

Chapter XII

Appendix: Land Use Task Force Goals, Strategies, and Discussion Papers (Summer 1996)

DISCUSSION PAPER #1

GOAL #1. To guide quality growth throughout the County in conjunction with affected local governments. Wake County recognizes that its actions impact other local governments in the area, and its Land Use Plan will consider those impacts.

STRATEGY a. Seek regional solutions to regional issues, incorporating regional planning goals into the Land Use Plan as appropriate.

Scope. Regional issues can be defined as those in which actions in one geographic area impact other areas. Easily identifiable regional issues affected by land uses include transportation, surface water and wastewater and air quality.

Existing Situation. Transportation planning in this area is done through the Capital Area Metropolitan Planning Organization (CAMPO) and the Triangle Transit Authority (TTA). Wake County actively participates in both organizations.

CAMPO is responsible for transportation planning within Wake County, and with the Durham-Chapel Hill- Carrboro (DCHC) planning organization, is preparing a regional transportation model. The Wake County Board of Commissioners has adopted a thoroughfare plan for Wake County, including the thoroughfare plans for all municipalities in the County.

The Triangle Transit Authority (TTA) is attempting to implement a regional transit plan for Wake, Durham and Orange Counties, consisting primarily of regional rail and express bus service. The Wake County Board of Commissioners has endorsed TTA's recommendations for a Regional Transit Plan.

OBSERVATION - *Wake County seeks regional solutions to regional transportation issues and*

has incorporated regional transportation planning recommendations into its local plans. Continued coordination appears appropriate.

Scope. Surface water and wastewater are interrelated. They include: maintaining the quality of all surface waters; securing an adequate water supply; providing adequate wastewater treatment; and interbasin transfers.

Existing situation. Surface water quality planning has primarily concentrated on maintaining the quality of Water-Supply Watersheds. Wake County implemented development regulations to maintain the quality of its water-supply watersheds, starting in 1984. This was a regional effort through the Triangle J Council of Governments. Wake County revised those regulations to comply with new State water quality regulations in 1993. Many of the 1993 changes involved development standards to protect the water quality of supplies downstream from Wake County.

Wake County also participated with the City of Raleigh in the Lower Barton's and Honeycutt Creek watersheds study, completed in July 1992. This study addressed three points:

1. A delineation of the critical area of the drainage basins based on travel times.
2. The advisability of an impervious surface limit for residential development in the drainage basins.
3. Spill containment measures for the North Wake Expressway.

The Board of Commissioners considered the recommendations from this study, but deferred action on them pending completion of a study of the entire Falls Lake in 1995.

Wake County participated in the 1995 study of Falls Lake. As a follow-up to that study, the Board of Commissioners agreed to participate in the Upper Neuse River Basin Association,

where many of the Study's recommendations will be addressed. This association was created to foster improved communication and coordination of the various water quality management programs in the Upper Neuse River basin and to explore new techniques and strategies for improving these water quality management programs.

The State of North Carolina prepared a Comprehensive Conservation and Management Plan (CCMP) for the Albemarle-Pamlico Estuarine Basin. Wake County has appointed a member to the Neuse River Regional Council. This Council was created to represent local interests within the Neuse portion of the Basin during the implementation phase of the CCMP, to improve public awareness and involvement in the management of the state's natural resources and protect the quality and intended use of North Carolina's natural resources while allowing for reasonable economic planning and growth.

OBSERVATION - *Wake County seeks regional solutions to regional water quality issues and has incorporated regional and State water quality recommendations into its regulations and programs. Continued cooperation appears appropriate.*

Scope. Securing an adequate supply of water involves not only ensuring that there is an adequate source of water, but also that it can be distributed where it is needed.

Existing Situation. Wake County's water supply consists primarily of Falls Lake, Jordan Lake, the Wake Forest reservoir, Little River, and water from Harnett County. Wake County government does not own or operate a water supply or treatment plant. However, the County has been instrumental in providing interconnections among Wake County's municipalities. Major anticipated changes include: enhancing the storage capacity of Falls, requesting an additional allocation from Jordan, using Lake Benson as a water source once again, and constructing a reservoir and treatment plant on Little River. Planned water sources need to be implemented in a timely manner, if Wake's future demand for municipal water is to be satisfied.

Regionally, the Greater Triangle Regional Council is considering conducting a Regional Water Supply Feasibility Study. This study would evaluate existing and projected water

demands and water supply and treatment facility capacities, and would present alternative approaches that might be mutually beneficial to local communities as they develop plans to meet those demands. Wake County staff is involved in this work.

OBSERVATION - *Since a regional approach will enhance the potential for Wake County to receive an additional allocation for Jordan water, the County should work with Cary and Apex to secure the additional allocation. An intergovernmental approach is already being used to create the Little River reservoir, and it appears appropriate to continue that approach. The County should continue to be involved in the regional study.*

Existing Situation. Many municipalities lack the financial ability to extend water service lines in a timely manner. Therefore, many municipalities depend largely upon the private sector to finance line extensions, primarily to serve new developments. This approach can result in a haphazard sequence of development, complicating delivery of other services. It also leaves owners of outlying property unsure as to when services will be extended their way. The lack of a systematic water line extension program also leads some to develop their property on wells, when they would be better served by municipal water.

OBSERVATION - *One way in which the ability to provide water service in a timely manner could be addressed is to provide a mechanism for adequately funding water improvements, in accordance with an overall plan for water supply, treatment and delivery. Such a program would enhance all local government's ability to provide water services where needed.*

Scope. Securing adequate wastewater disposal involves not only ensuring that there is adequate treatment capacity, but also that collection lines can be extended where needed, and that receiving waters are not degraded by effluent from wastewater treatment plants.

Existing Situation. Providing adequate treatment capacity is becoming more complex and expensive. In past years, Knightdale, Rolesville and Wendell opted to connect to Raleigh's system, rather than go on their own. This approach not only provides municipal wastewater treatment at less cost to the municipalities, but it also concentrates treatment activities in large plants which can benefit from economies of scale in operation,

and allow a higher level of treatment than might otherwise be available.

Regionally, the Greater Triangle Regional Council is considering a report and recommendations on regional wastewater management. County staff is involved in this effort.

OBSERVATION - *A regional approach to providing wastewater treatment appears to be occurring now, because of costs. The County should continue its involvement in the regional wastewater management study.*

Existing Situation. As with water lines, many municipalities lack the financial ability to extend wastewater treatment lines in a timely manner, with the same effects mentioned above for water lines. The lack of a systematic water line extension program also leads some to develop their property on septic tanks or community wastewater systems, when they would be better served by municipal wastewater service. This is more serious than developing on wells, however, because there can be an adverse environmental impact from developing on alternative wastewater systems.

OBSERVATION - *As with water service, one way in which the ability to provide wastewater service in a timely manner could be addressed is to provide a mechanism for adequately funding improvements, in accordance with an overall plan. Such a program would enhance all local government's ability to provide water services where needed.*

Existing Situation. The State of North Carolina issues discharge permits for wastewater treatment plants by river basin, in part so that they may consider the total impact of all of the plants at the same time.

OBSERVATION - *The state handles this, so it appears that a regional approach to issuing discharge permits is implemented by the state. There does not appear to be a need to duplicate their efforts.*

Existing Situation. Since parts of Wake County are in the Neuse River Basin and other parts are in the Cape Fear River Basin, where water is drawn from one basin and discharged into another, State approval of interbasin transfers is required.

OBSERVATION - *Since the state handles this,*

it appears that a regional approach is implemented by them. There does not appear to be a need to duplicate their efforts.

Existing Situation. Air quality is addressed through CAMPO and by the state. The primary source of air pollution in this area is exhaust from motor vehicles. The transportation planning process followed by CAMPO and all other metropolitan planning organizations includes air quality implications of all changes to the transportation network. The State monitors air quality and imposes requirements designed to improve emissions from motor vehicles, such as emission standards, as well as oxygenated fuel for winter time.

OBSERVATION - *It appears that a regional approach is implemented by CAMPO and the state. There does not appear to be a need to duplicate their efforts.*

STRATEGY b. Adopt joint land use and community facility plans with municipalities for short and long range urban services areas and use those plans as a guide in land use, community facilities and infrastructure decisions.

Existing Situation. The Board of Commissioners began the joint planning process with municipalities in 1988. The General Development Plan (GDP) and joint plans included in the GDP have a 10 to 15 year time frame. The Perimunicipal Areas outlined in the GDP are defined as those areas where municipalities plan to provide services and annex over a 10 to 15 year period. In 1989, the County adopted a water and sewer plan, which included plans for each municipality. This plan was created in order for the County to evaluate requests for funding improvements. The County has coordinated planning for its community facilities with municipalities, usually involving co-location of facilities on the same property.

The following 8 joint land use plans have been adopted:

1. August 21, 1989 - Fuquay-Varina
2. September 17, 1990 - Wake Forest
3. October 1, 1990 - Apex
4. October 1, 1990 - Cary
5. November 18, 1991 - Raleigh Southeast Area
6. December 16, 1991 - Raleigh Northeast Area
7. January 27, 1992 - Swift Creek Land Management Plan
8. July 20, 1992 - Wake

County/Raleigh/Rolesville/Wake Forest Joint Plan.

In 1994, Fuquay-Varina, Holly Springs, Apex, Cary and County staff prepared a plan for the Upper Middle Creek area. The Planning Board deferred acting on this plan until it could be discussed in the context of the Land Use Plan.

In the current joint planning process, it is not clear what will happen to Rural areas after the 10 to 15 year time frame. It is not clear if they are intended to forever remain low-density residential, rural, or agricultural, or are they merely future urban areas beyond the plan's time period.

OBSERVATION - *The joint planning process could be revised to address these concerns, by establishing a longer time frame for plans, perhaps 40 years. This would require close coordination with municipalities and rural and water-supply watershed communities to determine areas that could and should be served in that time frame.*

DISCUSSION PAPER #2

GOAL #2. To encourage growth close to municipalities, to take advantage of existing and planned infrastructure, such as transportation, water and sewer facilities.

STRATEGY a. Encourage higher densities and a wider range of land uses where existing and planned short-range community facilities and infrastructure can support them.

Existing Situation. Many communities leave undeveloped, or lightly developed areas of the community zoned in a "holding" zone, usually agricultural or low-density residential, even when their land use plan designates an urban use for the area. The reasons for this practice vary, but it often is because there are not services in the area to accommodate planned uses, the plan is general about what the specific uses on specific properties should be (and the municipality does not feel it is appropriate to predetermine the use), or the municipality wishes to obtain improvements not specified in their ordinance through the rezoning process. This practice, however, often encourages development into rural areas, where the land is cheaper and densities are more determined by the ability of the land to provide water and accept wastewater than by zoning.

OBSERVATION - *Since the primary services provided by municipalities to newly developing areas are water, sewer and roads, implementing the funding mechanism for water and sewer mentioned above would help municipalities overcome that resistance to pre-zoning land. If the problem with pre-zoning land is the lack of specificity of plans, or a reluctance to be specific about the permitted uses, the municipality could prezone by intensities. In this process, the municipality decides what intensity of uses is appropriate for different areas. Residential land uses within those intensities would be allowed as permitted uses, and non-residential land uses which comply with the land use plan would also be allowed as permitted uses. Only exceptions to the plan would require rezoning or special permits. In order to ensure that needed improvements are made to support new developments, municipalities could include those requirements in their zoning and subdivision regulations.*

Since the plan emphasizes encouraging and incentives to achieve its goals, there would be no proposal to make development in rural areas less attractive. If the municipalities provide adequate services and make it easy to develop in accordance with their plans, the market should respond by developing close to municipalities and their services.

STRATEGY b. Enhance the ability of local governments to provide water and wastewater treatment services in accordance with joint plans for urban services areas.

Existing Situation. As mentioned above, many local governments do not have the financial capability to provide water or wastewater treatment or the lines to extend that service to developing areas. In the past, this was not as burdensome for local governments, because the Environmental Protection Agency provided grants for 75% and the State provided grants for 12-1/2% of the cost of providing wastewater treatment services.

OBSERVATION - *A County-wide program to help finance improvements for water and sewer service could be established. Such a program would probably need a county-wide land use plan, a water and sewer plan to serve land uses where needed, and funding.*

DISCUSSION PAPER # 3

GOAL 3. To encourage development of communities which provide adequate land for anticipated demands, in a pattern which allows a mixture of uses.

STRATEGY a. Encourage appropriate design and a compatible mix of land uses and locate community facilities where they can be focal points for communities.

STRATEGY b. Encourage local governments to properly zone a sufficient amount of land for short-range land use demands.

This concept appears to deal with the communities (e.g. municipalities) as a whole and areas (e.g. neighborhoods, rural crossroad communities) where a mixture of land uses exists or could be planned.

The land use plan should identify the needs for various types of land uses and ensure that municipal, joint and County plans accommodate those needs, with sufficient flexibility to ensure that the market for land operates effectively. Local governments should at least allow, or perhaps encourage, mixed use developments, provided they are designed to allow compatibility among uses. Local governments should continue to coordinate their planning for community facilities to create community centers which are accessible and provide a range of services.

DISCUSSION PAPER #4 & #5

GOAL # 4. To encourage maintenance of: open space, scenic aspects of rural areas, entranceways to urban areas, and transition areas between urban areas.

Strategy a. Identify the open space, scenic aspects of rural areas, entranceways to urban areas, and transition areas between urban areas of Wake County that significantly contribute to the County's character and provide incentives for property owners who choose to maintain them, or acquire an appropriate public interest in the property. These may include such measures as design flexibility to incorporate a feature into a development while still deriving the allowed intensity of use from it, adaptive reuse of structures, land acquisition, purchase or transfer of development rights, and density credits for open space reservation or dedication.

GOAL # 5. To encourage the conservation of environmentally significant areas and important natural and cultural resources.

Strategy a. Identify areas which provide habitat for significant plant or wildlife species or make a significant contribution to environmental quality. Identify areas, sites, structures, or objects with historical, architectural, or cultural significance. Provide incentives for property owners who choose to maintain them, or acquire an appropriate public interest in the property. These may include such measures as design flexibility to incorporate a feature into a development while still deriving the allowed intensity of use from it, adaptive reuse of structures, land acquisition, purchase or transfer of development rights, and density credits for open space reservation or dedication.

Scope. This document represents the observations and recommendations, to date, of the Environmental Resources Subcommittee of the Wake County Land Use Task Force. This document does not represent regulations being considered or proposed by Wake County.

The subcommittee chose to address these goals together because many of the strategies for protecting scenic areas, open space, and significant environmental, historic, and cultural resources and for providing land for recreational activities are related. The subcommittee also notes that protection of farmland (goal 6), surface water (goal 9), and groundwater (goal 10) are also highly related goals, and many of the strategies discussed in this paper may be helpful in protecting those resources as well.

Existing Situation. Private landowners of farm and forest land in Wake County have historically protected many of the county's most important environmental and scenic resources and, in close-knit rural communities, provided much of the recreational land. Now that the population of the county has grown so rapidly and the economics of farming has declined, those environmental, scenic, and recreational resources are disappearing rapidly. Between 1982 and 1992, the acreage in farms in Wake County declined by 25%, from 160,862 to 119,855 acres (US Census Bureau).

In its [Inventory of the Natural Areas of Wake County](#), the Triangle Land Conservancy

identified 53 sites as the most important natural areas in the county because of their native plants and geologic features. Many of these sites are located along stream corridors. Although the county's prime wildlife habitat has never been systematically inventoried, much of it will occur along these same stream corridors and in large, unbroken tracts of forests and fields. Significant historic structures are identified in The Historic Architecture of Wake County, North Carolina (Lally). The county has not attempted to identify important scenic resources and highways.

Some of the natural and historic sites in these inventories have been protected by governments and non-profit agencies, but the status of many of them is presently unknown. Durham County has established an excellent process, which Wake County may want to adopt, for reviewing the status of its inventory sites and adding new ones when they are discovered.

As the population of Wake County has grown, citizens continue to need places to walk and enjoy nature, and private landowners can no longer provide access to the growing number of neighbors to their properties.

Current Wake County Parks & Open Space (Acres) per 1000 People:
 School Parks 0.45
 District Parks 0.06
 Developed Parkland 0.89
 Undeveloped Parkland 1.73
 [Information from Wake County Parks & Recreation]

Wake County has three passive recreation parks (Lake Crabtree, Blue Jay Point, and Historic Oakview) and a number of active recreation parks on school campuses. The county is now acquiring land for the Little River Reservoir, some of which will be used for park land, and negotiating for lease or acquisition of a number of other areas throughout the county.

Existing Wake County Parks, particularly Lake Crabtree, are experiencing very heavy use. Trails and grassy open space are in highest demand. The County ranks low in acres of open space per capita compared to other counties nationwide. Planners suggest that there should be 2.5 acres of active recreation parks per 1000 people and 5 acres of passive recreation parks per 1000 people.

The natural beauty of Wake County seems to be one of the main reasons that people like to live here. Protection of those environmental and scenic resources, therefore, makes sense from an economic perspective. As the county becomes more crowded, a premium will be placed on open space and it will have enhanced economic benefit, especially for the future.

Other benefits of protecting our natural areas are to help reduce air pollution, improve water quality, and reduce flooding.

Wake County has been most effective in protecting open space when it has developed a specific "master plan" for an area that provides multiple benefits. An example of this type of plan is the one created for the Little River Reservoir, which will not only provide an increased water source and protect its quality but also provide park land and trails.

Landowners often initially resist the idea of having land they own shown on a map as a resource that is important to the county. Identifying land in this way, however, can be a great help to a landowner who wants to develop and/or conserve his land. First, developers rarely work on projects that are large enough to set aside parks and open space that are significant to the county as a whole, such as connected greenways along rivers. But if the county creates a plan for such protected open space, a developer can increase the marketability and value of his development by designing it to fit into that overall plan. People seeking a rural experience will often pay more to live next to a protected natural or agricultural area.

Second, in order to qualify for tax deductions and credits for placing a conservation easement on your land, the land must be identified in a government document as having public value. These tax benefits are particularly valuable to people who have a low basis in their land. They can use the tax deductions/credits to offset capital gains taxes and may end up making more money by conserving part of their land.

The County is presently encouraging protection of open space through the following means:

- On April 15, 1996, new cluster subdivision regulations were adopted. Cluster development is a design alternative to conventional lot-by-lot subdivision design which smaller lots

are grouped, or "clustered," on part of the development site in exchange for reserving other parts of the site as permanent open space. Cluster development design provides significant benefits over lot-by-lot subdivision design. By allowing development to be clustered on part of the site, it reduces the size of the network of roads and utilities needed to serve the development, and reduces the amount of land disturbance and impervious surfaces. By reserving parts of the site as permanent open space, it better conserves and protects natural hazard areas, allows better conservation and protection of other significant or environmentally sensitive natural areas, and allows the provision of active and/or passive recreational opportunities for area residents. Open space may also be reserved to conserve and protect historic resources and to conserve and protect farmland and forestland for continued agricultural or forestry use.

- The Board of Commissioners adopted a framework for protecting open space that was developed by the Open Space Task Force in May 1993. The framework identifies a number of stream corridors and stand alone areas as key areas for protection.
- The Wake County Parks & Open Space Master plan is being revised. The current version contains greenway corridors.
- The County has worked with some municipalities to develop joint land use plans for the Perimunicipal Planning Areas (PPA). Typically, these plans identify areas for open space. These plans provide opportunities to identify and gain municipal commitment for gateway and transition areas.

Recommendations

The subcommittee recommends the following three strategies for protecting natural, cultural, and recreational areas in the county. Each strategy can be pursued concurrently, and the recommendations within each are written in the order in which they would be undertaken.

Strategy I

This strategy is for areas of enough significance that the county may want to consider acquiring

land and easements to provide permanent protection and, in some instances, public access.

a) Define, on a map, what resources the county wants to encourage voluntary, incentive-based conservation of. These resources might include:

- 1) natural areas identified in the Triangle Land Conservancy inventory;
- 2) historic sites identified in the Wake County inventory;
- 3) major wildlife corridors (new research will be needed to identify these corridors);
- 4) existing and planned parks and greenways;
- 5) scenic roads and byways (new research will be needed to identify these roads);
- 6) water supply watersheds and lakes;
- 7) groundwater recharge areas (new research will be needed to identify these areas); and
- 8) prime agricultural soils and historic farms.

b) Contact all owners of land identified in a) above to let them know that their land has been identified as significant and that they are now eligible for tax incentives if they are interested in protecting the land through donation of land or easements. The letter should identify who the landowner should call for more information. The county may want to work with local non-governmental organizations such as the Triangle Land Conservancy or Wake County Historical Society to educate landowners about options and to evaluate land.

c) Educate landowners about estate and income tax benefits of donations of land and easements. Such educational programs are most effective when done in small workshops and one-on-one.

d) Establish a system to ensure that the county knows whether any of the resources identified in a) above may be affected by a proposed development. Educate the developer about the resource and about voluntary options for protecting it. Encourage flexibility in the development plan review so that the resource can be protected.

e) Set priorities for where to concentrate protection efforts. Criteria should include:

- 1) most significant resources within each category in a) above;
- 2) areas under strong development pressure;
- 3) areas that receive little protection through existing regulations;
- 4) areas where public access is desired; and
- 5) landowner interest.

f) Develop master plans that create a vision for

how the significant resources listed in a) above can be protected and, when appropriate, opened to the public. For example, as many of the resources are located along stream corridors, many of these plans would create a vision for how land along a river or creek could be used to provide park land, greenway trails, vegetative buffers for water quality, and a variety of other benefits (e.g. Little River Reservoir plan). These master plans should be developed with the help of broad-based advisory committees of local landowners and concerned citizens.

g) Seek the financial and organizational resources to acquire and maintain land and easements in the areas identified in the master plans:

- 1) The county should designate one or more of its departments to hold and monitor trail, conservation, and agricultural easements;
- 2) Seek support for land and easement acquisition programs from municipalities and non-profit land trusts such as the Triangle Land Conservancy and the Trust for Public Land;
- 3) Potential sources of funds are county bonds, the NC Parks and Recreation Trust Fund, local portion of state deed excise tax, county general fund, a new tax, private funding; and
- 4) Develop program to encourage owners of land adjacent to areas that are to be protected to finance part of protection costs.

Strategy II

Use regulations, incentives, and education to protect stream buffers and provide open space in areas other than those identified for acquisition or easements in the master plans.

Options include:

- a) writing regulations governing new development to encourage:
 - 1) 50-foot-wide vegetated setbacks from streams (see this subcommittee's recommendations for surface water protection-goal 9);
 - 2) set backs from flood hazard areas, wetlands, and steep slopes (greater than 25%); and
 - 3) provision or access to open space for people to walk and enjoy nature.
- b) using public investments in water and sewer, schools, and roads to encourage development where it will have the least impact on significant resources; and
- c) educating owners of land along stream corridors about landscaping options that maintain a forested, fifty-foot buffer.

Strategy III

Establish a permanent advisory committee to review, advise, and help implement the county's programs to protect open space and provide recreational areas. This committee should be a broad-based group including landowners and concerned citizens.

DISCUSSION PAPER #6

GOAL #6 To allow owners of significant farmlands and forest lands the opportunity to maintain the productivity of their lands. Provide incentives and/or assistance which help property owners to maintain farms and forests.

Strategy a. Implement a voluntary Purchase of Development Rights (PDR) program if a significant number of landowners are interested in participating. Consider leasing development rights (LDR) if interest in PDR is low.

Existing Situation. The Wake County Board of Commissioners adopted a PDR program in 1989. However, this program has never been funded beyond an initial \$25,000 start-up allocation. Efforts to obtain additional general funds for the program were unsuccessful due to the tightening budget situation. An attempt to include funds for this program as part of the \$10 million Parks Bond in 1993 did not succeed due to a legal barrier prohibiting the combination of funding for full public access projects (parks) and projects with no public access (farmland preservation) on the same referendum.

Discussions with local farmers prior to adoption of the PDR program in 1989 indicated a significant level of interest in participation, with adequate funding. Changes in the local farm economy may have altered this interest level. The unpredictable future of tobacco production, which has traditionally formed the backbone of the local farm industry, is an obvious factor. This, together with development patterns occurring since 1989 and other influences mean that the priority areas and program scope outlined in the 1989 PDR program should be reexamined.

Voluntary PDR is still one of the most effective and equitable methods available for keeping lands available for agriculture. Now, as was the case in 1989, identification of a dependable funding source and landowners interested in participating are the key elements.

Landowners unwilling to sell development rights in perpetuity may be interested in leasing their development rights for a period of years (10 years was suggested). The downside of this approach would be that it may be viewed as another farm subsidy program with no permanent public benefit. This could be partially offset by allowing lease funds to go toward eventual PDR should the landowner later decide to sell.

Recommendations (pursue in the following order):

1. Educate the County Commissioners about the benefits of farmland preservation and seek a commitment from them to contribute County funds for purchasing or leasing development rights.
2. Conduct an education program and survey directed at farmland owners in the County to promote an understanding of PDR/LDR and to determine if there would be enough participation to justify the establishment of such a program.
3. Conduct an education program and survey directed at local taxpayers to promote an understanding of the public benefits of farmland preservation and to measure support for using public funds for PDR/LDR.
4. If the results of the above activities are positive, the following funding sources should be pursued, in priority order. Bond funds would be sought if program participation exceeded the level supportable by the first two sources.
 - Rollback taxes collected when farmland is sold for non-farm uses (generates \$100,000 - \$1 million annually)
 - A portion of the land transfer tax
 - Farmland Preservation Bond

Once funds are secured from one or more of the above sources, additional monies should be sought from:

- Grants
- Farms for the Future Act Funds (a low-interest federal loan program for farmland preservation).

5. Funds available for the PDR/LDR program should be used to protect lands in the following priority order:

- Soils with highest productivity
- Large contiguous tracts or tracts within close proximity of each other
- Lands near other open/protected areas
- Farms with conservation measures in place
- Historic farms
- Farms producing unique crops

- Farms containing significant natural areas
- Farms with high probability of development
- Water supply watershed areas as designated by Wake County
- Lands where owner has made recent large investments in farm operation
- Gateway areas along roadways between municipalities

6. Amend the County's 1989 PDR program to reflect updated goals and priorities and to include provisions for LDR if surveys show support for these programs.

STRATEGY b: Promote estate planning, the donations of conservation easements, and land donations to keep land available for farming. Work to reduce or eliminate state and federal inheritance taxes and increase tax incentives for donations.

Existing Situation. High inheritance taxes often force farm families to sell land for development. Timely estate planning can utilize existing provisions within the law to greatly lessen or eliminate this tax burden. Conservation easement donations can be used to reduce both inheritance and income taxes. If land is sold for development, other lands protected by easements can be used to offset capital gains taxes immediately and to reduce income taxes over a period of years. Outright land donations by individuals or corporations can also carry significant tax incentives that citizens may not be aware of. A limited number of consultants with a variety of organizations are available at the present time to assist with estate planning and conservation easement programs. Some of these specialists are not adequately trained in all aspects of this strategy. These efforts would likely be most effective if carried out on a regional basis.

Recommendation:

1. Establish a Task Force composed of specialists from appropriate agricultural organizations, government agencies, land trusts, and other appropriate groups, to develop a cooperative regional program to promote estate planning, conservation easement donations, and land donations. This program should include:
 - public education/information programs
 - consultant recruitment and training efforts
 - a cooperative arrangement for soliciting, negotiating, processing, and monitoring donations
 - political action strategies for reducing or

eliminating inheritance taxes and increasing tax incentives for donating easements and lands for conservation.

STRATEGY c: Provide for ongoing efforts to investigate and implement farmland preservation strategies.

Existing Situation. The farmland preservation subcommittee of the Land Use Task Force did not have adequate time to fully evaluate all of the emerging farmland preservation strategies. Work should continue to evaluate the success of the recommendations contained herein and to explore other options.

Recommendation:

1. Establish an advisory committee to advise the County on farmland preservation issues. This group will evaluate the results of planned farmland preservation activities, monitor emerging voluntary/incentive-driven strategies, and recommend implementation of those strategies which hold promise.

DISCUSSION PAPER # 7

GOAL 7. To ensure that the land use plan and transportation plan mutually support each other.

STRATEGY a. Ensure that the land use plan reflects the ability of the transportation system to maintain an acceptable level of mobility.

STRATEGY b. Ensure that the intensity and design of land uses maintain, to the extent practical, the ability of roads to carry traffic safely and efficiently.

STRATEGY c. Promote transit-oriented development along existing and planned transit corridors by encouraging appropriate design, mixed uses and intensities.

STRATEGY d. Plan transportation facilities in relation to planned growth.

Existing Situation. The County coordinates land use and transportation planning in the following ways :

1. The County (through NCDOT) uses its land use plan to help forecast future road needs.
2. Where roads are planned, the County requires coordination of those roads with planned subdivisions.
3. Where road widenings are planned, the County requires coordination of those

widenings with planned subdivisions.

4. Where roads are over capacity or projected to be over capacity, the County considers that in approving or denying rezoning and special use applications (and in planning its own facilities).

5. The County plans its most intense growth in relation to roads, in at least two ways: Non-residential growth is generally planned at major intersections, which can handle the traffic and the most intense residential and non-residential growth is generally planned close to municipalities, where more resources are often devoted to road planning.

6. The County manages curb cuts (frequency and spacing) along its major roads.

7. The County considers all subdivisions in relation to sight distances and the possible need for deceleration or turning lanes.

8. The County requires road connections between subdivisions so there will be a network of local roads.

Analysis. The Land Use Plan should propose intensities and locations for land uses that can be supported by the transportation system, including planned improvements to the system. Land use intensities should be appropriate for their location (e.g. high intensity uses located where they are served by major thoroughfares or public transportation), and access to roads designed so that their ability to carry traffic safely and effectively is not diminished. Transit-oriented developments, which allow a mixture of land uses and encourage walking, should be encouraged along existing and planned transit corridors. Reevaluate the planned transportation system to accommodate changes in land use patterns not previously programmed.

DISCUSSION PAPER # 8

GOAL #8. To ensure that the County always protects the property rights of landowners.

STRATEGY a. Where achieving public purposes affects private property, work with property owners to determine the most appropriate means to balance public purposes with individual property rights. These may include such measures as providing design flexibility to incorporate a feature into a development while still deriving the allowed intensity of use from it, adaptive reuse of structures, land acquisition, purchase or transfer of development rights, and density credits for

open space reservation or dedication. Use incentives or public acquisition of property rights, as appropriate, instead of regulations. Use restrictive regulations only where public health or safety require them.

Scope. The concept of private property rights in the United States is one of the fundamental rights espoused by the founding fathers and incorporated into the Declaration of Independence and the Bill of Rights. The colonial leaders were influenced by the writings on natural law and the function of government of Sir William Blackstone, Sir Edward Coke, John Locke, and Thomas Hobbes, among others. The prevailing theory was that government was necessary in order to ensure to the individual the protection of his fundamental rights. However, checks must be placed on government so that it did not become too powerful and itself deprive individuals of their fundamental rights. While it was recognized that the rights of the individual must sometimes give way to the welfare of society as a whole, government must not be able to erode individual rights in a wholesale fashion under the guise of protecting the health, safety, and welfare of the larger society.¹

Efforts to define private property rights, and the extent of government authority to regulate the use and development of private property have historically focused on balancing the individual's interest in using his property the way he would like and society's interest in controlling that use to protect the health, safety, and general welfare of the larger society. Two hundred years of constitutional law, however, have not established a "bright line test" for striking that balance, since judicial attitudes have changed along with public opinion, composition of the courts, and political philosophy.

Existing Conditions

The Role of This Plan - This land use plan provides both a context and policy guide for making decisions about public projects and regulations affecting the future growth and development of Wake County. It defines those societal goals concerning land use and development that are to be achieved through a variety of programs and regulations. Its development included consideration of how achievement of public purposes might affect private property rights and how best to ensure that those rights are not eroded while achieving essential public purposes. This plan, therefore,

serves to define the intended nature and extent of those programs and regulations that will implement it.

Constitutional Requirements - The ultimate protection of private property rights against government interference is found in the "due process" and "takings" clauses of the Fifth Amendment of the U.S. Constitution's Bill of Rights, which state that "no person shall be ... deprived of life, liberty, or property, without due process of law, nor shall private property be taken for public use without just compensation." Although the takings clause was originally meant to deal with direct, physical appropriations of private property, its meaning has been expanded to include any regulation that "goes too far." Court decisions have generally merged the due process and taking issues, but have not yet defined any hard and fast formula for determining when a taking has occurred or when due process is absent (although attempts to do so have resulted in numerous tests²).

Zoning as Property Protection - Zoning came about during the political and civic reforms of the early 19th Century as "a more comprehensive, forward-looking, rational approach to addressing the public interest in the development of urban and urbanizing areas. It was designed to replace reliance on single-purpose ordinances and private litigation for land use management."³ The potential that zoning regulations may unduly interfere with private property rights has increased in recent years as zoning regulations have been used to address a broader scope of development-related issues and as rapid urban growth has placed local governments in a "catch-up" position in meeting demands for urban services. In many cases, traditional zoning measures simply cannot be adapted to address these new issues and demands without increasing the potential for undue interference with private property rights.

Fair Decision-Making Procedures - All property is different. Even the best, nonintrusive regulations may still adversely affect a particular property. A system of variances and special uses provides administrative relief from unfair regulatory impacts, but may be cumbersome or too unduly influenced by the political process to ensure fairness. Similarly, unnecessarily complex decision-making processes and a failure to rely on defined decision-making criteria may result in the unfair application of

regulations to private property.

OBSERVATIONS

Review all plan-implementing programs and regulations that affect private property to ensure that they conform to, and are justified by, the land use plan.

Periodically review and update this land use plan to ensure that its goals and strategies continue to reflect consideration of private property rights and to define how it should be implemented so as to continue protecting those rights; provide ample opportunity for participation by all affected persons, especially landowners.

Ensure that the programs and regulations implementing this plan substantially advance the public purposes reflected in it, and that they do so in an effective and efficient manner, while continuing to provide landowners the opportunity to make economically viable use of their property, and without inordinately burdening their reasonably foreseeable, investment-backed expectations.

Ensure that no landowner permanently bears a disproportionate share of a burden imposed for the public good that, in fairness, should be borne by the general public - e.g., ensure that there is an essential nexus between legitimate public purposes and the conditions imposed on a development approval, and that the nature and extent of the conditions are "roughly proportional" to the impact of the proposed development.

Provide methods for fairly compensating landowners who are inordinately burdened by application of land use regulations solely intended to serve community interests.

Remember that individual property rights do not extend beyond the boundary lines of one's property. For example, individuals buying property in a single-family residential subdivision have no guarantee (and no right to expect one) that the area surrounding their subdivision will remain the same as when they purchased. The maxim that all landowners need to be protected from the harmful activities of their neighbors applies not only to the farmer who wants to develop his land only to be told by the neighboring subdivision that the expectation is for the farm to remain open space, but also to the neighbors who learn that a developer wants

to locate an asphalt plant next to their subdivision.

Make greater use of incentives and other nonregulatory approaches in achieving this plan's goals and strategies, preferably approaches that recognize and take advantage of real estate marketing and economic tendencies. Focus the planning of, and public investment in, new and extended public facilities and services in those areas where this plan calls for encouraging development.

Make sure requirements that new development provide or contribute to public facility and service improvements are based on quantitative standards that accurately reflect the development's demand for, and/or impact on, those facilities and services.

Provide greater design flexibility in development regulations so as to avoid or mitigate reductions in land value, and to avoid the need for variances.

Ensure that development regulations provide a decision-making process whereby final decisions are reached in a reasonable time, decision-making and review is impartial, reasons for decisions are given, and administrative relief is routine.

¹ Carr and Berstein's American Democracy, 8th edition, Dryden Press, 1977.

² Simplified, the U.S. Supreme Court's decisions have determined that, to comply with the takings and due process clauses of the Fifth Amendment, a regulation must substantially advance legitimate state interests (*Agins v. City of Tiburon*), not deny landowners all economically viable use of their land (*Agins, Lucas v. South Carolina Coastal Council*), and not interfere with distinct investment-backed expectations (*Penn Central Transportation Company v. New York City*). It has also determined that there must be an "essential nexus" between legitimate public purposes and any condition imposed on a development approval (*Nollan v. California Coastal Commission*), and that there must be "rough proportionality" between the nature and extent of the conditions and the impacts of the proposed development (*Dolan v. City of Tigard*).

³ Legislative Zoning Decisions, by David W. Owens, Institute of Government, 1993.

DISCUSSION PAPER # 9

GOAL 9. To maintain the quality and develop the capacity of surface water resources, using them for recreation sites, where appropriate.

STRATEGY a. Allow land uses and densities of development as appropriate for designated uses of surface waters. Minimize pollutants from stormwater runoff, protect drinking water, and protect water quality suitable for fishing, boating, and swimming.

STRATEGY b. Encourage cooperation among jurisdiction and private enterprises within watershed basins to maintain water quality.

Scope. This document is a work in progress and represents the observations and recommendations, to date, of the Environmental Resources Subcommittee of the Wake County Land Use Task Force. This document does not represent regulations being considered or proposed by Wake County.

Existing Situation. The quality of life in Wake County depends to a large extent on the suitable use, availability, and conservation of its surface water resources. A large proportion of Wake County residents depend on surface water supplies for their daily water needs. People downstream from Wake County also depend on surface water, to varying degrees, for their water needs. Activities that degrade water quality in Wake County may affect these people.

Surface water is used for drinking water, industrial processes, irrigation and other agricultural activities, waste disposal, and recreation. It also supports commercial and recreational fishing in Wake County and downstream communities.

Many negative effects of land use and development on surface waters are known and have been studied within Wake County. Water quality is directly related to the pattern and intensity of land use and development in a watershed. When development such as roads and houses occurs in the watershed, impervious (built-upon) surfaces are increased and there is less infiltration of rainwater into the ground. This results in a larger volume of runoff, moving at a faster velocity, and carrying more pollutants, than would normally be the case without development. Rain falling in the area that does not infiltrate into the soil or return to

the atmosphere by evapotranspiration flows as runoff into the surface water.

Increases in the amount of impervious surface, without suitable controls, increases the volume and speed of water flowing over the land (runoff). Runoff carries sediment, nutrients, and pollutants from construction sites, lawns, golf courses, agricultural fields, roads, and parking lots. These sediments, nutrients, and pollutants enter surface waters.

As development continues to occur and more land is built upon, the quantity, rate, and contamination of runoff going into a water body increases. Eventually, a point is reached where the water supply is polluted and recreational aspects are impaired.

Development, without suitable controls, causes three related runoff problems:

- Increases in the quantity of runoff. More water runs across land surfaces than in pre-development conditions. This can result in more erosion, which deposits more sediment in streams and other water bodies.
- Increases in the velocity of runoff. The water moves more quickly across land surfaces, and is often channelized and accelerated. This can result in more erosion, which deposits more sediment in streams and other water bodies.
- Degradation of the quality of runoff. Water moving over roadways, parking lots, lawns, agricultural fields, and construction sites picks up sediment and pollutants that are channeled into streams and other water bodies.

Nuisance flooding also occurs in Wake County, and is often the result of poor runoff management.

Observations:

- The quality of surface waters in the County (and the state) is being threatened by human land use practices.
- Non-point source pollution carries sediments and other contaminants.
- From Durham to Smithfield, 2/3 of streams do not meet fishing and swimming standards (Leavenworth 1996: 10A).

- Much of the runoff from urban and suburban areas is piped into streams.

- The recent series in the News & Observer highlights many of the pollution problems threatening the Neuse River and its tributaries (Leavenworth 1996a, 1996b; Warrick 1996; Warrick and Leavenworth 1996). The Neuse River passes through Wake County and through the jurisdiction of Wake County municipalities. Most streams in Wake County carry water to the Neuse River.

- As documented in the Neuse River Nutrient Sensitive Waters Management Strategy (DEM 1996), non-point source pollution contributes approximately 75% of the nitrogen load to the Neuse River. This includes runoff from urban and agricultural areas.

- Buffers have been recommended repeatedly as a method to improve the quality of runoff.

- Albemarle-Pamlico Estuarine Study (NCDEM 1994) recommended 20-foot buffers in agricultural areas; not enacted because of protests from counties, cities, farmers (Warrick 1996: 6A).

- Upper Neuse Basin study by The Cadmus Group (1995) recommended protective stream buffers (Bonner 1995).

- Neuse River Management Strategy is recommending 50-foot buffers (DEM 1996).

- Wake County already has a plan to protect County water supply watersheds (Wake County 1996). The plan require buffers similar to those required in the Neuse River Nutrient Sensitive Waters Management Strategy (DEM 1996).

- Wake County has buffer requirements along surface waters in water supply watersheds, and in Resource Conservation areas (Robertson's Pond and Bass Lake). Outside these areas, there are no buffer requirements for streams or water impoundments.

- Strictly voluntary controls were not successful in attempts to clean up the Chesapeake Bay (recent N&O article).

Recommendation (Alternative 1):

- Require fifty-foot buffers of undisturbed vegetation along streams throughout the County for all new development, as follows:

- Buffers located along all US Geological Survey topographic map "blue-line" streams, which includes all perennial (always contain water) and intermittent (contain water seasonally) streams.

- No concentrated or channelized flow may bypass the buffers, including runoff from roadways and parking lots.

- Provide incentives to maintain forested buffers as described in DEM (1996).

- Provide incentives to re-vegetate the buffer zone as needed.

- Provide cost relief for affected property owners (e.g., tax abatement, tax reduction, conservation easement).

- Require 30-foot buffers on small (less than 25 acres) upper watershed drainageways throughout the County (presently required in water supply watersheds by Wake County).

- Offer incentives to create or restore stream buffers in areas already developed.

Recommendation (Alternative 2):

- Apply Wake County's existing water supply watershed buffer requirements throughout the County.

Recommendation (Alternative 3):

- Set performance standards for stormwater runoff that address both quantity, quality, and velocity issues (e.g., 85% reduction in total suspended solids in runoff; control the 1" storm; maintain stream hydrograph for the 10 year storm at pre-development levels).

- Provide a menu of best management practices to meet those standards. The standards would apply to all new development and to existing development, including agriculture, where feasible. There is plenty of information available on best management practices for stormwater (e.g., Arnold et al. 1993, NCDEM 1995).

Observations:

- A comprehensive stormwater management program is required to reduce the quantity and velocity of runoff, and to improve the quality of runoff.
- Some of the County's municipalities have stormwater management plans (Cary, Garner, Raleigh).
- Other cities and counties in North Carolina have stormwater management plans (e.g., Charlotte—Mecklenberg, Greensboro, Cary, Garner).
- There is no shortage of literature detailing methods to control runoff (e.g., Schuller 1987; Ferguson and Thomas 1990; Newson 1992; Urbonas and Stahre 1993, Pyzoha 1994).
- Wake County does not have a stormwater management plan.

Recommendations:

- Wake County should implement a stormwater management program and consider establishing a stormwater utility.
- The philosophy of stormwater management should be changed from one of concentration and conveyance to one of dispersal and infiltration that more closely mimics pre-development hydrologic conditions.
- Uniform application of the low density option described in the Neuse River Management Strategy for control of runoff - 1 dwelling unit per acre or less than 12% built-upon area - is not appropriate for Wake County outside of the water supply watershed. At such low densities, water and sewer services would be prohibitively expensive, resulting in many more septic tanks and wells. Roads and other infrastructure would also carry a high per-unit cost. Open space would be consumed rapidly by houses and development.
- The high density option is to apply existing State high-quality water regulations more widely to control the one-inch storm with buffers, detention basins, and infiltration basins. Since the initial runoff from each storm carries the highest concentration of pollutants, controlling

the one-inch storm improves the quality of runoff.

- It is not clear that controlling the one-inch storm will significantly reduce the quantity of runoff. The County should establish a design storm for stormwater management (e.g., the 10 year storm or the 20 year storm).
- Some options for stormwater control:
 - On-site control. Each development is required to control runoff on the site. Ordinances are often phrased in term of controlling a design storm or keeping runoff at or below levels generated if the site were developed at lower densities. Advantages of this approach include flexible site location and increased efficiency of downstream conveyance. Disadvantages include a large number of units, leading to difficulty in monitoring and maintaining the system. Open space residential developments (Arendt 1994) are well-suited to this approach.
 - Regional ponds established to serve several developments and protect downstream properties. Advantages of this approach include reduced construction, operation, and maintenance costs (compared to on-site). However, regional facilities may be hard to site and do not protect smaller streams upstream from the facility. Regional stormwater facilities may serve as a focus for recreational activities (e.g., Shelly Lake Park, Crabtree Lake Park). Greenways along streams may also serve as stormwater control facilities.
- On-site and regional controls may be combined.

Observations:

- Wake County allows development and building in the floodplain (floodway fringe), subject to minimum floor elevation and other restrictions (Rick Bailey, Lee Billington, Personal Communication). Development is not allowed in the floodway.
- Wake County has other development regulations based on the Federal Emergency Management Agency (FEMA) 100-year floodplain boundaries.
- Wake County requires flood prevention measures in alluvial soils beyond the area covered by FEMA maps.

- The 100-year floodplain will change as more development occurs within the county. Unless appropriate planning is done, construction in downstream areas may be threatened by future upstream development.

Recommendation:

- Review ordinances that impact development in flood plains and consider prohibiting building construction within the 100-year floodplain.

Observations:

- Sediment and erosion control regulations do not address the quantity of runoff generated during construction (Rick Bailey, Personal Communication).
- Other development ordinances may result in the generation of excess runoff and consequent degradation of surface water quality (e.g., road width, parking lot size, curb and gutter requirements).

Recommendations:

- Sedimentation and erosion regulations should be amended to address quantity of water as well as sediment and velocity.
- Ordinances should be reviewed with an eye toward surface water protection and amended as necessary (e.g., require sediment and oil traps in parking lots).

Observations:

- Most surface waters — particularly rivers and streams — are a public resource.
- The public, through government, has a right to require the protection of surface waters.
- Private landowners have an obligation to protect the public good, but should not be required to bear the entire cost of that obligation.
- The public should share in the cost of protecting surface waters.

Recommendations:

- The County must determine an equitable way to finance surface water protection.

• Some options:

- Impact fees on development based on amount of impervious surfaces. This approach places the burden on those causing the impact.
- Stormwater utility with dedicated tax revenue. This approach spreads the cost over a larger base and passes some of the costs to those who benefit from surface water protection.
- Tax breaks to property owners whose property includes protective buffers. This would probably be offset by increased property tax rates to recoup the revenue lost to these tax breaks, spreading the cost widely.
- Conservation easements.
- Combinations of these approaches.

Observations:

- During the educational portion of the task force process, we learned that projected water supplies are sufficient to meet projected demands through the 2020 planning period. However, the study that was distributed to the task force recommended development of additional capacity because the 30-year planning horizon is shorter than that normally used for such projections.
- Cary has already projected a drinking water supply deficit in the near future.

- Does the County control enough water to support projected population growth? It is critical that the county control enough water to support projected population growth beyond 2020 because, with increased development, there will be fewer options to develop new surface water supplies. Such projections should consider possible expansion of surface water use into areas currently served by groundwater wells.

Recommendations:

- Undertake a study with an appropriate planning horizon.

- Cary's projection provides ample evidence that a water conservation campaign is needed. Electric utility companies have found that promoting conservation of electricity is cost effective because it reduces the need for expensive new electrical generating facilities. Conservation may be the best way to increase the capacity of our water supply. For example, stormwater detention ponds in residential subdivisions might supply water for lawn irrigation, as farm ponds do for crop irrigation.

Observations:

- Stormwater, runoff, and streams do not obey political boundaries.
- The benefits of stormwater management (or the harm of continuing to ignore the issue) extend well beyond municipal and county boundaries.

Recommendations:

- Pursue the adoption of uniform controls throughout the county. This will require close cooperation with municipalities.
- Pursue the development of a multi-county, watershed-based surface water utility (e.g., Upper Neuse Basin) with the authority to assess all property owners within the watershed for surface water protection measures.

Observation:

- Septic tank failures may affect surface water quality as a form of non-point pollution.

Recommendation:

- Undertake an educational program on the care and maintenance of septic systems to increase their operating lives.

Observation:

- Contrary to popular public opinion, conservation easements do not imply public access. This popular belief may impede efforts to obtain conservation easements.

- Some education of the public on this issue might make it easier to obtain such easements.

Recommendation:

- Undertake a public education campaign.

Observation:

- Successful implementation of any of the recommendations listed above will require an intensive public education campaign about the causes and consequences of the problems described. We must be particularly careful to assure people that there are options for compensation when their property is affected.

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DISCUSSION PAPER #10

GOAL 10. To prevent contamination of groundwater resources.

STRATEGY a. Use groundwater monitoring and modeling to better understand the dynamics of groundwater movement in areas where groundwater is the primary source of drinking water so as to be able to determine the sources of groundwater contamination and ensure that land uses do not contribute to contamination.

Scope. This document is a work in progress and represents the observations and recommendations, to date, of the Environmental Resources Subcommittee of the Wake County Land Use Task Force. This document does not represent regulations being considered or proposed by Wake County.

Background on Wake County's Groundwater Resources. Characteristics of the local geology and soils affect the storage capacity and movement of groundwater. In particular, the size and number of spaces in the rocks and soils determine how much water is stored and how fast it moves underground. The County can roughly be divided into 3 areas within the Piedmont and Coastal Plain. Well yields and ground water quality are related to the characteristics of the bedrock.

For most of Wake County, the aquifer or water bearing rock layer consists of saprolite containing soil and weathered bedrock overlying the bedrock. In the saprolite, the pore spaces are numerous but small. Since groundwater occurs in the soil and rock pore spaces, the subsurface water movement in this region is very slow. Bedrock is very dense but contains cracks. These cracks are particularly numerous in the transition area between the saprolite and upper bedrock layers. Groundwater in cracks of the bedrock are supplied through cracks in the transition zone. The saprolite acts as a reservoir for the underlying bedrock.

The largest area is underlain by crystalline metasedimentary and metavolcanic rock. That is, the rock has been reheated since its formation. Most groundwater follows fractures in the transition zone containing partially cracked and weathered crystalline bedrock.

Triassic basin sedimentary rocks underlie a 3 to 9 mile band which follows the western county line. These sediments overlay metavolcanic and igneous rocks. Soils derived from these rocks are nearly impermeable. Pore space is so small that water does not flow. Well yields are low, averaging less than 10 gallons per minute. Parts of Falls Lake and Jordan Lake, Cary and Holly Springs are underlain by triassic sediments.

Diabase dikes ranging from a few inches to 200 feet thick are found in both the Triassic basin and the crystalline series. The dikes are fairly impermeable. However, contact metamorphism, in the Triassic basin only, has produced small fractures in the neighboring rocks where groundwater can be stored. Well yields have been recorded as high as 40 gallons per minute. Much controversy has centered on the proposed location for the LLRW facility in the Triassic basin/dike area. Since the cracks are difficult to locate from surface investigation, the ability to model and/or track contaminant migration is uncertain.

Sandy coastal plain sediments overlay the crystalline bedrock in the southeastern area and higher elevations throughout the County. The sediments are 40 to 80 feet thick and have characteristically large spaces between the sediment particles through which groundwater travels more quickly than other areas of the county. Shallow wells tapping bedrock sediments have good yields. The spaces would also permit contaminants in groundwater to migrate.

Local Weather Patterns. Groundwater recharge, water from the surface which seeps all the way down to the water table, varies seasonally and geographically with local precipitation patterns and proximity to surface water bodies. In Wake County, most precipitation occurs during the hottest months (July and August) of the growing season when evaporation and plant transpiration rates are highest. During the summer, any potential recharge evaporates or is utilized by plants before it reaches the water table. Wells

continue to remove water from the saturated zone and the surface of the water table is lowered. The water table is closest to the surface when most recharge occurs during May and June. The water table depth reflects the fluctuating amount of available groundwater in storage. Generally, the areas of recharge (and infiltration) include all land surfaces except areas underlying rivers, streams and creeks and their floodplains which are discharge areas. Surface impoundments such as Falls Lake and Jordan Lake may also contribute to recharge at a rate controlled by the soils underlying the impoundment.

Groundwater Withdrawals. Groundwater is a renewable resource. However, in any one location, if groundwater is pumped out, less is available to other potential uses because recharge may be slow. Groundwater is removed used as base flow for surface water, potable water, and irrigation.

Existing Situation. According to the Wall Street Journal, Wake County is one of the fastest growing counties in the Southeast, with an annual population growth rate of 18 percent. Although Wake County has adopted a policy leaving to municipalities the responsibility for water supply, much residential development has taken place and continues to take place outside municipal and peri-municipal boundaries. In these areas, where water and sewer services are not supplied, groundwater is being developed at an accelerating rate.

The 1990 census recorded 33,608 households using individual wells in Wake County, and records from the N.C. Groundwater Section and the Wake County Health Department show an accelerating rate of well construction in the county over the last five years.

Year	1991	1992	1993-94	1994-95
Number of wells	198	257	886	946

* 1991-1992 numbers taken from data provided by N.C. Groundwater Section. 1993-95 numbers are wells inspected by the Wake County Health Department July 1993 to June 1994 and July 1994 to June 1995.

Adding the number of households on wells recorded by the 1990 census to the number constructed since the census, it appears that as

many as 35,895 households in Wake County could be served by individual wells. Assuming an average 2.39 persons per household, more than 85,000 Wake County residents may be served by individual wells. At a conservative figure of 77 gallons per person per day (according to a recent newspaper report, Cary residents use 115 gallons per person per day), 6.54 million gallons per day (MGD) of groundwater is being withdrawn by individual wells.

1994 records from the N.C. Public Water Supply Section show 249 community water supply systems using groundwater in Wake County, with an estimated population served of about 47,000. At 77 gallons per person per day, community wells supply another 3.63 MGD.

The number of Wake County residents served by individual wells added to the number served by community wells with groundwater sources equals about 133,000. If Wake County now has one-half million people, then about 26 percent may be served by groundwater with a total daily demand of at least 10 MGD, probably much more. In addition to household water supplies, there are about 470 noncommunity public water supply systems in Wake County, most of which use groundwater. These systems serve schools, restaurants, motels, campgrounds, parks, and other non-resident facilities. Moreover, industrial use of groundwater in Wake County no doubt occurs, although no records of such use are kept. To gauge the significance of this use, compare it to the Town of Cary, with a population of 77,666, which is now using about 15 MGD (News & Observer Jan 29, 1996).

1990 Census projections for Wake County anticipate a 40 percent increase in households in census tracts using wells by the year 2000 and an 85 percent increase by 2010. That does not mean that the entire increased population will be served by wells, as some of these areas will be annexed by municipalities and served by municipal water supplies. But it does indicate that growth will continue to take place in many areas that will not be served by municipal water and sewer.

Obviously, groundwater is important to Wake County and will continue to be developed. However, data on present and projected water demand presented to the Wake Land Use Task Force and Advisory Group do not reflect the importance of groundwater. The Hazen and

Sawyer study done for the County assumes that by 2020, the entire projected population of Wake County (except for Rolesville and Holly Springs) will be served by municipalities from surface water supplies and bases projected surface water demand on this assumption. The figures show groundwater being used only by Rolesville (0.075 MGD) and Holly Springs (0.1 MGD).

The failure to include a groundwater resource and use inventory in water supply planning for Wake County indicates that groundwater is being written off as a viable resource. This is a mistake. First, if population projections are on target, and the entire population of the county is being served by surface water, surface water supplies will be strained. Developing the next source of surface water--which will be a great distance away if it is available at all--will be extremely expensive. Being right under our feet, groundwater is much less expensive than developing future, far away surface water resources. However, if groundwater resources have not been protected, they will not be available to supplement surface water. It only makes to sense to protect and preserve all existing sources of water supply.

Second, if by some twist of fate, population projections for Wake County do not develop as expected, abandoning groundwater in favor of surface water could mean that more surface water resources will be developed than may be necessary.

In addition, lack of attention to the current accelerating rate of development of groundwater and lack of knowledge about the capacity of Wake County's groundwater resources could lead to overuse and contamination of groundwater resources in some areas, additional threats to surface water quality and quantity, and expenditure of public tax dollars to rectify problems with failed and polluted drinking water sources.

Because of Wake County's geology, certain parts of the county cannot support intense groundwater use. Studies conducted in 1982 and 1983 showed that overdraft of groundwater is likely in certain areas of the county and delineated some of these areas based on average well yields, number of dry holes and abandoned wells, geologic factors including apparent intensity of rock fracturing, and apparent long-term trends of ground water recharge. If inappropriately intense groundwater

development is allowed to take place in these areas, residents will soon find themselves without water, and the county and its municipalities will be obligated to finance water extensions to correct problems.

Even in areas of the county where groundwater is relatively abundant, development density must be managed in such a way as to assure adequate recharge of individual or community wells. As the size of an average house in Wake County increases, the amount of impervious area associated with each residential unit grows, and the amount of open area available for groundwater recharge decreases. If greater residential density in one area is not offset by significantly lower density in surrounding areas, groundwater depletion may occur.

Sources of Groundwater Contamination.

Potential sources of groundwater contamination in the area are past and present fertilizer and pesticide use, failing waste management systems such as septic tanks and abandoned landfills, and hazardous waste sites including leaking underground storage tanks. The NC DEHNR maintains a state database which tracks groundwater contamination incidents.

Community wells of two subdivisions in southern Wake County, Kenwood Meadows and Pear Meadows, have been found to contain high levels of ethylene dibromide, a pesticide previously used in tobacco farming. It is not certain how extensive this chemical was used in other areas of the county.

The number of septic tanks in operation in the County has been estimated at 62,700. Pollutants from improperly maintained and/or overloaded can enter the water table and recharge. In 1994, bankruptcy of a wastewater utility led to the operation failure of 5 subdivisions' low pressure pipe subsurface systems.

Several landfills are located in Wake County. Groundwater monitoring is required at all active landfills. Several Wake County sites contaminated by hazardous materials are currently in the cleanup process. Most sites involve the removal of underground fuel storage tanks which are and/or were leaking or do not pass safety standards.

Groundwater Protection Programs: Federal and state laws do not provide a general or comprehensive framework for groundwater

protection. Groundwater management and protection has always been considered a local responsibility. The Safe Drinking Water Act regulates the quality of public drinking water as it comes out of the tap but has nothing to say about source protection. The Clean Water Act suggests only local voluntary groundwater programs and includes no regulatory scheme for groundwater.

Federal/state regulations relating to location and operation of waste disposal systems (landfills) and underground storage tanks offer some protection from these specific groundwater pollution threats. State law dictates certain well construction standards to prevent pollution of groundwater by surface sources. County Board of Health regulations require that individual residences using wells and septic tanks have minimum lot sizes of 20,000 s.f. and that wells be located some distance away from and up gradient of septic tanks. New individual wells must be tested for bacterial contamination before occupancy is allowed, but no other testing is required, either before occupancy or subsequently. State health regulations require back-up area for community wells and require monitoring and treatment of water public community wells. What protection these laws and regulations provide for groundwater in Wake County is fragmented and inadequate at best.

Observations:

Groundwater protection is complex due to the amount of information involved, the number agencies, and the uncertainty associated with geology of the area. Evaluation of the existing conditions and the effectiveness of the program indicates the following:

= There is no specific county groundwater protection plan other than the well protection program.

= While in general the aquifers have good yields and quality, because of geology, it is somewhat more difficult to locate a well in some areas of the county.

= Groundwater contributes to 40 to 70 percent of the stream flow. Groundwater from some areas of the county feed active and future surface water supplies.

= County water facilities plans have not considered the impacts of groundwater as an input nor areas which might require services due to poor yields or quality.

= New development in rural areas has been increasing. Development and existing residents in remote areas where residential densities are low will continue to rely on groundwater to supply potable needs.

= Most residents using wells for potable water also have on-site wastewater disposal.

= Operation and maintenance of private wells and septic tanks are not subject to any additional regulations once certificate of occupancy has been granted.

= Groundwater remediation is expensive, time-consuming, and may not restore to original quality.

= Recharge areas may be impaired by sources of surface and subsurface contamination and reduced infiltration due to land uses. Several drainage basins contain old industrial, new industrial, mixed urban and residential land uses where there is potential for contamination.

= Groundwater recharge varies seasonally and annually and may exacerbate yield and contamination problems.

= Since surface water bodies receive base flow from groundwater, any living organism in one of several community types (wetlands, floodplain, bottomland forest) could be affected by water soluble contaminants and fluctuations in supply.

= Many residents with wells and septic tanks located near municipal services will connect as municipalities expand.

= The County has developed a service plan for some failing wastewater treatment disposal.

= Several departments and agencies are involved in the enforcement, inspections, record keeping, response and cleanup operations. Yet information has not been compiled in a usable form or circulated.

= Underlying geology makes modeling contaminant flow difficult.

= The general public, including water-related field professionals (water softening, construction), landowners and residents utilizing wells, could be more informed about the well and septic tank construction and maintenance, local sources of contamination, emergency storage capacity, nature and toxicity of contaminants, and their own impact on water quality and quantity.

= In an urbanizing area where significant use is and can continue to be made of groundwater resources, local government should assure that the available supply is adequate for demands placed on it, that the groundwater reservoir is not being consistently overdrawn, and that land use policies protect groundwater so that the existing resources remain available for use.

Recommendations

1. Goal #10 should be revised to include protection of groundwater capacity.

2. Wake County should modify its countywide water supply plan to include use of groundwater resources. As part of this water supply plan modification, the County should conduct or sponsor inventories of groundwater use and groundwater resources within the county. It might be possible that the U.S. Geological Survey would cooperate with Wake County in a study of groundwater capacity. Groundwater availability studies done in 1982 and 1983 by Dr. Charles Welby of NCSU should be reviewed and updated and the recommendations put forth in those studies should be reviewed for their applicability to the current situation.

3. Wake County should investigate the need to develop a groundwater management program focused on maintaining use of groundwater for public and individual water supply consistent with preserving both capacity and quality for future use and protecting ecosystems and local surface waters dependent upon groundwater discharge. The program should include:

a. Require registration of significant (perhaps larger than 1 MGD) industrial, commercial, and agricultural groundwater withdrawals.

(Withdrawals by community wells are already known, and individual withdrawals can be estimated.)

b. Determine what areas of the County can permanently sustain development using individual or community wells and on-site wastewater systems and the appropriate densities for these areas. Investigate the

economic and resource consequences of not designating such areas as rural residential and restricting them to densities which can permanently sustain wells and on-site wastewater disposal without depleting the resource.

c. Identify areas with low well yields and/or poor soils suitability for septic systems and develop appropriate density/water supply provisions for these areas. Consider making these areas high priorities for extension of municipal services.

d. Institute wellhead protection efforts for existing and future community water supply wells. This would include identifying well recharge areas and protecting them from development and sources of pollution.

4. Wake County should seek cooperative arrangements with local civic organizations (such as the League of Women Voters) to undertake a groundwater education program for homeowners whose water is supplied by individual wells and community wells as well as all citizens of Wake County.

DISCUSSION PAPER # 11

GOAL 11. To ensure that local governments provide adequate, properly located land for recreational and leisure opportunities.

STRATEGY a. Enhance access to scenic and recreational opportunities near lakes and other surface waters, where appropriate, without threatening water quality.

STRATEGY b. Encourage local governments to acquire sufficient land in appropriate locations and develop it to meet the park, recreation, leisure and open space needs in Wake County.

STRATEGY c. Provide incentives for incorporating recreation areas into developments, such as maintaining or increasing the amount of development allowed when recreational facilities are provided.

Scope. This discussion paper focuses on how planning for recreational and leisure opportunities can be supported in the upcoming Land Use Plan. In Wake County, the challenge is to accommodate continuing growth in residential, commercial, and industrial land uses while maintaining and expanding land uses suitable for recreational and leisure opportunities. Without clear direction and long-

range planning, there can be significant detrimental effects on the very qualities that contribute so much to the County's growth (such as scenic recreational and wooded areas, spaciousness, and beauty). Related open space issues and protection of environmentally significant areas issues are addressed in more detail in discussion papers #4 and #5.

An in-depth discussion of County parks and recreation facilities can be found in the adopted Parks, Recreation & Open Space Master Plan. The Land Use Plan and the Parks, Recreation & Open Space Master Plan are both designated Wake County Comprehensive Plan elements. The 1989 version of the Parks, Recreation & Open Space Master Plan is now undergoing update and revision. It summarizes the needs, standards, and distribution of existing and proposed parks and recreational facilities, including school parks, in Wake County. These facilities include active uses such as playgrounds and ball fields, and passive uses such nature trails and nature centers. The Wake County Parks and Recreation division of the Community Services department manages these resources. Planning department staff is working with Parks and Recreation staff to coordinate long-range planning for parks and recreational opportunities.

Existing Situation. County parks are land and/or water based sites, scenic in character and large enough to serve regional needs. The four existing or planned regional county parks are: Blue Jay Point, Little River, Harris Lake, and Lake Crabtree. They are large natural areas of 100 acres or more which provide picnic shelters, open play fields, and education or special use areas. They are oriented toward natural resources, not formal athletic areas, ballfields, or active play. Active athletic or play areas are found at District and School Parks. Cedar Forks District Park is a 35 acre user-based park of soccer fields for league play. School Parks are recreational areas of less than 20 acres built in conjunction with several elementary and middle schools throughout the County.

Service Providers. Wake County, Federal, State, and municipal agencies provide a variety of recreational and leisure opportunities throughout the region. Private and public trusts, and local non-profit organizations, also help to provide such opportunities. The list of service providers includes, but is not limited to:

Conservation Trust for NC

NC Division of Forest Resources
 NC Division of Parks & Recreation
 NC University System
 NC Wildlife Resources Commission
 Research Triangle Foundation
 Scenic North Carolina
 Municipal Parks & Recreation departments
 Triangle J Council Of Governments
 Triangle Land Conservancy
 U.S. Army Corps of Engineers

Coordinating services and facilities allows needed parks and recreational facilities to be provided in a cost-effective and equitable manner. County parks, such as Blue Jay Point and Lake Crabtree, are designed and developed with intergovernmental and public/private partnerships in mind. In the Little River Water Supply Watershed, Wake County is acquiring land for a future reservoir and park site. A formal organizational arrangement exists between the County and Raleigh, Zebulon, Wendell, Knightdale, Wake Forest, and Rolesville regarding land rights acquisition and financial responsibilities.

Natural resource based planning. There are natural constraints in systems of environmentally sensitive surface waters, wetlands, and marshes, and such places are usually not appropriate for recreational activities. Topography and slope are important considerations in locating suitable water-based recreational areas. Steep slopes are vulnerable to erosion, as are any stream-side areas where vegetation is disturbed. Enhanced access for the public often means constructing roads and parking lots, which can have a negative impact on scenic and water quality.

Fortunately, there are myriad lakes, ponds, creeks, and streams throughout Wake County which are well-suited for enjoyment and recreation. Water-based recreation areas, appropriately located, can also enhance the community's livability by providing water quality protection and ways to control flooding, by keeping shoreline and floodplains in a natural state.

Falls Lake Reservoir, Jordan Lake Reservoir, and the Swift Creek system are protected water supplies which also provide a variety of recreational opportunities such as swimming, boating, fishing, camping, hiking, and greenway trails to residents of our region. The parks at Lake Crabtree and Shelly Lake are two examples of how local governments can derive

recreational benefits from flood control and drainage projects.

Parks and recreational facilities are needed in high growth areas, but this is also typically where land costs are high. This can be addressed in part with coordinated facilities planning which locates parks, schools, libraries, and other public facilities in Wake County on large tracts at the same location. Properly designed pedestrian links should be part of coordinated facilities planning efforts.

Wake County can provide density incentives for developers to provide recreation in new developments. Cluster subdivision provisions are one example. Wake County could also explore the feasibility of developing incentives to encourage developers to donate a percentage of land for park acquisition and development.

Observations:

Wake County should continue to participate in intergovernmental ventures and public/private partnerships in order to provide parks and recreational facilities throughout the region.

Recreational and leisure opportunities for residents should be addressed in all joint land use plans.

To enhance access to scenic and recreational opportunities Wake County should:

- purchase or lease land for new scenic and recreational facilities;
- build more trails and greenways around and connecting existing facilities; and
- encourage more pedestrian linkages from homes to parks, schools, shopping centers and other points throughout the County.

An inventory of available parks, recreational facilities, and open spaces, both public and private, should continue to be maintained as part of the Parks, Recreation, and Open Space Master Plan.

