

# Wake County Groundwater Sustainability Stakeholder Committee Report

## 1.0 Introduction

Groundwater continues to be an important resource in Wake County. Almost one quarter of the County's residents rely on groundwater for their water supply. Recent Wake County environmental initiatives, including the *Comprehensive Groundwater Investigation* in 2003, have emphasized the importance of groundwater as a crucial current and future water supply especially to those areas of the County where the extension of water and sewer service is not planned.

Building on the recommendations of the *Comprehensive Groundwater Investigation*, the Wake County Department of Environmental Services (DES) initiated a stakeholder-driven process to investigate issues related to groundwater resources and review and recommend potential groundwater management solutions appropriate to Wake County. The process began in June of 2006 with the formation of the Groundwater Sustainability Committee (see inset), as part of the Environmental Services Committee, Water Quality Subcommittee. The County formed the committee in response to the concerns of several private well owners, two of which served on the committee. One of the committee's well owners experienced a dry well and the other expressed concerns about the impacts of high-capacity wells on private wells.

## 1.1 Purpose, Goals, and Objectives

The 2003 *Comprehensive Groundwater Investigation Report*, also developed by a stakeholder committee, included eight major recommendations related to groundwater resources in Wake County. Recommendation No. 3 from the report proposed that the County *implement a community-based process to develop principles and policies for*

*groundwater resource sustainability and prepare strategies that can be implemented to achieve groundwater sustainability.* With that goal in mind, the current committee (some of which were part of the original stakeholder committee) began developing a list of specific objectives, questions, and concerns that might be considered during the process. For example:

Groundwater Sustainability Stakeholder Committee	
Stakeholder	Affiliation
Dr. John Fountain (Chair)	North Carolina State University
Greg Bright	Wake County Dept. of Environmental Services
Steve Bristow	Wake County Dept. of Environmental Services
Mark Bailey	Wake County Dept. of Environmental Services
Reginald Goodson	Wake County Planning Dept.
Celena Everette	Wake County Dept. of Community Services
Jill Strickler	Aqua America/Heater Utilities
George Rogers	City of Raleigh Public Utilities
Allen Hardy	Public Water Supply Section- NCDENR
George Kevalak	Citizen and Private Well Owner
Steve Zoufaly	Citizen and Private Well Owner
Rusty Ammons	RLA Development
Nat Wilson	NCDENR Division of Water Resources
John Boyette	Boyette Well
David Hutson	Acme Well Drilling
Rick Bolich	NCDENR Aquifer Protection Section
Melinda Chapman	United States Geological Survey
Buck Kennedy	The Wooten Company
John Boyer	CDM (Consultant, Non-voting member)
Natalie Rittlinger	CDM (Facilitator, Non-voting member)

- What are the implications of resource competition on private wells? What are a well owner's legal rights?
- What are the assurances that existing wells are going to be protected?
- What are the impacts of development around an existing, low-yielding well?
- Is there a problem with groundwater resource competition or overuse? If there is a problem, is it localized or county-wide?

- Can pumpage records for community water system (CWS) wells be made available?
- We need to consider the impacts of groundwater withdrawals on streams and wetlands, in addition to other wells.
- Is it realistic to protect the right of an individual to have a private well?
- What scientific data is there related to community well use, impact, etc.?
- We need to consider groundwater quality in the definition of sustainability. Experience has shown that the quality of groundwater has been a factor limiting groundwater use in many instances.

## 2.0 Committee Meeting Summaries

The Groundwater Sustainability Stakeholder Committee held six meetings between June and December of 2006. A summary of each meeting is presented below.

### *Meeting No. 1 - June 29, 2006*

The focus of the committee's initial meeting was establishing the purpose for the committee, discussing goals and objectives, and reviewing the drivers behind the process. The drivers included:

- **well interference** – there is growing concern that some wells are experiencing reduced or no yield as a result on the increase in competition for groundwater at a local scale;
- **development (growth)** – approximately 600 to 700 new wells are permitted in Wake County each year;
- **drought (e.g. 1999-2002)** – less groundwater is available for withdrawal during a drought; and
- **short-term high demands** (e.g. firefighting) may cause unacceptable impacts to nearby wells.

To help achieve the goal of preparing strategies that can be implemented to achieve groundwater

sustainability, the committee received and reviewed two publications, *Sustainability of Groundwater Resources*<sup>1</sup> and *Defining and Managing Sustainable Yield*<sup>2</sup>. The publications discuss relevant issues related to defining and achieving groundwater sustainability.

### *Meeting No. 2 - August 2, 2006*

During the second meeting, the committee reviewed the results of the countywide and drainage basin-level water budgets that were developed as part of the *Comprehensive Groundwater Investigation*. The water budgets provided insight into particular areas of the County where groundwater use was limited due to low-yielding rock units. Three case studies were presented to highlight instances of unacceptable impacts associated with groundwater development in other parts of North Carolina and the southeast U.S. Nat Wilson from the North Carolina Department of Environment and Natural Resources (NCDENR) Division of Water Resources (DWR) summarized the history and status of the Capacity Use Area in North Carolina's central coastal plain. Melinda Chapman from the United States Geological Survey (USGS) presented two examples from Cary, North Carolina and Lawrenceville, Georgia highlighting the difficulty in predicting drawdown in fractured rock aquifers. Finally, a NCDENR, DWR study investigating well interference in Cashiers, North Carolina was reviewed and discussed. With an idea of some of the problems occurring in other areas, the committee broke into groups to discuss and define the extent of current problems occurring in Wake County and the likelihood of future problems. Some of the current problems identified by the committee included:

- well interference;
- the difficulty in developing community wells;
- the lack of knowledge/education about groundwater resources.

<sup>1</sup> Alley, W.M., T.E. Reilly and O.L. Franke, U.S. Geological Survey Circular 1186, 1999.

<sup>2</sup> Maimone, M., Issue Paper appearing in *Ground Water*, Vol. 42, No. 6, November-December 2004.

- poor groundwater quality limits the use of groundwater in certain areas, lacking appropriate treatment; and
- the relationship between surface water and groundwater in Wake County has to be considered.

Some of the future problems identified by the committee included:

- limited conservation and reuse do little to slow the growing demands on groundwater and surface water resources;
- the continued localized cases of competition and interference;
- the lack of storage available in the regolith-fractured aquifer system will result in continued instances of dry wells during drought (regolith wells are much more susceptible to drought than fractured bedrock wells); and
- the continuing contamination of wells from naturally occurring sources and from man.

**Meeting No. 3 - September 6, 2006**

Water rights laws were reviewed and discussed during the third meeting. Water rights in North Carolina are understood to follow the "Reasonable Use" rule, which limits a landowner's use to beneficial uses having a reasonable relationship to the use of his overlying land.

John Nykamp, an Environmental Health Program Specialist with Guilford County, discussed the factors that led to the development of well rules in Guilford County. Wells in Guilford County, which are outside of areas where municipal water is provided and that

withdraw more than 10,000 gallons per day, must receive a special permit. The special permit process includes a well interference test to determine if the proposed well has the potential to negatively impact nearby wells. Examples of groundwater management rules and regulations from other jurisdictions across the U.S. were also presented. The committee considered the applicability of these rules and regulations in Wake County.

**Meeting No. 4 - October 12, 2006**

The focus of the committee's fourth meeting was on developing one or more functional objectives, based on the perceived current and future problems identified by the committee during Meeting No. 2. The functional objective(s) were created to help address the first overall objective, which is to define sustainability and provide a benchmark for evaluating potential management solutions developed by the committee. The committee agreed to the following functional objective:

*Prevent or mitigate known and/or potential groundwater quality and quantity impacts for existing and future groundwater resources and ecosystems.*

<b>Short-Listed Management Strategies</b> (number of votes shown in parentheses)	
1.	Collect Additional Information to Track Groundwater Usage (6)
2.	Develop a "Risk Level" Area Map (5)
3.	Establish a Permit Process for High Capacity Wells (4)
4.	Monitor Drawdown during Pump Tests of High Capacity Wells (4)
5.	Take Reactive Measures (4)
6.	Initiate a Groundwater Monitoring Program to Collect Additional Information (3)

With this functional objective in mind, the committee reviewed a preliminary list of 11 potential management strategies to be evaluated during subsequent meetings. The management strategies that were considered are discussed in Section 3.

**Meeting No. 5 - November 9, 2006**

Meeting No. 5 began with a review of tools that are commonly used to monitor groundwater use and availability in other areas across the U.S. The purpose of the review was to provide additional insight into some of the potential strategies that can be used to monitor and manage groundwater resources in Wake County.

**Table 1**  
**Groundwater Resource Management Strategies**

- 1. No Action**  
Take no additional action beyond what is currently performed.
- 2. Take Reactive Measures**  
When instances of well interference or other problems appear, Wake County DES would take the lead in investigating the problem and mediating a resolution. Owners/operators of high capacity wells that may be contributing to the problem would be expected to play an integral role in the investigation and solution.
- 3. Increase Public Education**  
Encourage sustainable use of groundwater resources through increased education of homeowners, builders, developers, high-capacity well owners/operators, etc.
- 4. Collect Additional Information through Groundwater Monitoring**  
Establish a long-term monitoring program focusing on collecting information characterizing groundwater quality and water levels in select areas.
- 5. Collect Additional Information to Track Groundwater Usage**  
Require owners/operators of high capacity wells to report monthly pumping totals (by well and system) to Wake County DES. DES will populate a database and assess withdrawal trends over time.
- 6. Develop a "Risk Level" Area Map**  
Use latest available information to identify groundwater Risk Level areas. A Risk Level area map was first prepared by Dr. Charles Welby in 1983, on behalf of the Wake County Planning Department.
- 7. Monitor Drawdown during Pump Tests of High Capacity Wells**  
Require that owners of high capacity wells monitor drawdown at the well and at existing nearby wells during a pump test conducted after well installation. The results would be submitted to Wake County DES for informational purposes only (i.e. to facilitate reactive measures).
- 8. Require Step Drawdown Tests of Community Waters System Wells**  
Require that owners of community water system wells conduct step-drawdown tests of newly installed wells. Step-draw down tests, if performed correctly, allow for the collection of high-quality hydrogeologic data. The results would be submitted to Wake County DES for informational purposes only (i.e. to facilitate reactive measures).
- 9. Permit Process for High Capacity Wells in Certain Risk Level Areas**  
Require a County permit for high capacity wells installed in certain Risk Level areas. A permit would be approved or denied following a hydrogeologists review and/or pump test to investigate well interference.
- 10. Permit Process for High Capacity Wells Everywhere**  
Require a County permit for high capacity wells installed anywhere in the County. A permit would be approved or denied following a hydrogeologists review and/or pump test to investigate well interference. (i.e. some form of the Guilford County, NC model).
- 11. Permit Process for All Water Supply Wells**  
Require a County permit for all water supply wells installed anywhere in the County. Permit approval contingent upon demonstration of no significant interference to existing water supply wells (i.e. some form of the East Amwell, NJ model).
- 12. Permit Process Based on Minimum Streamflow in a Basin**  
Establish a threshold of collective withdraw within each basin, based on a certain minimum streamflow value. For example, the total sum of all average day withdrawals within a basin (or sub-basin) could not exceed 50 percent of the basins 30Q2 streamflow. (i.e. some form of the Oregon Administrative Rules model).
- 13. Density Control**  
Establish residential development densities based on availability of groundwater resources using Risk Level area map and information from the *Comprehensive Groundwater Investigation Report*.

The committee added 2 additional strategies to the list of 11 (see Table 1). Each committee member then voted on the top three strategies that they believed would best meet the functional objective. Six strategies received three or more votes (see inset) and were retained for further consideration at the final meeting.

#### *Meeting No. 6 - December 1, 2006*

The sixth and final meeting was spent reviewing, considering, and voting on various implementation scenarios created by combining one or more of the short-listed management strategies. A one-page summary of each management strategy was developed to (1) further describe the strategy; (2) identify the purpose and benefit; (3) characterize the ease of implementation and cost; and (4) evaluate its compliance with the functional objective (see Appendix A). Armed with a more thorough understanding of the short-listed management strategies, the committee debated the merits and drawbacks of four different implementation scenarios created by grouping one or more of the management strategies. To identify the level of support for each scenario, the committee voted by a show of hands. Each member was allowed to vote for only one scenario. The committee's recommended strategies are discussed in Section 4.

### **3.0 Groundwater Management Alternatives**

A variety of tools and strategies are used by groundwater managers to allocate withdrawals, prevent impacts associated with over-drafting, reduce the potential for well interference resulting from the localized competition for groundwater, and/or ensure the sustainable use of the resource. The tools and strategies range from the simple, such as assigning a minimum spacing between wells, to the complex, including the development and use of three-dimensional groundwater models. In many areas, local, state, or regional regulatory agencies have passed ordinances or laws that require potential groundwater users to apply for permits prior to the installation of a well and the withdrawal of groundwater. The permits often

require the applicant to document evidence showing that the proposed groundwater withdrawal will not have a negative impact on other users. Some jurisdictions are also interested in protecting and preserving the natural groundwater discharge (baseflow) to streams, lakes, and wetlands.

After considering the realm of potential strategies that are available to manage groundwater resources, the committee developed and evaluated a toolbox of 13 strategies that would, by themselves, or in combination with others, best support the functional objective (Table 1). They range from doing nothing (the "take no action" strategy), to establishing maximum residential development densities based on the availability of groundwater. Five strategies focus on data collection to further the understanding of how groundwater resources are used in Wake County and how they respond to changes in natural and man-made stresses. Four strategies consider some form of permit process designed to identify, prevent, and/or mitigate potential adverse impacts to existing nearby wells. The committee also considered options such as increasing the level of public education programs and, in lieu of proactive attempts to prevent negative impacts, the development of a reactive measures plan.

Four implementation approaches were prepared by combining one or more of the six most promising strategies selected by the committee. The four approaches were reviewed, discussed, and voted on by the committee.

### **4.0 Committee Recommendation**

By a vote of 14 to 2, the committee recommended a phased approach consisting of four steps, the first three would be implemented concurrently:

- **Step 1 - Implement a data collection and analysis program.** Wake County DES would implement a program to collect information that will be used to establish a baseline and define (or refute) the problem. The data collection program would include the following components:

A. Owners of community water systems and other high capacity wells would be required to report monthly pumping totals to the DES. A database would be created and routinely reviewed to identify potential problem areas.

B. A long-term groundwater monitoring network focusing on the collection of groundwater level and water quality information in select areas; and,

C. Owners of high capacity wells would be required to monitor drawdown in nearby private wells during execution of the pump test conducted following installation. By observing the response of the aquifer in private wells that are in close proximity (e.g., within 1000 or 2000 feet) of the high capacity well, potential impacts could be identified.

■ **Step 2 - Develop a geographical information system-based (GIS) risk level area map.** Use the latest available information characterizing well yields, rock porosity and permeability, stream low flows, and apparent recharge rates, to identify groundwater “risk level” areas.

■ **Step 3 - Develop a mitigation strategy.** By considering the results of ongoing data collection and analysis and using the “risk level” area map, DES would be in a better position to identify the likely contributors to problems, should they arise. This strategy includes the expectation that community water system owners and owners of other high capacity wells would play an integral role in the investigation, analysis, and solution of the problems.

■ **Step 4 - Establish a permit system for community water system wells and other high capacity wells.** If evidence suggests that groundwater use is increasing, impacts are being more frequently observed, or potentially responsible parties are not taking effective reactive measures, the County would **establish a permit process for high capacity wells.** The permit process would require that high capacity well owners demonstrate that the proposed

withdrawal will not have a negative impact on existing users and ecosystems. If negative impacts are observed, mitigating steps would be required.

The committee recommended this approach for two reasons: (1) there was nearly unanimous agreement among the stakeholders that the collection and analysis of additional data is necessary to gain a better understanding of how groundwater in Wake County responds to natural and artificial stresses; and (2) most of the stakeholders did not think that negative impacts associated with groundwater use were occurring at a frequency or severity to warrant the development of a permit system for high capacity wells.

The two stakeholders representing private well owners, who perceived their wells either have been impacted or are threatened by community water system wells, were notable exceptions to the majority. They felt a mandatory permitting-based policy for high capacity wells should be implemented immediately in addition to the data collection and analysis approach the committee recommended. The majority of the committee felt, however, that there was insufficient evidence of widespread impact to justify a mandatory permit process; instead the recommended plan is designed explicitly to acquire data to determine if a permit process is warranted. Letters further detailing their respective positions are contained in Appendix B.

The committee’s recommendation calls for Wake County DES to take the lead implementing Steps 1 and 2. Stakeholder representatives from both the USGS and NCDENR noted that resources from their agencies could be made available to help establish a long-term monitoring well network.

The recommended approach is based on the assumption that the committee or a similar group of stakeholders would reconvene if evidence suggests that groundwater use is increasing and unacceptable impacts are occurring. The committee would collectively review the data developed from Steps 1 and 2 and recommend an appropriate permitting-based strategy.

# Appendix A

## Detailed Descriptions of Short-Listed Management Strategies

**Strategy: Track Groundwater Use (Received 6 votes)**

**Description**

This tool would require owners/operators of community water system (CWS) wells and other large users (industrial, commercial, and large-scale irrigation such as a golf course) to report monthly pumping totals by well and system to Wake County. Wake County Department of Environmental Services would create and maintain a database with monthly pumping totals by well and CWS.

**Purpose and Benefit**

In 2000 there were approximately 800 CWS wells in operation in Wake County providing water to nearly 48,000 people. As part of the County's Comprehensive Groundwater Investigation, water budgets by drainage basin were prepared using billing records. Among other things, the water budgets were used to identify where groundwater use was the highest and how net groundwater use compared to groundwater recharge within each basin.

The collection of groundwater withdrawal data is routine in areas where water management is practiced. For instance, Florida has established five Water Management Districts (WMDs) to help track and manage surface and groundwater use. The WMDs require that CWSs and other large users submit monthly pumping records. The records are used to identify water withdrawal trends, relate impacts to use, support modeling, and make sound decisions regarding water management issues. The reasons for collecting water use data in Wake County are similar to those in Florida (and other areas); however, the data would not likely be used to support modeling.

In Wake County, the collection of groundwater use data may assist in identifying areas where groundwater use may currently, or in the future, contribute to declining water levels, reduced stream baseflow or dry streams, and reduced well yields or dry wells. This is considered to be both a proactive tool, since the data may help identify potential problems before they occur, and a reactive tool, since the data may be used to help understand why a problem occurred.

**Ease of Implementation and Cost**

This tool would require that the owners/operators of CWSs and other large users track and submit monthly withdrawal rates by well. This could be accomplished through billing records, for systems where only one well is used, and/or through a totalizing flow meter at the wellhead.

This tool would require that the County modify their existing regulations Governing Well Construction and Groundwater Protection in Wake County. The current regulations apply only to "private and semi-public well water supplies". The rules would need to be rewritten to apply to CWSs, or a new regulation would need to be developed that applies only to CWSs.

A relatively simple database (e.g. MS Access or Excel) would be created to store the pumping records. To facilitate input, a standardized electronic data deliverable (EDD) format would be used so that pumping data could be automatically uploaded into the database. The database could include simple reporting and graphing functions to facilitate ongoing data analysis.

The overall cost for this tool is considered low, both for the regulated community and the County. Costs would primarily be associated with labor to collect and store the data. The County would likely be able to implement this tool without adding staff.

**Compliance with Objective**

The collection of groundwater use data partially supports the functional objective identified by the Committee. Groundwater use data would potentially help prevent and mitigate groundwater quantity impacts by providing a better understanding of how withdrawals occur spatially and how they compare to recharge under normal and drought conditions.



**Strategy: Develop a Risk Level Area Map** (Received 5 votes)

**Description**

In 1983, a map was prepared by Dr. Charles Welby of NCSU for the Wake County Planning Department that depicted areas of favorable and unfavorable groundwater availability and suggested the intensity of groundwater use that could be tolerated without over-drafting the resource. Five classes of relative availability for groundwater withdrawal were established based upon rock porosity, permeability, stream low flow data, well yields, and apparent recharge rates. The five classes were determined “risk levels”. Residential density based upon the potential availability of groundwater and the estimated use of groundwater per residential unit were used to define the risk levels.

The risk level area map could be updated by considering additional data that has been collected over the past two decades (e.g., well yields, recharge rates, and additional stream low flow records). Much recent data has already been collected, compiled, and summarized as part of the County’s 2003 Comprehensive Groundwater Investigation. An overlay depicting areas where poor groundwater quality has limited the use of the resource (lacking treatment) could be created to add functionality.

**Purpose and Benefit**

An updated risk level map would provide stakeholders with a better understanding of the constraints that the groundwater inventory places upon the development of the resource. In addition to updating the map with basic data that further characterizes groundwater availability, an overlay to the map could be created depicting current total and net groundwater withdrawals by basin. A comparison of the risk level areas and current (and future) groundwater withdrawals would be useful in predicting areas where problems are more likely to occur.

This is considered to be both a proactive tool, since the risk level area map may help identify potential problems before they occur, and a reactive tool, since the map may provide clues as to why a problem occurred.

**Ease of Implementation and Cost**

It would be expected that the County would take the lead in developing an updated risk level area map, with input from various stakeholders including water utilities, NCDENR, NCGS, and USGS. Development and implementation of this tool would be expected to take no more than three to six months. The overall cost for this tool is considered low. The County would be able to implement this tool without adding staff.

**Compliance with Objective**

The development of a risk level area map partially supports the functional objective identified by the Committee. The map would potentially help prevent and mitigate groundwater quantity impacts by providing a better understanding of how withdrawals occur spatially, and how they compare to recharge under normal and drought conditions. By augmenting the map with groundwater quality information the tool may also serve to prevent future groundwater quality impacts to new users.

**Strategy: Permit Process for High Capacity Wells** (Received 4 votes)

**Description**

This tool would require that well owners apply for a permit from Wake County prior to operating a new a high capacity well. In Wake County, a high capacity well could be defined as any well serving a community water system. Wells installed for commercial, industrial, or irrigation purposes (excluding residential irrigation wells) that are be expected to withdrawal more than 10,000 gallons per day (or similar amount) could also be considered high capacity wells.

The permit process would require applicants to conduct a pump test according to standards set forth in the State’s 2C Standards for Well Construction. In addition to monitoring drawdown at the well being pumped, drawdown in wells within a certain distance of the pumping well would also have to be measured during the pump test. Water quality samples of all wells monitored during the test would be taken before and immediately after the test is complete. Permit approval would occur if the County determines that use of the proposed well will not adversely affect water quality and/or quantity of the resource for nearby users, or otherwise pose a threat to public health or the environment. If an impact is identified, a permit would not be issued unless the applicant takes necessary mitigation steps, such as agreeing to supply potable water to the impacted (existing) users.

**Purpose and Benefit**

A permit process for high capacity wells would help reduce and mitigate the instances of resource competition between users. The permit process, as described above, would not be guaranteed to prevent all problems associated with competition between users, since other factors, such as drought, may contribute to the development of a problem subsequent to approval of a new high capacity well. This tool alone would also not prevent problems related to competition between pre-existing wells/users.

This is considered to be a proactive tool, since it would identify and potentially prevent before they occur

**Ease of Implementation and Cost**

This tool would require that the owners of CWSs and other high capacity wells designate additional resources during testing of a proposed well. Additional labor and equipment would be required to monitor water level changes in nearby wells. Additional time and labor would be required to prepare documentation as required by the permit application.

This tool would require that the County modify their existing regulations Governing Well Construction and Groundwater Protection in Wake County. The current regulations apply only to “private and semi-public well water supplies”. The rules would need to be rewritten to apply to CWSs, and other high capacity wells, and include all requirements related to the permit process.

Development and implementation of this tool would be expected to take approximately six months. The overall cost for this tool is considered high, relative to the other short-listed tools. The application of this tool may require that the County add an additional staff position to assist in permit review, depending on the expected number of permits.

**Compliance with Objective**

Implementation of a permit process for high capacity wells partially supports the functional objective identified by the Committee. The tool would help prevent groundwater quantity impacts by identifying them before a high capacity well is put into use. Water quality testing conducted before and after the pump test would also help identify potential water quality problems; however, it would not necessarily prevent future problems from occurring.

**Strategy: Monitor Drawdown During Pump Tests of High Capacity Wells** (Received 4 votes)

**Description**

This tool would require that owners of new high capacity wells conduct a pump test according to standards set forth in the State's 2C Standards for Well Construction and submit the results to Wake County. In addition to monitoring drawdown at the well being pumped, drawdown in wells within a certain distance of the pumping well would also have to be measured during the pump test. Water quality samples of all wells monitored during the test would be taken before and immediately after the test is complete. In Wake County, a high capacity well could be defined as any well serving a community water system. Wells installed for commercial, industrial, or irrigation purposes (excluding residential irrigation wells) that are expected to withdraw more than 10,000 gallons per day (or similar amount), could also be considered high capacity wells.

The owner of the proposed high capacity well would not be subject to permit or other approval before operating the well. The data collected during the pump test would be submitted to the County only for their records.

**Purpose and Benefit**

The information collected from the high capacity well pump tests would help increase the understanding of the potential problems associated with groundwater resource competition. The information may be useful in determining the size and shape of drawdown cones. The information collected would be useful in determining the relative contribution of an impact from a nearby high capacity well, should problems occur within the same area in the future (i.e., it would provide supporting evidence when reactively addressing the problem).

This tool would not prevent problems associated with competition between users. This is considered to be both a proactive tool, since it would help identify problems before they occur, and a reactive tool, since it may provide clues as to why a problem occurred. Data resulting from this tool could be used to augment the risk level area map (a separate considered tool).

**Ease of Implementation and Cost**

This tool would require that the owners of CWSs and other high capacity wells designate additional resources during testing of a proposed well. Additional labor and equipment would be required to monitor water level changes in nearby wells.

This tool would require that the County modify their existing regulations Governing Well Construction and Groundwater Protection in Wake County. The current regulations apply only to "private and semi-public well water supplies". The rules would need to be rewritten to apply to CWSs and other high capacity wells, and include all requirements related to the permit process.

Development and implementation of this tool would be expected to take approximately six months. The overall cost for this tool is considered moderate, relative to the other short-listed tools. The application of this tool would not require that the County add additional staff; however, existing staff time would be required to receive, review, understand, and store the pump tests results.

**Compliance with Objective**

Implementation of this tool partially supports the functional objective identified by the Committee. The tool may help identify groundwater quantity impacts before they occur, but would not necessarily prevent them. Water quality testing conducted before and after the pump test would also help identify potential water quality problems; however, it would not necessarily prevent future problems from occurring.

**Strategy: Take Reactive Measures** (Received 3 votes)

**Description**

This tool would be developed as information from existing and proposed data collection programs is collected. Proposed data collection programs would include those currently being considered by the Committee. A “reaction plan” could be developed which describes a process where potential stakeholders are engaged to help identify the factors using existing data that may be contributing to the problem. Reactive measures would be initiated following assessment of the problem by the stakeholders and Wake County staff leveraging, as necessary, the expertise offered by other local agencies including NCDENR, USGS, NCGS, NCSU and/or consultants.

**Purpose and Benefit**

This tool would not prevent problems associated with competition between users. This is a reactive tool and does little to prevent future problems from occurring.

**Ease of Implementation and Cost**

This tool would require that the County, over time, develop a plan that would promote an efficient and effective solution to problems related to groundwater resource use and competition.

The overall cost for this tool is considered low, relative to the other short-listed tools. The application of this tool would not require that the County add additional staff; however, existing staff time would be required to develop a plan and mount a response if a problem occurred.

**Compliance with Objective**

Implementation of this tool partially supports the functional objective identified by the Committee. The tool may help mitigate groundwater quantity and quality impacts after they occur, but would not necessarily prevent them from re-occurring.

**Strategy: Collect Additional Information Through Groundwater Monitoring** (Received 3 votes)

**Description**

This tool would consist of designated monitoring wells located in select areas of the County that could be used to collect information related to groundwater quality and quantity. A county-wide monitoring well network was originally proposed in the 2003 Comprehensive Groundwater Investigation. It recommended the installation of monitoring wells and well pairs in 16 locations throughout the County. Approximate well locations were selected based on such factors as hydrogeologic unit; accessibility; healthy, impacted or degraded watersheds; amount of imperviousness; recharge rates; soil types; predominate land use; residential density; thickness of the regolith; well failure history; and other factors. The network was envisioned as a cooperative network, calling on the expertise and resources available from other local, state, and federal agencies which investigate and manage water resources. Variations of this tool from that which is recommended in the Comprehensive Groundwater Investigation are plausible, and may be considered based on the availability of funds and partners.

**Purpose and Benefit**

Some of the purposes and benefits of this tool include: (1) providing a long-term record of data to assess the impact of groundwater withdrawals; (2) providing data to monitor water level declines due to groundwater withdrawals, drought, and/or reduced recharge resulting from changing land use; (3) providing information to understand better the impacts of urbanization on groundwater quantity and quality; (4) providing defensible data to support potential groundwater resource management decisions; and (5) providing a mechanism to monitor changes in raw groundwater quality over time.

This is considered to be both a proactive tool, since the data may help identify potential problems before they occur, and a reactive tool, since the data may be used to help understand why a problem occurred.

**Ease of Implementation and Cost**

This tool would require that the County take the lead in establishing a cooperative monitoring well network. Both state and federal agencies have noted that resources and potential funding may be available to assist in implementing and operating this tool. Still, the overall cost for this tool is considered high relative to the other tools considered. Costs would primarily be associated with labor, equipment, and materials to implement, operate, and maintain the network. The County would likely be able to implement this tool without adding staff; however extensive cooperation with other local, state, and federal agencies would be required to ensure its long-term effectiveness.

**Compliance with Objective**

The collection of groundwater level and quality data partially supports the functional objective identified by the Committee. Groundwater data that is collected from a monitoring well network would potentially help prevent and mitigate groundwater quantity impacts by providing a better understanding of how various factors, including groundwater withdrawals, impact the overall "health" and use of the resource.

# Appendix B

## Letters from Stakeholder Committee Members Who Own Individual Wells

December 12, 2006

Dear Environmental Services Board and Wake County Commissioners:

I appreciated the opportunity to serve on the County's Groundwater Sustainability Committee. Two of the stakeholders on the committee represented Wake County citizens served by individual private wells. I was one of the two.

My wife and I live in the northwest part of the county, just north of Norwood Road. This area is experiencing considerable growth. In fact, two new subdivisions are being built adjoining our property. These subdivisions will each have a community well system. These wells are normally deeper and draw more water than individual wells, such as ours. Our concern is that the proliferation of the high demand wells in our area will have a negative effect on the existing private wells which are usually shallower. There has already been at least one documented incident of a newly installed community well causing the loss of water to existing private well users in our area. We are concerned with additional occurrences, especially in the event of droughts and the likelihood that the newer subdivisions use more water, such as for irrigation.

I commend the County for establishing the stakeholder group and promoting discussion of how best to address groundwater sustainability. However, I am disappointed that the stakeholders were not able to reach a consensus. Although I understand that Option 3 will be forwarded to you as the recommendation, I'd like for you to note that both citizen representatives voted for a more proactive course of action for the County to pursue, Option 2. Please note again that one of the citizen representatives lost use of their private well due to a newly installed community well.

As homeowners on private wells we would like assurance that we have a sustainable source of water and that our investment is protected. I feel that the recommendation you will be presented is too vague as to when protective measures will be enacted. We wonder how many homeowners on private wells to be negatively affected it will take before the County will take a more proactive approach than the recommendation you are being presented. You can imagine that for even one more homeowner to lose their water supply, they will consider that one too many.

The risk to private well users is probably not universal countywide. However, shouldn't the County have a plan of action for areas already documented to demonstrate problems?

I request that the County adopt and implement a more proactive approach than Option 3. It is too vague and for some areas of the county, may be too little too late to help. I am hoping that the County will, in addition to collecting more data (which will be useful long-term) will adopt measures that will guarantee existing private well owners their right to a safe and viable water supply by either protecting existing private wells or providing connections to community water systems.

Thank you for your consideration.

Sincerely,

Steve Zoufaly

December 5, 2006

Memo to: Greg Bright

Subject: My Vote Regarding the Wake County Groundwater Sustainability Committee Recommendations

At the 6<sup>th</sup> meeting of the Wake County Groundwater Sustainability Committee on December 1, 2006 I was one of two votes differing from the majority. I want this letter, providing my rationale, to be included in the final report.

The majority voted for Approach No. 1. In brevity, this approach consists of:

1. Data Collection and Analysis;
2. Develop a "Risk Level" or "Resource Availability" Area Map;
3. Take Reactive Measures (indicated only as a possibility);
4. Establish a Permit Process for High Capacity Wells (indicated only as a possibility).

I do not support this as a final recommendation because steps 3 and 4 are not a given. They may never occur.

I voted for Approach No. 2. In brevity, this approach consists of:

1. Data Collection and Analysis;
2. Develop a "Risk Level" or "Resource Availability" Area Map;
3. Establish a Permit Process for High Capacity Wells (mandatory component).

I fully agree that steps 1 and 2 are vitally necessary. I also have a strong belief that the establishment of a permitting process for high capacity wells must begin and not be left to further analysis that may not ever result in its adoption.

The data collection, analysis, and resource availability area map will be valuable determine whether groundwater sustainability is a problem county-wide, a problem in a few locations, or not a problem.

The reason for this committee is the fact that on June 18, 2005 two private wells (including mine) in my development and three private wells in an adjoining neighborhood experienced the impact of groundwater sustainability. It cost us each thousands of dollars to reestablish our wells. This convinces me that there is at least a localized groundwater sustainability problem. This problem requires, at a minimum, regulatory controls on high capacity wells, both in bringing new wells on line (as to their impact on existing wells) and in monitoring and limiting their pumping rates as demand continues to grow.



My reasoning:

1. We have already experienced a severe problem;
2. The Lower Falls Lake Basin, where this incident occurred, is known to have water availability issues due to its underground geological composition, differing from other basins in Wake County.
3. Residential development continues to rapidly grow in this watershed;
4. Most new growth is high value residential properties incorporating expensive landscaping and expansive irrigation that goes with it. (during the drought of 2005, one new development even continued to water the berm along Creedmoor Road;
5. There are a growing number of high capacity wells within the Lower Falls Lake Basin to support new developments;
6. The minutes of meeting No. 5 ndicated Allen Hardy's (NCDENR Public Water Supply Section) comments about a problem observed in a planned subdivision near highway 98 and Creedmoor Road; water was unable to be found to sustain the development. The state has limited hookups in the area.
7. I have heard that a water line is to be installed from Strickland Road to Highway 98 along Creedmoor Road. This convinces me that water from high capacity wells close to us will potentially be supplying additional water to new developments in the lower Falls Lake Basin. I foresee further impact on private wells in the area.

Thus, I believe that Approach No. 2 is necessary to support the functionall objective of "preventing and mitigating know and/or potential groundwater quality and quantity impact for existing and future groundwater resources and ecosystems". It contains a basic component to address high capacity well usage parameters instead of leaving it as just a "possibility" in the future.

I want the County Commissioners to support regulations to control new high capacity wells and the increased pumping of current high capacity wells at least in the Lower Falls Lake Basin now. There is a problem. This was the reason for initiating this committee.

I also include a copy of the initial petition (signed by 25 neighboring citizens) sent to County Commissioner Betty Lou Ward.

Sincerely,



George Kavelak

Citizen Committee Participant

Attachment:

Letter to Wake County Commissioner Betty Lou Ward, dated July 14, 2005

July 14, 2005

Betty Lou Ward  
Wake County Commissioner  
District 6  
1321 Deerhurst Drive  
Raleigh, NC 27614

Dear Commissioner:

Subject: Water Utility Legislation

We are writing to inform you of a well water problem our neighborhoods in northern Wake County experienced the weekend of June 18, 2005. Based on the severity of the situation, we request your support in sponsoring county legislation to provide oversight of commercial water utility companies.

At least five individual wells on Norwood Oaks Drive and Bayleaf Trail went dry that weekend, resulting in our considerable expenses for deeper drilling, hydro-fracturing and/or replacing pumps. During the course of investigating the cause of these issues, it was discovered that the static water level in the entire area is more than 100 feet lower than it should be for this time of year.

Greg Bright, Wake County Environmental Services – Water, Wastewater and Development Services, and Jay Zimmerman, North Carolina Department of Environment and Natural Resources, investigated our situation and are concerned with this widespread water table change. These authorities informed us that water utility companies such as Heater Utilities are not subject to regulatory oversight on the amount of water they pump from their wells that share our aquifer.

It appears the utilities can remove enormous amounts of water from their various wells in one area and market it to customers in other areas within the county. With 65 wells in northern Wake County, Heater Utilities is by far the largest consumer of water in the area; therefore, their practices have a significant impact on those of us who are not their customers. It is clear that the water table is dropping severely and quite rapidly. This trend will continue unless someone takes action to address this situation. It is very likely that our issue was caused by Heater Utilities pumping excessive amounts of water from nearby wells in order to satisfy their customers' needs (new residential developments or existing water pressure issues) in other areas of northern Wake County.

Please sponsor legislation that will enable regulatory oversight of well locations as well as records of volumes and times of water pumped by commercial water utilities. Otherwise, there is no control to determine the environmental impact such a large commercial utility has on the water rights of individual citizens.

Thank you for your attention.

Name	Address	Telephone
George Kavelak	5820 NORWOOD OAKS DR RALEIGH, NC 27614	919-848-2268
Susan Kavelak	5820 NORWOOD OAKS DR RALEIGH, NC 27614	919-848-2268
Neal S. Kavelak	582A NORWOOD OAKS DR. RALEIGH, NC 27614	919 676 4194
Betty Franks	5829 Norwood Oaks Dr. Raleigh, N.C. 27614	919 676-4194
Beth Kinsler	5825 NORWOOD OAKS DR RALEIGH NC 27614	919-622-5303
Charlie Gaul	5825 norwood oaks dr raleigh nc, 27614	919-610-1555
Ginny Mahoney	5821 Norwood Oaks Dr Raleigh NC 27614	919-847-6059
Jus. P. Mahoney	5821 Norwood OAKS DR. RALEIGH NC 27614	919-847-6059
Lyn Foyall	1708 Bayleaf Trail Raleigh, NC 27614	919-846-1598
Jamett Bundy	1720 Bayleaf Tr Raleigh, NC 27614	919-847-7323
Margie Bundy	1720 Bayleaf tr 27614	919-847-7323
John Johnson	1717 BAYLEAF TRAIL	919-847-8949
Elizabeth Johnson	1717 Bayleaf trail 27614	919 847 -8949
Jerry Kempton	5809 NORWOOD OAKS DR 27614	919-676-7688
Beth Kempton	"	"
Eddy Wangsawidjaja	5812 NORWOOD OAKS DR	919-845-0088
IRIENE Wangsawidjaja	"	"
Amy Warren	5800 Norwood Oaks Dr. Raleigh NC 27614	919-604-8999
Joseph P. Freed	5813 Norwood Oaks Dr.	919-848-8268
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Gregory A. Thompson	1704 BAYLEAF TR	(919) 847-7260

<del>W. J. K.</del>	5805 Norwood Oaks Dr 27614	919-844-2817
Matt + Jamie Finnum	5816 Norwood Oaks Pkve 27614	919-841-5991
Mady Ficks	1716 Bayleaf Trl 27614	919-847-4083
Annie Ruth Jew	1712 Bayleaf Trl 27614	919-844-4465

CC:  
 Greg Bright  
 Wake County Environmental Services  
 Water, Wastewater and Development Services  
 336 Fayetteville Street Mall  
 P.O. Box 550  
 Raleigh, NC 27602

S. Jay Zimmerman  
 North Carolina Department of Environment and Natural Resources  
 Raleigh Regional Office  
 1628 Mail Service Center  
 Raleigh, NC 27699-1628