

V. Water Supply Watershed Protection Policies

A. WATER QUALITY GOAL

To maintain and enhance the quality of public water resources, allowing no further degradation of water quality, while allowing limited development in water supply watersheds.

B. BACKGROUND

Wake County first adopted regulations to protect its water supply watersheds in 1984. Five years later, the North Carolina General Assembly adopted the Water Supply Watershed Protection Act, which required all local governments to adopt and apply water supply watershed protection regulations. In 1992, the State Environmental Management Commission (EMC) adopted minimum statewide water supply watershed management requirements that local watershed protection regulations must meet.

In December 1992, Wake County amended its water supply watershed regulations to comply with the State's minimum requirements and submitted them to the State for approval.

In August 1995, the EMC made a number of revisions to its minimum requirements that were intended to provide local governments more administrative flexibility and to clarify a number of requirements.

In the autumn of 1996, the State Division of Water Quality (DWQ) reviewed Wake County's regulations for compliance with the EMC's minimum watershed management requirements, and the Board of County Commissioners adopted additional ordinance amendments in the spring of 1997.

C. STATE WATER SUPPLY WATERSHED CLASSIFICATIONS

State water supply protection rules describe five protective classifications for surface water supplies.

The most restrictive classification, WS-I, is applied to a few dozen small, pristine watersheds located in the western mountains of North Carolina. There are none in Wake County. The least restrictive classification, WS-V, has no categorical restrictions or minimum standards for development, and refers to the portions of water supply watersheds which lie outside of WS-IV protected area boundaries. No stream segments are classified WS-V in Wake County.

The state uses these classifications to determine the type of point source discharges it will permit in each water supply watershed. The classifications are also used to determine what set of water supply watershed standards local governments must implement to control non-point source pollution (mainly storm water runoff). Each water supply watershed, however classified, has a "critical area," which is that part of the watershed closest to the water supply source where it is most important to minimize the discharge, and maximize the filtration, of potential pollutants.

There are nearly 163,000 acres of protected water supply watershed land within Wake County's borders. Of that amount, the County has zoning jurisdiction over, and applies watershed protection regulations to, 118,000 acres. The quality of a drinking water resource is highly dependant on the nature of land use within its watershed. However, there usually are more than one local government with planning and zoning jurisdiction in any given water supply watershed, so land use regulations applied within it may vary.

The table below lists the seven separate water supply watersheds designated in whole or in part within the borders of Wake County. All acreage figures are approximate:

Water Supply Watershed	State Classification	Total Size (Acres)	Acres in Wake County	Acres (% of Total) in County Jurisdiction
Little River	WS-II	36,000	27,000	25,600 (71%)
Smith Creek	WS-II	2,000	1,000	800 (40%)
Swift Creek	WS-III	42,300	42,300	17,500 (41%)
Falls Lake	WS-IV	174,000	63,200	55,000 (32%)
Jordan Lake	WS-IV	168,000	27,000	17,500 (10%)
Richland Creek	WS-IV	10,000	10,000	973 (9.7%)
Cape Fear	WS-IV	142,000	1,800	1,600 (1%)

D. LAND USE CLASSIFICATIONS OF WATER SUPPLY WATERSHEDS

As shown on the General Classifications Map, all of the Little River and Smith Creek watersheds, and nearly all of the Falls Lake watershed within the County's jurisdiction are classified as Non-Urban Area/Water Supply Watershed, and thus are not intended to become urbanized. Similarly, the critical area of the Jordan Lake watershed and two parts of the Swift Creek watershed that are within the County's jurisdiction are classified as Non-Urban Area/Water Supply Watershed and not intended to become urbanized. Only that part of the Falls Lake watershed south of the proposed Northern Wake Expressway is classified as part of Raleigh's Urban Services Area, and only two parts of the Swift Creek watershed (west of Holly Springs Road and between Lake Wheeler Road and Old Stage Road) are classified as part of Cary's and Garner's Urban Service Areas - as called for by the jointly-adopted Swift Creek Land Management Plan. The Upper Neuse River/Richland Creek watershed is classified as Long Range Urban Service Area/Water Supply Watershed since all parcels currently under county jurisdiction are contained in either Raleigh's or Wake Forest's Long Range Urban Service Areas.

Except for a small number of Non-Urban Neighborhood Activity Centers, the Land Use Classifications Map classifies all of the Little River watershed - as well as all of the Non-Urban Area of the Falls Lake, Jordan Lake, and Swift Creek watersheds - as Residential, with a density range of 0-0.5 dwelling units per acre in critical areas and a density range of 0-1.0 dwelling units per acres in the balance of those areas. The Map recognizes the intent that some

parts of the Jordan Lake, Swift Creek, and Falls Lake watersheds be urbanized by classifying the Urban Services Areas within those watersheds for more urban residential densities and more closely spaced Urban Neighborhood and Community Activity Centers.

[Note: Subsequently the adopted Southwest Wake, East Raleigh-Knightdale, Southeast Wake and Northeast Wake Area Land Use Plans reclassified several of these areas, primarily to new classifications intended to accommodate residential development.]

With the exception of Swift Creek water supply watershed (whose critical area was specially defined by the jointly adopted Swift Creek Land Management Plan), Wake County defines the critical area of a water supply watersheds within its jurisdiction as extending 1/2 mile plus 300 feet from the flood pool elevation of the water supply source. However, based on a study specific to the Lower Bartons and Honeycutt Creek basins in Falls Lake water supply watershed, the critical area boundary in those two basins is set near the 200-minute time-of-travel line, meaning that all land in those basins where stream water takes 200 minutes or less to reach the Lake is within the critical area.

E. STATE CONTROLS IN WATER SUPPLY WATERSHEDS

The state is primarily responsible for regulating point source discharges within water supply watersheds. In WS-II watersheds, the state may allow domestic discharges but no new discharges of municipal or industrial wastes. In WS-III watersheds, the state may allow domestic and non-process industrial

discharges, but as in WS-II watersheds, no new municipal or industrial discharges. In WS-IV watersheds, the state may allow all types of discharges, but in their critical area, require additional treatment programs for any new industrial discharges. However, before the state issues a discharge permit in Wake's jurisdiction, it must be determined that the proposed use meets all requirements of County ordinances.

F. LOCAL LAND USE CONTROLS IN WATER SUPPLY WATERSHEDS

1. Introduction

The state Water Supply Watershed Protection Act makes local governments primarily responsible for controlling non-point source discharges within water supply watersheds, by requiring local governments to adopt land use regulations meeting the state's minimum water supply watershed requirements.

The state's water supply watershed protection requirements provide both a "low-density option" and a "high-density option."

Requirements under the low-density option emphasize limits on housing density and impervious surface coverage, as well as the use of vegetated buffers along watercourses. Requirements under the high-density option do not limit housing density, and allow greater impervious surface coverage, but call for the installation of wet detention basins, or other engineered storm water management systems, that both control the rate of storm water discharge and allow the removal of suspended solids. If a local government elects to use the high-density option, it must assume ultimate responsibility for the operation, maintenance, and inspection of the engineered storm water controls.

Wake County does not own or operate major water or wastewater treatment systems, and the intensity of development allowed under the "low density option" is appropriate for development without such central systems. Further, the County does not have a storm water utility operation, and is not otherwise organized for operating, maintaining, and inspecting engineered storm water controls throughout its zoning jurisdiction. The County, therefore, has elected to meet the state's requirements under its low-density option. The County's water supply watershed protection regulations are intended to meet all of the state's minimum requirements, and to exceed those requirements as needed, based on past Wake County

practices and policies, which predated the state's Water Supply Watershed Protection Act.

Wake County protects water quality in water supply watersheds by applying land use and development regulations that are designed to keep impervious surface coverage low and to provide adequate infiltration of runoff water into the ground. They do so by limiting the density of residential development, limiting the impervious surface coverage of nonresidential development, requiring vegetated buffers along watercourses, limiting nonresidential land uses to those with characteristics less likely to adversely affect water quality, controlling the storage and use of hazardous materials, and applying design standards to minimize adverse water quality impacts. These land use and development regulations help to maintain water quality and direct more dense growth out of water supply watersheds and into the urbanizing areas. The remainder of this section gives an overview of Wake County's water supply watershed protection regulations.

2. Impervious Surface Coverage and Housing Density Limits

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 the 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. 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 can be reached where the water supply source is degraded, recreational and scenic features are impaired, and costly treatment is needed to provide clean drinking water.

Impervious surfaces can be limited directly by applying maximum impervious surface coverage standards to new development. Alternatively, impervious surfaces can be limited indirectly by applying maximum density standards or floor area ratios to new development. Because housing within the County's jurisdiction tend to be single-family detached homes, which have a relatively consistent impervious surface coverage, Wake County has elected to control impervious surfaces within new residential development by

applying maximum lot density and minimum lot size standards. Within nonresidential developments, where impervious surface coverage is not relatively consistent, the County controls impervious surfaces directly by applying maximum impervious surface coverage standards.

In general, Wake County limits new residential development to a maximum gross density of 0.5 lot/acre (or the equivalent minimum lot size of 80,000 square feet) in the critical areas of a water supply watershed, and a maximum gross density of 1.0 lot/acre (or the equivalent minimum lot size of 40,000 square feet) in the balance of the watershed. It generally limits new nonresidential development to a maximum impervious surface coverage of 6% (of the development site) in the critical area of a water supply watershed and a maximum impervious surface coverage of 24% in the balance of the watershed.

Where nonresidential development is proposed on land that is residentially zoned, as are most of the watersheds, it must also provide storm water controls on the initial runoff from impervious surface coverage exceeding 12%. In the Little River and Smith Creek watersheds, which are classified as WS-II watersheds, maximum impervious surface coverage for nonresidential development in areas outside the watershed's critical area is limited to 12%.

3. Watershed and Drainageway Buffers

Watershed and drainageway buffer requirements are intended to maintain strips of natural vegetation that serve to remove pollutants from storm water runoff before they can reach a water supply source, or a watercourse or other drainageway that drains to the water supply source. They do so by allowing infiltration of runoff and filtration of pollutants through the ground and soil, slowing down the runoff flow to allow settling and deposition of pollutants, and providing vegetation that absorbs pollutants through the roots. The provision of vegetated, undisturbed buffers within water supply watersheds, therefore, serves as an important and effective method of maintaining the quality of public water supply sources and protecting those sources from the potential polluting activities associated with development within the watershed.

Wake County requires new development in all water supply watersheds to maintain watershed buffers along perennial streams (as shown on

U.S.G.S. topographic maps) as well as along any other streams that drain at least 25 acres. It also requires new development to maintain drainageway buffers along drainageways, or around water impoundments, that drain at least five (5) acres, but less than twenty-five (25) acres. Except as minimally necessary to accommodate certain public projects, these watershed and drainageway buffers are required to remain undisturbed.

4. Nonresidential Land Use Limits

Most of the land within water supply watersheds in the County's jurisdiction is currently zoned Residential-80 Watershed (critical areas) or Residential-40 Watershed (balance of watershed). This zoning generally limits nonresidential uses to only those low-impact types and intensities not likely to adversely impact water quality, and also treats such uses as special uses requiring extra scrutiny of (among other things) potential water quality impacts (especially in the critical areas of water supply watersheds). All land classified Non-Urban Area/Water Supply Watershed by the General Classifications Map that is currently so zoned is intended to remain subject to the same or similar zoning that strictly limits the types and intensity of nonresidential development to those posing little potential threat to water quality and subjects development of such uses to special scrutiny. Land classified Non-Urban Area/Water Supply Watershed that is currently zoned otherwise is intended to remain subject to overlay zoning that applies the supplemental impervious surface coverage limits, buffer requirements, and hazardous material controls necessary to meet the state minimum watershed protection requirements for the low-density option.

Within those parts of water supply watersheds classified as Urban Services Area/Water Supply Watershed, nonresidential uses may be developed, provided they are consistent with the Land Use Classifications Map. They may be developed either under current residential zoning (as special uses) or under nonresidential zoning subject to overlay zoning that applies the supplemental impervious surface coverage limits, buffer requirements, and hazardous material controls necessary to meet the state minimum watershed protection requirements for the low density option.

5. Hazardous Material Controls

If hazardous materials should get into a watercourse leading to a water supply source,

they could significantly threaten the quality of the community's drinking water. Although residential use and development generally does not use or store hazardous materials in quantities significant to warrant special controls beyond the generally applicable storm water runoff and buffer standards, a number of nonresidential uses and development that may be allowed in water supply watersheds might involve the use and storage of significant quantities of hazardous materials. State and federal regulations already exercise a good deal of control over the use, storage, and transfer of hazardous materials.

To further protect water supply sources from hazardous materials, Wake County generally limits the types and intensity of nonresidential uses in water supply watersheds, especially in their critical areas (see above). Within the critical areas of watersheds, the County prohibits nonresidential development from using or storing hazardous materials. Within the balance of the watershed, the County requires nonresidential development in water supply watersheds that uses or stores hazardous materials to prepare an inventory of such materials and emergency procedures to contain any spills, and to design use and storage facilities to maximize spill prevention. This requirement is intended to ensure that occupants of nonresidential development, as well as area governments, are aware of the location, types, and general amount of hazardous materials being used or stored in watersheds, and can respond accordingly in case of a spill.

6. Water Quality Protection Design Standards

In addition to limiting the types and intensity of development allowed within water supply watersheds, Wake County also helps ensure protection of water supply sources by applying certain design standards to all development within a water supply watershed. Those standards require all new development, to the maximum extent practicable, to minimize impervious surface coverage, direct storm water runoff away from surface waters, incorporate Best Management Practices (BMPs) to minimize water quality impacts, and transport storm water runoff by vegetated conveyances. In addition, the County requires residential cluster development in water supply watersheds, to the maximum extent practicable, to concentrate development sites in upland areas (away from surface waters and drainage

ways), to retain the remainder of the development site in a vegetated or natural state, to minimize concentrated storm water flow, and to maximize the use, and length, of sheet flow through vegetated areas.

G. SWIFT CREEK LAND MANAGEMENT PLAN

[In the late 1980s and early 1990s, Wake County, Raleigh, Cary, Garner, and Apex jointly developed (with the North Carolina Division of Water Quality) and adopted the Swift Creek Land Management Plan as a guide to managing development in the watersheds of Lake Wheeler and Lake Benson so as to protect water quality in those existing or potential water supply reservoirs. The Wake County Board of Commissioners adopted the Swift Creek Land Management Plan on April 19, 1990.

Session Law 1998-192, adopted by the North Carolina General Assembly on October 22, 1998, prohibits Wake County (and other parties to the Plan) from adopting any development ordinance or granting any development permit that would be inconsistent with the standards and provisions of the Swift Creek Land Management Plan adopted on April 19, 1990. This portion of the Water Supply Watershed Protection Policies is a verbatim version of that adopted Plan (thus page references do not apply to this document).]

1. Competing Objectives

It is believed that there are two competing objectives that affect land use patterns and development standards within the Swift Creek watershed: the protection of water quality, and the logical extension of urban development.

2. Level of Water Quality Protection

A request has been made by the City of Raleigh to NRCDD-DEM to designate the Swift Creek Watershed as a WS-II watershed. The practical result of this designation would be that the State would prohibit industrial wastewater discharges into the watershed. In order to attain the WS-II designation, each local government involved would need to adopt appropriate water quality protection measures through a land management plan and implementing ordinances.

3. Urban Densities

The Swift Creek watershed, located in southern Wake County, is comprised of approximately 40,174 acres. Lakes Benson and Wheeler are the primary bodies of water within the

watershed. Local governments have jurisdiction in the watershed as follows (refer to Map A, Jurisdictions within Swift Creek Watershed):

Apex	1,976 acres	5%
Cary	11,126 acres	28%
Garner	7,071 acres	18%
Raleigh	3,290 acres	8%
Wake County	16,771 acres	41%

Approximately 59% of the watershed is within municipal jurisdictions. In addition, municipalities plan expansion within the watershed. Cary and Garner plan to extend their jurisdictional boundaries southward through the Swift Creek watershed. Cary is constructing a wastewater treatment plant in the Middle Creek watershed, and will run wastewater lines from their Middle Creek treatment plant through the Swift Creek watershed to provide service to Cary. Garner also plans to run wastewater trunk lines through the Swift Creek watershed critical area (defined below) in order to provide services to an area in the non-critical portion (defined below) of the watershed on the south side of Swift Creek. Given municipal interest in the area, the committee studied whether residential development greater than one dwelling unit per acre, with greater than 12% impervious surface area, and non-residential development should be recommended in the non-critical area of the watershed, subject to land use regulations designed to protect the quality of the water.

4. Development Regulations

a. Definition of Critical Area and Stream Buffers

The following minimum critical areas and stream buffers are effective in the Swift Creek watershed (refer to Map B):

b. Performance Standards

Table 1, on page 6, summarizes minimum performance standards which could be applied to the entire watershed and are designed, with appropriate development densities and stream and vegetative buffers, to attain a WS-II classification.

The application of these standards to new development throughout the watershed is recommended. They are not proposed to affect existing or already approved development. The proposed impervious surface limit is 6% in the critical area and 12% in the non-critical area for areas without storm-water control measures. The proposed maximum impervious surface limit is 30% except for those areas designated as: (a) critical: urban limited residential, or (b) non-critical: new urban residential and non-residential, or existing urban (refer to Table 1).

It should be noted that storm-water impoundments are required when proposed impervious surface limits exceed 6% in the critical area and 12% in the non-critical area, and that as the amount of impervious surface increases, the size of the proposed impoundment must also increase. All

Table 1

Area of Watershed	Minimum Critical Area Width	Minimum Vegetative Buffer Width
Lake Benson	North side 2000 feet, south side 2640 feet measured from lake conservation pool level	100 feet measured from lake conservation pool level
Swift Creek between Lakes Benson and Wheeler	500 ft from the center of creek along both sides of creek	100 ft measured from creek bank
Lake Wheeler	1000 ft measured from lake conservation pool level	100 ft measured from lake conservation pool level
Swift Creek upstream of Lake Wheeler	500 ft from the center of creek along both sides of creek above Lake Wheeler to Holly Springs Road (S.R. 1152)	50 ft measured from creek bank
Little Swift Creek (LSC) and Yates Mill Creek (YMC)	None	100 ft measured from creek bank, measured to Yates Mill Pond Dam for YMC, and measured to the dam located southeast of S.R. 1371 and S.R. 1152 for LSC
Drainageways	None	0 ft if area drained is less than 5 acres, 25 ft if 5 to less than 25 acres, 50 ft if 25 or more acres; measured from creek bank or center of a drainageway

impoundments are to be constructed according to DEM standards. It is believed that private maintenance of impoundments is sufficient to maintain water quality protection, but that periodic public inspection according to DEM guidelines should be required to monitor impoundment effectiveness, and that public maintenance should be required when private maintenance fails.

As a further enhancement of water quality protection, it is also proposed that point source discharges be prohibited within the watershed. A WS-II classification would prohibit industrial discharges within the watershed. The performance standards in Table 1 would also require domestic dischargers, such as public and community sewer systems, to pump their effluent out of the watershed. It should also be noted that in the critical portion of the watershed public sewer is required for limited residential uses that exceed an impervious surface ratio of 6%. In addition, in the non-critical portion of the watershed public sewer is proposed to be required for residential and non-residential uses that exceed an impervious surface ratio of 12%. These requirements for public sewer would need to be implemented and enforced by local governments through local ordinances.

5. Land Uses

a. Existing Land Use Patterns

The existing land use patterns were identified and mapped for each local government jurisdiction in the watershed (refer to Map C, Existing Land Use Patterns, Swift Creek Watershed). In general it was found that the highest intensity of land use in the watershed is north of Lake Benson, within Garner's jurisdiction, and in areas west of Holly Springs Road within Apex and Cary's jurisdictions.

These areas were developed primarily for small lot residential uses, but also have some business and commercial uses. The lowest intensity of land use in the watershed surrounds Lake Wheeler and the south side of Lake Benson, and is in Wake County's jurisdiction. This area is zoned by Wake County to allow about one dwelling unit per two acres in the critical area (defined by the County as the area within 1,200 feet of Lakes Benson and Wheeler, measured from the lake conservation pool level, and within 600 feet of Swift Creek between the two lakes and upstream of Lake Wheeler, measured from the floodway center), and about one dwelling unit per acre in the non-critical area. Much of this area is undeveloped. Most of

the remainder of the watershed, the areas north and west of Holly Springs Road is developed at a residential density averaging 2.5 dwelling units per acre, and at an impervious surface area of approximately 30%. The exceptions are those central portions of Cary that exceed 2.5 dwelling units per acre and have no impervious surface limit. Although some existing development has been constructed to a 30% or greater impervious surface level, Cary staff estimates that existing impoundments and lakes meet the size requirements for collecting storm water runoff as recommended by DEM. Therefore, Cary staff estimates that these areas were developed in a manner which could meet recommended water quality protection measures.

b. Potential Future Land Use Patterns

The scenario outlined below represents the potential future land use pattern of the Swift Creek watershed as municipal jurisdictions expand. Differences among land use patterns reflect the extent of planned water and sewer line extensions into the watershed. In general, Apex, Cary and Garner plan to extend sewer trunk lines in the watershed, which could create the potential for urban development. Raleigh and Wake County do not plan to extend sewer trunk lines in the watershed.

The general land use patterns in the scenario, and the recommended performance standards described in Table 1, are designed to enable the Swift Creek watershed to attain a WS-II classification. It should be noted that the checkered areas on Map D represent areas that were developed prior to the establishment of water quality protection standards, and may not meet the standards proposed in Table 1.

The performance standards discussed above are to be applied to the scenario discussed below.

c. Land Use Scenario

i. Vegetative Buffers

Vegetative buffers would be maintained along all streams that drain into Swift Creek, and Lakes Wheeler and Benson. DEM requires that vegetative buffers be maintained for water quality protection to attain a WS-II classification. These buffers would remain undisturbed so that they could function to filter storm water runoff.

ii. Critical Area

Limited residential development would be permitted within the critical area of the

watershed. Limited residential development would prohibit institutional uses such as colleges, places of worship, schools, public libraries and museums, and art galleries. In order to curb the potential for future urban development in the critical portion of the watershed, public sewer trunk line tap-ons also would be prohibited in the critical area.

Garner and Wake County are the only local governments that maintain jurisdiction in the critical area of the Swift Creek watershed as defined in this report. A portion of Garner's jurisdiction within the critical area of the watershed is already developed to urban residential densities, and part of this area was developed prior to the establishment of water quality protection standards. For the undeveloped remainder of the critical area within Garner's jurisdiction, Garner allows only limited residential, agricultural, recreational and public uses, and enforces watershed protection standards that fall within DEM's guidelines for adequate water quality protection. In order to allow development patterns in the undeveloped portion of Garner's jurisdiction within the critical area to be consistent with previous development in that area, limited residential uses at a maximum density of 2.5 dwelling units per acre with an impervious surface ratio of over 6% but no greater than 35% would be allowed provided the first 1 inch of runoff is captured and public sewer is provided.

The portion of the critical area located within Wake County's jurisdiction is partially developed to a maximum density of 0.5 dwelling units per acre with limited residential uses (prohibiting all commercial and institutional uses other than recreational uses). Because Wake County's, like Garner's, portion of the critical area is adjacent to the water take-out point, but unlike Garner's remains largely undeveloped, this area would be maintained at a maximum residential density of 0.5 dwelling units per acre, yielding an impervious surface ratio of about 6%.

iii. Non-Critical Area: Current Jurisdictions

The area east of Lake Wheeler Road is within Garner's, Raleigh's, and Wake County's jurisdictions. Much of the area within Garner's jurisdiction was developed prior to the establishment of water quality protection measures. However, Garner requires that water quality protection measures be met for all new development in the watershed. For a portion of those undeveloped areas in the watershed at

the intersection of S.R. 1010 and U.S. 401, and at the intersection of U.S. 401 and the proposed Vandora Springs Road extension, Garner plans to allow residential development densities of up to 6 dwelling units per acre. The areas, which are to be maintained at a maximum density of 1 dwelling unit per acre, are the portion of the NCSU Research Farm designated as major open space, and those areas east of and adjacent to the NCSU Research Farm, and between Lake Benson and N.C. 50.

For the portion of Raleigh's jurisdiction within the watershed east of Lake Wheeler Road, residential use densities of up to 6 dwelling units per acre are proposed. New urban areas are proposed in the area south of Tryon Road and east of the NCSU Research Farm adjacent to existing developed urban areas where public utilities exist or can be easily extended. The remainder of this area is planned to be maintained as major open space or to be developed to a maximum residential density of 1 dwelling unit per acre. It should be noted that some of the area east of Lake Wheeler Road within Raleigh's jurisdiction was developed prior to watershed protection standards.

The majority of the area east of Lake Wheeler Road within Wake County's jurisdiction is designated as rural residential which allows for a maximum density of up to 1 dwelling unit per acre. However, a portion of this area north of Swift Creek was developed with non-residential uses prior to the establishment of water quality protection standards.

Within the non-critical portion of the watershed east of Holly Springs and Jones Franklin Roads, and west of Lake Wheeler Road, residential development and a limited amount of non-residential development would be permitted. This area is largely within Wake County's jurisdiction except for smaller areas in Cary and Raleigh's jurisdictions. The majority of this area within Wake County's jurisdiction is rural residential, with an average density of one dwelling unit per acre. The exceptions are those portions, which are developed to allow non-residential uses necessary to serve the daily needs of area residents, such as convenience stores and elementary schools. The area within Wake County would be maintained at a maximum residential density of 1.0 dwelling unit per acre with a limited number of non-residential uses allowed, and would not be sewered because of the increased potential, once developed, to adversely affect the water

quality of Lakes Benson and Wheeler. This type of development would yield an impervious surface area of about 12%, and would be able to maintain an adequate level of water quality protection without structural devices.

For the area within Cary's jurisdiction east of Holly Springs Road and west of Campbell Road, residential development would be allowed at a density of up to 6.0 dwelling units per acre. Municipal sewer extensions are planned for this area that is designated by Cary on Map D for new urban development. Cary proposes to restrict their impervious surface limits to a maximum of 30% in this area.

For the area within Raleigh's jurisdiction east of Jones Franklin and Holly Springs Roads, and north of the NCSU Research Farm, residential development would be allowed at a density of up to 6.0 dwelling units per acre. Although Raleigh does not plan to extend sewer trunk lines into this portion of the Swift Creek watershed, Raleigh could extend sewer trunk lines into this area, but would restrict their impervious surface limits to a maximum of 30%.

Because these areas within Cary's and Raleigh's jurisdictions are at the periphery of the watershed, it is not believed that a limited amount of residential development at a maximum density of 6.0 dwelling units per acre would significantly increase the potential to adversely affect water quality. (As specified in Table 1, impervious surface limit may be increased to 30%, and 70%, provided that the first one-half inch or one inch of rainfall run-off is retained, respectively.)

The remainder of the watershed, the area west of Holly Springs and Jones Franklin Roads, lies within Apex's, Cary's and Wake County's jurisdictions. Much of the area within Apex and Cary's jurisdictions is developed or has site plans, which have already been approved at a residential density averaging 2.5 dwelling units per acre and result in impervious surfaces of approximately 30%. The exceptions are those residential portions of Apex and Cary that exceed 2.5 dwelling units per acre, and those non-residential portions that have no impervious surface limit. Since these areas are located at the periphery of the watershed, and because the recommended performance standards are not proposed to affect existing or approved development, these areas would be allowed to develop at these densities.

The area within Wake County's jurisdiction west of Holly Springs Road remains largely undeveloped, but has some large lot single family subdivisions. Residential uses with a maximum density of 1 dwelling unit per acre would be allowed for the undeveloped portion.

iv. Non-Critical Area: Municipal Jurisdiction Expansion

The potential future land use patterns (described, below) would be applied as municipal jurisdictions expand in the watershed. As proposed above, vegetative buffers would remain undisturbed, and proposed critical areas would be maintained according to the recommended performance standards in Table 1.

Within the non-critical portion of the watershed, new suburban areas with a maximum average density of 2.5 dwelling units per acre and non-residential uses with a maximum impervious surface limit of up to 30% would be allowed in municipal jurisdictions. Portions of these areas, which are currently in Wake County's jurisdiction, are to be developed to suburban densities by municipalities.

In the non-critical portion of the watershed east of Holly Springs and Jones Franklin Roads, residential uses with an average density of 6 dwelling units per acre also would be allowed in municipal jurisdictions. Existing areas within Cary's and Raleigh's jurisdictions are already proposed to be developed at an average of 6 dwelling units per acre in this area. Other new urban areas proposed to allow up to 6 dwelling units per acre, and non-residential uses with a maximum impervious surface of up to 70% would be located along the north shore of Lake Benson and along U.S. 401 in Garner's jurisdiction.

In the non-critical portion of the watershed west of Jones Franklin and Holly Springs Roads, residential uses with a density exceeding 6 dwelling units per acre and non-residential uses with a maximum impervious surface of up to 70% also would be allowed in municipal jurisdictions. New urban areas proposed to allow greater than 6 dwelling units per acre are proposed to be located adjacent to existing central business districts in Apex and Cary, and on portions of other sites within Cary's jurisdiction.

6. Issues for Additional Study

During discussions, several issues were brought up which could have an effect on the implementation of future land use regulations in the watershed. No conclusions were reached for these issues. However, it is believed that these issues should be considered, **as the land management plan for the Swift Creek watershed is refined.**

Impoundments Serving Multiple Properties:

Impoundments serving multiple properties are to be allowed. This method is used within individual Planned Unit Developments (PUDs) built within Cary's jurisdiction and should be expanded to apply to a runoff impoundment serving more than one development. It is believed that large impoundments serving multiple properties are more effective and easier to maintain than small impoundments serving individual properties.

Removal of Existing Point Source

Discharges in the Watershed: The ability to attain a WS-II classification for the watershed may be improved if public sewer improvements or land use controls can be utilized to remove existing point source discharges from the Swift Creek watershed. There are approximately 7 existing discharges within the watershed.

Sewer Lines Passing Through Critical

Areas: The proposed regulations specify that the critical area of a water supply watershed (except for areas already urban) should not be served with public sewer. Garner's future growth patterns include the area around and to the south of Lake Benson. In order to provide sewer service, which is required by State law for areas within corporate limits, it would be most economical to run main sewer lines through the critical area rather than around the critical area. Garner staff believes that the Town could successfully prohibit trunk line tap-ons in the critical area. There is a concern, however, that if sewer mains were allowed to run through the critical area, Garner could be pressured into allowing trunk line tap-ons to provide service to those properties in the immediate area of the lines.

General Enabling Legislation: General enabling legislation is needed to allow municipalities to annex within water supply watersheds without the requirement that they extend water and sewer lines (G.S. 160A-35 (3) b. and G.S. 160A-47 (3) b.), thereby allowing municipal expansion while also protecting the

water quality.

Low Pressure Wastewater Disposal Systems: Because of the recent failure of a low pressure wastewater disposal system in the Swift Creek watershed, it was discussed whether or not these systems should continue to be allowed in a water supply watershed, and, if so, whether public maintenance should be required if they fail.

Road Construction Standards: Road construction standards were discussed briefly.

Amount of Non-Residential Development to be Allowed: The land use plans represented in this report (Map D) concentrate on residential uses as the predominant use. The amount and nature of proposed non-residential use areas needs to be further refined. The non-residential areas are not intended to be major commercial or employment areas. The intensity of non-residential development could be allowed to increase as the distance from the critical area increases.

7. Conclusion

It is believed that good water quality management practices can be enforced by limiting the types and densities of future growth, controlling point source discharges, and applying water quality regulations which meet or exceed those recommended by DEM staff to maintain a WS-II classification. The performance standards outlined in Table 1 and the watershed critical areas and buffers defined above are proposed to meet these water quality management objectives, while permitting municipal growth. The scenario attempts to present land use patterns that could be applied to the watershed to attain a WS-II classification.

8. Maps and Performance Standards

a. Table 1- Recommended Performance Standards Swift Creek Watershed

b. Current Jurisdictions – Map A (SEE "Land Use Plan Current Jurisdictions")

c. Critical Areas and Vegetative Buffers- Map B (SEE "Land Use Plan Critical Areas and Vegetative Buffers")

d. Land Use Scenario – Map D (SEE "Land Use Plan Land Use Scenario")

H. UPPER NEUSE RIVER/RICHLAND CREEK WATER SUPPLY WATERSHED

In 2001, the Town of Wake Forest petitioned the EMC to draw water directly from the Neuse River at an intake site on the south bank of the Neuse River adjacent to the Capital Boulevard crossing. This action prompted the EMC to reclassify the surrounding area from Class C Nutrient Sensitive Waters (NSW) to Class WS-IV NSW and Class WS-IV NSW Critical Area (CA). The WS-IV classification is for water supplies in areas that are moderately to highly developed. Additionally, the WS-IV classification is the same as Falls Lake. The Capital Boulevard Corridor is an area of strong growth for the City of Raleigh and the Town of Wake Forest. All of the properties currently under the County's jurisdiction are either in Raleigh's or Wake Forest's Long Range Urban Services Areas and could eventually be annexed into their separate jurisdictions. The Wake County Landfill, south of the Neuse River, and the Hanson/Benchmark quarry, north of the river, make up over two thirds of the County's jurisdiction. The remaining properties are either owner-occupied or rental residences, with a small number of

independent business activities operating along Capital Boulevard and at the intersection of Falls of Neuse Road and Old NC 98.

The Watershed Protected Area Overlay (WPAO) District was specifically created for watershed areas designated WS-IV by the EMC. The WPAO applies impervious surface ratio restrictions (either 24% or 30% of the total area depending on the presence or absence of curb and gutter systems) and requires vegetated buffers along perennial and nonperennial watercourses. These buffers range from 30 to 100 feet depending on the classification (perennial or nonperennial) and drainage area of the affected watercourse. Existing development is excluded from the impervious surface and vegetated buffer requirements and the WPAO requirements will only come into play should the properties be redeveloped or their land uses change. Additionally, the WPAO is designed to provide extra water supply watershed protection where the underlying zoning or other watershed regulations (e.g. Neuse River Riparian Buffer Rules) are less restrictive than the WPAO. In all cases, the more restrictive of the available watershed regulations will apply to the property.