring in all aquifers. Therefore, understanding these dynamics and changes will enable us to deal with these realities in a more timely and cost-effective manner.

- Making informed decisions that are defensible to the public, court challenges, and more cost-effective.
- One of the best and most defensible ways to make a decision is by evaluating long-term data. This study sets the County up with a long-term groundwater monitoring network that would better prepare us to make these critical decisions in the future.